UNIVERSITY OF SOUTHAMPTON

Faculty of Social Sciences

Southampton Education School

The Impact of Using Flipped Mobile Learning in Continuing Professional Development to Develop Electronic Lecture Skills among Female University Teachers in the Kingdom of Saudi Arabia

by

Dalya Osama Khayat

Thesis for the degree of Doctor of Philosophy

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Abstract

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Mobile technologies have changed many ways in which entire societies look at and use information. Rapid developments in the field have radically altered how we communicate, collaborate and interact via these technologies and this has had a deep impact on the educational sector, which is expanding almost daily as technologies become increasingly integrated and available to learners and teachers of all ages. Mobile learning (ML) has been increasingly employed both in student learning and in teacher training and flipped learning (FL) has been recognised as an innovative and effective instructional approach that has recently gained prominence. In this era, learning as well as training environments have become more diverse, from traditional classroom environments to the latest online video conferencing applications. Each environment has its advantages and disadvantages, however, and this research examines the potential benefits of delivering mobile learning in a flipped (learner-centred) format. The integration of mobile learning with flipped learning is known as flipped mobile learning (FML) and is an attempt to overcome the disadvantages of each learning method on its own.

By combining the advantages of each in a university teachers' continuing professional development programme (CPD), this research aims to better understand the perceived and actual effects of the FML approach. The study investigates whether FML improves the electronic lecture (e-lecture) skills of university teachers in a leading university in Saudi Arabia, with a view to increasing the use of e-lectures in higher education (HE) institutions in this country. Additionally, this research explores university teachers' opinions of the concerns, challenges, and affordances of the FML approach to determine whether FML is viable for teaching large numbers of students. It is proposed that FML could make this possible at low cost, thus addressing teacher shortages as well as allowing women to transcend current gender segregation restrictions in Saudi Arabian education.

The underpinning theoretical framework for this thesis was based on the concept of Technology, Pedagogy, and Content Knowledge (TPACK), expressed through three groups for FL, ML, and FML. A pragmatic research paradigm and a mixed research approach were employed with a quasi-experimental and multiple interventions approach. Participants were Saudi female university teachers in a range of different academic positions and disciplines. They were each assigned to one of three groups; the first group trained in an FL environment, the second were trained using ML, and the third via FML. This research used multiple methods in order to achieve the aims. Data analysis compared the perceived outcomes of FL, ML, and FML CPD on university teachers' e-lecture skills through questionnaires before and after the experiment. An evaluation product card was used by the researcher before and after CPD to identify the actual outcomes of FL, ML, and FML CPD on the university teachers' e-lecture skills. This was followed by semi-structured interviews to record rich data about the university teachers' opinion of FML.

Overall, the findings indicate that, first, by looking at the perceived and actual skills of creating e-lectures in general, the findings show there are improvements from pre- to post-measures in favour of the group trained via FML but these differences were not significant. Second, with regard to the three main perceived and actual skills of creating e-lectures, the findings show that there are statistically significant differences in favour of the group trained via FML. Third, with regard to each perceived and actual sub-skill of creating e-lectures, there are statistically significant differences in some sub-skills in favour of the group trained via FML; however, the remaining sub-skills showed statistically significant differences in favour of the groups trained via FL and ML. The qualitative analysis illustrates the teachers' opinions about FML, which were positive. Data on the benefits and difficulties of applying FML were gathered.

The findings presented in this dissertation contribute to our current knowledge of FML and its potential to deliver low cost, effective teacher training which can be implemented easily and with readily available devices. The study also contributes to our knowledge of university lecturer training and, since teacher training is associated with student quality, effective training via FML could lead to obtaining a higher quality for student learning within higher education institutions. The findings could aid in making recommendations to policymakers in higher education in KSA and may contribute new data to the growing body of research on the effects of ML and FL on individual performance.

Keywords

Flipped learning – FL – mobile learning – ML – m-learning – educational environment – electronic lecture skills – e-lecture skills – continuing professional development – CPD – Teacher training – Technology, Pedagogy, and Content Knowledge – TPACK – Technology – higher education – HE– Saudi Arabia – KSA

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Research Thesis: Declaration of Authorship

Print name:	Dalya Osama Khayat

Title of thesis:	The Impact of Using Flipped Mobile Learning in Continuing Professional Development to Develop Electronic Lecture Skills among Female University Teachers in the Kingdom of Saudi Arabia

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission.

Signature:		Date:	7/4/2022

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Definitions and Abbreviations

Items	Abbreviations	Definitions	Reference
1.	2G	The second generation of wireless mobile telecommunications network, which provides text only (phone + text). The use of 2G networks began in 1991	Hussain et al. (2006)
2.	3G	The third generation of wireless mobile telecommunications network. 3G provides high bandwidth including images and videos, wireless voice telephony, video calls, mobile TV, and mobile Internet access (Internet + phone + text). The use of 3G networks began in 1998	Hussain et al. (2006)
3.	4G	The fourth generation of wireless mobile telecommunications network, which is an advanced form of 3G. High-speed Internet was the defining characteristic of 4G (High speed Internet + phone + text). The use of 4G networks began in 2008	Hussain et al. (2006); 5G PPP Architecture Working Group (2016)
4.	5G	The fifth generation of wireless mobile telecommunications network, which is an advanced form of 4G. Greater bandwidth giving high download speed is the defining characteristic of 5G (Radio waves + high speed Internet + phone + text). The use of 5G networks began in 2016	5G PPP Architecture Working Group (2016)
5.	Learner, student	An individual who gains information to improve their knowledge, skills, and attitude	
6.	Teacher, tutor, instructor, lecturer, university teacher	An employed person who provides information to learners in the education institutions	
7.	Platform, environment	The place of education	
8.	Traditional learning	Face-to-face learning involving teachers and students in a physical classroom within an education institution	Adebari et al. (2016)

Chapter 1 Introduction

1.1 Introduction

The use of information and communication technology (ICT), especially the Internet, to process data has revolutionised many aspects of our life. This has had a significant impact on higher education (HE) (Sarkar, 2012). Higher education institutions benefit from technologies and make use of them to provide education to segments of society, support the learning process, and aid the development of education. Educational methods have traditionally involved lecture-style delivery of information from teachers to students. Today and in many places, however, the education process has become dependent on the student's access to information under the supervision of the teacher as guide. This has become possible through ICT (Alfarani, 2015) and especially the Internet, which has enabled free and widespread access to information.

Despite these changes, some teachers continue to teach using traditional methods, which involves lecturing and using traditional blackboards, with students taking notes on which they are summatively tested (Bonn, 2008; Keser et al., 2011; Eppard & Rochdi, 2017; Amer, 2019). The use of technology in education has allowed the replacement of blackboards with smart boards, projectors, and laptops, heralding the advent of computer-aided education. Currently and in some places, digital technologies such as smartphones and iPads are well integrated into education to facilitate the teaching and learning process (Alfahad, 2012; Ozuorcun & Tabak, 2012; Spector, 2015; Bower, 2016; Mohapatra & Dash, 2016; Henderson et al., 2017; Hernández-Lara et al., 2019; Lacka & Wong, 2019). According to a number of studies such as Brown and Manogue (2001), Visioli et al. (2009), and Amer (2019) state that lectures are the most commonly used method of teaching. The majority of students tend to prefer traditional education as it allows them to have human interaction and to form friendships which start in the classroom and then expand outside into private life (Bonn, 2008; Sarkar, 2012; Roth, 2014). Moreover, traditional education allows the learner to follow specific lectures which are characterised by the teacher's personality and teaching style (Bonn, 2008). This quality of live education has led to professional concerns about moving from traditional physical settings to online or mobile education (Sarkar, 2012; Roth, 2014; Mohapatra & Dash, 2016; Lacka & Wong, 2019). An alternative way to facilitate the teaching and learning process is to integrate technology with classroom education (Bonn, 2008; Alfahad, 2012; Ozuorcun & Tabak, 2012; Spector, 2015; Bower, 2016; Mohapatra & Dash, 2016; Henderson et al., 2017; Hernández-Lara et al., 2019; Lacka & Wong, 2019). The roles of teachers and learners change when technology is employed in education. When integrating technology, the learner can become the centre of the learning process and leads the discussions with the teacher, while the role of the teacher is to facilitate and offer guidance (Mohapatra & Dash, 2016). In contrast, in many traditional educational settings, the teacher is the centre of the learning process (Paechter et al., 2010).

Several empirical studies have investigated the advantages and drawbacks of ICT in education. As observed above, technology can bring the student to the fore and can alter the traditional teacher/learner relationship (Paechter et al., 2010; Alfahad, 2012). Technology in instruction can boost the dynamics of the education process (Bruce, 1998; Mohapatra & Dash, 2016) and can lead to increased student engagement and peer/faculty interaction in a positive atmosphere. It can encourage collective information sharing, enhance problem-solving, and promote learning via a safe, comfortable and flexible environment for mutual exchange of information without any barriers of time and place (Alavi, 1994; Bruce, 1998; Bisciglia & Monk-Turner, 2002; Alfahad, 2012; Whitaker et al., 2016; Henderson et al., 2017). Due to ever-faster Internet speeds, online learning can allow students to receive immediate feedback on their work and also provide an opportunity for learners to make progress at their own pace without feeling embarrassed in the classroom spotlight (Bonn, 2008; Mohapatra & Dash, 2016). In contrast, Sarkar (2012) claims that ICT in HE may cause tension for both students and teachers, mainly because of its student-centredness (Alsowat, 2016). ICT in HE may also limit social interaction (Bonn, 2008). In this researcher's view, resolving HE problems is the major benefit of ICT. Education through technology could be the only option for many issues, such as health, employment, and time constraints (Sarkar, 2012). However, Ageel (2011) has found only limited use of ICT by teachers at Jazan University in Saudi Arabia. Another study has found that Saudi universities must work hard to develop their ICT infrastructure and provide training for staff in ICT and connection networks (Alturise et al., 2016). This confirms the results of Ageel's study (2011) about the teachers' limited use of ICT.

Rapid technological developments in the areas of electronic learning (EL), distance learning (DL), virtual learning (VL), and mobile learning (ML), have meant that traditional classroom learning is becoming more and more integrated with these new technologies (Bingimlas, 2009). This integration will create challenges for teachers, students, educational assistants, and educational environments (Smith et al., 2016). Teachers and students should have a high level of technological awareness in order to face these challenges and adapt to online methods of teaching (Park, 2019). This has become even more necessary recently, since the COVID-19 pandemic has brought about an increase in Internet use, whether for education or entertainment. It has become necessary for decision makers in the educational field to teach students about technological issues. In addition, there is a need for further research to examine the suitability of new methods for universities' teacher training programmes, re-training, and regular assessment of educators (Park, 2019). The existing ICT provision and online access is not enough on its own, since teachers need to be shown new ways to gain maximum benefit from technology in their teaching. Training teachers in ICT may also help to support their teaching.

The following sections highlight the rationale of this project and the scope of the research. The research aims, research questions, and research contribution will be described in detail. The proposed research methodology and the structure of the thesis will be presented at the end of this chapter. The following section discusses the reasons for choosing this topic and the importance the results of this research may have in the field of education.

1.2 Research Rationale

This project will cover several key areas and make an original contribution to educational technology knowledge and the possibility of using innovative methods in continuing professional development (CPD) courses for university teachers. CPD programmes aim to provide further training for university teachers; however, the number of training programmes currently on offer within universities is inadequate. CPD programmes are still offered traditionally and topics relating to technology have not been incorporated into training sessions. CPD programmes are an interesting case because teachers have been shown to have a tremendous influence on student outcomes (Chetty et al., 2014; Jackson & Makarin, 2016). Rienties et al. (2013) note the lack of research into the impact of university CPD on the integration of technology in education. Reyes Jr et al. (2017) insist that innovation in CPD programmes is vital to ensure that teachers are up to date and that they are well prepared to deal with the potential challenges of integrating technology with teaching.

In 2002, the United Nations Educational Scientific and Cultural Organisation (UNESCO) has emphasised that teachers should be provided with technological knowledge and skills (also see Sarkar, 2012), and although some of these programmes have clearly been helpful, academic staff still lack the skills to make full and efficient use of technology in their teaching methods (Orellana et al., 2005; Al-Jarf, 2007; Ageel, 2011; Roth, 2014; Belmonte et al., 2018). This has led to a low level of satisfaction with how mobile and Internet technologies are used in teaching, considering their vast potential (Kinchin, 2012). As well, academic staff still use traditional learning approaches, for example lecturing, which has been found to be the least effective method for student learning as mentioned in some studies (Brown & Atkins, 2002; Sarkar, 2012). In browsing several online databases such as Education Week, Google Scholar, Science Direct, ERIC, DelphiS, JSTOR, and Ingenta Connect, the researcher found only a few studies on mobile technologies in university teacher training, either from Saudi Arabia or internationally, which illustrates the significance of the present research project.

The mobile learning (ML) approach to CPD has been chosen for this study because of the increasing ubiquity of mobile technologies and devices. Many Saudis own at least one device and thoroughly understand their use (Tsai et al., 2005), and studies have shown that tutors are increasingly interested in using ML as an educational platform (Al-Naseer, 2008; Cohen et al., 2011; Abu-Al-Aish & Love, 2013; Almaiah & Jalil, 2014). The major reason for employing ML in HE is because learners are considered mature enough to be able to use mobile interfaces for educational purposes (Alrasheedi & Capretz, 2015). However, Kearney and Maher (2013), Baran (2014), and Ekanayake and Wishart (2015) stress that ML has been the least explored topic in teacher training. Most studies in the field of ML have focused on students in primary, secondary and higher education, as well as on disabled students of all ages, and there has been much less attention given to how teachers make use of ML potential (Soykan & Uzunboylu, 2015). Soykan and Uzunboylu (2015) have indicated that the percentage of studies on teachers, including university academics, is only 10.3% compared to 89.7% on students. Given the widespread use of mobile devices around the world (Statista, 2017), the novel method of flipped mobile learning (FML) is likely to contribute to helping more of the population access HE. Meanwhile, scant attention has been paid to the use of ML in training university teachers and this is another area in which the researcher can evaluate its potential. One reason for the significance of this study lies in the fact that both theoretical explanations and empirical evidence acknowledge the positive outcomes of ML (Wu et al., 2012; Crompton et al., 2016). Despite this and positive empirical evidence toward the use of ML which will be presented in Chapter 3, universities have so far not been confident enough to make large investments in ML to support education (Alrasheedi & Capretz, 2015). Hence, despite the difficulties and time constraints involved in fully grasping the dimensions of ML (Alfarani, 2015), there is the need for research to demonstrate the effectiveness of ML both in university teaching and in university teacher training CPD programmes.

Because university teachers' technology competencies vary a great deal, it is necessary for CPD programmes to take into account their individual differences in knowledge and skills. One way to do this is to offer a mobile learning approach to CPD in a flipped format (FML). The literature confirms that flipped learning (FL) takes into account the individual differences between learners (Lage et al., 2000; Critz & Knight, 2013; Davies et al., 2013; Mason et al., 2013; Smith, 2013; Tune et al., 2013; McLaughlin et al., 2014). Saudi research on flipped learning is scarce, however, and there is a clear lack of balance between Saudi and international research (Bishop & Verleger, 2013; Lundin et al., 2018). Lundin et al. (2018) counted more than three hundred research publications in the United States (USA) compared to only three in the Kingdom of Saudi Arabia (KSA), which demonstrates the need for further research in this country and globally (Bishop & Verleger, 2013; Giannakos et al., 2018; Lundin et al., 2018). In their literature review, Bishop and Verleger (2013) and Lundin et al. (2018) draw attention to the fact that students' perceptions of FL are mixed, although positive. Davies et al. (2013) insist that technology-enhanced FL is effective. However, Bishop and Verleger (2013) claim that students tend to prefer traditional lectures to video lectures, mainly because of the interactive nature of the former method. The Literature Review in Chapter 3 shows that FL has been the least explored learning mode in teacher training. Since effectiveness varies depending on context (Brown & Atkins, 2002), it is necessary to present justifications specific to the Saudi context and especially to Saudi women's education.

The Kingdom of Saudi Arabia is recognised as ranking among the nations with high population growth (Ministry of Economy and Planning, 2014; Open Data, 2017). As a result, the number of females graduating from secondary school who want to continue learning via higher education is increasing significantly year on year, causing an excess demand for HE institutions and teachers (Al Alhareth et al., 2015). Since the number of female students enrolling in universities is constantly increasing (Roy, 1992; Onsman, 2010; Almalki, 2011), current numbers of university teachers will not be sufficient to cope with the demand (Abdulkarim, 2009; Alebaikan, 2010; Alissa, 2011; Al Alhareth et al., 2015) and finding enough teachers with the right qualifications could be challenging for universities (Abdulkarim, 2009). In their studies, Wang et al. (2009) and Terzis and Economides (2011) found no significant relationship between ML and gender. And because the Saudi educational system segregates genders, which hampers the education of both genders simultaneously, the researcher sees maximal load in universities and a considerable strain in terms of available accommodation and resources (Almalki, 2011). For these two reasons, the researcher has restricted the current study to include female teachers only. The use of Flipped Mobile Learning (FML) can also enhance inclusion in education. In the Saudi education system, women are allowed to teach women only, whereas it is possible for men to teach both women and men via methods such as one-way video conferencing. Therefore, FML will also allow women to teach men, minimising gender segregation and resolving the shortage of tutors in Saudi universities. Similarly, statistics on technology use in KSA reflects the significant adoption of the Internet as well as a wide variety of handheld and desktop technology devices (Saudi Press Agency [SPA], 2020).

The traditional teaching methods of Saudi HE are based on classroom lectures to large groups of learners (Alnassar & Dow, 2013; Al Mutlaq, 2017), which demonstrate the importance of the integration of educational technologies with face-to-face classrooms in this era of advanced digital technologies. The focus on electronic lectures (e-lectures) in HE is important because learning in this way can bring new flexibility to the constraints of time and location. However, it has become even more vital in recent months since the COVID-19 pandemic has forced educators and students to stay at home and use Internet-based resources for learning and teaching. E-lectures could help teachers to deliver lessons from home under these difficult circumstances and students need to receive inspiring and motivating input from teachers. CPD for teachers on how to prepare and deliver e-lectures would therefore be a timely and useful form of teacher training. This research hopes to demonstrate that e-lectures, mobile learning and flipped learning could be powerful options for the integration with traditional lectures in HE.

The major reason for choosing this topic arises from the researcher's personal interest. As a faculty member at the Curriculums Department of the Education College of Umm Al-Qura University (UQU), the researcher has witnessed significant investment in technologies in the higher education domain. Additionally, technological topics have increasingly appeared within CPD programmes for university teachers, whether provided inside a university or via external educational institution (e.g. the National Centre for E-learning and Distance Learning [NCEL]). In contrast, the researcher has encountered several challenges in finding opportunities to attend a CPD course, mainly due to the limited number of courses on offer to university teachers. This scarcity of training courses is out of proportion to the vast number of academics in the university. As well, these training courses accept only a specific number of trainees.

The Kingdom of Saudi Arabia (KSA) now has the opportunity to build digital capacity and overcome its challenges through the appropriate management of smart innovations (Chakravorti et al., 2015). Ageel and Woollard (2012), Al Mulhem (2013), Al Ghamdi (2015) and Al Mutlaq (2017) point out that Technology Enhanced Learning (TEL) provides a critical solution to satisfy the need to use technology in teaching and training, to overcome complicated technological challenges, and to overcome specifically Saudi HE challenges. The Saudi government could find itself in an embarrassing position if it fails to adopt initiatives to deal with these HE challenges in a timely manner. The insistence on using only traditional learning environments and employing only traditional lecturing methods cannot resolve the challenges posed by modern educational demands; however, technology needs to be embraced in order to facilitate learning to ever-increasing numbers of students, with efficiency of effort and financial outlay, including the removal of space and time limits.

The researcher's personal interest in this subject, added to the reasons above, have led the researcher to investigate further the potential advantages of ML and FL within university teaching and CPD, especially for female teachers, and to collect data on the usefulness of e-lectures in supporting teaching in higher educational institutions.

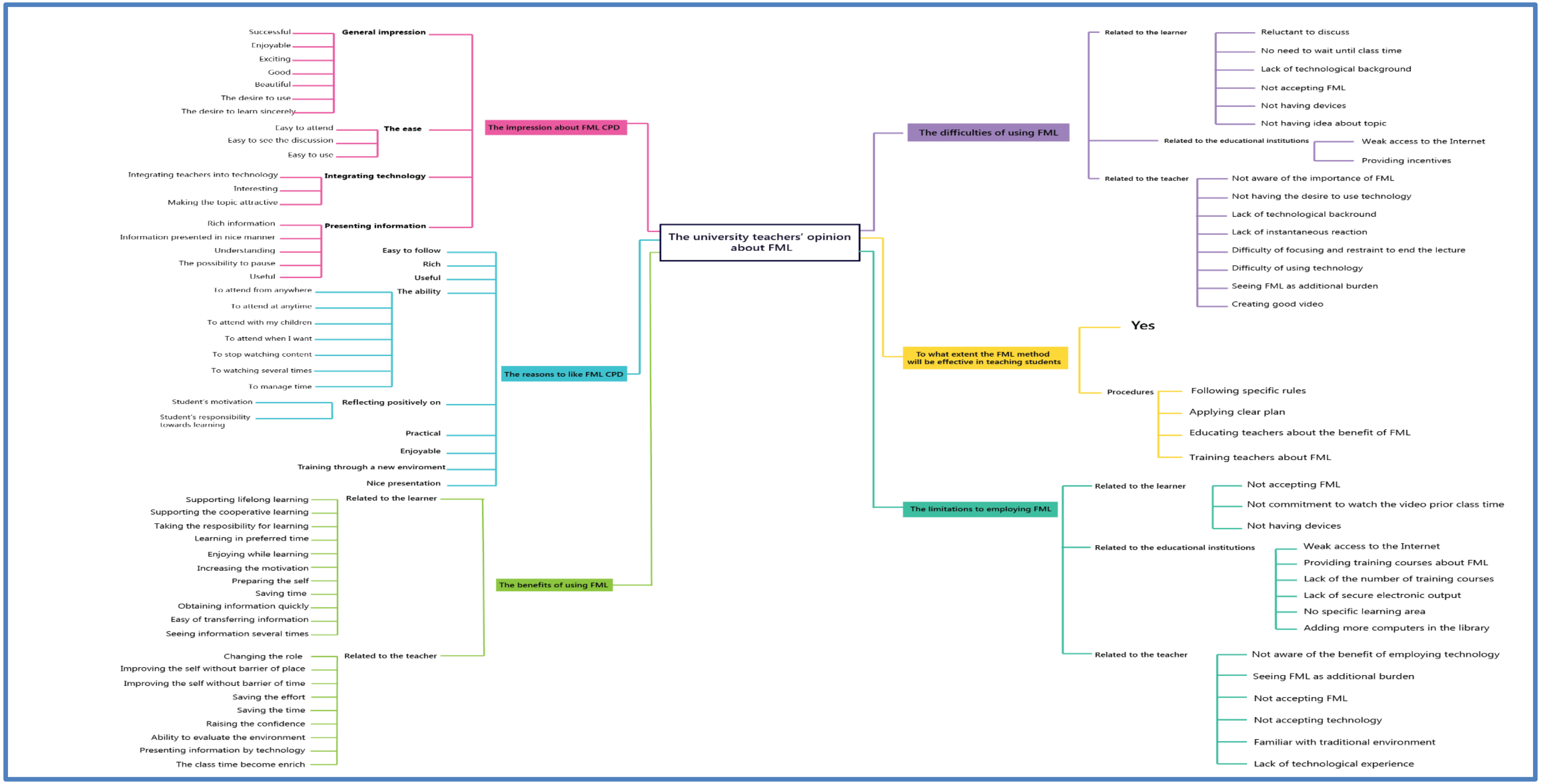


Figure 1. Summary of interviewees' opinions of FML [repeated from Figure 24]

The model shown in Figure 1 (repeated from Figure 24) organises and categorises opinion data gathered from the interviews conducted in this present research on FML. This model of FML offers a conceptual framework that describes several aspects of FML and provides a springboard for further research in this field; the model can also be used to inform practice and policy. The researcher proposes that the importance of FML lies in its potential to be implemented in higher education as a way of solving the numerous teaching and technology issues facing this sector. For example, FML will facilitate learning to ever-increasing numbers of students, with efficiency of effort and financial outlay, including the removal of space and time limits. FML will allow women to teach not only other women but men also, without women and men having to share the same physical space. In this way, Saudis would be able to break the barrier of gender separation and solve the problem of low tutor numbers in Saudi universities, and this would contribute to removing major barriers to HE. It is crucial, therefore, to gather opinions from university teachers because these teachers are themselves important agents in the development and change process. Knowing what university teachers think of FML is vital to understanding the nature of its potential for academic use. By understanding how teachers perceive FML in terms of its concerns, challenges, and affordances, educational institutions can better implement their technology strategies. This research will cover several gaps in the literature, including academic uses of mobile learning and flipped learning, creation of electronic lectures, continuing professional development, and higher education. The research gaps will be discussed more fully in Chapters 2 and 3.

1.3 Research Aims

This study examines the potential benefits of using mobile learning in a flipped format, an approach which is here termed fipped mobile learning (FML). Flipped learning (FL) refers to the use of technology with hands-on activities to present course content to students before and outside of the classroom, while inside the classroom, students engage in in-depth debates on that content, working through problems and engaging in collaborative learning. Mobile learning (ML) refers to learning that enables students to access educational content anywhere and at any time through any mobile technologies. The integration of FL and ML into FML is an attempt to overcome the disadvantages arising from the independent application of each learning method and to make use of the advantages of FL and ML in Continuing Professional Development programmes (CPD). Hence, the main aim of this research project is to gain a better understanding of the perceived and actual effects of using FML in Saudi university teacher training with a view to increasing the use of e-lectures in supporting teaching throughout HE institutions in KSA. In addition to exploring university teachers' opinions of FML in turn, this can help them to utilise FML for teaching large numbers of students with less effort and less financial outlay. FML also allows Saudi women to teach not only other women but men as well, since they are not in the same physical space. To this end, the aims lead to several research objectives, which are:

1) Gaining a better understanding of the perceived effects of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills;
2) Gaining a better understanding of the actual effects of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills;
3) Providing a better understanding of the use of FML in continuing professional development, including the removal of space and time limits, to increase the use of e-lectures in supporting teaching in higher educational institutions;
4) Determining the e-lecturing skills;
5) Exploring university teachers' opinions of using FML; and
6) The possibility of using FML in teaching in HE institutions.

The following section illustrates the research questions for this thesis.

1.4 Research Questions

Research questions (RQs) play a significant role in analysing phenomena by showing their strengths and weaknesses. This thesis seeks to answer the following three research questions:

RQ 1. What are the perceived outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills?

RQ 2. What are the actual outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills?

RQ 3. What are university teachers' opinions of the concerns, challenges, and affordances of flipped mobile learning?

1.5 Scope of the Research Project

This thesis focuses on the effect of FML in developing the e-lecturing skills of female faculty members at UQU. An understanding of how e-lectures are perceived and used by university teachers is crucial to evaluating the extent of their use in teaching. It is hoped that the intervention will give useful insights into the best way to train university teachers and the challenges that affect the creating of e-lectures. Figure 2 illustrates the focus of this study.

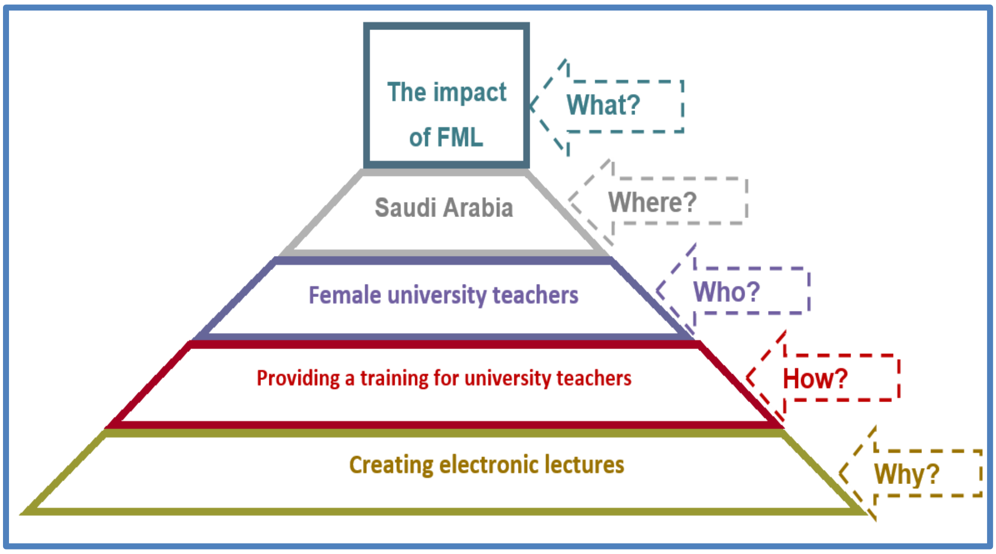


Figure 2. The focus of the study

Using Figure 2, the explanation of each component is as follows:

What: The aim of this research is to gain a better understanding of the impact of FML during training (or teaching) prior to the training session, which is conducted through mobile applications. The teacher watches a recorded video before the class, whereas class time will be used to solve complex concepts and answer questions relating to the lecture.

Where: This research is conducted at Umm Al-Qura University (UQU) in KSA, as representative of a typical Saudi university. This institution was chosen mainly because the researcher is a member of staff, and therefore accessing research participants here was much easier than recruiting them in an institution unfamiliar to the researcher.

Who: The participants are female university teachers (also referred to as trainees in this thesis). Due to gender segregation, it is impossible to conduct a study on both genders simultaneously due to the education system regulation in the Kingdom.

How: FML was used to deliver CPD training sessions to the sample of university teachers in the study.

Why: The research seeks to investigate whether FML can improve e-lecturing skills among the faculty members. It also seeks to provide a better understanding of FML in CPD with a view to increasing the use of e-lectures in supporting teaching throughout HE institutions in KSA, and the study aims to elicit participants' opinions of the concerns, challenges, and affordances of FML.

1.6 Research Contributions

Nowadays, mobile devices play a major part in our daily lives, facilitating communication, capturing images, organising office work, accessing emails and social media platforms, surfing the Internet, and enrolling in learning courses (Altameem, 2011; Nassuora, 2012). This research could potentially present several significant contributions to current knowledge of ML and FL in higher education. First, this research could assist university teachers in creating accessible e-lectures, which could in turn enhance student learning. Second, this thesis attempts to cover the conceptual gap, where the intervention (i.e. flipped mobile learning [FML]) has been designed to improve teacher effectiveness in a low cost, easy manner via readily available devices. Third, the use of the Technological Pedagogical, and Content Knowledge framework (TPACK) provides a better understanding of perceived and actual effects of using FL, ML, and FML in CPD programmes on university teachers' e-lecture skills. The TPACK framework fills the gaps identified in this research (ML, FL, creating e-lectures, CPD, and HE). This framework was appropriate, whereby each gap in the research was covered by an element of the framework (here, content refers to the creation of e-lectures, pedagogy to flipped learning, technology to mobile learning, and context to Saudi higher education). Fourth, this intervention could also contribute to using other teaching tools available via mobile device applications in CPD programmes. Fifth, the research could contribute to the training of university lecturers in KSA and elsewhere. Quality of teacher training has been found to correlate highly with student achievement, therefore effective training could potentially influence learner excellence (Clotfelter et al., 2006). Sixth, this thesis could contribute to addressing issues specific to KSA, such as gender segregation in the education system. Moreover, this thesis proposes a teacher training environment characterised by efficient and cost-effective methods that minimise financial outlay. This is one of the Saudi Vision 2030 goals (Saudi Vision 2030, 2017). Seventh, the findings lead to recommendations that can be brought to the attention of policy makers in higher education in KSA. Finally, the findings could contribute new data to the growing body of research on the effects of ML and FL on individual performance.

1.7 The Proposed Research Methodology

This thesis follows a pragmatic paradigm and uses a quasi-experimental, mixed methods approach. This requires diverse data collection instruments. In addition, a pre- and post-test design will also be used. The study will be conducted in the form of pre- and post-training questionnaires, pre- and post-evaluation product cards, and semi-structured interviews. Table 1 presents a summary of the research aims, main research questions and the appropriate methods to help answer the research questions.

	Research Aims	Research Questions	Methods
1.	Gaining a better understanding of the perceived effects of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills	RQ 1. What are the perceived outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills? (Quantitative data)	Pre- and post-training questionnaire
2.	Gaining a better understanding of the actual effects of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills	RQ 2. What are the actual outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills? (Quantitative data)	Pre- and post-evaluation product card
3.	Exploring university teachers' opinions of the concerns, challenges, and affordances of using FML	RQ 3. What are university teachers' opinions of the concerns, challenges, and affordances of flipped mobile learning? (Qualitative data)	Semi-structured interview

Table 1. Research aims, research questions, and methods

This research employs a multiple intervention approach. Instead of having a control group and an intervention group, *three* intervention groups are identified to understand which intervention works better and improves the participants' skills (if any improvement in skills happens at all). Group A trains via a flipped learning environment, Group B trains via a mobile learning environment, and Group C trains via a flipped mobile learning environment. All intervention groups have equal conditions. This research explores whether technological ways alone (ML or FL) or in combination (FML) can facilitate learning for the teachers in the context of this research and improve their e-lecturing skills effectively. The researcher expects mobile technology to enhance flipped learning and flipped mobile learning to have positive effects on instruction.

The analysis intends to compare the perceived outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills through questionnaires before and after the experiment. Certain steps will be taken to reduce bias (see Chapter 4). An evaluation product card will be used by the researcher before and after the CPD to identify the actual outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills. Semi-structured interviews will be used to record the university teachers' opinion of flipped mobile learning CPD. This research is arguably unique because of its three-way comparison of CPD strategies, relating to online CPD in KSA, and seeks to inform policy and practice.

1.8 The Structure of the Research

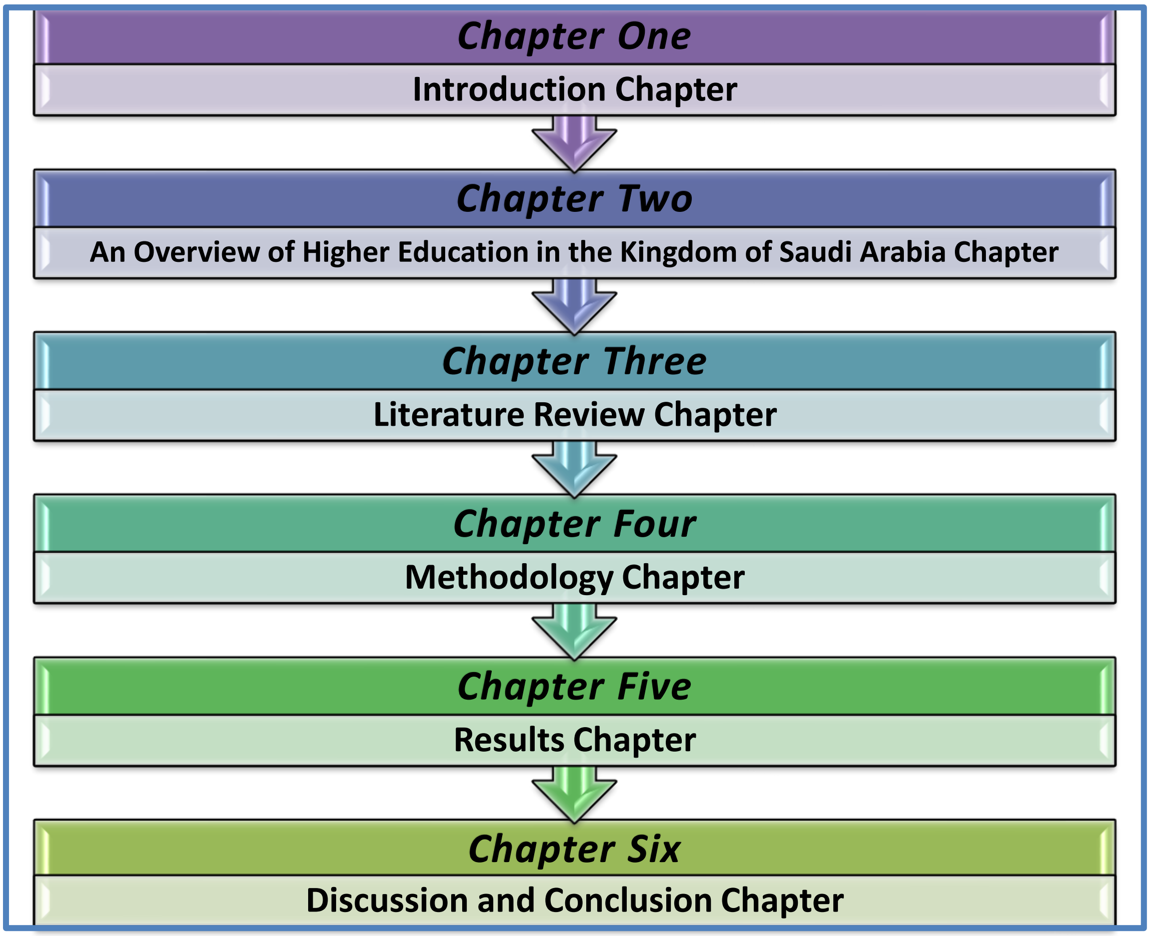


Figure 3. The structure of the thesis

This thesis comprises six chapters, as shown in Figure 3. The present **Chapter 1** forms the introduction, in which I have stated the problem and the scope of the research project. The project rationale, aims, research questions, and proposed research methodology of the research are described and the intended research contributions are also discussed.

Chapter 2 presents an overview of education in KSA and discusses the influences of religion and social life on the education system. I then look at HE in Saudi Arabia in terms of the development and expansion of universities, whether the outcomes of HE are in line with the labour market, and challenges facing the system. I also briefly consider the use of technology in the HE educational process.

Chapter 3 reviews the current research literature on both mobile learning, as well flipped learning, in terms of the benefits, drawbacks, and challenges that universities in KSA and elsewhere could face. In addition, I discuss research on e-lectures in terms of their characteristics, and procedures, followed by a discussion of CPD literature. From this analysis, I identify research gaps and the theoretical dimensions of research. The justifications for choosing the TPACK framework (technology, pedagogy, and content knowledge) along with reasons for the rejection of other models are elaborated.

Chapter 4 presents the research design and describes its underlying philosophy, paradigms, approaches, and methods. The research position is outlined and this is followed by a discussion of the sampling strategy, pilot study agenda, and ethical considerations. The validity and reliability of the methods and the data analysis procedures are described. The background of UQU and Acadox are also given in detail.

In **Chapter 5,** the collected research data are analysed and interpreted to give the results in graph and table formats, and then the overall study findings are presented.

Chapter 6 discusses the findings, comparing them with those of previous studies, and drawing the final conclusions with respect to the research questions. The researcher acknowledges the limitations of the study and makes recommendations to policy makers and suggestions for future research. **Chapter 6** concludes and summarises the entire study.

This chapter has provided a brief background to this research project. Earlier in the chapter, the researcher determined the need for the project and the focus of the research. Since the study will be conducted in the Kingdom of Saudi Arabia, the following chapter presents an overview of the Kingdom and its higher education system.

Chapter 2 An Overview of Higher Education in the Kingdom of Saudi Arabia

2.1 Introduction

"There is a strong link between culture and learning that is reflected in how people prefer to learn and how they tend to process information" (Samovar et al., 2009:338).

The education system of Saudi Arabia is based on the religion, culture, and values of its society (Ammar, 1998). This context clearly matters, since the success of ML is heavily dependent upon the sociocultural environment in which it is used (UNESCO, 2010). The purpose of this chapter, therefore, is to provide an overview of the existing literature on issues related to Saudi higher education (HE) and to present the existing demographics of HE in KSA. This chapter first offers a brief history of the KSA to give an insight into the national context and the influence of religion and social life of the state in education. Then, it focuses more specifically on HE and the role of faculty members in the educational process in an effort to place this thesis in its rightful context. After highlighting recent developments in HE which enhance the quality of learning and teaching, the challenges facing Saudi HE are then displayed. The chapter concludes by discussing the connection between HE and the Saudi Vision 2030, and how this research project aims to contribute to the Vision. The Kingdom has come a long way in improving and finding new initiatives in education generally and in HE specifically. However, the Kingdom is behind, technologically speaking, compared to other developing countries in the Gulf States (Alturise et al., 2016). Hence, the government and HE institutions need to redouble their efforts to bring technology in learning and teacher training firmly up to date.

2.2 An overview of the Kingdom of Saudi Arabia

The Kingdom of Saudi Arabia gained its independence in 1932 under the leadership of King Abdul-Aziz bin Abdurrahman Al-Saud, or Ibn Sa'ud as he was known historically (Al-Rasheed, 2010). KSA is governed by absolute monarchy, based on Islamic Law. The "Majlis Al-Shoura" is a Consultative Council which works to provide advice to the King in his position as Prime Minister. Currently, it consists of 150 Saudi members, both male and female, of politicians, religious scholars, traders, and academics. This council is one of the important aspects of decision-making in the Kingdom (Al-Rasheed, 2010; Ministry of Education, 2017). Geographically, KSA is the second-largest state in the Arab world (Ministry of Education, 2017). KSA is one of the world's major oil exporters making the country internationally influential (Vassiliev, 2013). Saudi society, like many other communities, consists of indigenous peoples as well as a population of immigrants, either as residents or as workers with the population increasing rapidly. KSA is recognised as ranking among the nations with high growth rates of population based on the Preliminary Results of General Population and Housing Census issued by the Central Department of Statistics annd Information (CDSI). The Ministry of Economy and Planning (2014) and Open Data (2017) gave total population estimates of 20,846,884 million in the year 2000 and 29,897,000 million in 2014, with foreign nationals representing around 23%.

KSA is influenced by Islamic law to a large extent and indeed is the birthplace of Islamic religion, containing both of the Holy Mosques of Makkah and Medina (Vassiliev, 2013). One of the Islamic rules which has been applied strictly to Kingdom law in all sectors, including education, is that restricting the interaction of women and men who are unrelated to each other (Alebaikan, 2010; Almalki, 2011). There are certain exceptions to this rule, for example, pre-schools, daycare, medical schools, and some private elementary schools (Metz, 1992; Al-Khalifa, 2010; Smith & Abouammoh, 2013; Al Alhareth et al., 2015). Based on this, Saudi society clearly differs from others since its laws are influenced by Islamic law and traditions. As well as that, Saudi higher education faces a shortage of university teachers for several reasons. Some university teachers obtain a year's sabbatical to conduct research in order to obtain a higher degree. Others are offered scholarships to continue their postgraduate education in developed countries (Alissa, 2011; Al Alhareth et al., 2015). The low level of training and creativity development among university teachers (Abdulkarim, 2009), sticking to traditional ways of teaching and are being resistant to change (Alebaikan, 2010; Alfarani, 2015), and the low research productivity (Alamri, 2011; Alharbi, 2016) are also considered as the causes for the teacher shortages in Saudi HE.

Hence, the researcher proposes that the use of flipped mobile learning (FML) would help the Saudi community to provide learning or training opportunities for both genders together. FML allows female teachers to teach not only women but men as well, since they are not in the same physical space. In addition to that, university teachers will have more time that they devote to teaching, improve themselves, and develop their skills. FML would therefore enable Saudi education to break free of the barriers imposed by gender segregation and solve the problem of the lack of sufficient teachers in Saudi universities. The following section presents detailed information on the Saudi education system.

2.3 Saudi Education System

The philosopher-scientist Ibn Sina, or Avicenna, wrote in his seminal works about the flourishing of Islamic civilisation and education in the eleventh century. He mentioned two primary learning environments of that time. Firstly, *maktab* (better known as *ktatib*) are places for teaching children, either boys or girls, within an instructor's home (Asimov & Bosworth, 1998). Indeed, *ktatib* (which is plural; its singular is *kotab*) is an old educational system well-known by the majority of Arabs even before the advent of Islam (Alhamed et al., 2007). The second learning place is *madrasah*. Ibn Sina indicates that *madrasah* are places of learning within mosques for the teaching of the Holy Quran (Asimov & Bosworth, 1998) and accessible to only a few people. However, previous generations had studied Islamic law, accounting, the art of calligraphy and basic literacy skills (Albalawi, 2007). There were around 180 *ktatib* when Saudi Arabia was established in 1932 (Akhbaar, 2015), then the Kingdom began the foundation of regulations of state and the establishment of its educational system.

Saudi education policy stems from the government's belief that academically qualified citizens can form a strong basis for cultural and scientific progress by taking on nation-building tasks (Al-Erieni, 1999). A document of general Saudi education policy was issued in 1970, which had four characteristics: (1) education to be based on Islamic law, (2) mandatory gender separation in education, (3) education to be funded by the state, and (4) education to be a centralised system (Alzahrani, 2013; Al Mutlaq, 2017). In addition, Saudi education policy follows two trends: (a) expanding education in various ways without being bound by how, and (b) harmonisation of quality and quantity. For instance, it has established many schools and colleges and worked hard at adding many amendments to improve the quality of education in Saudi Arabia. Furthermore, the government believes that if educational policy does not focus on quality and quantity, the resulting decrease in educated individuals would then prove to be a burden on the system as well as the community (Alhamed et al., 2007).

In 2001, the Saudi educational system became a source of political concern as it was seen as negatively affecting Arab and Islamic identity, which was not the intention of education policy (Prokop, 2003). Hence, policy-makers were required to amend the curricula completely as well as work on qualitative improvements in education, focusing on technical and vocational training. If the education system were to achieve these precise changes, the Saudi government could not only be influencing a new generation, but also ensuring the economic survival of the Kingdom. Changes have commenced and an evaluation of the new curriculum has been conducted by officials from inside and outside the Kingdom (Alyami, 2014).

In light of this educational policy, the development of mental, psychological and social learning has been achieved and, in addition, the principle of equal educational opportunities, where girls receive their share of education. Furthermore, all children, whether living in a town or the suburbs are given an opportunity to learn (Aqeel, 2013). On the other hand, the education system overall has not yet learned to use the full potential of technology in teaching and learning. In addition, educational outcomes are not keeping pace with current employment requirements (Alhamed et al., 2007). Finally, there is an urgent need for continuous development in curricula and activities to produce a generation of innovators (Alhamed et al., 2007; Aqeel, 2013). The Saudi education system oversees more than 26,000 state, private and international schools, in which more than six million students are enrolled (Ministry of Education, 2021).

Generally speaking, the consequences of religious values, cultural norms and beliefs on Saudi society manifest as deeply-held traditions, for example, the extended family, conservatism, and sexual discrimination (Oyaid, 2009; Alebaikan, 2010). All aspects of life in KSA are affected, including education, by these religious and cultural beliefs. A prime example is the long-held fear in traditional Saudi society that education for girls and women would lead to adornments and mixing with men (Alhamed et al., 2007; Alamri, 2011). This has led to many families preventing their daughters from attending school (Alyami, 2014). When female education first began to spread in KSA, it aimed to produce successful housewives and good mothers by teaching vocational skills thought to be more appropriate to female nature, such as teaching and nursing (Metz, 1992; Al-Khalifa, 2010). For the girls, this learning took place in an educational environment where they were segregated from the boys after the age of seven (Al Mutlaq, 2017). A number of traditional cultural elements also played an important role in governing how social interactions should be carried out among Saudis, such as considerations of age, family relationships and social hierarchies (the head of the family, teachers, rulers, etc.) (Al Mutlaq, 2017).

2.4 Development of Education in Saudi Arabia

Opportunities to learn in the KSA education system were limited to individualised education in urban areas, whether in mosques or in *ktatib*. In 1926, Saudi Arabia established its first education system under the name of the Knowledge Directorate (Alhamed et al., 2007). The Knowledge Directorate worked to establish schools and universities throughout the country. The syllabus taught throughout the country was the same for both public and private schools and out of respect for the rules of Islam, Saudi education practised gender segregation except in kindergartens, daycare, medical schools, and some private elementary schools (Metz, 1992; Al-Khalifa, 2010; Smith & Abouammoh, 2013; Al Alhareth et al., 2015). The Saudi government provided free education for both citizens and visitors, either in general or in higher education, as stated by the government (Alyami, 2014).

In 1953, a radical change in the perceptions of the educational system occurred whereby the Directorate became the independent Ministry of Knowledge. This coincided with a change in education policy in the Kingdom, which became linked to some of the neighbouring countries whereby that the Saudi education policy applied their curricula and plans, used their books and involved some of their teachers. Because of previous fears in Saudi society that female education would lead to adornments and mixing with men, formal education for girls lagged behind that of boys, and was only represented in *ktatib* and in a few schools (Alhamed et al., 2007; Alamri, 2011). However, society's negative vision did not deter the growing awareness that girls and women needed a higher standard of education (Alyami, 2014). Families began to allow their daughters to attend school and the government addressed opposition to this trend by establishing the General Presidency for Girls' Education in 1960, which worked towards widening the education system to include girls and women in general and higher education (Alamri, 2011).

In 2002, the General Presidency for Girls' Education merged with the Ministry of Knowledge, which then became the Ministry of Education in 2003. In 2007, the King Abdullah Bin Abdulaziz Public Education Development Project (Tatweer) was established. *Tatweer* is an Arabic term that means development. This project focuses on developing Saudi public education throughout the entire system by focusing on teacher training, improvement of the educational environment, development of curricula, and support activities (Tatweer, 2017). One of Tatweer's goals was to make the transition to digital education by slowing the printing of paper books (Alshaya, 2017). Currently, the Tatweer project has been added to the Saudi Vision for 2030, which will be explained later in this chapter. In 2015, the Ministry of Education consisted of general education, technical and vocational education, and higher education (Ministry of Education, 2017). The improvement of Saudi HE right up to the present has been characterised by powerful enthusiasm in the quest for excellence, but it has also been a race against time to bring the system up to date with other countries (Pavan, 2016).

Despite the importance of early learning in preparing children for a scientific education, the outcomes also depend very much on parental views and willingness to cooperate (Tqmhail, 2013). At the level of general education, a range of state, private, and international schools are available. Children start school at the age of six years and study in three phases: six years of elementary school followed by three of intermediate and, finally, three years of secondary education (Al-Asmari, 2005). Two pathways are available to students after their first year in secondary school, either science or literature, which as specialties are still taught in Arabic. In addition, learners study Islamic law, Arabic, English, and the Arts, but there are no mandatory modules in technical or vocational skills (Al-Asmari, 2005; Alhamed et al., 2007). The Saudi government continues to invest in HE for girls, with the consequences that: (1) the demand for HE has increased as ever-greater numbers of women graduate from secondary schools (General Authority for Statistics, 2020). In 2001, there were 99,000 and by 2010 numbers had risen to 155,000 (Al Alhareth et al., 2015); (2) the number of female students now surpasses the number of male students (Alebaikan, 2010; Al Alhareth et al., 2015). The number of women in general education is 3,217,487 in contrast to 2,970,289 men; which totals 6,187,776 students all together (Minstry of Education, 2021); (3) most universities now accept women students, with the exception of King Fahad University and the Islamic University (Alebaikan, 2010; Almalki, 2011; Al Alhareth et al., 2015); (4) women can now study abroad (Al Alhareth et al., 2015); (5) there is now a women-only university – the Princess Noura Bint Abdulrahman University (Al-Khalifa, 2010; Almalki, 2011; Al Alhareth et al., 2015), and (6) the number of female university teachers increased from just 4,700 in 2004 to approximately 19,600 in 2009 and continues to rise while male university teachers have risen from nearly 7,200 to about 48,800 in the same period (Al Alhareth et al., 2015). According to the General Authority for Statistics (2020), the numbers of male and female Saudi faculty members are fairly equal. Since there are now more female than male students, it has been challenging to recruit and train corresponding numbers of female university teachers to teach them. The researcher thinks if the government will invest more heavily in FML, however, this could go some way towards solving these problems since issues of gender separation would then not present a barrier to female class attendance, while teachers would also be able to teach greater numbers of students in a virtual space than in a physical one, with the efficiency of effort and financial outlay, including the removal of space and time limits.

Based on the above discussion, the goals of women in education need to be amended, as the requirements of today's women are completely different to those of even ten years ago. Social changes are more likely as women become more educated, more knowledgeable about their rights, and more active than before. In addition, women who have studied abroad are expected to return with new ideas about the life that they want from their society and government (Al Alhareth et al., 2015). Not only does the Saudi government need to increase its spending on female education, but it also needs to involve women in policy decisions that will affect their lives. This has begun to happen since the Saudi Vision 2030 was announced in early 2017.

2.5 Saudi Higher Education

Presenting an expanded characterisation of Saudi HE is significant to help frame the issues existing within it. The HE system allows students to enrol in any of its institutions at the age of 18 years, joining either an undergraduate or postgraduate course (Albalawi, 2007). Saudi HE is exclusively for Saudi citizens, and students are given a financial reward for enrolling in its programmes (Alamri, 2011). The Saudi HE aims to establish more universities in the Kingdom in order to ensure that all Saudi students have access to HE. It also aims to increase scientific research as well as motivate teachers to upskill through CPD. Furthermore, HE aims not only to impart skills and ability, but also to support quality outcomes, and to this end it embraces innovation and creativity (Ministry of Education, 2017).

Saudi HE has paid in recent decades special attention to plans and strategies in order to fulfil the needs of the Saudi society, which has rapidly grown socially and economically (Ministry of Economy and Planning, 2014). Although the Saudi HE system has faced many challenges, some of the major issues have been resolved to enable greater success in educational achievement. One major recent change is that the HE budget is now the largest in the total Saudi budget, with 200 million Saudi riyals given in 2016 (Al-Shammari, 2016). This has resulted in the establishment of more universities and other HE institutions. In 1996, for example, the Kingdom had only eight universities, whereas by 2017 there were twenty-six public universities, nine private universities, and twenty private colleges as well as a large number of other training institutions. As well as the establishment of new universities, curricula have been updated and digital educational aids developed to suit the needs of twenty-first century students (Onsman, 2010). In addition, electronic learning (EL) has been enabled in technical and vocational education (Alzahrani, 2013). Through utilising ICT in teaching, there have been many prominent achievements of Saudi education policy in obtaining high quality standards and academic success (Ministry of Higher Education, 2010).

In 2004, the establishment of the National Commission for Assessment and Academic Accreditation (NCAAA) emphasised the credence and quality of higher education (Onsman, 2010). In 2006, the National Centre for E-learning and Distance Learning (NCEL) was established (NCEL, 2017), which aims to support not only EL in general, but also distance learning (DL) in all Saudi universities and technology training for university teachers (Ministry of Education, 2017). The first university for postgraduate students was founded in 2009: the King Abdullah University of Science and Technology (KAUST) (Onsman, 2010; KAUST, 2012). The opening of KAUST as a coeducational university represented a huge step forward for female education (Al Alhareth et al., 2015; Pavan, 2016). Job security in Saudi HE is one of the strengths of the system, and it allows researchers and scholars to stand up for their rights and for ongoing development of the HE system (Alamri, 2011).

Despite progress in the Saudi HE sector, its achievements seem low when compared to educational advances in other developing or developed countries, some of which have progressed further with less overall expenditure. Although a vast amount of financial, political and moral support has been given to education, HE still faces problems and challenges. By looking at previous literature, the researcher classifies these challenges into three types: (1) challenges related to the educational system itself; (2) challenges relating to university teachers; and (3) challenges relating to university students. The following section presents these challenges in detail.

1. **Challenges Related to the Educational System:** Centralised bureaucracy represents a major barrier to progress in Saudi HE. For instance, there is no clear agenda for change that adresses the need for significant development (Alamri, 2011). In addition, the HE system does not support online education and it is included only minimally in universities (Alamri, 2011). Unsurprisingly, however, with the recent global spread of COVID-19, the Saudi Ministry of Education has resorted to the use of electronic learning (EL) at all educational ages and levels. In 2013, Al-Hattami et al. investigated the competencies required by faculty members of Saudi universities. Questionnaires and semistructured interviews were employed to collect data from 882 participants, including students, faculty members, chair persons, college board members, and deans from several Saudi universities. The findings emphasised the overall weakness of university teachers' professional teaching skills and the need for better professional training programmes and higher quality CPD. The participants demanded the right to in-service training courses to ensure ongoing high quality teaching.
2. **Challenges Relating to University Teachers:** One of the major issues in HE is the lack of a sufficient number of university teachers (Alissa, 2011; Al Alhareth et al., 2015). This issue has several possible causes. For example, university teachers sometimes take a year's sabbatical to conduct research in order to obtain a higher degree, and scholarships may be provided so that academic staff can continue their postgraduate education in developed countries. In 2012, approximately six hundred Saudi academics took scholarships to further their postgraduate education abroad (Hassan, 2014). Another issue is the low level of training and creativity development among university teachers (Abdulkarim, 2009). The basic reason for this could be a lack of academic performance evaluation and follow-up of progression in academic life. Another challenge is that university teachers are stuck in traditional ways of teaching and are resistant to change (Alebaikan, 2010; Alfarani, 2015). A negative reaction to change and refusal to use modern technology may be due to a lack of skills in using technology or a lack of knowledge of technology use in education (Alfarani, 2015). Finally, low research productivity as well as poor accreditation and quality control is evident in Saudi HE (Alamri, 2011; Alharbi, 2016). This shows in the limited number of academic conferences taking place and in the absence of peer-reviewed journals in many departments (Alamri, 2011) and may be a consequence of the lack of research funds (Alamri, 2011), deficits in up-to-date knowledge, low

awareness of the importance of research, and poor proficiency in English (Alamri, 2011; Alharbi, 2016).

3. **Challenges Relating to University Students:** Very high numbers of students, especially female, are now entering HE in Saudi Arabia, which means a significant increase in the demand for university-level teachers (Alebaikan, 2010; Onsman, 2010; Al Alhareth et al., 2015; General Authority for Statistics, 2020). According to Minstry of Education (2021) statistics, the number of women in general education (i.e., in state, private, and international schools) is 3,217,487 in contrast to 2,970,289 men; which totals 6,187,776 students altogether. The General Authority for Statistics (2020) indicates that the percentage of university graduates has increased, jumping from 51.8% of women and 44.6% of men in 2011 to 55.8% of women in contrast to 45.5% of men in 2019. This also implies an increase in the demand for jobs. Based on that, another issue appears, which is the failure to provide sufficient accommodation for students who come from other cities, suburbs, or from outside KSA (Almalki, 2011). The next issue facing HE in the digital era is that some families reject the use of modern technology in their children's education (Alebaikan, 2010). The reason for this rejection is the perceived need to protect children from the potential risks of technology such as the dangers of unlimited Internet access for children, which can result in their viewing content inappropriate to their age. Another problem is the separation of genders in the KSA education system whereby gender segregation requires separate staff and buildings for men and women. Indeed, a one-way video conferencing system is used in HE in the case of men teaching in a women's college or university (Almalki, 2011). Another problem is that graduate skills must fit the needs of the employment market. This problem is evident in the limited number of scientific disciplines available in undergraduate courses. Therefore, there is a need to create enough relevant educational opportunities to supply the demands of the Saudi job market (Prokop, 2003).

Considering these challenges, the implementation of ICT in learning and teaching, especially in female education, could lead to improved progress throughout all educational stages (Sarkar, 2012). Facing these challenges with a committed Saudi educational policy and with respect for the social and religious values of Saudi society, the use of flipped mobile learning (FML) in education could be a better option to support university teaching and teacher training. The FML could give better support due to the effective pedagogical uses of ML and FL applications, as ML is highly adaptable to the learner's location and circumstances (Korucu & Alkan, 2011; Ozuorcun & Tabak, 2012). ML can meet the educational needs not only of learners experiencing physical difficulties or cognitive, behavioural, and social problems, but also of distance-learning students, international students, mature learners and others who may need to stay close to their home environment (Strom & Strom, 2002; Savill-Smith & Kent, 2003; Cobcroft et al., 2006). It offers the opportunity to gain access to education easily and quickly (Botha & Butgereit, 2012; Pimmer et al., 2014) and allows free communication between men and women. Students can therefore learn what, when and where they want to, without the traditional restrictions of time, place and gender. Additionally, mobile technology is an educational tool that is now familiar to the majority of learners (Batchuluun et al., 2007; Motlik, 2008). Perhaps this relationship between the device and learner has led to mobile learning having a high rate of adoption (Al-Naseer, 2008; Cohen et al., 2011; Abu-Al-Aish & Love, 2013; Almaiah & Jalil, 2014).

2.6 Using Technology in Teaching and Training in Saudi Higher Education

University teachers have three core functions: teaching, management, and research (Brown & Atkins, 2002). Regarding a tutor's role, Shulman (1986) and Koehler and Mishra (2009) emphasise that teachers should not only know and understand the basic pedagogical principles but also be able to apply pedagogical content to their existing knowledge, thus achieving the desired goals. In this era, knowledge is massively expanding in the realms of technology. Therefore, it is likely that university teachers' knowledge and understanding of how to use cutting edge technology is currently insufficient. Teachers should know and understand fundamental methods of making learning effective and have the skills to practice these methods in highly complex classroom contexts (Leinhardt & Greeno, 1986). As noted by Roth (2014), the use of technology among teachers depends on their skills and perspectives. Roth (2014) found that teachers have a low level of technological and ICT skills.

Presenting in a one-way communication lecturing method for a large group of learners in a physical classroom within the educational institution is the most common teaching method adopted in the Saudi HE. This method has been followed from generation to generation to cater for increasing student numbers and requires learners to memorise information and then to give correct answers for the assessment. Therefore, students' grades reflect the extent to which they successfully memorise information (Allamnakhrah, 2013; Al Mutlaq, 2017). University teachers in KSA still follow traditional approaches, such as teacher-centred lecturing (Alnassar & Dow, 2013), with some exceptions in specialised programmes which employ independent problem-solving and group work strategies (Alnassar & Dow, 2013; Al Mutlaq, 2017). Because of this and a general lack of technological knowledge and skills amongst universities teachers, the effective adoption of technology in education can be a difficult task (Orellana et al., 2005; Al-Jarf, 2007; Ageel, 2011; Roth, 2014; Al Mutlaq, 2017). Furthermore, it has been observed that the use of educational technology services among university teachers in Saudi HE institutions is limited (Alebaikan, 2010).

The causes of low skill levels and limited technology use may be due to lack of experience (Roth, 2014; Jantjies & Joy, 2016). However, lack of skills and limited training in ICT leads university teachers to be reluctant in using ICT in their teaching, and thus researchers such as Ming et al. (2010) and Al-Hattami et al. (2013) suggested that continuous training for teachers will enable them to successfully use ICT in their teaching. Some teachers tend to prefer an old-fashioned lifestyle and have no experience with using technology. Another cause is lack of necessary infrastructure to employ technology in supporting the educational process (Jantjies & Joy, 2016). The traditional culture of Saudi universities, along with teachers' beliefs about student-centred pedagogy, are among the barriers to integrating technology in education (Alebaikan, 2010; Al Mutlaq, 2017).

However, it has been suggested that initiatives and newly acquired ideas from overseas should be considered by HE policymakers in KSA, as non-traditional methods developed by individuals who believe that technology has a vital impact on learning and teaching may help to overcome the challenges (Alnassar & Dow, 2013; Alamri, 2016; Almutlaq, 2017). The researcher believes that cutting-edge mobile technologies have the potential to change current teaching methods in Saudi HE and improve student achievement as well as bring equality of educational opportunity to both genders.

Mirza (2009) points out in a report of the National Council for the Accreditation of Teacher Education Standards that integrating technology into teacher training is the next step forward. It is rare that National Education Technology Standards for Teachers are integrated into current Saudi teacher training programmes (Chesley & Jordan, 2012) and this is unfortunate since education departments worldwide seek teachers who are skilled, competent and up-to-date in the uses of technology in education (Dillon et al., 2010).

With respect to current practices in university teacher training, CPD opportunities are offered by each Saudi university via deanships for academic development, which provide CPD programmes, workshops and conferences aimed at improving academic staff. These opportunities are equal across genders as well as nationalities (i.e., Saudi and non-Saudi), but the difficulty has been that due to gender segregation, women are allowed to teach women only, whereas men are able to teach both men and women via one-way video conferencing. Additional restrictions on women's travel have also affected their higher education, although this is gradually changing. For example, up until 2017, women were not allowed to drive (Arabic.CNN, 2017), and up until 2019 they were not permitted to travel alone (Arabic.CNN, 2019). However, Umm Al-Qura University (UQU), as many other Saudi universities, are committed to providing CPD programmes for female university teachers, although in the morning/early afternoon sessions only (between 9 am and 3 pm).

The estabishment of NCEL in 2006 and KAUST in 2009 has led to HE initiatives in terms of technology in teaching and training. In this vein, the project 'Future Plan for Universities Education in Saudi Arabia', known as Afaq, was established in 2006. *Afaq* is an Arabic word meaning 'horizons' and the project focuses on encountering any new challenges that might arise in Saudi HE by actively contributing to the goals of all HE institutions, and promoting and coordinating research projects (Afaq, 2006). The Afaq project stresses the importance of CPD for all levels of academic staff, which, in KSA are: teaching assistant, for which a bachelor's degree is the highest requirement; lecturer, holding at least a master's degree; assistant professor, then associate professor, and lastly professor, all holding at least a PhD. Furthermore, the Afaq project draws attention to CPD for university teachers in the belief that constructing a high-quality HE system correlated significantly to CPD through offering the best and latest learning practices. In addition to that, the Afaq project calls on CPD to prepare academics in HE institutions with the necessary professional skills and equip them with the technological skills in order to enable them to make the maximum use of technology as a tool to enhance teaching methods (Afaq, 2006).

The findings of researches conducted to evaluate CPD opportunities offered by Technology Enhanced Learning (TEL) in Saudi higher education institutions (e.g., Ageel & Woollard, 2012; Al Mulhem, 2013; Al Ghamdi, 2015) point out that TEL CPD is viewed as providing a critical solution to not only the complicated technological challenges, but also the HE challenges. This finding has been supported by Al Mutlaq's research (2017), which aimed to gain a better understanding of the current situation of TEL CPD in Saudi HE and challenges facing the university teachers to obtain CPD opportunity. The findings showed that most participants believe that CPD is valuable and useful not only for themselves, but also to students and institutions as a whole. The results referred to significant challenges encountered by the university teachers to participation in CPD programmes, such as relevant and realistic programme content, time of offering CPD programmes, workload, and accessibility to a range of CPD programmes that address specific topics or specific needs with the need to raise awareness of the importance of these programmes. Statistics on technology use in KSA reflects a significantly high adoption of the Internet using many different types of technology device. In 2020, Saudi Internet speed was ranked as the tenth fastest in the world with 55.71 Mbps (Saudi Press Agency [SPA], 2020). In 2017, KSA ranked second in the Arab world in terms of the number of Internet users (about 24 million), meaning that more than half the population of KSA (estimated at 32.6 million) has access to the Internet (Sabq, 2019).

While Saudi HE aims to meet high-quality standards of staff CPD, to the best of the researcher's knowledge, no studies have investigated the effects of using flipped mobile learning (FML) in CPD. It would be useful, therefore, to collect and analyse data on FML in teaching as well as teacher training, to evaluate the potential advantages of this technology for education. The researcher suggests that the advantages of FML include the capability of teaching greater numbers of learners with less effort and with less financial outlay; the removal of space and time limits, allowing female teachers to teach men as well as women; and increased accessibility of education by the general public. Through FML educational technologies, Saudis would be able to break the barrier of gender separation, solve the problem of low university tutor numbers, and overcome the challenges of access to HE. The findings of this research could therefore contribute significantly to achieving the goals of the Saudi Vision 2030. The next section provides a brief overview of how FML technology in education fits into this vision.

2.7 Saudi Vision 2030

The Saudi Vision 2030 was announced in early 2017. This vision aspires to develop Saudi Arabia into one of the most advanced countries in the world in terms of the economy and education by 2030. The vision seeks to build a more prosperous nation in which citizens find all that they need and contains many initiatives seeking to increase Saudi non-oil revenues and reduce Saudi dependence on oil. Furthermore, the Vision states that these changes will come into effect by using resources efficiently and reducing financial waste (Saudi Vision 2030, 2017). With this in mind, it can be seen that investment in HE is a fundamental tool for shaping progress, economic growth, and the global identity of the Kingdom (Pavan, 2016). According to the goals of Vision 2030, the education sector will work towards matching HE outcomes to the demands of the employment market, raising the standards of state education, and bringing at least five Saudi universities into the top two hundred world-class universities by 2030. Alongside these objectives, the sector needs to bring its digital infrastructure up to speed, which includes bringing the role of the teacher into the twenty-first century by offering cutting-edge digital technology training and skill-set oriented CPD and follow-up on their level of progress. In addition, the curriculum should be reworked and redesigned, focusing on the skills required by our rapidly-changing working environments. Furthermore, the promotion of collaboration between Saudi and international educational institutions ensures that KSA will maintain its place in the global economy (Saudi Vision 2030, 2017). Vision 2030 aims to increase the employment of Saudi women by 30% and to facilitate women's access to political positions, including within the Shura Council and the security field, as well as to senior posts in the education sector. Empowering Saudi women and supporting their capabilities through education, training and opportunities will allow women to be true, effective partners in nation-building and development (Saudi Vision 2030, 2017). It goes without saying that these goals should be accomplished efficiently, cost-effectively, and by 2030.

University leaders in KSA have responded to these calls for development by collaborating with world-class universities and internationalising HE, but the reality is that it is becoming more challenging to meet the country's HE expectations (Alharbi, 2016). For instance, Alamri (2011) and Alharbi (2016) mentioned that weaknesses in research productivity, accreditation and quality of education is one of the obstacles in Saudi HE; Mazi and Altbach (2013: 13) argue that research productivity is one of the most important aspects and key points of world-class universities, stating that, 'Research is the only aspect of a university's work that can be easily measured cross-nationally. Counting numbers of articles published and to some extent measuring their impact is an accepted part of bibliometrics and is done by companies such as Thomson Reuters. Other metrics used by the rankers include research funds obtained by universities, qualifications of the faculty, and student selectivity'.

Moreover, according to Smith and Abouammoh (2013), Saudi HE should pay urgent attention to its research effort if it aims to achieve world-class status for its universities, because global university ranking systems are heavily dependent on the quantity, quality and outcomes of an institution's research activity. The low number of research projects and peer-reviewed journal articles is due to severe lack of funding (Alamri, 2011) as well as low awareness of the importance of research in the global context, deficits in academic knowledge, and poor proficiency in the English language (Alamri, 2011; Alharbi, 2016). Hence, it could be said that adopting a five-year national development plan is a perfect method of achieving the future vision in the HE sector. In principle, these plans take into account the economic, political, educational, health and social aspects to facing challenges in the HE domain. The plan seeks to help HE leaders and policymakers to resolve the challenges facing HE with initiatives to improve university performance and quality of outcomes (Alharbi, 2016; Al Mutlaq, 2017).

Generally speaking, these dramatic changes to Saudi HE that have happened in a relatively short space of time have worried Saudi scholars and decision-makers whose concern is to preserve religious values, cultural norms and beliefs. Education itself is not seen as a threat, but it is rather the reconciliation of religious and social traditions with the demands of globalisation that is fraught with obstacles (Pavan, 2016). For instance, the establishment of the Kingdom required an educational curriculum that would open the minds of its sons and daughters to modern knowledge. In the present day and for the future, there is a need for an educational curriculum that will open the Kingdom to the learning of the modern digital age while at the same time preserving religious values and cultural norms. In the opinion of the researcher, the opening of the coeducational King Abdullah University of Science and Technology (KAUST), announcing the Saudi vision 2030, and other developments which will occur in the future in the HE sector are for serving the people in the Kingdom and their benefit and in line with religious values and tradition.

This chapter has given an overview of the Kingdom of Saudi Arabia and the influence of its history, society and religion on education. It has looked specifically at the higher education system, in terms of recent and current developments, and the Saudi Vision 2030. The following chapter provides an overview of the existing literature on issues relating to mobile learning, flipped learning, academic CPD level, and e-lectures.

Chapter 3 Literature Review

3.1 Introduction

Information and communication technology (ICT) plays a key role in education. It can improve the quality of education by motivating teachers and students (Mohapatra & Dash, 2016). KSA appreciates the need for keeping pace with the developed nations and international standards in ICT, hence the emphasis on ICT with education (Ministry of Higher Education, 2010) and an investment of 112 billion riyals in the Saudi ICT sector (Communications and Information Technology Commission, 2015). What really matters is how to prepare teachers for an advanced way of training and encourage trainers to avoid the superficial treatment of cultural values. Preparation for this kind of training requires a critical examination of the traditional system of education in KSA.

The literature review in this chapter highlights the current situation of mobile learning (ML) and flipped learning (FL) in higher education (HE), in KSA as well as in other countries, in terms of the benefits, drawbacks, and challenges that universities could face. This chapter also discusses the characteristics of e-lectures and the procedures and skills to successfully create and produce them. Furthermore, this chapter reviews the current and relevant literature on continuing professional development (CPD). The chapter concludes by discussing the research gaps, and how this research project aims to fill these gaps. The TPACK theoretical framework will also be presented.

3.2 Technology for Learning and Teaching in Higher Education

Learning, as a process, is a product of all internal interactions with the self and all external interactions with environmental content (Daniels et al., 2012). Brown and Atkins (2002) regard teaching as an interactive process that offers learning opportunities to students, while allowing teachers to acquire knowledge, skills, enhanced perceptions and attitudes, and capacity for problem-solving. The content of learning comprises facts, skills, and values (Brown & Atkins, 2002). The teaching process is complicated and demands the integration of several types of knowledge; for example, knowledge of technology and the ways learners think and learn, as well as knowledge of subject matter (Koehler & Mishra, 2009). These varieties of knowledge require teachers to develop a range of skills to match highly complex classroom contexts (Leinhardt & Greeno, 1986).

Teaching methods vary based on the nature of teachers’ and students’ control and participation (Brown & Atkins, 2002). In terms of teacher control over the process, teachers traditionally impose methods that involve listening and note taking on the part of students. Student control (i.e., a learner-centred approach), on the other hand, is most commonly facillitated using technology-based learning (Brown & Atkins, 2002). Each of these methods requires varying proportions of teacher and student participation. For example, courses requiring practical laboratory work are highly structured to enable students to develop hypotheses, select methods, and conduct practical experiments to test the hypotheses (Brown & Atkins, 2002). The learner-centred approach regards learners not only as central to the development of education but also as the basis of the education system. The learner-centred approach involves aligning all the components of the education system to learners' needs and supporting their highest possible outputs. Therefore, traditional education stands in contrast to the learner-centred approach, which requires a radical change in the education system. It is necessary, therefore, to develop teachers' performance as well as to change and improve the educational environment (Brown & Atkins, 2002). In 1993 in the United Kingdom, the Teaching and Learning Technology Programme (TLTP) was created to promote the use of technology in higher education (HE). It encouraged the design of technology-based materials to be used in teaching and learning (Sarkar, 2012), such as those used to produce educational videos, presentations, and electronic lectures.

Technology in HE is now well-integrated with teaching and learning processes (Spector, 2015; Bower, 2016; Henderson et al., 2017; Hernández-Lara et al., 2019; Lacka & Wong, 2019), and is a key aspect of teaching and learning worldwide, involving 'the practical application of knowledge for a purpose' (Spector, 2015: 5). This is a broad definition that encompasses a wide range of knowledge for a variety of purposes. Technology in itself is neither good nor bad but its purpose determines its quality (according to Spector, 2015). The application of technology in HE reflects changes in how students work towards their learning goals and in how HE institutions support these efforts (Conole et al., 2008). Traditional learning (i.e. face to face learning) reflects a teacher-centred approach to teaching and learning, whereas integrating new technologies into education moves education towards a 'student-centred' approach (Lacka & Wong, 2019). Traditional learning (i.e., face-to-face learning) reflects a teacher-centred approach to teaching and learning (e.g. use of face-to-face lectures), and can also be a learner-centred approach by using a discussion groups strategy between learners. Whereas, integrating new technologies into education not only moves education towards a student-centred approach (Lacka & Wong, 2019), but technology can move even further, if technology can also be used as a substitute for a teacher.

It must be stated here that this research uses the term 'technology' to mean digital technologies only (e.g. computers and other devices along with software applications) and excludes traditional pedagogical technologies such as blackboards and projector images (Koehler & Mishra, 2009). Digital technologies are characterised by rapid evolution (Koehler & Mishra, 2009), adaptability and variety of use (Papert, 1980), as well as opaqueness (i.e. the inner working mechanism is hidden from users) (Turkle, 1995). These characteristics render technology challenging for teachers who intend to use technology in their teaching (Ertmer, 2005; Koehler & Mishra, 2009). This perhaps requires rethinking and redesigning CPD for teachers (Ertmer, 2005; Koehler & Mishra, 2009). Brown and Atkins (2002) assert that effective teaching is complicated both socially and intellectually. Social challenges imply that teaching happens in the context of an institution, having particular instructional practices, unexamined traditions, and unexpected goals and values. To teach effectively, teachers need to have knowledge of the subject, what students know, how students learn, and how to teach. In contrast, intellectual challenges emphasise teachers' depth of knowledge. To teach effectively, teachers need to be familiar with problem-solving, analysing topics, selecting appropriate approaches, strategies, and materials, and organising tasks for students. Thus, effective teaching includes many skills that can be acquired and developed (Brown & Atkins, 2002; Koehler & Mishra, 2009).

Technology in education may be offered in the form of hardware such as cameras, laptops and smartphones, using modes of connectivity like wireless and Bluetooth, and software such as Windows and Microsoft Office or voice and image media (Kukulska-Hulme, 2009; Crescente & Lee, 2011; Nassuora, 2012; Sarkar, 2012). The use of technology in the teaching process could be conducted synchronously or asynchronously (Bonn, 2008; Mohapatra & Dash, 2016). Synchronous learning suggests that teacher and learners engage in the teaching-learning process simultaneously, while asynchronous learning indicates that the teacher and learners are communicating separately at intervals, for example via email (Bonn, 2008; Mohapatra & Dash, 2016). Many accounts of technology in HE show that it tends to alter the teacher-learner relationship by putting the learner centre-stage. In this scenario, students can lead the discussions, with the teacher assuming the role of facilitator and guide (Paechter et al., 2010; Alfahad, 2012). Technology in instruction boosts the dynamics of the education process (Bruce, 1998; Mohapatra & Dash, 2016) by encouraging student engagement as well as peer and faculty interaction in a positive atmosphere. It enables collective information-sharing, enhanced problem-solving, and learning via a safe, comfortable and flexible learning environment for mutual exchange of information without any barriers of time and place (Alavi, 1994; Bruce, 1998; Alfahad, 2012; Whitaker et al., 2016; Henderson et al., 2017).

However, technology in HE has some disadvantages. Alfahad (2012) and Henderson et al. (2017) caution that technologies in education could have harmful effects on students such as eyestrain and possibly depression, which lead to difficulties in focusing on tasks. It has been pointed out that the cost of acquiring, installing, and maintaining ICT equipment is high (Alfahad, 2012; Sarkar, 2012) and that English, the language dominating much of the software, may act as a barrier for non-English speaking teachers (Sarkar, 2012). Furthermore, ICT in HE may cause anxiety for some students and teachers, mainly due to the emphasis on student-centredness (Sarkar, 2012; Hwang et al., 2015), as it requires students to accept responsibility for their own learning, to attend classes with a basic understanding of the subjects, and to develop the ability to engage and participate in class discussions (McLaughlin et al., 2014; Hwang et al., 2015). The teacher's role involves guiding students and providing activities to encourage creative thinking, as well as creating opportunities for interaction and giving feedback. Interestingly, however, research by Whitaker et al. (2016) suggests that students learn effectively whether with or without technologies.

Another concern about technology use in HE is the possibility of losing opportunities for face-to-face social interaction (Bonn, 2008), while Koehler and Mishra (2009) point out that social and contextual factors are often unsupportive of teachers who wish to incorporate technology into their work. For example, some teachers have inadequate experience of using technology for instruction, contributing to their insufficient preparedness to use technology. Other teachers face a shortage of time for gaining new skills, leading reaearchers such as Ertmer (2005) to recommend adequate training for teachers. Orellana et al. (2005) found that the level of ICT skills in basic applications such as email, design, and programming among university teachers is low. Al-Jarf (2007) reported that only 50% of the teachers in a study sample had basic computer skills, with 5% having some knowledge about online courses and only 1% being expert users (Al-Jarf, 2007). Similarly, Ageel (2011) found that teachers' ICT proficiency at Jazan University in Saudi Arabia was limited and Roth (2014) also came to the same conclusion.

In light of these inconsistent findings on technology in education, Henderson et al. (2017) encourage institutions to be more enthusiastic, given what could be achieved by integrating technology into HE. They also call for more research into the effects of technology in the HE sector, and suggest that integrating technology into HE could be the best way of solving its current problems. Given the mounting number of tasks individuals have to undertake these days, investing in technology in education may be the only option (Sarkar, 2012).

Given that teachers' decisions to integrate technology in teaching may depend on their individual beliefs, concerns, preferences and perceptions (Dusick & Yildirim, 2000; Grasha & Yangarber-Hicks, 2000; Albion & Ertmer, 2002), it is important to explore university teachers' opinions of one specific mode, flipped mobile learning (FML). If they have a positive orientation towards this form of learning, they will tend to find it easier to integrate it into their teaching. In addition, if university teachers feel positively about themselves in relation to their previous experiences of technology, they are more likely to find benefit in integrating FML as a teaching tool. Teachers' views of teaching practices and styles are a powerful influence on their decisions to integrate technology into teaching (Alfahad, 2012). Grasha and Yangarber-Hicks (2000: 3) make the point that teaching styles are based on 'the needs, emotions, motives, beliefs, and attitudes of the teacher and that these teaching practices, when used positively, are the force behind student success'. In the light of this observation, this study uses semi-structured interviews to ask a sample of university teachers questions such as 'How do you describe your relationship with technology?', 'Do you employ technology in the educational process or do you use it only in everyday life situations? Why?' (for more detail see section 4.9.4 'The Semi-Structured Interview'). In the pre-training questionnaire of this research project, participants were also asked questions such as 'Have you attended any training courses or workshops about mobile learning/ flipped learning/creating electronic lectures?', 'Have you provided any educational activities via a mobile learning/flipped learning environment?', 'Do you prefer to attend a training session via a flipped mobile learning environment?', 'Do you prefer to attend a training session about flipped mobile learning environment?', and 'Have you ever presented an electronic lecture?' (see section 4.9.1 'The Pre-Training Questionnaire').

Secondly, Alfahad (2012) further reports that competency is one of the factors that determines the use of technology in teaching. For instance, some teachers have ten or more years of teaching experience but are reluctant to integrate technology into their work because they feel they lack the skills. This could be due to inadequate university teacher training or failure to provide subsequent CPD training in technology for education during their academic career (Rosenfeld & Martinez-Pons, 2005). Alfahad (2012) suggests that offering CPD training in technology would reduce teachers' anxiety in this area and promote both confidence and competency. To explore this idea further, section two of the pre-training questionnaire of this study aims to elicit teachers' opinions about CPD programmes by asking, for example, 'The number of training courses or workshops you have attended during a semester', 'The number of training courses or workshops you have attended during a semester is sufficient', 'The number of training courses or workshops presented during a semester should be more', 'What kind of workshops or training courses would you like to attend?' and 'Were there any training courses that you would have liked to attend but couldn't? What were the reasons for your non-attendance?' (for more detail see section 4.9.1 'The Pre-Training Questionnaire').

Thirdly, faculty demographics, specifically age and gender, as well as institutional support, may affect the integration of technology in education. Alfahad (2012) points out, for example, that older faculty members may not have the required technological knowledge or have attended a training to successfully use technology in their teaching. Peluchette and Rust (2005) demonstrate that educational institutions may not offer the support required to motivate teachers to use technology in education. However, in more recent studies by Wang et al. (2009) and Terzis and Economides (2011), no significant relationship was found between mobile learning (ML) and gender. Based on the existing research, the above factors are important in motivating teachers to use technology. If attention is paid to teachers' beliefs, competencies and comfort with technology, there will be a stronger probability that they will integrate technology successfully into their classes.

A variety of educational and training methods have been devised (Motiwalla, 2007) to use digital technologies in education. For example, the Internet and email have greatly faciliated distance learning (DL) and this has led to various forms of electronic learning (EL) being established within universities and other institutions. Developments in EL have in turn been adapted for mobile learning (ML), since mobile technologies have become more accessible than ever throughout developed and developing countries (Ktoridou et al., 2007). Due to the fast-developing nature of technology (Koehler & Mishra, 2009), this researcher believes that the above-mentioned types of learning may also be affected by the constant evolution of software and applications. Figure 4 shows a hierarchy of different educational environments.

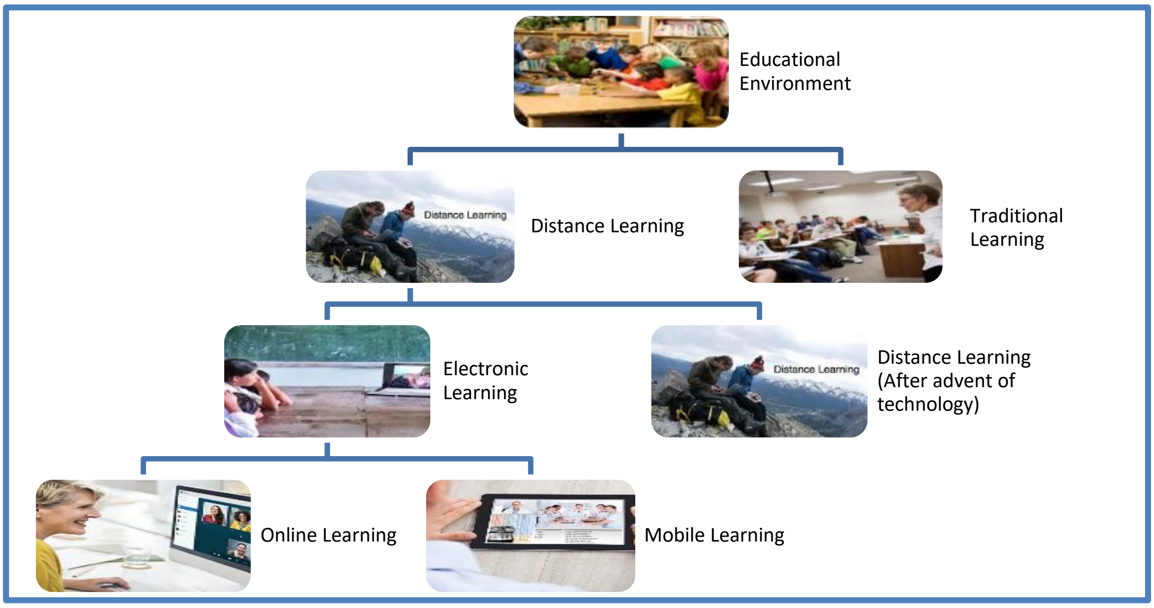


Figure 4. Hierarchy of educational environments [adopted from Ozuorcun and Tabak (2012)]

Traditional learning is conducted face-to-face (Adebari et al., 2016) and involves personal interaction between teachers and learners and between learners themselves. The traditional environment involves teachers teaching at the front of the classroom with students taking notes, on which they are summatively assessed (Bonn, 2008; Keser et al., 2011; Roth, 2014). Traditional learning holds the teacher as the centre of the learning process (Paechter et al., 2010). Some teachers and students prefer traditional learning, mainly because it allows learners to select a particular lecture according to the personality of their teachers and their manner of interaction with learners (Bonn, 2008). This attitude prevents some teachers from switching from traditional education to online or mobile education (Sarkar, 2012; Roth, 2014). Moreover, traditional education allows learners to interact with other learners (Bonn, 2008).

The second type of educational environment is ***distance learning (DL)***, which delivers education to learners who cannot attend classes in person (Moore et al., 2011; Kaplan & Haenlein, 2016). Before the advent of technology, paper-based educational materials were prepared by recognised educational institutions and posted to learners in the mail. DL now includes digital materials that are designed and delivered using technology (Dede, 1996). Georgiev et al. (2004) consider ML to be a new phase of educational technology that has evolved directly from DL and EL. Figure 5 shows the position of ML relative to DL and EL.

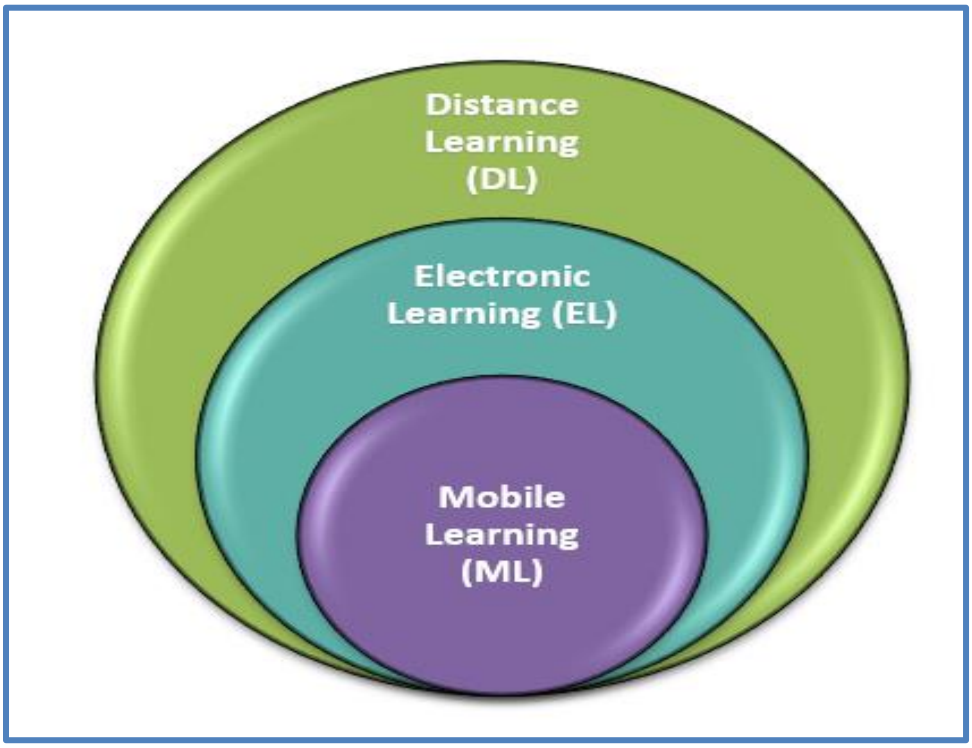


Figure 5. Position of ML relative to DL and EL [adopted from Rimale et al. (2016)]

Electronic learning (EL), the third type of educational environment, has been discussed by researchers such as Pownell and Bailey (2000), Crescente and Lee (2011), and Moore et al. (2011). Crescente and Lee (2011) define EL as any kind of knowledge that is delivered using electronic communication, whether this is via hardware such as computers and DVDs or digital means such as the Internet and intranet systems. The fourth type, ***online learning*** refers to distance learning via the Internet (Benson, 2002; Conrad, 2002). Lowenthal et al. (2009) identify that online learning is the technology medium or context within which it is used, whilst Oblinger et al. (2005) describe online learning as 'wholly' online learning. The last in this list, ***mobile learning (ML),*** uses mobile digital technologies to enable learners to overcome the constraints of location and time (Rimale et al., 2016). Digital communication technologies represent powerful means by which HE institutions can change, expand and update the ways they deliver their services (Levine, 2000).

With the proliferation of mobile devices and the growing capabilities of smart devices, DL and EL are sometimes used synonymously. In addition, some believe that ML is merely EL on a mobile device, but it is more than that. ML adds the option of student mobility to the learning experience, enabling them to access learning materials anywhere and at anytime, indoors or out, without them having to be in a particular place with a fixed device and a power source close at hand (Peng et al., 2009). Mobile telephones give learners the chance to learn in ways that are different to how they may have used desktop computers, laptops, or tablets in the past; educational institutions can thus take advantage of the versatility of mobile technology. The next section dives deeper into the concept of ML by reviewing different aspects as discussed in the existing academic literature.

3.3 Mobile Learning (ML)

'Mobile technology is changing the way we live and it is beginning to change the way we learn' (UNESCO, 2017a).

Zhang and Hung (2011) point out the need for future studies on ML, mainly because it is relatively new as a learning technology and there is currently a lack of research into its academic uses, despite our everyday familiarity with it (Abu-Al-Aish & Love, 2013). The advent of 5G promises to further expand the potential of ML and it would be interesting to observe whether and how HE institutions are making educational use of the many new applications flooding the market.

3.3.1 Concept of Mobile Learning

There is no comprehensive definition of ML; however, the researcher has identified three ways in which it has been defined historically. Some researchers view ML as a subset of EL, suggesting that the use of handheld technology is only for delivering EL. Kadirire (2009: 15) summarises ML thus:

> 'Mobile learning is a form of EL, which can take place anytime, anywhere with the help of a mobile communication device or any such small portable devices'.

Some other researchers regard ML as a lateral move in relation to DL. This view focuses on the prevalence of devices. For example, Crescente and Lee (2011) suggest that ML is shaped by DL, allowing learners to access information through mobile devices at a time that suits them most. Similarly, Korucu and Alkan (2011) demonstrate that ML is a model of DL and aims to use mobile technology to meet learners' educational needs independent of time and place. A final group of researchers believes that ML is an independent discipline, emphasising the mobility concept where learners learn a specific concept whenever they need it and apply it after having learnt it (Alrasheedi & Capretz, 2015); this view includes devices that allow learners to engage in just-in-time learning

(Alrasheedi & Capretz, 2015). This thesis intends to adhere to this latter definition of ML and seeks to show that ML is a kind of independent education with its own criteria and limitations, irrespective of other models of learning. Below, several definitions will be presented and discussed.

Vavoula et al. (2004) consider ML to be a kind of learning that occurs through mobile technologies when the learner is not in a fixed place. Similarly, Traxler (2009) says that ML is accessing educational content via smartphones (e.g. personal digital assistant devices (PDAs) and handhelds). Greener (2012) offers a broader definition and observes that ML not only allows learners to collaborate in educational activities but also to communicate without any specific location. Rimale et al. (2016) add that ML is a kind of learning that enables learners to overcome the constraints of location and time. According to UNESCO (2017a), ML enables learners to learn anywhere and at any time. UNESCO's (2017a) definition of ML is a technology that allows learner mobility (the ability to learn whenever and wherever the learner wants), technology mobility (via mobile devices only), and learner technologies (in tandem with another ICT tool).

Although scholars have not reached a comprehensive definition of ML, an appropriate explanation can be made for this term based on the various descriptions mentioned in the literature. Thus, ML is learning that enables a learner to access educational content anywhere and at any time through any mobile technologies. Various terms have been used to refer to mobile learning, such as m-learning, ML, ubiquitous learning, u-learning, learning while mobile, handheld learning, personalised learning, and anytime/anywhere learning (Crescente & Lee, 2011; Razek & Bardesi, 2011). ML is sometimes referred to as a dynamic digital environment (UNESCO, 2017b, and 2017c). This study uses ML to mean mobile learning.

There are several gaps in the ML literature, with only a few studies on the impact of ML on different courses and a few others on educational design, which must be used when organising mobile learning environments (Korkmaz, 2015). However, Wu et al. (2012) found that ML can have a positive effect on education. Around 90% of the ML literature focuses on how it affects students (Baran, 2014; Soykan & Uzunboylu, 2015) and only 10% of the research examines it from the point of view of teachers (Soykan & Uzunboylu, 2015). Wang et al. (2009) report that gender differences are moderate and there may be no strong relationship between ML and gender. Investigating gender differences in accepting computer-based assessment, Terzis and Economides (2011) found that both genders gave similar results. The current thesis concentrates only on female faculty members, and it is hoped that the findings of this research can benefit women-only HE institutions in KSA and elsewhere.

3.3.2 Mobile Learning Applications and Devices

Crescente and Lee (2011) define applications (apps) as programs installed in a device to provide information that users want to know. Zhou et al. (2012) describe applications as programs in a device driven with specific tasks. There is considerable competition between Apple, Samsung, and Google to provide the best hardware and apps to benefit users most. Apps are normally available, either free or for a small charge, through Apple Store, Google Play Store, and Amazon. Examples of apps include social media platforms such as Twitter, where people can communicate with each other, obtain information, and post photographs or videos. There is also a plethora of entertainment apps for playing games such as Subway Surf, and apps for shopping such as Wish. An increasing number of educational apps are providing new opportunities to learn, such as Preschool All In One, which helps to teach mathematics and literacy to children, and Duolingo for language learning for all ages. Prime examples of apps that offer university level teaching are Coursera, Khan Academy, and Acadox in English, while Rwaq, and Edraak are popular in Arabic speaking countries.

This study uses the Acadox app to explore the experiences and views of two of the experimental groups (i.e., Groups B and C). Acadox, whose name is derived from '*aca*demia *doc*umentation' is a virtual, online environment which permits users to manage coursework, connect and collaborate with other learners, exchange information and document their achievements (Acadox, 2020). Acadox has been chosen because it is free and compatible to Arabic and English languages, and the interface of the app is simple and user friendly. It uses maximum security and safety to assure data confidentiality, regular updates, and data backup (Acadox, 2020). More detail about Acadox appears in section 4.7 'The Acadox Platform'. For the purpose of this research, the participants were required to have the technological knowledge (TK) to use apps such as as Snapseed and PhotoDirector (for creating and editing pictures), Viva Video and YouCut (for making and editing videos), Prezi and PowToon (for making presentations), and Soundcloud (for audio production). Competency in apps such as these is necessary for e-lecture design and production.

As early as 2012, Wu et al. (2012) were suggeting that teachers should use mobile educational apps in their teaching. Melhuish and Falloon (2010) also strongly recommended that teachers manage their time efficiently by using apps. Because of the large number of apps available which essentially perform the same tasks, they proposed that teachers should initially spend time identifying the best app for their needs. However, it is not just educational apps that are relevant in the HE context, but everyday social media apps such as Facebook can be useful because they enable communication between groups of students.

In a quasi-experimental study by Amin et al. (2015), they evaluated the effectiveness of Acadox as a learning environment for the development of student skills in creating digital repositories. A measure of social interaction and an evaluation product card were used with a sample of twenty-five students in the 3rd Division in Instruction Technology, Specific Education Faculty, Minia University. The system permitted the learners to prepare before class via activities offered through the application. During the activities, learners exchanged information in the form of text messages, videos and photographs, as well as documenting their achievements. Findings showed the feasibility and effectiveness of Acadox for the development of creating digital repositories skills for students. As well, their study showed that Acadox not only improved the digital skills of the learners, but also gave them the skills to concentrate and not be distracted; and this result has also been confirmed in the quasi-experimental studies of Khalaf Allah (2010), Al-Fawzan (2013), Abbadi (2014), and Alshawi (2016).

Both the quasi-experimental research of Ammar (2015) and the experimental research of Alshawi (2016) have shown the effectiveness of Acadox in developing technological concepts and electronic communication skills. Both of these studies used a test to measure the cognitive aspects and an evaluation card to measure skills. Recent research by Al-Wakeel (2020) studied the effects of flipped learning via Acadox on students' cognitive achievements and on the teaching skills of music teachers. The study used quasi-experimental design with pre-and post-testing and featured a questionnaire plus evaluation card. The results show that flipped learning using the Acadox platform contributed to developing cognitive achievement, as well, it increased some participants' teaching skills.

Based on empirical studies that investigate the use of mobile education, the researcher has identified that the devices suitable for studying ML include smartphones, PDAs, tablets, laptops, and digital/personal media players.

3.3.3 Mobile Learning Features

The first feature of ML is its mobility, which gives learners and teachers the flexibility of time, place, pace, and space (Corbeil & Valdes-Corbeil, 2007; Alrasheedi & Capretz, 2015; Mohapatra & Dash, 2016). Mobility can also be said to extend to the content, as barriers to physical access are removed and processing time is reduced. This feature leads to the second feature of ML, which is that the learner feels the convenience of time and place, which allows learners to access learning anytime, anywhere, and based on demand. The third feature of ML is that it can enable increased collaboration between learners during the learning process (Alrasheedi & Capretz, 2015). Traditional learning can also incorporate collaboration, of course; however, ML gives learners the opportunity to interact with fellow students and teachers who live at a distance, and the flexibility to do this outside of class teaching times. Fourth, the application design is user-friendly (Alrasheedi & Capretz, 2015), and fifth, ML is very flexible in that it allows learners easy access to many different kinds of learning resources. Thus, ML is a form of performance support (Corbeil & Valdes-Corbeil, 2007; Crescente & Lee, 2011; Alrasheedi & Capretz, 2015). In addition to these features, ML can increase teaching and learning productivity and decreases costs associated with training, e.g. logistics (Corbeil & Valdes-Corbeil, 2007). Finally, ML provides information to learners in a self-contained package which allows adding, deleting, and amending to be done quickly and in one place (Crescente & Lee, 2011).

3.3.4 Benefits and Challenges of Mobile Learning

The existing literature identifies a great number of benefits of using ML within education. Many studies have emphasised that ML can provide easy and quick access to information (Botha & Butgereit, 2012; Pimmer et al., 2014). This is particularly useful for learners who have physical, cognitive, behavioural, social problems as well as for those who are talented, remote, internationally located, middle-aged, and based at home (Strom & Strom, 2002; Savill-Smith & Kent, 2003; Cobcroft et al., 2006). Second, ML can have a positive effect on the teaching and learning process (Ktoridou et al., 2007; Motiwalla, 2007; Evans, 2008; Ozuorcun & Tabak, 2012; Taleb & Sohrabi, 2012), allowing learners and teachers to utilise their free time more flexibly (Liaw & Huang, 2011). Third, ML can enhance learning by encouraging learners who are interested in innovation and technology to learn about the characteristics of mobile devices and the uses of each application (Mehdipour & Zerehkafi, 2013). Fourth, ML can not only improve learners' skills in literacy and numeracy but can also determine the areas where they need support in their learning process (Brown, 2003; Cobcroft et al., 2006; Ozuorcun & Tabak, 2012; Hylén, 2015). It can also assist learners to concentrate for longer periods and can raise their self-confidence (Brown, 2003; Attewell, 2005; Cobcroft et al., 2006; Ozuorcun & Tabak, 2012; Hylén, 2015). Several researchers have indicated that learners who use mobile devices are motivated and engaged, and are hence likely to attain higher levels of achievement (Wang et al., 2009; Rogers et al., 2010; Aziz, 2015) and comprehensive understanding (Motiwalla, 2007). Some sources believe that teachers need to update their instructional methods (UNESCO, 2002) by moving from traditional to mobile education (Sarkar, 2012; Roth, 2014). In this way, teachers may succeed in improving pedagogy and making the lecture content attractive, especially given that lecturing is considered the least effective method for presenting knowledge and providing explanations (Brown & Atkins, 2002; Sarkar, 2012).

On the other hand, ML has significant weaknesses. The researcher classifies these challenges into four types and these comprise challenges related to (1) educational environments, (2) tutors, (3) learners, and (4) mobile devices.

1. **Challenges Related to the Educational Environment:** This challenge focuses on the lack of broad access, even in developed countries (Corbeil & Valdes-Corbeil, 2007), meaning that a country may have a strong ICT infrastructure but not at all locations, mainly because of high maintenance costs. Therefore, trainers and teachers who use ML should ensure that their learners have a reliable mobile signal and Internet connections. In addition, technical support may also pose a challenge (Corbeil & Valdes-Corbeil, 2007), in that a device may fail to connect or be infected with a virus, which affects its function. Therefore, trainers and teachers who use ML should ensure the availability of technicians in the HE institutions where they work.
2. **Challenges Related to the Tutors:** Ozuorcun and Tabak (2012) warn that mobile devices may weaken the relationship between teachers and learners. In the case of ML, it is very difficult for teachers to interfere or influence their students' motivation. The high level of teacher-learner interaction will lead to great satisfaction in the information received (Martin et al., 2012).
3. **Challenges Related to the Learners:** Mehdipour and Zerehkafi (2013) caution that lack of digital access could potentially disappoint or frustrate learners. Similarly, Corbeil and Valdes-Corbeil (2007) warn that learners who are not adequately familiar with technology may experience feelings of isolation. Furthermore, distractions caused by using other functions of mobile devices undermine learners' concentration during lessons (Pollara, 2011). To reduce this, learning must be attractive, useful, and engaging (Allen, 2011; Nassuora, 2012).
4. **Challenges Related to the Mobile Devices:** The first challenge is the small internal storage capacity, which may quickly be filled with downloaded materials (e.g. Boulos et al., 2011; Chanchary & Islam, 2011; Elias, 2011; Nassuora, 2012). The second challenge is information access, in that ML may not be a very accurate tool of evaluation, and this could affect examination results (Ozuorcun & Tabak 2012). Theft or loss of devices may affect the security of confidential data held on mobile telephones (Boulos et al., 2011), and educational information exchanged during ML could be easily lost in this way. Finally, it is necessary to keep batteries charged, lest work be lost (Perry, 2003; Maniar et al., 2008; Nassuora, 2012; Fong, 2013; Mehdipour & Zerehkafi, 2013; Narayanasamy & Mohamed, 2013).

3.3.5 Mobile Learning in Higher Education and Teacher Training

A systematic review by Anohah et al. (2017) shows that the primary focus of ML studies is on the effectiveness and implementation of ML solutions. More importantly, they also claim that ML can raise several affective traits among learners. Ferry's study (2009) focused on how mobile learning helped pre-service teachers to augment their developing pedagogy. The study included five schools that participated in the study for six weeks. During professional training, the pre-service teachers had access to mobile telephones that had Microsoft (MS) Excel, Word, video recording, and other features. The findings demonstrate that the mobile learning approach contributed effectively to the professional growth of pre-service teachers. In Australia, Kearney and Maher (2013) worked on understanding the ML approach to enhance pre-service mathematics teachers' professional learning. Qualitative data were gathered from sixteen pre-service teachers using case studies, focus groups, and interviews. The results emphasised that pre-service teachers explored the features of ML in mathematics teaching contexts and they also exploited iPad benefits in their CPD. The experiences stimulated the pre-service teachers' thinking about ML applications in mathematics teaching contexts.

Seppälä and Alamäki (2003) studied the use of ML in training teachers in Finland. Their qualititative data were gathered from only five teachers via group interview. The findings showed that using mobile technology in teacher education was generally a positive experience and that ML creates flexible teaching solutions, which enables access to information and produces materials flexibly. These results were confirmed by Aubusson et al. (2009). They researched the potential of ML in professional learning in Australia and the UK by interviewing eight teachers. The mixed methods of Mahruf et al. (2010) evaluated the effects of using ML to enhance teaching and learning in English-language classrooms from the teachers' perspectives. Involving around fifteen teachers on a CPD programme in Bangladesh, the study collected their perspectives via survey, observations, and interviews. The findings demonstrated that the teachers felt a lack of confidence in their professional knowledge and skills in using ML in their classroom practice. As well, the teachers had already experienced difficulties in dealing with the technologies but managed to create time and space for professional learning. ML facilitated their access to learning, as well as improving the quality of teacher training. Ekanayake and Wishart (2015) implemented professional development workshops to integrate mobile devices into science teaching for eighteen teachers in Sri Lanka. The qualitative approach used observations and field notes to collect data. The findings showed that CPD enhances teachers' recognition of the educational potential of mobile telephones in science teaching. Moreover, CPD supported teachers in changing their attitudes towards the use of mobile telephones in teaching and sharing knowledge and skills related to using applications.

However, Alfarani (2015) considers that certain factors could affect ML in the Saudi HE context and investigates the effect of age and experience on use ML. Questionnaires were used to collect data from 165 faculty members. The findings showed that resistance to change and perceived social culture are two factors that affect the use of ML among faculty members, and that perceived social culture is a stronger influence on ML than resistance to change. Alfarani noted that resistance to change significantly affected the use of ML by older participants rather than younger. As the current study was conducted in KSA, the next section discusses ML in the Saudi context.

3.3.6 Mobile Learning in Saudi Arabia

When numerous educational institutions in Europe adopted the use of mobile technology and worked on implementing it in real life (Hylen, 2012), KSA was in an early period of its implementation (Alfarani, 2015), with laptops being the most popular device (Nassuora, 2012). Narayanasamy and Mohamed (2013) observed that ML was most popular among young Saudi learners. The Qassim College of Medicine announced the first use of ML programmes in KSA (Garg, 2013), with public universities pioneering mobile applications (Al-Wabil, 2015).

In 2015, the Saudi Communications and Information Technology Commission (CITC) announced that the use of IT had grown only by 14% in ten years, which rendered KSA the least developed in IT of the Gulf countries at that time (Alturise et al., 2016). In addition, the limitations of ML use in KSA were made worse by low Internet speeds and the growing number of Internet users (Nassuora, 2012). In 2017, KSA ranked 96th in the world out of 122 countries and 12th in the Arab world for Internet speed, with an average of 10.47 Mbps (Speedtest, 2017). This can be compared to the United Arab Emirates, which ranked eighth in the world and first in the Arab world with 46.04 Mbps (Speedtest, 2017). However, also in 2017, KSA ranked second in the Arab world in terms of the number of Internet users (about 24 million), meaning that more than half the population of KSA (estimated at 32.6 million) had Internet access (Sabq, 2019). Since completing data collection and obtaining the results of this study, and since the spread of the COVID-19 pandemic around the world, the Kingdom has significantly improved its technological infrastructure and Internet speeds have become much faster. Its global ranking in Internet speed jumped to tenth in the world in 2020 with 55.71 Mbps (SPA, 2020). Thus, the above numbers reflect significant adoption of the Internet in KSA, as well as high usage of technology devices. Based on such massive investment in technology among Saudis and significant use, it is important to consider its uses in education.

Another challenge to ML involves network technologies. In 2005, the Saudi Telecoms Company (STC) was the only mobile service provider nationwide. By the end of 2005 and 2008, Mobily and Zain had been established and all of these companies competed to offer the best 3G service possible. According to CITC's report of 2015, the growth of IT in KSA is due to increasing interest in technology, the start of e-government projects, continuous investment in technology and infrastructure, and increasing demand on smartphones and tablets consequently increasing spending on them. However, although ML is widely recognised, it continues to face some limitations in KSA.

This literature review illustrates that while there is ample evidence for the positive uses of ML in teaching and learning, considerable challenges are still existing that need to be overcome. For example, there is a lack of academic knowledge regarding the extent to which teachers own the skills to use mobile technologies productively and creatively in their teaching. For example, whether they are able to design and produce their own e-lectures for students. This research seeks to provide a better understanding of teacher training in flipped mobile learning and in e-lecture creation. The next section of this literature review looks at the concept of flipped learning in more detail.

3.4 Flipped Learning (FL)

'The lecture at home and the homework in class' (Bergmann & Sams, 2012: 13).

The concept of the flipped classroom is not new; however, it has gained great attention in the past decade (Lundin et al., 2018). It is discussed in the literature under different names (Eppard & Rochdi, 2017), such as inverted learning (Lage et al., 2000; Strayer, 2012) and peer instruction (Crouch & Mazur, 2001). This thesis uses the term flipped learning (FL). Previous studies have defined flipped learning as involving information transfer outside of the classroom, whereas class time is devoted to questions and discussions. Although Lage et al. (2000) are considered the founders of flipped learning, Bergmann and Sams (2009) were early adopters of this concept, providing videos for their students to watch at home and using class time for projects and discussions. Since 2009, technology has changed the way information is delivered in flipped classrooms, in the sense that videotapes or digital versatile discs (DVDs) have now been replaced by the downloading and streaming of video material (Eppard & Rochdi, 2017).

3.4.1 Concept of Flipped Learning

In contrast to the practices of traditional learning environments, FL gives students access to educational information which they need to read, listen to or watch before they attend a discussion class (Eppard & Rochdi, 2017). Lage et al. (2000) define flipped learning as an instructional method by which the events that traditionally occur within the classroom are flipped to occur *outside* the classroom and vice versa. Other researchers (e.g., Gannod et al., 2008; Bishop & Verleger, 2013;

Gaughan, 2014) define flipped learning as involving watching videos outside the classroom, then, it is followed by learning inside the classroom through learning in an interactive group. In other words, the transmission of information takes place before the classroom time first, followed by the assimilation of that information within the classroom (Talbert, 2012).

Gannod et al. (2008), Strayer (2012), and Tucker (2012) comment that flipped learning relies on the use of technology with hands-on activities to present course content to students outside of the classroom, while inside the classroom, they engage in in-depth debates on that content, working through problems and engaging in collaborative learning. Some practitioners use video clips (Gannod et al., 2008; Tucker, 2012; Mason et al., 2013), whilst others draw on other interactive technologies or materials, such as handouts and textbooks (Strayer, 2012; Prober & Khan, 2013; McLaughlin et al., 2014). If videos are used to present the course content, teachers very often need the relevant technological knowledge (TK) to design and produce them as well as make them available to students (more detail in section 3.9 'Theoretical Framework'). Although much educational content is available on sites such as YouTube, it may be preferable for the teacher to produce their own videos tailored to the needs of their students. This is because only the teacher is able to decide the most appropriate content for their students that is also suited to their age and educational requirements. For example, a video about healthy nutrition is bound to be qualitatively and quantitatively different depending on whether it is aimed at elementary pupils or undergraduate students. This thesis draws on the FL definitions of Gannod et al. (2008), Strayer (2012), and Tucker (2012) mainly because of their comprehensiveness.

3.4.2 The Advantages and Challenges of Flipped Learning

FL offers a variety of advantages for teachers and students. It helps teachers concentrate on student-centeredness (Strayer, 2012; Mason et al., 2013; McLaughlin et al., 2014). Collaborative and problem-based learning activities are presented to students (Strayer, 2012; Mason et al., 2013; McLaughlin et al., 2014; Hwang et al., 2015; Al-Wakeel, 2020), which allows teachers to utilise their time identifying students' needs and problems, with a view to creating activities and improving the curriculum (Strayer, 2012; Mason et al., 2013; Prober & Khan, 2013; Francl, 2014; McLaughlin et al., 2014). In addition, it enables teachers to cover more course material than would be possible in the classroom alone (Mason et al., 2013). Francl (2014) and McLaughlin et al. (2014) remark that FL encourages shared responsibility between teachers and students, and helps teachers remain deeply engaged with students during their participation in learning activities (Gannod et al., 2008; Strayer, 2012; Prober & Khan, 2013; Moffett & Mill, 2014; Al-Wakeel, 2020). Reaearch shows that both teachers and students accept the flipped approach (Gilboy et al., 2015) and confirms positive perceptions towards FL (Lage et al., 2000; Pierce & Fox, 2012; Critz & Knight, 2013; Davies et al., 2013; Mason et al., 2013; Wilson, 2013; Love et al., 2014; McLaughlin et al., 2014). In contrast, Strayer (2012) and Missildine et al. (2013) have observed that students were not as satisfied with the flipped classroom as teachers.

Bishop and Verleger (2013) and Lundin et al. (2018) found in their literature review that students' perceptions of FL were mixed, although generally positive. Davies et al. (2013) observed that technology-enhanced FL was more effective; however, Bishop and Verleger (2013) found that students tended to prefer traditional lectures to video lectures, mainly because of the interactive nature of the former. Although it has been observed that students sometimes initially struggle with the FL approach (Mason et al., 2013), and although it has been perceived by students as a burden on their free time (Smith, 2013), they have also been seen to adapt quickly to this approach and to develop positive attitudes to the point where they preferred FL over traditional learning (Lage et al., 2000; Pierce & Fox, 2012; Critz & Knight, 2013; Mason et al., 2013; Chen et al., 2014; Gilboy et al., 2015). During FL, students may enjoy working together and learning from each other's explorations, and feel comfortable asking questions in class (Lage et al., 2000). Enjoyment of FL in turn can lead to increased attendance, improved study efforts, and good performance (Tune et al., 2013; Chen et al., 2014; McLaughlin et al., 2014; Kong, 2015). The findings of Moffett and Mill (2014) stand in contrast to the results of Tune et al. (2013), Chen et al. (2014), McLaughlin et al. (2014), and Kong (2015); Moffett and Mill (2014) showed in their study that academic performance was better in the traditional classroom rather than in an FL environment.

FL can take into account the individual differences between students (Lage et al., 2000; Critz & Knight, 2013; Davies et al., 2013; Mason et al., 2013; Smith, 2013; Tune et al., 2013; McLaughlin et al., 2014) and can be used to guide students' thinking and discussions and provide feedback and advice (Hwang et al., 2015; Al-Wakeel, 2020). Gannod et al. (2008), Strayer (2012), Tucker (2012), Mason et al. (2013), McLaughlin et al. (2014), and Al-Wakeel (2020) agree that FL helps students to obtain a deeper level of knowledge before class. Francl (2014) and Al-Wakeel (2020) both point out that FL allows students to learn without the constraints of time or space and helps students who miss classes to catch up. This approach allows students to have access to the course content over a longer period of time, regardless of what interactive technologies or materials are used (Prober & Khan, 2013; Moffett & Mill, 2014). Flipped learning also encourages students to conduct more research on related subjects, particularly given the increasing number of social networks (Francl, 2014). Students engaged in flipped learning tend to be more active and more motivated (Critz & Knight, 2013; Wilson, 2013) and are likely to use higher-order thinking (according to Davies et al., 2013; Francl, 2014; Alsowat, 2016; Al-Wakeel, 2020). Enfield (2013), Wilson (2013), and Gilboy et al. (2015) carried out studies about the effectiveness of FL on learning achievement and the development of learners' skills. The results showed that FL contributed to an increase in achievement as well as an increase in the level of learners' skills.

In contrast to these advantages, learners may face certain challenges with FL; for example, Gannod et al. (2008) and Bergmann and Sams (2012) observe that students are not able to ask questions immediately and have to wait until class time. Another disadvantage of flipped learning is that students may be reluctant to attend class and choose to only watch the videos (Gannod et al., 2008). For this reason, the author of this present study was careful to make it clear to the participants that they were required to both watch the videos and attend the sessions, otherwise they would not be able to continue with the experiment. Strayer (2012) and Al-Wakeel (2020) have suggested that students need to adopt a number of approaches to learning activities, such as flipping the class and home environments, engaging in discussions with teachers and peers, and collaborative work. McLaughlin et al. (2014) found the level of student satisfaction with flipped learning to be limited, while Demski (2013) and Al-Wakeel (2020) make the point that FL works best if students take more responsibility for their learning and abandon the expectation that they will be spoon-fed information by the teacher. Therefore, Strayer (2012) recommends that classroom and back-to-back activities be carefully organised to constructively support each other and should take into account the individual differences between the learners (Mason et al., 2013); otherwise, flipping traditional classroom activities may hinder student learning instead of promoting it. In addition, teachers need to prepare learners before applying any new strategy (Al-Wakeel, 2020).

In terms of the challenges that face teachers using FL, Al-Wakeel (2020) points out that its initial implementation could be very time consuming and that teachers may find it difficult to abandon their traditional role of instructor and become more of a facilitator. Hwang et al. (2015) suggest that teacher preparation is an important step in implementing this approach, while Findlay-Thompson and Mombourquette (2014) emphasise that teachers should ensure they are up to speed with the technological skills needed to successfully produce and disseminate digital content. Technological knowledge (TK) forms a part of the TPACK framework (Koehler & Mishra, 2009) used in this research (see section 3.9 'Theoretical Framework') and is important because developing the technological skills to produce engaging e-lectures is vital to the success of FL.

3.4.3 Flipped Learning in Higher Education and Teacher Training

Bishop and Verleger (2013) and Lundin et al. (2018) have conducted systematic reviews which illustrate that previous research on flipped learning is relatively fragmented. Bishop and Verleger (2013), for example, found that learner perceptions of flipped learning are very mixed, although generally positive, and Lundin et al. (2018) drew similar conclusions. More importantly, Bishop and

Verleger (2013) found that student learning improves with flipped learning compared to traditional learning. However, they reported that students preferred traditional lectures that were interactive to watching video lectures.

Al-Wakeel (2020) has called for teachers to be trained in an FL approach because of its potential to improve academic achievement. Recent research by Lee (2020) on the effect of using FL in CPD for university teachers followed Kirkpatrick's 4-level model. Around 34 academics attended a CPD programme which was delivered using the FL approach. Questionnaires and semi-structured interviews were used to collect data and the results showed that FL was an effective way of delivering CPD. In addition, the outcome reached Level 3 of Kirkpatrick's model, meaning that the academics applied their acquired knowledge and skills in their teaching practice. Belmonte et al. (2019) investigated the extent of using FL as an innovative teaching method amongst teaching staff in HE. Data were collected quantitatively through questionnaires given to 316 teachers from different educational centres in Spain. The findings showed that a significant number of university teachers lacked the technological skills to use FL properly. While they felt inadequately trained for FL, at the same time they also held a certain apprehension towards innovative practices.

Lundin et al. (2018) found 312 research publications involving studies of flipped learning approach in the United States (USA), compared to only three in the Kingdom of Saudi Arabia (KSA). The paucity of research in Arabic countries in general, and Saudi Arabia in particular, indicates that more should be done to include these countries in studies to evaluate innovative educational methodologies like FL, especially in the light of today's rapid developments in digital and mobile technologies (Bishop & Verleger, 2013; Giannakos et al., 2018; Lundin et al., 2018).

Having reviewed the relevant literature, it can be said that flipped learning has a positive impact on the teaching and learning process although it is not without its challenges, especially in altering the deeply-held affinities of both teachers and students to traditional learning methods. The review has also shown that there is no research to investigate how HE teachers develop the skills to produce e-lectures in order to teach students using the FL approach. The present study, therefore, seeks to provide a better understanding of how the technologies and techniques of flipped mobile learning are both taught and used in HE CPD courses in order to train teachers to produce successful e-lectures. The next section looks at the educational potential offered by combining ML and FL to create a proposed flipped mobile learning environment (FML).

3.5 The Proposed Educational Environment of Flipped Mobile Learning (FML)

Saudi HE faces several challenges, including the current situation of vastly higher numbers of students than there are teachers to teach them (Roy, 1992; Onsman, 2010; Alissa, 2011; Almalki, 2011). At the same time, there is a lack of teacher training and CPD for university academics (Abdulkarim, 2009), a situation which is further complicated by the traditional gender segregation in Saudi education (Almalki, 2011). Although these challenges cannot be resolved in the traditional learning environments, researchers are waking up to the great potential of modern digital and mobile communication technologies in education. These can be used to teach large numbers of students with fewer teachers and less financial outlay, including the removal of space and time limits. Mobile technologies in education also allow Saudi women to teach not only women students, but men also, since ML removes the need to occupy the same physical space as the student. Flipped mobile learning thus has the potential not only to solve the problem of teacher shortages in Saudi universities, but also to dissolve the restrictions of gender segregation.

This study examines the potential benefits of using mobile learning in flipped environments, which is termed here the flipped mobile learning (FML) approach. The integration of ML with FL represents an attempt to overcome the disadvantages arising from the independent application of each learning method (see section 3.3.4 'Benefits and Challenges of Mobile Learning'), and to make use of the advantages of FL and ML in university teachers’ CPD programmes. The main focus of this study is to gain a better understanding of the perceived and actual outcomes of FML in training Saudi university teachers to improve the skills to create and produce their own e-lectures, with a view to increasing the use of e-lectures in HE. In addition, this study explores university teachers’ opinions of FML, since this, in turn, can help them to understand their students’ difficulties in adapting to FML. Ultimately, it is to be hoped that the use of FML in universities will help teachers to cope with increasingly large numbers of students, while removing the challenges of gender segregation and proving cost-effective to administer.

FML, therefore, can be characterised as a combination of mobile learning (ML) with flipped learning (FL) to gain the benefits of both. Aligning with the general concensus of the literature regarding the positive effects of ML (Ktoridou et al., 2007; Motiwalla, 2007; Evans, 2008; Ozuorcun & Tabak, 2012; Taleb & Sohrabi, 2012; Wu et al., 2012) and FL (Lage et al., 2000; Pierce & Fox, 2012; Bishop & Verleger, 2013; Critz & Knight, 2013; Mason et al., 2013; Chen et al., 2014; Gilboy et al., 2015; Lundin et al., 2018), the researcher proposes that FML is likely to have positive results on teaching and learning and that mobile technology is likely to enhance flipped learning and vice versa. Since research has demonstrated that learners and teachers readily accept using mobile technology in their learning (Al-Naseer, 2008; Cohen et al., 2011; Abu-Al-Aish & Love, 2013; Almaiah & Jalil, 2014) as well as the flipped approach (Gilboy et al., 2015), the researcher expects to find that FML will also be accepted by learners and teachers.

ML is not without its weaknesses, however, which could limit its use, and the same applies to FL. On the one hand, the use of ML could potentially frustrate learners (Mehdipour & Zerehkafi, 2013), or lead to feelings of isolation (Corbeil & Valdes-Corbeil, 2007) or distraction (Pollara, 2011). By blending FL and ML, the learning process could be more attractive, useful, and engaging for learners. Allen (2011) and Nassuora (2012) recommend this approach to reduce the drawbacks of ML and make learning more attractive. It has been suggested that ML alone may lead to weak relationship between teachers and learners (Ozuorcun & Tabak, 2012). However, the researcher expects that FML could potentially widen the scope of communication to virtually ‘anytime, anyplace, and anywhere’ despite the fact that FML does not involve face-to-face communication. The role of the learner in FML is to watch a video prior to class time via a mobile app, to note any questions they have about the content, and then to straight away attend a virtual group class via the same app in order to discuss complex concepts and ask questions. According to Martin et al. (2012), this teacher-learner interaction will lead to greater student satisfaction with coursework. The implementation of FL on its own means that the learner is unable to ask questions immediately after watching a course content video and needs to wait until class time. This lag can be frustrating and may lead to students ‘going off the boil’ or losing the momentum of their enthusiasm (Gannod et al., 2008; Bergmann & Sams, 2012). By integrating mobile learning with the flipped format, it is possible to organise learning so that students are able to ask questions through a discussion panel immediately after absorbing the content component, and thus they can gain clarification and feedback without the need to wait for the physical class time. Using FL may also make the learner reluctant to attend class and choose to watch the videos only (Gannod et al., 2008). By introducing mobile learning into a flipped environment, the learner has the opportunity to learn via different modes with a device that they thoroughly understand because they use it constantly in daily life. This is what Strayer (2012) noted regarding the necessity of providing the learner with different ways of learning.

FML combines the benefits of flipped learning and mobile learning. For example, learning via a mobile device offers the mobility of the content and the flexibility for learners and teachers in terms of time, place, pace, and space (Corbeil & Valdes-Corbeil, 2007; Alrasheedi & Capretz, 2015). ML is characterised as collaborative, where learners have the opportunity to interact with fellow learners and teachers from different locations, even when they are not in the classroom (Alrasheedi & Capretz, 2015). The use of ML decreases training costs (Corbeil & Valdes-Corbeil, 2007), and those applications used in ML make the content of learning user friendly (Alrasheedi & Capretz, 2015).

On the other hand, FL allows learners to learn regardless of time or space limitations (Francl, 2014). FL offers students a deeper level of knowledge prior to lessons (Gannod et al., 2008; Strayer, 2012; Tucker, 2012; Mason et al., 2013; McLaughlin et al., 2014), since they can view the content however many times they need (Prober & Khan, 2013; Moffett & Mill, 2014). By adopting flipped learning, learners can be more active and engage in higher-order thinking (Francl, 2014).

FML could be therefore defined as ML in a flipped form. In other words, FML could be described as learning that is done by accessing chunks of course content via a mobile device before attending a group class, also accessed via a mobile device. In practice, this means that learners watch a recorded video via an app on their device before the class, and the subsequent group class time is used to collaboratively address complex concepts and answer questions. However, FML is considered as a conceptual gap in this research, and this theme is further elaborated in section 3.8 'The Research Gaps'. Due to the present lack of knowledge and understanding of the effectiveness of FML, this research seeks to evaluate current perceptions, performance and effectiveness of FML in the HE context. The researcher has chosen to do this by examining the use of FML in Saudi university teachers' CPD courses to advance their skills in e-lecture design and production. The next section reviews the literature on CPD for HE teachers.

3.6 Continuing Professional Development (CPD)

Current fast-paced technological developments have prompted a number of different sectors worldwide, including education, to use different methods to improve and update professional competencies. To this end, many countries have directed their efforts towards implementing innovative and valuable educational programmes in order to provide teachers with the best learning opportunities and improve their effectiveness and skills (Darus et al., 2009; Jackson & Makarin, 2016). CPD in education has recently received much attention from the research community (Kennedy, 2005; Avalos, 2011). Despite pre-service teacher training being fundamentally adequate, dramatic growth and changes in digital media have led to the need for university teachers to engage in CPD in order to meet educational standards and bringing technological skills up-to-date. Bennett et al. (2010) in addition to Butcher and Stoncel (2012) stated that CPD programmes are essential because they aim to develop HE teachers to help them cope effectively with changes in the demands of the employment market, both for themselves and their students. CPD in HE works on updating university teachers with new knowledge, procedures, skills and technology, and prepares them for the ever-changing responsibilities of their jobs.

Despite the difficulties of determining the relationship between teaching and subsequent academic attainment (Goodall et al., 2005), Guskey (2002) maintained that high-quality CPD is considered as one of the critical factors in educational improvement. Alexandrou et al. (2005) pointed out that teachers who provide high-quality teaching via CPD programmes indirectly influence students' success in learning and in their choices for professional fields, whereby these teachers work on facilitating knowledge and improving pedagogical practices. In this vein, CPD activities can be formal, such as professional education (long courses), professional training (workshops, short courses), professional support (mentoring) and meetings, or it can be informal such as discussions with students and colleagues. However, whether it is formal or informal, university teachers can acquire new knowledge, skills and practices, as well as develop what they have, which is critically important for influencing individuals, groups and organisations (Earley & Bubb, 2004). A number of scholars have highlighted that teachers have long-lasting effects on student outcomes (Chetty et al., 2014; Jackson & Makarin, 2016). Regarding terminology, some researchers use the phrase teacher professional development (TPD) (Leach et al., 2004; Garet et al., 2008, 2016; UNESCO, 2017d), while others call it professional development (PD) (Guskey, 2000; Scher & O'Reilly, 2009; Kennedy, 2016; Kraft et al., 2018). However, the majority of researchers prefer the term continuing professional development (CPD) (Megginson & Whitaker, 2007; Collin et al., 2012; Friedman, 2013; Simoncini et al., 2014; Ismail et al., 2016). In the context of this study, CPD will refer to all the activities offered to university teachers which enable them to advance their subject knowledge and pedagogical skills and which, in turn, can lead to positive changes whether in their thinking or in their professional behaviour.

3.6.1 Views on Continuing Professional Development

A narrow view of CPD in education holds that it trains teachers in particular skills or knowledge to deal with new requirements in education, such as learning about an updated syllabus or becoming familiar with a new curriculum. Ur (1997) states that teacher learning is associated with what teachers do for their own individual improvement. Zeichner and Liston (2013) have suggested that CPD is a kind of self-directed learning, characterised by continuity. Another view of CPD regards it as a process characterised by depth and continuity. This view proposes that CPD not only fosters teachers' skills and knowledge but also enhances their understanding and thinking. In other words, teacher development is not limited to the development of their role in education but extends to career growth, new positions, and different responsibilities. Edge and Richards (1998) describe professional development as something that teachers do for themselves and on their own. Guskey (2000: 20), however, defines CPD as pointing to '...those processes and activities designed to enhance the professional knowledge, skills and attitudes of educators, so that they might, in turn, improve the learning of students'. Simoncini et al. (2014) emphasise that CPD will not be a success if it only consists of short courses on a small scale. Hence, educational systems must ensure that teachers contribute to their thinking, engage in professional dialogue, engage in peer observation, and provide feedback. Furthermore, UNESCO (2017d) defines CPD (or TPD) as developing the level of human ability to perform actions, set goals, work to achieve them, and solve problems in a sustainable manner. In this thesis, teacher learning, teacher development, and professional development are related terms, affecting teacher practices and knowledge, aiming to bring about change for teachers. The topic of CPD remains central to the achievement of quality education and is considered as one of the most active topics in the scientific research today in the domain of development of education.

Recalling the main argument of this thesis, Anderson and Weert (2002) observed that the individual productivity and professional practice of teachers are encouraged by the use of ICT. After teachers have been educated about ICT and technological skills, they apply this knowledge to their tasks and projects and have the ability to design lessons (or lectures) in electronic form. In addition, UNESCO (2010) believes that teacher development systems facilitate ICT for this role. Roth (2014) concludes that professional development contributes to an increase in technology content knowledge among teachers. Anderson and Weert (2002) draw attention to the fact that the training for a specific topic tends to be 'just-in-time'. Certainly, the time that is available to teacher X could be unavailable to teacher Y. Thus, it is advisable to allow teachers to choose a convenient time for their training course.

UNESCO and Nokia worked together from 2012 to 2018 to advance cost-effective projects to improve the skills of primary school teachers in Africa. The UNESCO China-Funds-in-Trust (CFIT) project, titled 'Harnessing Technology for Quality Teacher Training in Africa', employed mobile technologies to improve the ability of primary school teachers to improve English language literacy skills, knowledge of early childhood, education, mathematical understanding, and concepts in a dynamic digital environment. Participants commented that these types of training were efficient and useful for allowing them to create a variety of educational resources and distribute them through digital environments (UNESCO, 2017a, 2017b). Despite being a relatively new concept (Richardson, 2011), Leach et al. (2004) predict that technology might be the best solution in the future for training large cohorts of teachers.

Although scholars have not reached a clear-cut definition of CPD, an appropriate explanation can be concluded for this term based on the various definitions mentioned in the literature. Thus, CPD is viewed as a comprehensive framework provided within institutional development according to the available opportunities and on-going processes and aims basically at teacher growth, in turn, leading to improving student learning. However, several guidelines to be considered in the teaching of adult learners have been offered by Knowles et al. (2015), which are as follows:

1. Establish learners' self-concept: Adult learners are recognised as mature learners and therefore need to move from a dependent attitude to one of self-direction;
2. Establish the learners' experience: The experiences that adult learners gathering throughout their lives raise their learning resources. Thus, active learning experiences are the most effective methods for learning;
3. Readiness to learn: Adults learners are mature people, therefore, they have more enthusiasm for learning what is related to their lives, whether their personal lives or professional. Because they are more aware of the need to add to their education, their readiness to learn will be increased;
4. Orientation towards learning: A fundamental characteristic of adult learning is following a problem-centred approach. When adult learners are ready for problem-solving in real-life learning situations, they tend to conduct an instant performance-centred assessment and evaluate whether the knowledge is useful to them or not;
5. Motivation to learn: Adults' motives for learning stem from their internal, not from external, motives;
6. Offering a safe and comfortable learning environment enables adult learners to express themselves freely;
7. Enabling adults learners involves the planning of content, curriculum and methods;
8. Enabling adult learners involves helping them to determine what they need and to translate their own needs in the form of their own learning objectives; and
9. Enabling adult learners involves evaluating their own learning process, which leads to developing their critical thinking skills.

In this regard, McQuiggan (2007) emphasised the significance of applying the teaching adult learners' principles and implementing these strategies in academic CPD. On the one hand, adult learners engage in many activities whether formal or informal, and they have many responsibilities as well. Therefore, their learning must be balanced and also take into account their responsibility for their own learning. On the other hand, educational institutions should support teachers' learning experiences and listen to their voice and their desire to achieve their learning goals (Merrill, 2004). Wheeler (2011), however, rejected these teaching principles as they were formualted for adults only, as he is of the view that learning happens for people of all ages, including children, and so everyone, not just adults, engages in these processes.

A recent study by Hulon et al. (2020) strongly recommended offering virtual CPD programmes to all educators as well as training in instructional design principles. The previous research of Gustafson and Branch (2002) and Koehler and Mishra (2009) are in accord with this view, with their findings that the advancement of teachers' technological, pedagogical and content knowledge through virtual CPD significantly improved student outcomes. Hulon et al. (2020) also point out the advantages of delivering university teachers' CPD during the COVID-19 lockdowns, which include teachers enjoying the convenience of online participation in virtual professional learning and ease of access through not having to drive to a specific location. As well, adult learners are highly motivated to learn if the content is relevant to their work. This point was made by Knowles et al. (2015) as being one of the principles of teaching adult learners.

In the context of this study, the application of adult learning principles to university teachers in KSA could help to understand ways in which FML could be used effectively in fulfilling CPD requirements. This, in turn, could help university teachers to use FML in their teaching to reach large numbers of students easily and more cost-effectively via e-lectures. University teachers are mature learners who can draw on personal and career experiences in their learning, and therefore these experiences can function as guidelines in designing CPD activities. FML is ideally suited to university teachers' CPD because they are already able to learn in a reflective, self-directed and responsible way, and they will find it more convenient to determine when, how and what to learn, according to the demands of their working life, as well as being able to focus on what is relevant to their own teaching. This leads to university teachers being more motivated to learn since they understand how their participation would be beneficial. In order to make the atmosphere of the educational environment of this study to be more encouraging for university teacher learning, this study used Acadox to offer professional development in FML format, since it is recognised as a safe and comfortable learning environment (Amin et al., 2015; Acadox, 2020; Al-Wakeel, 2020). The content of the CPD course was e-lecture creation skills, which is relevant to current career demands, and is a subject which university teachers are motivated to learn. By using the FML format to teach the technological skills or any other content needed to facilitate FML for teaching students, university teachers will have first-hand personal experience of learning within the same format they aim to use for their own students. This will give them a much better understanding of utilising FML in educational practice and will raise the awareness about its advantages and pitfalls.

3.6.2 The Importance of Continuing Professional Development

Kraft et al. (2018) point out that national education systems spend tens of billions of dollars annually on professional development programmes to update and increase teachers' knowledge and skills. They also claim that CPD programmes have a significantly positive effect on instruction and on student achievement. However, Cohen and Hill (1998), Scher and O'Reilly (2009), and Kennedy (2016) believe that student achievements increase by improving teacher knowledge. Kraft et al. (2018) still consider teacher training to be a core tool for improving teaching methods, translating new knowledge into classroom practice, and developing teachers' skills (Hill, 2007).

Surprisingly, the effects of these huge investments have been reported as limited in some studies. Some CPD programmes even fail to improve education or student achievement, especially when implemented on a large scale (Garet et al., 2008, 2016; Glazerman et al., 2010). Hill et al. (2015) emphasise that it is impossible to separate developments in teachers' skills from improvements in their knowledge, suggesting that, to develop teachers, skills coaching should be added to training sessions. CPD helps teachers to identify what they need to improve and to determine their own teaching practices. Consequently, it leads to changes in their educational capabilities and change in their teaching methods (Ismail et al., 2016). Day (1999), Guskey (2000), Desimone (2009), and Scher and O'Reilly (2009) all make the assumption that since CPD aims to improve teachers' practice, it therefore translates into better student learning.

Clotfelter et al. (2006) and Feng (2009) tend to link teacher training to student quality, suggesting that good training and extensive teaching experience in teaching are key factors in producing high ability students with fewer behavioural problems. Researchers such as Garet et al. (2008, 2016), Glazerman et al. (2010), and Kraft et al. (2018) indicate that CPD is associated with improvements in teachers' instructional practice and with subsequent student achievement. Mitchell et al. (2005) declare that teachers' contribution to the design and implementation of the curriculum may support the relationship between learners' needs, the designed curricula, and the context of their work. Ismail et al. (2016) claim that CPD courses are likely to improve teachers' skills in creating e-content. Butcher and Stoncel (2012) strongly recommended reviewing existing CPD programmes since this step works on updating academics with elements that are new in the educational system, thus, encouraging them to adapt to those changes easily, such as taking account of the knowledge explosion which has gathered pace in this era, as yesterday's information becomes outdated tomorrow.

However, teachers who attend CPD programmes tend to put their newly-learned techniques into practice and are also more inclined to develop in-depth insights into how they can integrate technology into their teaching process. In this regard, Galanouli et al. (2004), Daly et al. (2009), and Hramiak and Boulton (2013) announce recognising the effectiveness of CPD programmes as a valuable approach to achieving success in integrating technology in education. These authors also show that putting knowledge into practice straight after CPD courses gives teachers stronger familiarity with the appropriate application of technology in education.

With regard to the context of Saudi Arabia, new university teachers are not prepared with intensive pedagogical preparation for practice to start their academic career smoothly; therefore, they tend to use the same teaching methods by which they themselves have been taught. It is likely that HE institutions consider university teachers as sufficiently knowledgeable in their field and able to conduct research, but the teachers themselves perceive their own need for new and effective teaching strategies. Thus, they need to continually develop their skills and gain new skills in order to communicate knowledge to learners successfully. To achieve this end, the Saudi HE system needs to develop and update CPD in various aspects, including content, the integration of technology, use of different environments, and attention to skills development.

Regarding teacher-training opportunities in Saudi Arabia, Al Mutlaq (2017) conducted interpretative research to evaluate CPD in TEL (technology-enhanced learning) for Saudi HE lecturers. Using a survey and interviews to gather data from the College of Education at a Saudi university, Al Mutlaq's research (2017) aimed to understand the current situation of TEL in CPD and the factors underlying the opportunities and challenges encountered by Saudi HE teachers. The findings show that most of the participants believe that CPD is valuable not only to lecturers, but also to the learners and educational institutions. The results demonstrated considerable challenges encountered by the university teachers in participating in these CPD programmes, such as relevant and realistic programme content, time of offering CPD programmes, workload, and accessibility to and awareness of CPD courses. In addition to these, the lecturers needed access to a range of CPD courses that addressed their specific subject area and needs.

Al-Asmar (2009), Ageel and Woollard (2012), and Al Mutlaq (2017) hold the view that CPD opportunities within Saudi HE could potentially influence academic achievements and could raise educational quality massively. Researchers such as Ageel and Woollard (2012), Al Mulhem (2013), Al Ghamdi (2015) and Al Mutlaq (2017) have all conducted research on Saudi HE and their findings suggest that TEL CPD provides a critical solution to overcoming not only complex challenges of technology integration, but also logistical challenges within the HE system itself. Therefore, investing in higher education CPD that uses FML as a teaching method could help university teachers to use FML in ways that would address some of the inequities inherent in the system as well as the general staff shortages.

3.6.3 Continuing Professional Development Challenges

Using technology in teacher-training CPD courses could present a number of difficulties. The key problem is that any kind of online environment poses a challenge to teachers according to their situation (Ruth & Houghton, 2009). First, teachers need to address learners' needs, which may vary wildly since students may not only be located in different parts of the world but they may also belong to different age groups and cultures (Elliott, 2007). These circumstances require that teachers give guidance and assistance to students to enable them to engage and collaborate with their peers (Ravitch, 2011). In addition, teachers are required to overcome the distractions of physical absence by keeping learners motivated and linked into the virtual group by choosing appropriate strategies and activities (Anderson, 2008). This problem was mentioned by the participants in Ismail et al.'s (2016) study, who expressed dissatisfaction with the lack of practicality in CPD. Tutors thus need to keep a balance between the diverse needs of learners and the curriculum objectives (Hammerness et al., 2005). Finally, due to the evolving nature of technology, tutors need to facilitate information via creative methods (Elliott, 2007). For instance, teachers can use chats or email to communicate with learners synchronously or asynchronously. Literature advises teachers to pay attention to their professional development. Bennell and Mukyanuzi (2005) conclude that reducing teaching hours not only motivates teachers to improve themselves but also supports them to change their work routine. Ismail et al. (2016) suggest linking the specific number of CPD hours with the salary level, meaning that the number of the CPD hours that teachers attend be used to determine the salary level.

A poorly designed CPD programme is one of the challenges arising from reacting to the need for professional development, but without taking into account what academics actually need, as well as without taking into account what the professional development programme offered seeks to achieve. McCarney (2004) concluded that participants who experienced poor quality programmes were demotivated and appeared resistant to positive change in adopting technology in education practices. Similarly, the results of Galanouli et al.'s questionnaires (2004) showed that the participants felt negative towards the training and they described the programme as a waste of time.

The literature reviewed in this chapter demonstrates that CPD has a positive effect not only on the teaching and learning process but also on the quality of student outcomes. It is also clear, however, that there are gaps in the existing literature regarding the efficiency and effectiveness of FL or ML as a training environment for HE teachers. This present research seeks therefore to provide a better understanding of how FML can be used to provide CPD with a view to increasing teachers' use of e-lectures throughout HE institutions in KSA. The next section discusses electronic lecture (e-lecture) production skills.

3.7 Electronic Lectures (E-Lectures)

Out of all of possible teaching modalities, HE teachers have always tended to prefer the lecture method (Brown & Manogue, 2001; Visioli et al., 2009; Amer, 2019). Due to the influence of technology on our lifestyle and work, lectures are now most often in electronic form, which makes them easier for students to access. Generally speaking, the quality of a lecture is determined by the teachers' expertise and lecturing skills (Visioli et al., 2009).

3.7.1 The Concept of E-Lectures

Stephenson et al. (2008: 641) define e-lectures as:

> 'Courseware is presented as a recording of a lecture that has actually taken place (or has been pre-recorded in a studio or office) and appears on screen as a synchrony of the PowerPoint slides and the voice (and sometimes video) of the lecturer'.

Adebari et al. (2016) describe e-lectures as involving the use of video technology for the purpose of interactive communication between learners and tutors. The University of Utrecht (2017b) describes the e-lecture as a convenient tool of blended learning to present a specific chunk of knowldege via a short video. E-lectures have some fundamental characteristics, for example, they present one particular topic (Adebari et al., 2016) in a video of between five and ten minutes duration (Adebari et al., 2016) which includes images, MS PowerPoint slides, text, recorded audio, and recorded video (Wangerin, 2003; Adebari et al., 2016). E-lectures may also simply be the recorded video of a traditional lecture (Adebari et al., 2016). They can contain any combination of pictures (footage, still images, graphics), presentation slides, text, recorded audio, and recorded video (Wangerin, 2003; Adebari et al., 2016). They can be recordings of live classes modified into audio or video files (Wangerin, 2003). E-lectures may be recorded in a studio or an office (Wangerin, 2003; Adebari et al., 2016).

To clarify terminology, an online lecture (Spickard et al., 2002; Musunuru et al., 2021) is also known as a web- or multimedia lecture (Rafaeli et al., 2004; Ketterl et al., 2009; Verliefde et al., 2012; Ooms et al., 2015). Currently, the majority of researchers seem to prefer the term e-lecture (Wangerin, 2003; Demetriadis & Pombortsis, 2007; Stephenson et al., 2008; Jadin et al., 2009; Adebari et al., 2016; Sprenger & Schwaninger, 2021). These take place within what is referred to as distance, near-distance, or hybrid-distance courses (Roberts & Dyer, 2005; Chen et al., 2010). In the current study, the term e-lecture will be used to refer to a five- to ten-minute video which may include images, MS PowerPoint slides, text, recorded audio, and recorded video, or simply be a recorded video of a traditional in-person lecture.

3.7.2 E-Lectures Producing Skills

A search of several databases (Education Week, Google Scholar, Science Direct, ERIC, DelphiS, JSTOR, and Ingenta Connect) showed a lack of resources for e-lecturing skills, which prompted this researcher to modify traditional lecturing skills to fit the e-lecture form. Irby et al. (1976) and Van et al. (1991) list some basic traditional lecturing skills, including organising presentations, using objectives, clarifying concepts, utilising questions, examples, and discussion, employing audio-visual aids, and summarising. Brown and Manogue (2001) have identified lecturing skills which are independent of the methods of structuring lectures, include preparing, opening, explaining, presenting information, creating and using audio-visual aids, presenting activities for students, narrating, comparing, contrasting, being responsive to the audience, and summarising. Visioli et al. (2009) add questioning skills and good verbal and nonverbal communication skills.

Due to the differences between e-lectures and traditional lectures, it is necessary to develop and use appropriate hardware and software. The e-lecture skills identified in this present research have been examined and reviewed by educational technology experts (see Table 19 in Appendix A) who were contacted via an educational technology group on WhatsApp. The group consists of 255 educational technology specialists from the Arabic world. They were happy to provide their names and contact details for this project. Table 2 lists the sub-skills of traditional lecture production, gives a breakdown of each sub-skill with reference to the literature, and shows which sub-skills can be repurposed to create e-lectures.

	Sub-skills for Presenting Traditional Lectures	Breakdown of sub-skill	Adapting Traditional Lecture Skills to Preparing E-lectures	Principal E-lecture Skills (As Suggested by Panel of Experts)
1.	The preparing skill	Preparation skills include: a) Determining the aims; and b) Defining the content of the lecture (Brown & Manogue, 2001)	Preparation skills	Designing and organising the structure of the presentation
2.	Organising the presentation skill (introduction, explaining, presenting information, and summarising)	The teacher's ability to organise a lecture involves: a) Designing lecture framework in proportion to the characteristics of the learners; b) Introduction: gains learners' attention and provides the framework; c) Explaining: clarifies concepts and terms when presenting information; and d) Summarising: emphasise the key points presented in the lecture (Brown & Manogue, 2001; Visioli et al., 2009)	Organising the presentation into component parts, e.g., introduction, presenting information, arguments and counter-arguments, conclusion)	
3.	Presenting activities for students	Presenting activities for learners involves choosing activities in proportion to the content and in proportion to the characteristics of the learners. These activities motivate and keep learners interested (Brown & Manogue, 2001)	Presenting activities for student	
4.	Use of questions, examples, discussion, comparing, and contrasting	Creating an interactive lecture requires the ability to increase motivation and attention and to enhance active involvement by the learner, which leads to higher levels of learning, and an increase in learner and teacher satisfaction (Nasmith & Steinert, 2001). This skill is achieved by utilising questions, examples, comparing, and contrasting (Brown & Manogue, 2001; Visioli et al., 2009)	Creation of interactive lecture	Presentation skills

	Sub-skills for Presenting Traditional Lectures	Breakdown of sub-skill	Adapting Traditional Lecture Skills to Preparing E-lectures	Principal E-lecture Skills (As Suggested by Panel of Experts)
5.	Good verbal and nonverbal communication skills	Good verbal and nonverbal communication skills include the ability communicate with the audience through body movement, eye contact, facial expression, and phonic inflection, as well as through language. Other skills include listening to learners and reading their facial expressions (Brown & Manogue, 2001; Visioli et al,. 2009)	Good verbal and nonverbal communication skills (These skills were not included in this research to respect participants' confidentiality and anonymity)	
6.	Creating and using audiovisual aids	The ability to create, edit, and choose the appropriate audio and visual aids, in addition to how the teacher uses these aids (Brown & Manogue, 2001)	a) The skill of creating or editing audio and visual aids to present lecture content; and b) The skill of presenting audio and visual aids at the appropriate time in the lecture	The skills to create the content of electronic lectures
7.		Technological skills necessary to use devices to create e-lectures	The skills to understand and operate digital devices (suggested by panel of experts)	
8.		Skills necessary for dealing with the different applications used to create an e-lecture	Skill in using digital applications (suggested by panel of experts)	
9.		The teacher's ability to create a presentation which may be included in the e-lecture	Presentation skills (suggested by panel of experts)	
10.	Responsiveness to the audience	Responsiveness to the audience means a teacher's ability to monitor the audience's nonverbal behaviour (Macintyre et al., 1997; Brown & Manogue, 2001)	This skill is not appropriate for the e-lecture form where it is impossible for the teacher to see the reaction from the audience	

Table 2. List of lecturing skills, e-lecture skills, and meaning of each skill

Table 2 presents a list of e-lecturing skills, and thus achieves one of the objectives of this research. Generally speaking, fifteen e-lecturing sub-skills are categorised under three main skills as follows:

1. The skills of designing and organising the structure of the presentation include:
    1.1. The ability to determine the aims of the e-lecture;
    1.2. The ability to determine the content of the e-lecture;
    1.3. The ability to design an e-lecture framework appropriate to the characteristics of the learners;
    1.4. The ability to lead with an engaging introduction to gain learners' attention;
    1.5. The ability to give explanations to clarify concepts and terms when presenting information;
    1.6. The ability to give a summary emphasising key points presented during the e-lecture;
    1.7. The ability to design activities in alignment with the content of the e-lecture; and
    1.8. The ability to design activities in alignment with the characteristics of the learners.
2. The skills of creating the content of e-lectures include:
    2.1. The ability to use audio and visual aids appropriate to the e-lecture content (spoken word, video footage, still images, graphs, tables, etc.);
    2.2. The ability to determine the appropriate time to present audio and visual aids;
    2.3. The ability to deal with devices needed to create an e-lecture;
    2.4. The ability to deal with the applications needed to create an e-lecture; and
    2.5. The ability to create a presentation.
3. The skills of presenting an e-lecture include:
    3.1. The ability to make the e-lecture interactive e.g., by asking questions, asking students to think of their own examples; and
    3.2. Good verbal and nonverbal communication skills.

Good verbal and nonverbal communication skills were not included in the present research to respect participants' confidentiality and anonymity. Thus, participants were asked to produce e-lectures without talking about themselves or reproducing images of themselves; but only to include general images, text, and sounds. However, lecturing skills can be developed via teacher training, peer and even student evaluation, and expert observation (Brown & Manogue, 2001). Therefore, this research measures university teachers' skills in producing e-lectures, then provides training to improve these skills. The following section presents e-lecture benefits and challenges.

3.7.3 Challenges and Benefits of E-Lectures

E-lectures provide learners with chunks of course content and information prior to group discussion and review. This leads learners to gain a deeper understanding and better education in the sense that they are encouraged to think for themselves (according to Al-Ahdal & Al-Hattami, 2014). Wangerin (2003), Demetriadis and Pombortsis (2007), and Gormley et al. (2009) go as far as suggesting that e-lectures may be a solution to problems such as student boredom and absenteeism. In other words, if teachers move lectures to other times and places than the classroom, they will be able to spend classroom time encouraging learners to consolidate learning by thinking critically and asking questions. In addition, e-lectures could be a strategy for educational innovation (Martin et al., 2012), causing a change in the role of teachers. Thus, teachers can use their time efficiently for scientific research or developing the self, while learners will be responsible for educating themselves (University of Utrecht, 2017), increasing learners' efficacy to learn (Sendra-Portero et al., 2013; Al-Ahdal & Al-Hattami, 2014). Hence, e-lectures enhance the lifelong learning concept for learners (Chipps et al., 2012). Moreover, e-lectures could support knowledge for all, in that the educational materials are available to any learner worldwide to learn, share, and reuse (Al-Ahdal & Al-Hattami, 2014). Holt et al. (2001), Maki and Maki (2002) and Stephenson et al. (2008) state that while e-lectures are easy and effective to use, learners prefer the traditional type of live, interactive classroom lecture. In contrast, Evans et al. (2004) claim that e-lectures create a significant improvement in the student learning experience and are preferred by students. Tvedten et al. (1993), Dewhurst and Williams (1998), Spickard et al. (2002), Demetriadis and Pombortsis (2007), and Jadin et al. (2009) indicate that e-lectures are as effective as traditional lectures, while Williams et al. (2001) assert that e-lectures are not as useful as the traditional format. Due to the differences in educational and cultural contexts, it is necessary to explore how FML can influence e-lectures in Saudi HE and globally.

The recent research of Musunuru et al. (2021) assessed the efficacy of traditional lectures versus online modules with respect to student learning in an undergraduate introductory biochemistry course. The students had the option of attending live lectures given by the course instructor and viewing online modules prerecorded by the same instructor, with the lectures and modules covering identical content. They found that although the students who chose to attend live lectures were better primed to learn, there was no difference in the learning outcomes of traditional lectures versus online modules. Moreover, they found that students were better engaged when viewing online modules than when attending lectures in person.

Sprenger and Schwaninger (2021) made a comparative study of the acceptance levels of a number of new digital technologies, under the assumption that acceptance is necessary for and predicts the intention to use a technology. The investigation measured technology acceptance of a classroom response system, classroom chat, e-lectures, and mobile virtual reality. Using the technology acceptance model (TAM), the researchers gathered data from ninety-four students at the University of Applied Sciences and Arts Northwestern, Switzerland. An online questionnaire was sent out to participants after they had used all of the technologies for three months and data analysis showed that the classroom response system had the highest level of acceptance, closely followed by e-lectures, then classroom chat and mobile virtual reality.

However, Visioli et al. (2009) point out that all types of lectures (traditional or interactive) have a positive effect on students' attention and that this is also influenced by the teachers' attitudes. This research (2009) illustrated that speaking aloud and sustaining verbal communication with vocal inflection had the greatest positive effect on students. Although presenting e-lectures is better than presenting a sound recording only (Wangerin, 2003), the lack of graphics or pictures in e-lectures turns the latter into a monotonous audio recording. Moreover, the size of electronic lectures is large because they contain many different elements (Wangerin, 2003), occupying a considerable capacity of a user's device and, thus, limiting its distribution to learners or even necessitating uploading them to websites (Wangerin, 2003).

The previous section has discussed the characteristics and elements of e-lectures as well as the skills necessary to create them. The values and challenges facing e-lectures have also been elaborated. Through the literature review of this chapter, the conclusion is that there are gaps in research on ML and FL regarding the development of skills to produce e-lectures. The next section clarifies these research gaps.

3.8 The Research Gaps

Figure 6 illustrates the research gap, presented in a small area of the intersection of the five circles (mobile learning, flipped learning, creating electronic lectures, continuing professional development, and higher education).

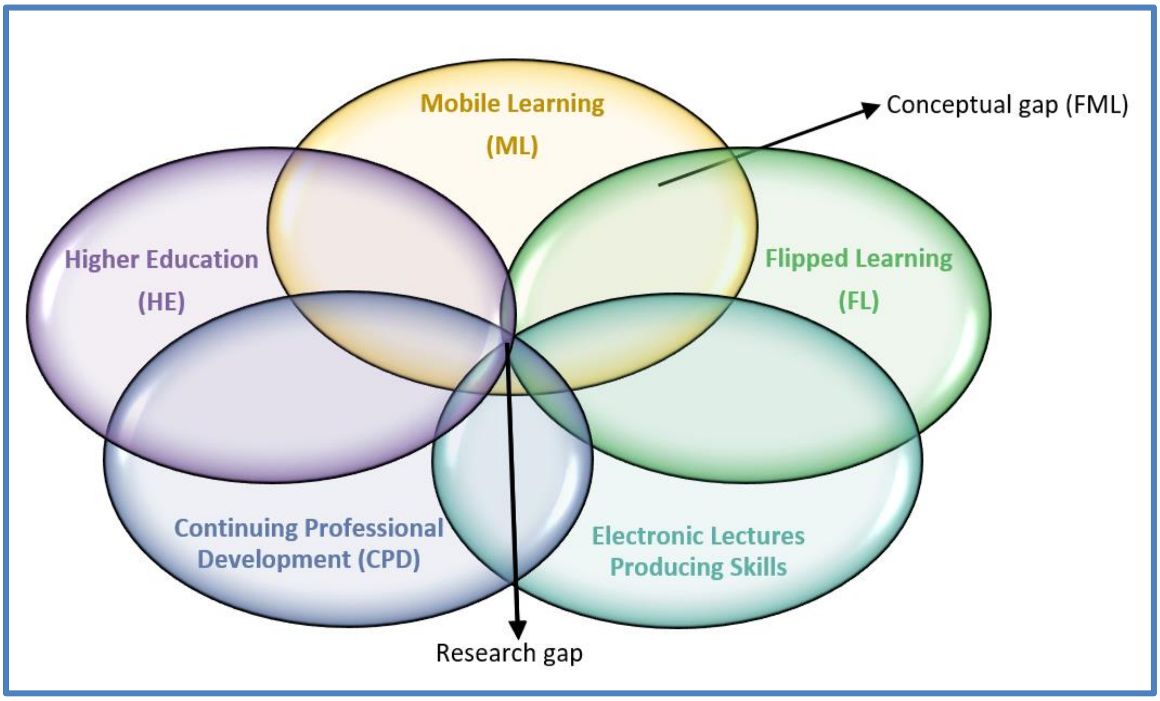


Figure 6. The research gaps

Some studies have spoken about the acceptance of ML among teachers in HE (Wang et al., 2009; Terzis & Economides, 2011; Alrasheedi & Capretz, 2015), while others have studied its effect on teachers and students (Wu et al., 2012; Crompton et al., 2016). A large number of studies have discussed flipped learning using various names such as inverted learning, peer instruction, and flipped learning (Lage et al., 2000; Crouch & Mazur, 2001; Bonn, 2008; Gannod et al., 2008; Bergmann & Sams, 2009; Keser et al., 2011; McLaughlin et al., 2014; Strayer, 2012; Talbert, 2012; Tucker, 2012; Bishop & Verleger, 2013; Mason et al., 2013; Prober & Khan, 2013; Davies & West, 2014; Gaughan, 2014; Roth, 2014; Eppard & Rochdi, 2017; Lundin et al., 2018). A considerable number of reports and studies have discussed CPD programmes in HE (Guskey, 2000; Leach et al., 2004; Megginson & Whitaker, 2007; Garet et al., 2008, 2016; Scher & O'Reilly, 2009; Collin et al., 2012; Hylen, 2012; Friedman, 2013; Chetty et al., 2014; Simoncini et al., 2014; Ismail et al., 2016; Jackson & Makarin, 2016; UNESCO, 2017a, 2017b, 2017c, 2017d; Kraft et al., 2018).

Some studies have suggested the possibility of using technology in CPD (e.g. Leach et al., 2004; Richardson, 2011). Meanwhile, a small number of studies have stressed the importance of creating e-lectures (Feifer & Tazbaz, 1997; Dewhurst & Williams, 1998; Evans & Edwards, 1999; Moreno & Mayer, 1999; Holt et al., 2001; Williams et al., 2001; Maki & Maki, 2002; Evans et al., 2004; Stephenson et al., 2008; Griffin et al., 2009; Visioli et al., 2009; Sendra-Portero et al., 2013; Adebari et al., 2016; University Utrecht, 2017). FML is considered a conceptual gap in this thesis. However, to the researcher's best knowledge, no research to date has investigated university teachers' perceived and actual skills in creating e-lectures via FML, and no research has offered a better understanding of FML in CPD to increase the use of e-lectures in supporting teaching in HE. This study, therefore, aims to fill these gaps in the context of HE in KSA. The final section of the literature review chapter introduces the theoretical framework, which allows consideration of the extent that this technology intervention (i.e., flipped mobile learning) is to be accepted for learners.

3.9 Theoretical Framework

This section considers the theory linked to the research gaps (ML, FL, creating e-lectures, CPD, and HE). In order to better understand the perceived and actual effects of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers e-lecture skills, this research adopts the TPACK framework.

Effective teaching with technology depends on the interaction of three fundamental elements: content, pedagogy, and technology (Koehler & Mishra, 2009). The interaction of these elements represents the broad extent and quality of educational technology integration. These three elements are also the foundation of the technology, pedagogy, and content knowledge (TPACK) framework (Koehler & Mishra, 2009). Shulman (1986) has stressed the need for a consistent theoretical framework, involving the types of knowledge teachers need in order to teach and to be able to do so effectively using technology, including the content knowledge they need to have and know how to connect this knowledge to that of good teaching practice.

The TPACK framework has been discussed and improved over the past decade through a series of publications beginning with Pierson (2001) and continuing with several other researchers, such as Margerum-Leys and Marx (2004), Mishra and Koehler (2006, 2007), Angeli and Valanides (2009), Koehler and Mishra (2009), and Archambault and Barnett (2010). TPACK gained widespread popularity in 2006 after the work of Mishra and Koehler, who tried determining the model and discussing each domain in detail (Graham, 2011). The previous literature until 2008 introduced the term 'TPCK', but based on the recommendation of the research community, it was changed to 'TPACK' (Thompson & Mishra, 2008). Reyes Jr et al. (2017) point out that TPACK empirical research focuses on pre-service teachers, and the literature focuses on discussing how teachers perceive TPACK in their teaching practice. Graham et al. (2009) measured the levels of TPACK confidence in in-service science teachers before and after participation in a professional development programme that seeks to improve technology integration in teaching process. The findings indicate that TPACK could detect statistically significant differences and a positive improvement after the programme.

Mishra and Koehler (2006) elucidate that the target of TPACK is to determine the needful knowledge for successful integration of educational technologies into the teaching and learning process. TPACK describes how teachers understand that educational technologies and pedagogical content knowledge (PCK) interact with one another to produce effective teaching with technology (Koehler & Mishra, 2009). The interaction between technology, content and pedagogy, which are the main components of teachers' knowledge (including university teachers), is considered the primary framework of the TPACK. These interactions between bodies of knowledge offer a method that help academics for planning to implement technologies that help learning acquisition. Figure 7 illustrates that integrating these three core knowledge domains develops four more knowledge domains: pedagogical content knowledge (PCK), technological content knowledge (TCK), technological pedagogical knowledge (TPK), and technological pedagogical content knowledge (TPACK) (Koehler & Mishra, 2009; Graham, 2011); frequently, the knowledge of context is added as a part of the model (Mishra & Koehler, 2006).

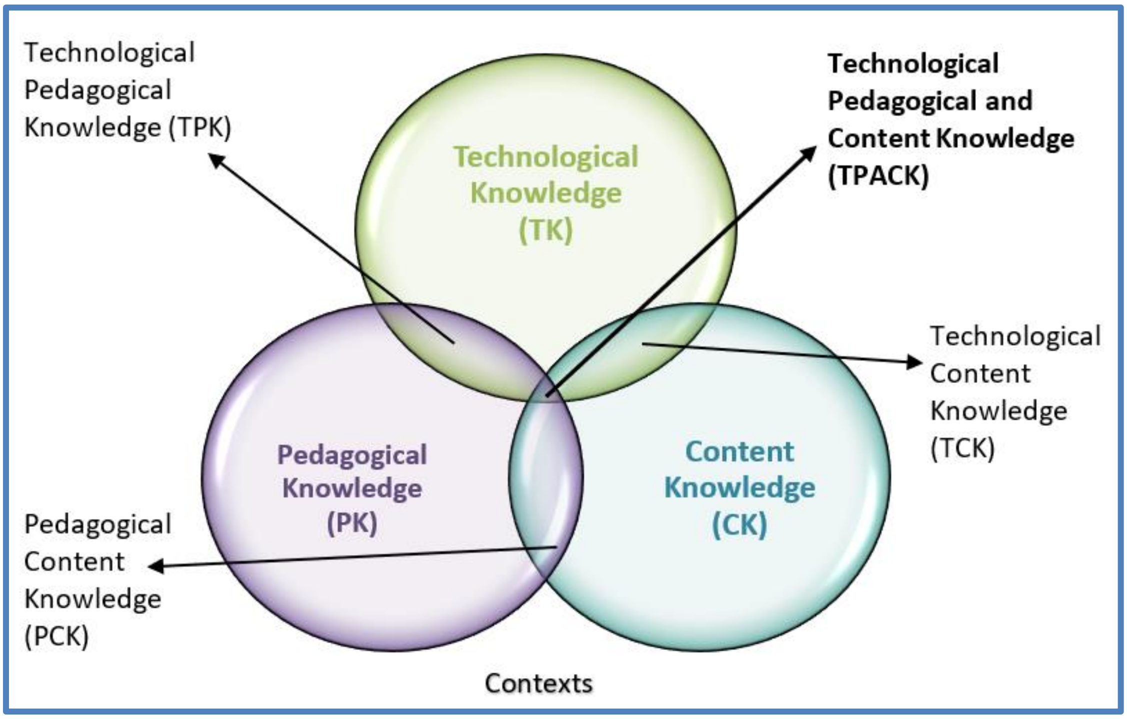


Figure 7. The TPACK framework and its knowledge components [adapted from Koehler and Mishra (2009)]

Content Knowledge (CK) is teachers' knowledge around the subject matter to be taught or learnt (Koehler & Mishra, 2009; Graham, 2011). Shulman (1986) points out that this knowledge comprises the knowledge of theories, organisational frameworks, concepts, ideas, knowledge of evidence and proof, and practices and approaches towards developing that knowledge. CK is considered important to teachers as they need to have a good understanding of the disciplines which they teach (Koehler & Mishra, 2009). However, in the context of this study, content knowledge represents the university teacher's knowledge of the content of the CPD programme, which is about the skills of creating e-lectures.

Pedagogical Knowledge (PK) is teachers' knowledge of the practices, processes, or methods of teaching and learning. This knowledge comprises the knowledge of values, aims, and educational purposes (Koehler & Mishra, 2009; Graham, 2011). It includes teachers' understanding of how students learn, how they acquire skills, and what methods are used in the classroom. PK also includes classroom management skills, lesson planning, and student assessment (Koehler & Mishra, 2009; Graham, 2011). Therefore, PK demands a deep understanding of the cognitive, social, and developmental theories of learning and how these theories apply to learners in the classroom (Koehler & Mishra, 2009). However, in the context of this study, PK represents the university teacher's knowledge of flipped learning.

Pedagogical Content Knowledge (PCK) is the intersection of CK and PK. Shulman (1986), Koehler and Mishra (2009), and Graham (2011) describe PCK as a knowledge of pedagogy, which is applied to the teaching of a particular content. This knowledge comprises the fundamental business of teaching, learning, curriculum, and assessment and reporting. However, in the context of this study, PCK represents the university teacher's knowledge of using flipped learning to teach the skills of creating e-lectures.

Because of the evolving nature of technology (instability) (Koehler & Mishra, 2009), defining **Technological Knowledge (TK)** is notoriously difficult (Koehler & Mishra, 2009). Nonetheless, TK is more than an understanding of information technology, which is applied to work and everyday lives; recognising information technology can assist or impede the achievement of a particular aim (Koehler & Mishra, 2009; Graham, 2011). It can be argued that TK requires a deep understanding and mastery of information technology for communication, information processing, and problem-solving. Gaining TK leads teachers to accomplish a diversity of tasks via using information technology and developing different ways of accomplishing these tasks (The National Research Council, 1999; Koehler & Mishra, 2009). However, in the context of this study, technological knowledge represents the university teacher's knowledge about mobile learning.

Technological Content Knowledge (TCK) is the intersection of CK and TK, which suggests that both technology and content influence and constrain one another (Koehler & Mishra, 2009; Graham, 2011). For instance, content could limit the types of technologies that can be used in education (Koehler & Mishra, 2009). Selecting technologies could also facilitate or constrain the types of content that can be taught. Indeed, the understanding of technology and its effect on the knowledge of a particular discipline as well as its pedagogy leads to developing technological instruments appropriate for successful educational purposes (Koehler & Mishra, 2009). For example, the development of computers not only changed the nature of mathematics and physics but also emphasised the importance of the role of simulation to understand phenomena.

Therefore, teachers need to master the subject(s) that they teach; they also need to have a deep understanding of which technology is most suitable for addressing a particular subject and how content fits or changes technology and vice versa (Koehler & Mishra, 2009). However, in the context of this study, Technological Content Knowledge represents the university teacher's knowledge of using mobile learning to teach the skills of e-lecture creation.

Technological Pedagogical Knowledge (TPK) is the intersection of PK and TK, which involves understanding how specific technologies used in a particular way can lead to change in teaching and learning (Koehler & Mishra, 2009; Graham, 2011). TPK is very important because most software programs, such as MS Word and MS PowerPoint, are designed for business environments, while the other software programs, such as blogs and podcasts, are designed for purposes of communication and entertainment. Neither of these categories is designed specifically for educational purposes (Koehler & Mishra, 2009). Therefore, teachers need to have a deep understanding of the constraints of technology, its affordances, and how to benefit from these affordances (Koehler & Mishra, 2009). Furthermore, teachers need to break functional fixedness (Duncker & Lees, 1945), improve their skills to benefit from technologies for pedagogic purposes, and thus develop teaching and learning (Koehler & Mishra, 2009). In the context of this study, technological pedagogical knowledge represents the university teacher's knowledge of how to use mobile learning in a flipped method.

Technology, Pedagogy, and Content Knowledge (TPACK) is the intersection of PK, TK, and CK. TPACK seeks the understanding of the interactions among content, pedagogy, and technology knowledge (Koehler & Mishra, 2009; Graham, 2011), which are three inter-linked, inseparable knowledge domains. Koehler and Mishra (2009) consider TPACK the foundation of effective teaching with technology, which requires a deep understanding of concepts using technologies, knowing what makes concepts easy or even difficult to learn, and the role of technology to address the problems facing students, knowing how to gain new epistemologies or strengthen old ones from existing knowledge by utilising technologies, and understanding pedagogical methods that use technologies in constructive ways to teach a particular content (Koehler & Mishra, 2009; Graham, 2011).

Understanding the interactions between the components of the TPACK framework aids understanding of its separate components, thus allowing for richer teaching methods using technology. These teaching methods should include a perception of using technology in order to present abstract ideas in an attractive style, along with teaching strategies that employ technology to that offers particular content via new methods. Teachers should also be aware of the level of the previous knowledge of learners and how using technology can develop learners' thought, thus, extending that knowledge. In addition, teachers should have understanding of knowledge provided to learners and determine knowledge that learners are more likely to grasp immediately, as well as those elements that might be understood by learners if technology is used. As well, combining high levels of technological, content and pedagogical understanding could potentially lead to success when teachers select more appropriate teaching methods (Koehler & Mishra, 2009). Mishra and Koehler (2006) pointed out that the TPACK framework is considered an effective model that can be adapted to understand learning processes within a professional technological environment. As Banister and Reinhart (2011) stressed, the TPACK framework can make integration of technology into education easier for teachers and can improve learners' learning achievement, thus, developing learning outcomes. Hence, by adopting the TPACK framework, the understanding of how the combination of the three areas of knowledge to produce new learning experiences can be emphasised within a professional technological environment, thus, potentially improving learning outcomes.

Teachers can incorporate TPACK into the teaching process at any time by integrating knowledge of technology, pedagogy, and content (Koehler & Mishra, 2009). However, it is unrealistic to think that technological solutions apply to all teachers or courses; rather, solutions involve teachers' abilities to move flexibly in the spaces defined by content, pedagogy, and technology and their interactions (Koehler & Mishra, 2009). Hence, teachers need to improve their cognitive ability in each domain to be able to devise effective solutions (Koehler & Mishra, 2009).

The main advantage of the TPACK framework is that it allows teachers to move beyond the curriculum by linking content, technology, and pedagogy (Koehler & Mishra, 2009). The framework has been chosen for this reasearch as it seeks indirectly to increase university teachers' awareness of the significance of e-lectures in classroom contexts in order to support HE teaching practices. The TPACK framework involves the combination of technology with the types of knowledge which teachers need (Koehler & Mishra, 2009). Furthermore, the TPACK framework attempts to improve and describe how technological professional knowledge can be implemented in educational (Koehler & Mishra, 2009; Graham, 2011). In the context of this study, therefore, the factors of technology, pedagogy, and content knowledge are used to evaluate university teachers' knowledge of using mobile learning in a flipped way to create e-lectures. When mobile learning is improved by adding flipped learning, it is known as a flipped mobile learning environment. The TPACK framework seeks to provide several opportunities to encourage research in teacher development professionally, teacher education, and teachers' employing technology in the teaching process (Koehler & Mishra, 2009; Graham, 2011). Hence, TPACK is suitable for the current research, which seeks to enhance the understanding of using a flipped format with mobile technology in CPD. As well, it encourages teachers to learn the relevant technological skills for producing e-lectures.

Because participants' perceptions of flipped mobile learning (FML) are the most important part of technology use, understanding participants' perceptions allow a better understanding of this. By understanding how participants perceive FML in terms of its concerns, challenges, and affordances, educational institutions can better implement their technology.

Although TPACK is helpful from an organisational viewpoint, it faces the problem of separating each of the domains, which leads to doubt of its existence in real practice (Archambault & Barnett, 2010). For example, when teaching a particular topic, the teaching methods are considered part of the content, and when teaching in an online context, technology is considered part of the content. This makes it difficult to separate content, pedagogy, and technology from one another. As well, TPACK suffers from vague boundaries between components; for example, the definitions of technological pedagogical knowledge and technological content knowledge are unclear and point to a weakness and lack of precision in the framework (Mishra & Koehler, 2007). Therefore, TPACK faces difficulties in developing a methodology or validating an instrument that is applicable in a multitude of contexts (Archambault & Barnett, 2010). Furthermore, the TPACK framework does not help the researcher to explain and predict various phenomena, since TPACK domains do not statistically distinguish themselves, which leads to the heuristic value of the model being diminished (Archambault & Barnett, 2010). The heuristic value is defined as the extent to which the framework assists the researcher to discover a new knowledge or predict results.

However, the TPACK framework can be seen as an effective structure that can be adopted for the purpose of this research, which aims to understanding the perceived and actual effects of FML within CPD for teaching e-lecture skills to university teachers in KSA. Thus, in this research, the CPD programme is seen as providing technological, content and pedagogical knowledge for the university teachers. These interrelationships between the three types of knowledge influence the efficient adoption of FML as a new learning environment for teaching and training (Jimoyiannis, 2010). In other words, CPD aims to provide university teachers with the fundamental skills and knowledge to facilitate the implementation of FML in the teaching process effectively by presenting relevant informational content on constructing e-lectures, with a view to increasing the use of e-lectures in teaching throughout HE institutions in KSA. In order to enable university teachers to implement technologies during the teaching process successfully, the TPACK framework determines the areas of knowledge that university teachers need to achieve. Using the lens of TPACK, this research hopes to investigate university teachers' opinions of FML. The necessity for teachers to have functional and creative e-lecture skills has risen massively since March 2020, when the COVID-19 pandemic forced educators to continue their work via remote access. The CPD programme designed for this research has therefore turned out to be very timely, as the teachers at UQU have needed to fast-track their knowledge of cutting-edge technologies in how to create and deliver successful online learning. The flipped mobile learning approach is ideal for the current situation as all of the teaching and learning can happen via digital means, without any need for teachers and students to meet in a shared physical space.

By adopting the TPACK framework and its knowledge components, Figure 8 shows the application of TPACK in the context of this study. Here, flipped learning presents as the pedagogy, and mobile learning presents as the technology. The CPD (i.e. the skills of creating e-lectures) presents as the content, which is the same for all groups but the method of delivering this content is different. The context is that of higher education in Saudi Arabia. To sum up, the TPACK framework indicates that each content, pedagogy, technology, and teaching/learning context has a role to play individually and collectively. Teaching success with technology demands a dynamic equilibrium between and among all the components.

The main ingredients of this study have now been reviewed in the light of the existing academic literature. The review has explored the concepts of mobile learning (ML), flipped learning (FL), continuing professional development (CPD), and e-lectures, as well as the lens this research uses to view them through, the TPACK framework. The following chapter describes the methodology used in this research to answer the research questions that have been identified.

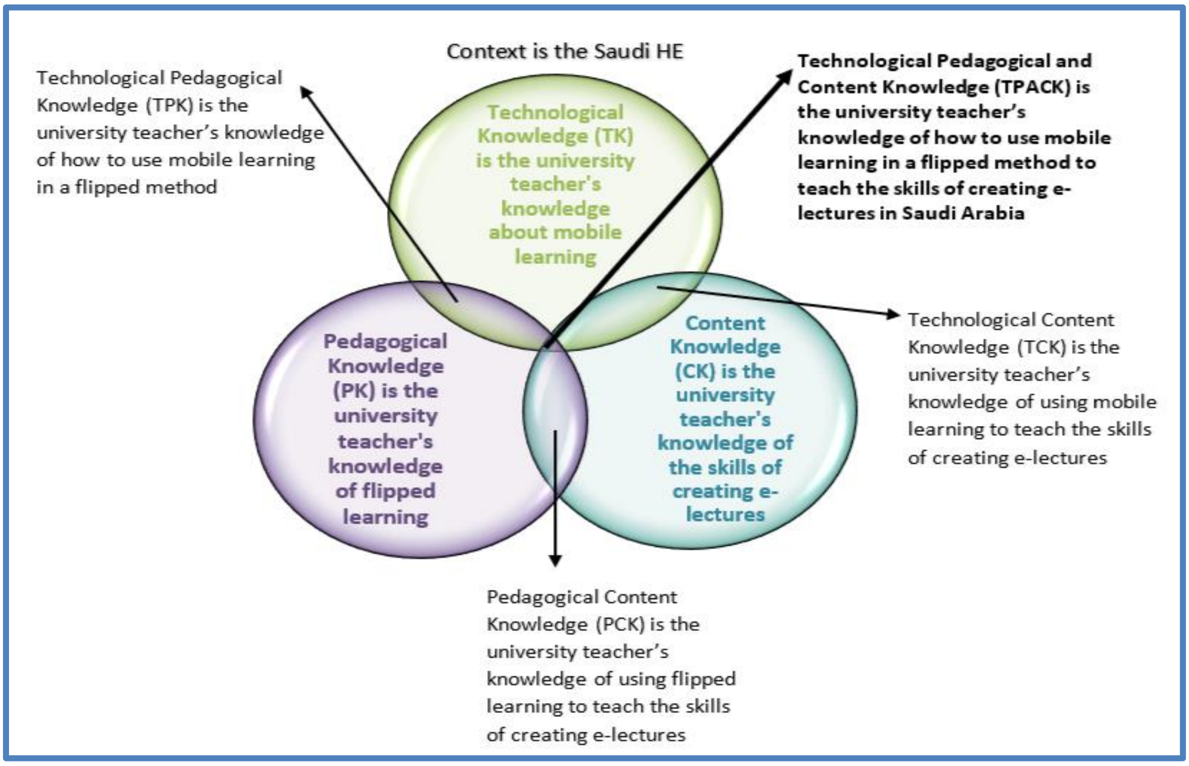


Figure 8. Application of the TPACK framework and its knowledge components in the context of this study

Chapter 4 Methodology

4.1 Introduction

This chapter presents the philosophical assumptions behind the researcher's position and justifications for choosing the approaches and paradigms. The rationale for the design of the study instruments and their use as an appropriate data collection method will be explained. Furthermore, this chapter describes the sample of university teachers from UQU in KSA and illustrates the sampling methods. Moreover, this chapter considers the procedures of data analysis and discusses the validity and reliability of the study. Finally, this chapter discusses the ethical considerations.

The term *methodology* encompasses the general principle that directs research questions (Dawson, 2006). Methodology relies on the nature of the objectives and research questions (Punch & Oancea, 2014). These objectives should therefore be determined and organised in an appropriate way. This research aims to provide a better understanding of the perceived and actual effects of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills in a leading university in Saudi Arabia, with a view to increasing the use of e-lectures in supporting teaching throughout HE institutions in KSA. This research also seeks to explore university teachers' opinions on the concerns, challenges, and affordances of using FML. It is hoped that the findings of this study can help teachers to utilise FML in teaching large numbers of students with less effort and less financial outlay. Other advantages of FML are the removal of space and time limits, allowing a woman to teach not only other women but men as well, since they do not have to be in the same space. Saudi teachers and students would then be able to break the barriers of gender separation in education, solve the problem of tutor shortages in Saudi universities, and address other obstacles related to HE access.

4.2 Philosophical Assumptions of Research

Scientific research offers a specific worldview concerning how a study can be designed to understand a phenomenon (Maxwell, 2005; Punch & Oancea, 2014). Worldview has been defined as a series of basic beliefs that a researcher follows to guide the study (Guba, 1990; Creswell, 2014). Burrell and Morgan (2017) justify the importance and necessity of a worldview for researchers, because it determines the theories, philosophies, approaches, and instruments that support the research paradigm to perform the research process successfully and attain the desired objectives. Guba (1990) and Creswell (2014) have renamed worldview as 'the philosophical worldview', whereas Carr (2006), Hammersley (2006), and Neuman (2013) use the term 'methodologies'. Maxwell (2005), Lincoln et al. (2011), Punch and Oancea (2014), and Mertens (2015) call this term 'paradigm'. The philosophical worldview arises from previous research experiences, discipline orientations, and inclinations of students' advisors or mentors. Therefore, combined with these factors, the researcher's beliefs determine the choice of a qualitative, quantitative, or mixed methods approach. This research will use the term *worldview*.

Maxwell (2005), Mackenzie and Knipe (2006), Creswell (2014), and Punch and Oancea (2014) introduce four widely adopted worldviews in social science research: post-positivism, constructivism, transformationism, and pragmatism. Philosophical worldview has been widely discussed in the literature and raises issues of whether the application of one philosophy or several is appropriate in different research contexts. Kumar (2005) warns about using a single paradigm for all research problems and argues that it may be inappropriate and misleading. Because the research paradigm is shaped basically by ontological, epistemological and axiological positions (Blaikie, 2009; Clough & Nutbrown, 2012), the following section discusses the researcher's positionality in these aspects.

Positionality concerns the relationship of the researcher to the research topic (Bourke, 2014). This is shaped principally by the researcher's worldview, i.e. their philosophical assumptions, values, personal beliefs, politics, biases, and prejudices. Choosing a methodology that aligns with the research philosophy will help to arrive at the 'truth' in a better way (Gregory et al., 2011; Scotland, 2012). The truth or knowledge this researcher seeks to obtain is a more realistic and comprehensive understanding of the perceived and actual effects of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills. Additionally, the study seeks to provide a better understanding of FML in CPD, in order to promote the use of e-lectures in HE teaching. E-lectures are a more cost effective approach to HE, and as well as solving problems of tutor shortages, the FML approach potentially overcomes barriers of gender segregation as outlined above. This research seeks to explore university teachers' opinions of the challenges and affordances of FML and therefore it is important to identify a research philosophy which aligns with the assumptions, beliefs, and values of the study. Determining the research philosophy enables the most appropriate methodology to be chosen and also helps to justify the research positionality (Gregory et al., 2011; Scotland, 2012). The following section presents the researcher's philosophical assumptions, personal beliefs, values, politics, biases, and prejudices.

With regard to **philosophical assumptions,** the research philosophy is built upon the researcher's ontological and epistemological beliefs, meaning that this study assesses not only the nature of reality but also the nature of knowledge and how to obtain it. The researcher's **personal beliefs** are that each person in the Saudi community has the right to education. To clarify:

- Educational equality means that boys and girls, young and old, and rich and poor have the right to education.
- Academic freedom means that a learner can learn any subject, anytime and anywhere.

The researcher also intends to challenge erroneous beliefs about technology in society. Globalisation is considered as one of the requirements for developing society and therefore, the Kingdom of Saudi Arabia should keep pace with technological developments and employment in education.

Regarding **values,** Hammersley (2006: 57) states that 'Educational research is always framed in terms of certain values. Yet researchers are often not explicit about what those values and their implications are; they also frequently fail to recognise that other values could have framed their enquiries'. The researcher would assert that the core values underpinning this thesis involve clarifying the research values, which will assist in understanding their implications and in responding to enquiries (Hammersley, 2006). The researcher's values include equality, freedom, change, globalisation, and technological development. Regarding **politics,** the researcher respects and follows Saudi educational policy (see the context chapter for details) insofar as it espouses universal eligibility and free education for every citizen and resident in the Kingdom and strives to keep pace with developed countries. **Biases and prejudices** on the other hand often exist among relatives and friends. This researcher sincerely hopes that the Saudi Corruption Commission will be able to resolve this problem and eliminate biases and prejudices.

These elements (assumptions, values, personal beliefs, politics, biases, and prejudices) are highly relevant to the humanistic element in social sciences, which adds a complexity beyond what already exists in the natural sciences and other fields (Blaikie, 2007). For example, people think differently to each other and therefore people's attitudes towards specific behaviours are also diverse. Hatch and Cunliffe (2013) acknowledge that different paradigms lead researchers to study phenomena in different ways. These different paradigms describe phenomena from the different philosophical perspectives of ontology, epistemology, axiology, and methodology (see below). Hammond and Wellington (2013: 58) state that:

> 'Epistemology and ontology take, or should take, a place together at the top of a hierarchy when it comes to shaping a research project. In other words, our understanding of what knowledge is and how we acquire it defines the nature of the questions we might ask when

> carrying out research as well as the methodology and methods that we think will help us address these questions'.

Ontology for instance, studies the nature of the social world (Greene, 2008), reality, being, becoming, or existence (Blaikie, 2007; Cohen et al., 2011; Clough & Nutbrown, 2012). In a philosophical study, researchers describe their own views (or claims or assumptions) of the nature of reality and how they work (Scotland, 2012). Hatch and Cunliffe (2013) ask the following questions:

- What is reality?
- Is this an objective reality that is really going on?
- Is this only a subjective reality, created in the researcher's mind?
- How can we understand reality?

Complexity is subsequently added when studying phenomena, such as control, culture, or power, by asking whether these really exist. Through a discussion, Hatch and Cunliffe (2013) frame the following questions:

- How do individuals determine these realities?
- Does the reality exist only through the experience of it?
- Does it exist independently of those who live it?

Hence, according to this philosophy, the answer to the question, 'What is the truth?' is that it is little more than an assertion of which we have been persuaded (Bailey, 2004). Lynch (2009) and Pedersen and Wright (2013) acknowledge that there are multiple truths (pluralism). Thus, because social science probes human behaviour and relationships, in which the actions differ from person to person, naturally each person will learn and change. Therefore, the way we perceive and understand human behaviour is a critical issue among scientists in social sciences (Thomas, 2013). Hence, to reflect on ontology, the researcher will question whether this research process has worked on reshaping her values, beliefs, and thinking as a researcher (Willig, 2001). To shape her ontology, this researcher believes that truth already exists, while also assuming that the truth may change based on individual interpretations.

Epistemology, on the other hand, studies the nature of social knowledge (Greene, 2008). It seeks to study more adequate methods of enquiring into the nature of validity, forms, limits, and sources of knowledge (Eriksson & Kovalainen, 2008; Cohen et al., 2011; Clough & Nutbrown, 2012). Hatch and Cunliffe (2013) explain epistemology by asking the following questions:

- What is valid knowledge?
- How can you know?

They add complexity by asking:

- What are the criteria that must be satisfied to be described as good or bad knowledge?
- How is knowledge found?
- How can reality be described?

Finally, the interdependent relationship between ontology and epistemology is considered. Similarly, Blaikie (2007: 18) sees epistemology as 'the theory or science of the method or grounds of knowledge' and expands it into several claims or assumptions about the potential ways to gain knowledge of reality, how it originates, and by what criteria is knowledge judged to be acceptable. Based on this philosophy, the researcher begins to consider the research method for the research questions.

Hence, to reflect on epistemology, the researcher asks, 'How does one know the truth?' 'Are valid questions asked?' By this, the researcher considers the relationship between her ontology and epistemology by setting out the epistemological assumptions about how knowledge can be created and gained (Willig, 2001). To shape her epistemology, the researcher will gain knowledge about the topic of the research by reading the previous literature, in Arabic and/or English and by collecting mixed data, which should be relevant to the research questions (Creswell & Clark, 2011). To judge whether this knowledge is acceptable, Cohen et al. (2011) mention that the acquisition of acceptable knowledge relies on research questions. Therefore, this researcher should monitor the phenomena carefully to attain the truth. The research topic is related to technology, which is characterised by instability (rapid evolution) (Koehler & Mishra, 2009). The researcher is aware of the fact that the truth extracted from this research may quickly change and become irrelevant.

Axiology is seen as the philosophical study of the role of values in research; Hammersley (2006) explains axiology by asking questions such as 'Can research be value-free?' 'Is research formed by the researcher's own values?' Hence, to reflect on her axiology, the researcher asks, 'What is the value of my research?' 'Is the research formed by my own values?' To shape her axiology, the researcher will clarify the value of her research very carefully. The core value of this research involves the use of more modern technology currently in the CPD programmes for university teachers in general and Saudi universities in particular. The researcher will combine these two types of learning environments (the mobile learning and flipped learning environments) and take advantage of both of their benefits. The effect of FML on the training of the university teachers will also be studied to achieve one of the objectives of the Saudi Vision 2030. The objective pursued in this study can arguably enhance the role of teachers most efficiently and cost-effectively through rehabilitation and training, improving the qualifications, and following up on the level of progress accomplished (Saudi Vision 2030, 2017).

If FML works well, then the Ministry of Education in KSA needs to be convinced to adopt FML as a suitable training medium for HE teachers. FML does not require a large budget, because university teachers already have mobile devices. However, a better understanding is needed of the perceived and actual effects of teaching CPD courses via FL, ML, and FML on university teachers' e-lecture skills. This research also seeks to explore university teachers' opinions about the concerns, challenges, and affordances of using FML. The advantages of delivering training via FML include the possiblity of teaching a large number of students with less cost and effort, the removal of space and time limitations, and the freedom for women to teach men as well as other women, since FML does not need teachers to be in the same physical location as the students. To minimise bias, comparison among groups will be fair, because it will be within one experiment and under the same conditions, where the researcher should use specific measures. For instance, the participants across all the groups will be interviewed and will be offered the option of 'neutral' in the pre- and post-questionnaire. Mixed methods (i.e. interviews, evaluation product cards and questionnaires) will also be used. This researcher's values play a significant role in interpreting the findings and fostering the subjective and objective points of view, although this can introduce a degree of bias while conducting the research.

According to Bourke (2014), positionality is characterised as a place where objectivism and subjectivism meet. It is impossible for the researcher to be purely objective, particularly in the social science domain, where the researcher is not only a researcher but also an individual and member of a community (Thomas, 2013). To understand the nature of the research problem according to the researcher's personal viewpoint, it is important for researchers to be objective *and* subjective (Cousin, 2010). Consequently, researcher positionality adopts both objectivity and subjectivity. Hellawell (2006: 484) describes the insider researcher as follows:

> 'The word 'community' is a much wider concept than just an organisation, and possessing an intimate knowledge of it doesn't necessarily mean being a member of it yourself. So being an 'insider' researcher is not necessarily the same as being currently a member of the organisation being researched'.

Brannick and Coghlan (2007) explain that a research undertaking by a member of an organisation within that same organisation is 'insider' research. A prime example of this is a teacher who conducts a study within the school they work at. In addition, research conducted as collaboration between insiders and outsiders is considered insider research (Adler et al., 2004). Outsider research is described as research in which the researcher's relationship with the organisation (or research place) is neutral and separate (Brannick & Coghlan, 2007). An insider possesses more knowledge about the context than an outsider. This insider knowledge can take a long time to be obtained by outsiders (Unluer, 2012).

Typically, the task of insider research is more formal and planned (Brannick & Coghlan, 2007) and involves engaging with the research context and interacting with participants (Merton, 1973). In the context of this research, the researcher will be considered an insider for several reasons. First, the researcher achieved her bachelor's degree at the same university in which the research will be carried out (i.e. Umm Al-Qura University (UQU)). Second, the researcher is currently working as a teaching assistant for UQU. Finally, the researcher is a Saudi, and the research will be conducted within a Saudi Arabian community.

The insider position is helpful in gathering data. However, it can be problematic and inadequate. Anderson and Herr (1999) and Alvesson (2003) point out that the value of insider research may be undermined if the researcher has a vested interest or is emotionally involved in some way. For this reason, insider research may be perceived as not being intellectually rigorous enough. Thus, because of the researcher's insider position, the mixed-methods approach has been chosen. In addition, a quasi-experimental study has been selected. Morse (1998) warns about carrying out qualitative research within an organisation in which the researcher is already employed or has a work role. In contrast, Brannick and Coghlan (2007) acknowledge the benefits of insider research because the researchers are native to their organisations, live within it, and see it from lived experience. The researcher agrees with Brannick and Coghlan (2007) in that all researchers are insiders in several systems (organisations, families, and societies). Hence, the knowledge that we have of these systems is more complex and richer.

The challenge that could potentially face the researcher as an insider is that the participants may give answers which they think the researcher desires (Unluer, 2012), introducing bias into the data (Mercer, 2007). Therefore, to minimise the risks of insider research and ensure credibility, the researcher must follow specific procedures. For example, the principles of social desirability (SDR) reporting will be used, which use mixed methods and indirect questioning to collect data (i.e. in interviews) (Hellawell, 2006). The data collection instruments will be confidential (i.e. an anonymised pre- and post-questionnaire in which each participant uses an ID that only the university teacher and faculty service department will know). Methodological triangulation will also be achieved using multiple methods. Unluer (2012) mentions that researchers should be rational and have knowledge of the effects of bias during data collection or data analysis, in accordance with the ethical considerations relating to anonymity. Therefore, philosophical assumptions, personal beliefs, values, politics, and biases affect researcher positionality. Johnson et al. (2007)

remark that philosophical commitments could change when using mixed methods research. Therefore, researchers should take into account these changes as part of the mixed methods research paradigm (Johnson et al., 2007). The next section explains the methodology in detail.

Methodology refers to the theoretical rationale that justifies the research methods used for the research topic (Carr, 2006; Cohen et al., 2011; Clough & Nutbrown, 2012). Methodology is grounded in theoretical knowledge, known as philosophy, and it is impossible to derive methodology from research (Carr, 2006). However, it raises questions regarding what, why, when, where, and how data are collected and analysed (Scotland, 2012). Hammersley (2006) defines methodology as both a technique and a philosophy. Methodology as a technique relates to conducting a particular procedure or specific techniques, for example, using experiments, interviews, or other techniques. Alternatively, methodology as a philosophy indicates the set of philosophical assumptions, for instance, following positivism, interpretivism, or another paradigm.

Post-positivism is predicated on scientific method, positivist/post-positivist research, and empirical science (Mackenzie & Knipe, 2006; Creswell, 2014). The positivist paradigm states that there is only one reality, and that its characteristics may be discovered through examining theoretical hypotheses. Post-positivism holds true for quantitative more than qualitative research, because only quantitative approaches present a safe basis for generalisation (Hammond & Wellington, 2013; Creswell, 2014). The researcher does not see this paradigm as suitable because the role of the researcher will not be independent of the subject under examination and the researcher is a separate observer describing specific social phenomena (Brannick & Coghlan, 2007). The researcher will therefore appoint other colleagues to conduct some aspects of the research, such as providing CPD training for all groups.

The constructivist worldview is also known as social constructivism, interpretivism, naturalism science, idealism, phenomenology, and rationalism (Creswell, 2014). The constructivist paradigm states that reality is multiple, meaning that there is more than one reality and that these realities are characterised by constant change (Henn et al., 2005). Therefore, this worldview can hold true for qualitative research, because it deals with understanding multiple interpretations of human behaviour within the relevant phenomena (Hammond & Wellington, 2013). Individuals differ in their historical and cultural backgrounds, and these meanings lead to multiple conceptions. The role of the researcher is engaged with the subject where the researcher participates via critical and analytical observation of the culture, which is integral to the research activity (Brannick & Coghlan, 2007). The researcher sees that this worldview may not suit her study due to the fact that this study aims to understand the perceived and actual effects of using FML in training university teachers and not to understand university teachers' behaviour during the training.

The transformative worldview emerged as a result of post-positivist assumptions setting out theories and laws that do not fit marginalised individuals or issues of social justice (Mackenzie & Knipe, 2006; Creswell, 2014). This paradigm states that reality is affected by power (Henn et al., 2005), and aims to criticise or raise awareness about various phenomena in the fields of social justice, domination, empowerment, and inequality (Henn et al., 2005; Creswell, 2014). The role of the researcher is to work to enact change in the researcher's own organisation (Brannick & Coghlan, 2007).

The pragmatic worldview does not view the world as an absolute unity (Creswell, 2014) but rather from several viewpoints (Hammond & Wellington, 2013). Hence, this paradigm sets out a philosophical basis for research that does not adhere to any one system of philosophy or reality (Creswell, 2014). According to this view, a researcher is free to use the full selection of methods, instruments, and procedures of research, which best fits the needs and purposes of the research and its specific context (Cherryholmes, 1992; Creswell et al., 2003; Morgan, 2007; Hammond & Wellington, 2013). Pragmatism states that the standard of truth and sincerity in a work is the basis of its success. In other words, this paradigm depends on the sincerity of the knowledge that is identified via a practical effect (Mackenzie & Knipe, 2006; Morgan, 2007; Creswell, 2014). The theory is extracted from practice in this paradigm (Morgan, 2007). The pragmatic paradigm concentrates on a research problem by asking 'what' and 'how' to research, based on the intended consequences (Patton, 2002; Cohen et al., 2011; Creswell, 2014). Therefore, rather than following one direction of data collection (e.g. quantitative or qualitative), this worldview holds true for mixed-method studies for data collection and analysis (Hammond & Wellington, 2013; Creswell, 2014). Cherryholmes (1992) and Morgan (2007) justify the reasons for using quantitative and qualitative data because of the mixing between 'what' and 'how', meaning that the words give meaning to numbers and vice (Hammond & Wellington, 2013). Therefore, this paradigm does not focus on methods but attempts to use all possible approaches to gain a better understanding of the problem and its solution(s) (Rossman & Wilson, 1985; Patton, 2002; Mackenzie & Knipe, 2006; Morgan, 2007; Creswell, 2014). Cohen et al. (2011) and Creswell and Clark (2011) state that pragmatism adopts practical and pluralistic methods rather than idealistic ones.

The pragmatic paradigm has been adopted in this project for several reasons. First, it reflects the researcher's view of the world as not being an absolute unity (Creswell, 2014). Therefore, it is important to stop asking questions about the reality and the laws of nature (Creswell, 2014), even when these questions work for the research inquiry (Thomas, 2013). This research aims to gain a better understanding of the research problem, which is the focus of the pragmatic paradigm

(Rossman & Wilson, 1985; Patton, 2002; Creswell et al., 2003; Johnson, 2004; Mackenzie & Knipe, 2006; Morgan, 2007; Creswell, 2014). Researchers such as Cherryholmes (1992), Tashakkori et al. (1998), Johnson et al. (2007), Morgan (2007), Migiro and Magangi (2011), and Creswell (2014) argue that pragmatism is a philosophy used to integrate approaches that could be utilised in a single study. From this, the researcher can argue that the main reason behind the choice of the pragmatic approach is the research questions, where the use of either quantitative or qualitative approaches does not completely address the research problem, whilst a combination of approaches does (Saunders et al., 2009; Creswell & Clark, 2011). As the research questions were mainly 'what' and 'how' questions, the pragmatic approach was judged to be a better approach (Patton, 2002; Saunders et al., 2009; Cohen et al., 2011; Creswell, 2014).

By adopting the pragmatism approach, the researcher will avoid becoming 'prisoner of a particular research method or technique' (Robson, 1993:291). The researcher was free to choose the methods, techniques and procedures that best met the purpose and need of the research (Murphy, 1990; Cherryholmes, 1992). The researcher was able to design multiple methods of data collection (questionnaires, interviews, and evaluation product cards) to best answer the research questions (Feilzer, 2010; Cohen et al., 2011; Creswell & Clark, 2011). In addition, this researcher strongly believes that both social reality and social knowledge are subject to change (Burnett, 2009). As mentioned in the epistemology section, truth or knowledge that will be extracted from this study can be changed tomorrow and become irrelevant or outdated. The research topic relates to employing technology in support of education, where that technology is characterised by instability (rapid evolution) (Koehler & Mishra, 2009). Therefore, the use of mixed methods generates valuable research questions and answers relevant to these questions (Cohen et al., 2011; Creswell, 2014). Furthermore, there are different analytical instruments that the pragmatic approach allows, such as the NVIVO and SPSS computer packages for qualitative and quantitative information analyses (Ihuah & Eaton, 2013) and focuses on the practical implications of the research. Hence, the research aims and goals will be realised using multiple methods, different assumptions, and various forms, whether during data collection or analysis. The next section discusses the approach of the study.

4.3 The Research Approach

The research approach refers to the study plan and procedures, which begin with initial assumptions and end with data collection, analysis, and interpretation (Creswell, 2014). Research approaches can be qualitative, quantitative, or mixed. Quantitative approaches were by far the most dominant in social science research until the mid-20th century, when interest in the qualitative approach increased, and this was followed by the emergence of mixed-methods research (Creswell, 2014).

Qualitative research seeks to explore a social or human problem through understanding the meaning individuals or communities ascribe to the problem in the form of natural language (Golafshani, 2003; Levitt et al., 2018). The process of the qualitative approach includes emerging procedures and questions, data collected from a smaller number of participants than quantitative studies, rich data, data analysis inductively built from property to general themes, and interpretation of the meaning of the data (Levitt et al., 2018).

Quantitative research, on the other hand, aims to examine a theory by formulating hypotheses, testing the relationship between variables, and collecting data to support or reject the hypotheses. Numerical data are analysed using statistical procedures and hypothesis testing (Golafshani, 2003). Winter (2000) sees that the quantitative approach divides a phenomenon into measurable categories, which can be applied to all subjects in varying situations.

The **mixed-methods approach**, in contrast, combines elements of both quantitative and qualitative approaches, resulting in the merging of the philosophical assumptions and theoretical frameworks (Levitt et al., 2018). This approach aims to overcome the limitations arising from the independent application of each approach (Johnson & Onwuegbuzie, 2004; Levitt et al., 2018) and arguably offers a deeper understanding of a research problem (Cohen et al., 2011; Creswell, 2014) by integrating both numerical and verbal data, leading to the generation of new visions (Levitt et al., 2018). By using both approaches, researchers are able to extract a wider perspective about the research problem, as opposed to the independent use of each approach. This approach permits researchers to keep track of the collection of multiple data types from multiple methods (Creswell, 2014).

Creswell and Clark (2006) introduce four mixed-methods designs: (a) triangulated, (b) embedded, (c) explanatory, and (d) exploratory. This research follows the mixed-methods embedded design—an experimental model. Mixed-methods embedded design consists of a single phase: concurrent quantitative and qualitative (with quantitative being dominant in this study) (Creswell et al., 2003). In an embedded design, a researcher might insert a quantitative strand within a qualitative design (e.g. in an interview) or add a qualitative strand into a quantitative design (e.g. in an experiment). The researcher in this design collects the quantitative (numeric) data with the intent of answering the primary question in an experimental design, whereas the qualitative data are embedded within the experimental design (before and after the intervention) to answer another research question related to the experiment (Creswell et al., 2003). The supplemental strand is added to support the overall design (Creswell & Clark, 2011). The different forms of data may be analysed separately before, during, or after the major data collection procedures (Creswell & Clark, 2011). The researcher analysed these research data after the major data collection procedures. Creswell and Clark (2006) emphasise that mixed-methods researchers must choose a particular design for their studies carefully, and they highlight various factors to the effect. The first factor to consider is the research problem, which offers researchers a logical framework to lead to the implementation of the research methods. This will make the research more manageable (Creswell & Clark, 2006). The second factor researchers must consider are their own quantitative and qualitative skills. For instance, in the case of beginner researchers, whose skills in conducting quantitative surveys may not be well developed, they should address this problem by working in a team or simply choosing a design that does not insist on that method (Creswell & Clark, 2006). The final factor involves respecting the available resources (e.g., time available for completing the study). Time was a critical factor to this research, and although the researcher followed a flexible plan, the time frame for collecting data was limited, hence the use of concurrent timing.

The mixed methods approach is adopted here as it fits the research questions and is expected to generate useful and valid answers. It is applied to obviate the limitations posed by either quantitative or qualitative approaches independently. Recalling the aim of this study, there is a need to gather quantitative data to measure the skills (perceived and actual skills) before and after the intervention. To this end, the researcher utilises closed-ended questions in the pre- and post-evaluation product cards and pre- and post-training questionnaires. There is also a need to collect qualitative data to learn about the participants' perceptions of the FML. To this end, the researcher uses open-ended questions in the interviews. Therefore, the triangulation of these two types of data provides a better understanding of FML and ensures that the findings are valid and unbiased (Zohrabi, 2013). The mixed methods approach is a feature of the pragmatic paradigm (Cherryholmes, 1992; Morgan, 2007; Creswell, 2014), and that the underlying philosophical framework for mixed methods research is presented through the pragmatic paradigm (Somekh & Lewin, 2005; Tashakkori & Teddlie, 2010). Thus, the mixed methods approach can indeed work within the pragmatic paradigm (Cohen et al., 2011). Since the researcher intends to employ more than a single method or approach, the mixed methods approach is suitable for addressing the research topic and answering a wide range of research questions (Johnson & Onwuegbuzie, 2004; Cohen et al., 2011; Creswell & Clark, 2011). The researcher will be flexible in the way the methods are used, as long as they provide rich and sufficient evidence (Thorpe & Moscarola, 1991). The mixed methods approach helps researchers explore the topic in-depth and obtain better understanding of the phenomena (Johnson & Onwuegbuzie, 2004; Cohen et al., 2011). Greene

(2008) states that: 'A better understanding of what matters in practice will help mixed methods theorists think more smartly about this contested domain and revise or develop a more elegant successor'. Hence, in-depth research leads to increasing the validity and reliability of the results (Cohen et al., 2011). Furthermore, using mixed methods merges the characteristics of both quantitative and qualitative methods. This means the research will be characterised by numbers, words, generalisation, and depth (Johnson & Onwuegbuzie, 2004; Cohen et al., 2011).

There are several reasons for using mixed methods, which are associated with teaching and teachers' development. Fishman and McCarthy (2000:13) propose that research into teaching must be 'both systematic and self-critical...involving established methods of data collection and analysis, peer review and publication'. To ensure systematic research in teacher development and for validity purposes, Rudduck and Hopkins (1985) suggest that teachers should be involved in the research process. In this research, the UQU female teachers were the research participants and contributed effectively to piloting the study to determine whether to participate in the piloting study or to review the content. At UQU, the researcher considered engaging a teacher to present the training sessions for groups instead of the researcher; this was to avoid bias and increase the validity of the research (Cohen et al., 2011). This approach has several limitations, however. For example, it may be necessary for the researcher to *train* about quantitative and qualitative approaches. Moreover, it may make the research time-consuming and necessitate more than one researcher (Driscoll et al., 2007). Despite these limitations, the researcher designed the methodology and intend to analyse the data by herself. The following section discusses the research design used in this study.

4.4 The Research Design

Researchers within the field of education have long used experimental research design to investigate cause-effect relationships. In other words, the experimental research design aims to examine whether there is a causal relationship between independent (input) and dependent variables (output) (Oppenheim, 2000). Researchers typically draw upon either true classic experimental, quasi-experimental, or natural experimental approaches to determine whether there is a causal relationship between the treatment and the outcome (Cohen et al., 2011; Hammond & Wellington, 2013; Rogers & Révész, 2020). The true experiment (also known as randomised control trial) is a controlled experiment conducted in laboratory conditions with two or more groups and the random allocation of participants to groups. Quasi-experimental design (also known as field experiments) is carried out in natural conditions with two or more groups, with the non-random allocation of participants to groups where the variables are controlled, manipulated, and isolated. In both types of experimental research design, the investigator conducts an intervention with one or more groups. In the natural experiment, the variables are impossible to isolate and control.

There are a number of defining features that mark true from quasi-experimental research. On the one hand, true experiments involve the manipulation of one or more independent variables, and the dependent variables are carefully measured, typically in the form of pre-and post-testing. True experiments are characterised by a random assignment, whereby those participants are randomly placed into either the control group or the experimental group. Both groups take part in pre-and post-testing, but the experimental group receives the experimental treatment (Kirk, 2009; Cohen et al., 2011; Loewen & Plonsky, 2016; Gravetter & Forzano, 2018; Rogers & Révész, 2020). On the other hand, the lack of random assignment for the participants is the main feature that characterises quasi-experimental design. A control group is not required in a quasi-experimental design but a comparison group may be included. A comparison group is an additional experimental group that receives a different experimental treatment (Kirk, 2009; Cohen et al., 2011; Rogers & Révész, 2020).

This research study employs a quasi-experimental design: the pre- and post-test, non-equivalent, multiple-interventions group approach. Several reasons justify the use of this design. The participants are not randomly allocated to all experimental groups and they will be chosen according to specific criteria (see section 4.8.3 'The Sampling Strategy') in line with the research aim and consistent with the properties of TPACK theory. Hence, the participants are not equated by randomisation. In addition, instead of having a control group and an intervention group, there will be three intervention groups (i.e. three comparation groups). Educational research literature does not use the term ‘multiple interventions approach’; rather it focuses on control and intervention groups (e.g., Stephenson et al., 2008; Jackson & Makarin, 2016). Justifications in support of not having a control group (i.e. a group training via the traditional face-to-face learning environment), but having three intervention groups are: (1) the research seeks to provide a better understanding of FML in CPD to increase the use of e-lectures in HE teaching in KSA. As the study investigates FML, it would be logical to achieve this by studying its elements, which are FL and ML, and to exclude face-to-face learning. (2) Several comparisons already exist in the literature of traditional versus flipped learning environments (e.g., Moffett & Mill, 2014), and there are also a number of published studies comparing traditional and mobile learning environments (e.g., Nouri et al., 2014). (3) The challenges faced by Saudi HE of rising student numbers (Roy, 1992; Onsman, 2010; Almalki, 2011), shortage of teachers (Alissa, 2011), the need to scale up Saudi HE teacher-training programmes (Abdulkarim, 2009) and gender segregation in education (Almalki, 2011) are too much for the traditional learning environment to overcome on its own, but can be significantly helped by technology in the form of FL, ML and FML as has been explained previously.

To determine whether the interventions were successful in improving e-lecture skills, these were measured in all three groups before the intervention to ensure parity between the groups, and they were also measured after the intervention to gauge the effects on the dependent variable. In the context of this study, the experimental variables (FL, ML, and FML) were applied to the three experimental groups (also known as intervention groups), after which the differences between these three groups were measured. The specifications of the three groups are as follows:

1. **The First Intervention Group (Group A):** Participants to be trained solely via flipped learning (FL). In the context of this study, FL involves training via a flipped learning environment whereby the trainees watch a recorded video prior to attending the training session, where class time is used to solve complex concepts and questions arising from the video. The classroom is a real, designated training room at Umm Al-Qura University (UQU).
2. **The Second Intervention Group (Group B):** Participants to be trained solely via mobile learning (ML), whereby trainees attend a training session using the Acadox application accessed through their mobile devices.
3. **The Third Intervention Group (Group C):** Participants to be trained solely via flipped mobile learning (FML), whereby trainees watch a video on their mobile devices prior to attending a training session via Acadox, also accessed through their mobile devices. Class time is then used to solve complex concepts arising from the video.

Because the FML approach is mobile learning in flipped form, Group C that is trained via this approach will incorporate characteristics from Group A and Group B. In order to present a clear picture of the differences between all groups, Table 3 shows the characteristics and differences between all three groups.

	Detail	The FL Intervention Group	The ML Intervention Group	The FML Intervention Group
1.	Group code	Group A	Group B	Group C
2.	Training method	Flipped learning (FL): The participants will watch a recorded video prior to attending the training session, while with the class time used to solve complex concepts and questions arising from the video	Mobile learning (ML): The participants will attend a training session using the Acadox application accessed through their mobile devices	Flipped mobile learning (FML): The participants will watch a recorded video prior to attending a training session on Acadox via their mobile devices. This virtual class time will be used to solve complex concepts arising from the video
3.	Training environment	A real class, designated training room at Umm Al-Qura University (UQU)	Acadox application in the participants' mobile devices	
4.	Time of training	• Presenting the first training session in the early morning (Group A on Monday, Group B on Tuesday, and Group C on Wednesday) • Presenting the second training session in the late morning (Group A on Monday, Group B on Thursday, and Group C on Wednesday)		
5.	The procedure before applying the training	Emailing the pre-training questionnaire link to all participants and gathering the produced e-lectures		
6.	The procedure of applying the training	Emailing the invitation to attend the training course in Building Y, Hall (Workshop 3) and ask the participants to watch the attached video in advance before attending the session, then complete the following assignments: 1. Write a summary of the information you got from the video 2. Write questions about the video contents 3. Write questions about the information that you could not understand	Emailing the invitation to attend the training course via Acadox platform, through the link: http://www.acadox.com/join/BAWH97	Emailing the invitation to attend the training course via Acadox platform, through the link: http://www.acadox.com/join/HSH75T and ask the participants to watch the video in the link in advance before attending the session then complete the following assignments: 1. Write a summary of the information you got from the video 2. Write questions about the video contents 3. Write questions about the information that you could not understand

<table>
<tr><th></th><th>Detail</th><th>The FL Intervention Group</th><th>The ML Intervention Group</th><th>The FML Intervention Group</th></tr>
<tr><td>7.</td><td>The procedure after applying the training</td><td>• The post-training questionnaire link was emailed to the participants
• Gathering the reproduced e-lecture via email</td><td colspan="2">• The post-training questionnaire link was emailed to the participants, as well as posted on the relevant Acadox page
• The re-produced e-lectures by the participants were gathered after they were posted on the discussion room in Acadox page</td></tr>
</table>

Table 3. The characteristics and differences between all three groups

A skills comparison within each group before and after training was completed first. A comparison within each group is fair because it involves only one experiment form undertaken in the same conditions. The three experimental groups were then compared after training to differentiate between the effects of FL, ML and FML in the CPD training to find out which method works better in terms of improving the participants' e-lecture skills. Figure 9 outlines the before-and-after design for the RQs with time scale (see Table 6 for more detail).

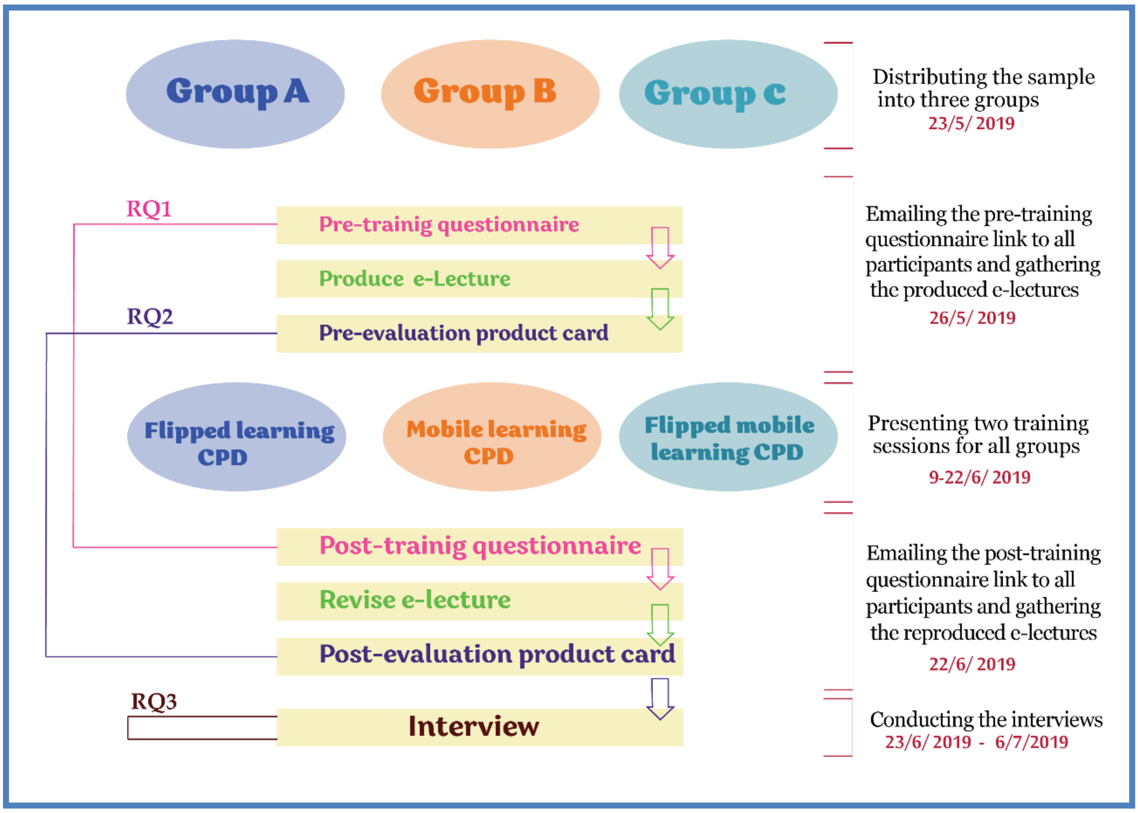


Figure 9. The before-and-after design for RQs with time scale

Oppenheim (2000) and Cohen et al. (2011) emphasise that the before-and-after design relies on the length of time between tests. In particular, the pre-training questionnaire should be conducted as closely as possible to the start of the intervention. As a result, the influence of confounding effects between the pre-training questionnaire and the start of the intervention will be avoided (Cohen et al., 2011). Morrison (2012) argues that the timing of both the pre- and the post-questionnaires matters. On the one hand, if the post-questionnaire is conducted too close to the end of the intervention, it may not measure notable effects. The effects of the intervention may have disappeard or become submerged by other matters if the post-test is administered too late. Cohen et al. (2011) recommend applying more than one post-test (e.g. once after the intervention and another one after a set period) to overcome the timing problem. Since the researcher was not able to return to KSA to conduct a second post-test (the sponsor, the Saudi Cultural Bureau in London offered financial support for one set of research only), the duration between the pre- and post-questionnaires was four to five weeks. This means that the post-test had to be applied after the last training session. The next section describes how the study variables were identified for this research.

4.5 Variables

There are five types of variables: (a) independent (IV), (b) dependent (DV), (c) controlled, (d) moderator, and (e) intervening. Independent variables (also known as experimental or explanatory variables) are the input variables, and these are the causes whose effects need to be measured. Dependent variables, however, are the outcome variables, and these are the results that are influenced by the independent variables (Oppenheim, 2000; Cohen et al., 2011; Hamdan, 2015). Figure 10 outlines the variables used in this study.

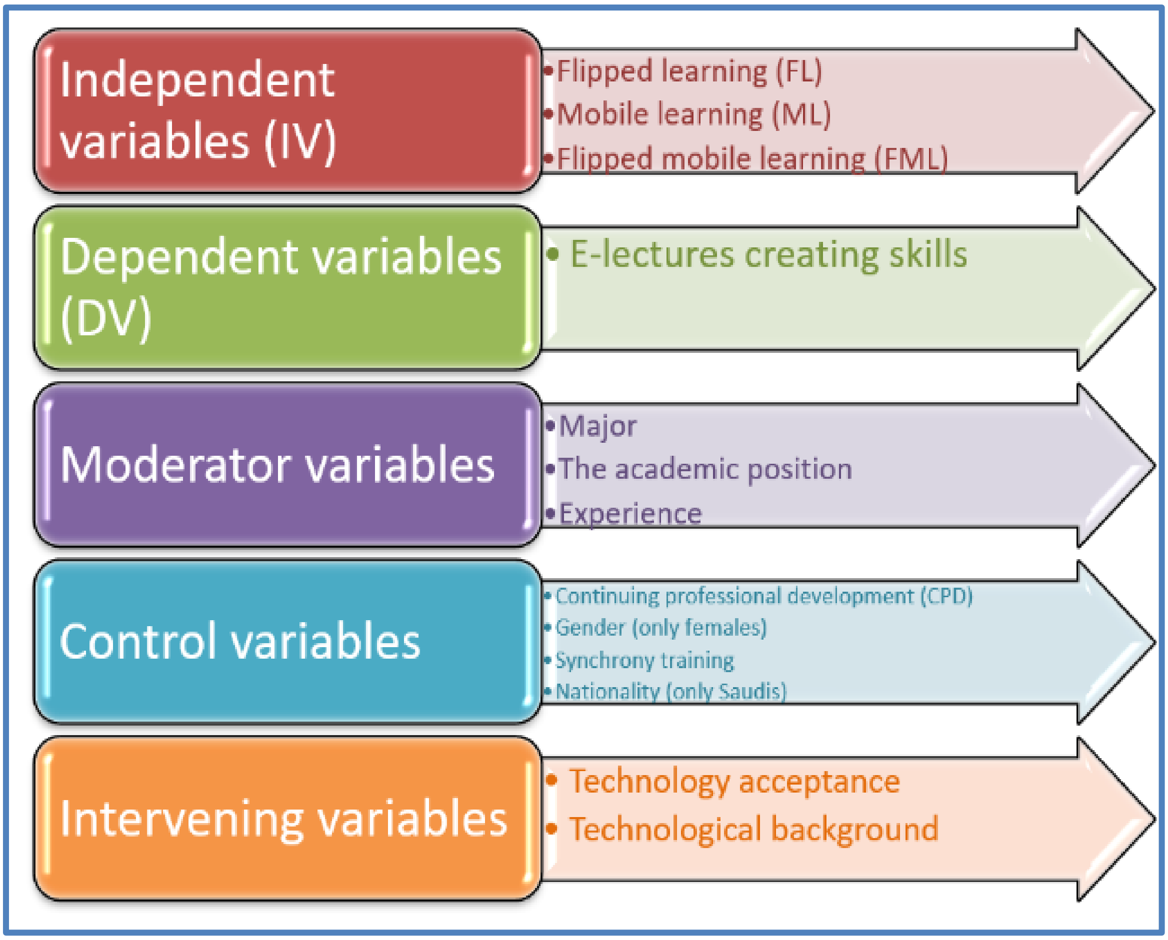


Figure 10. Variables in the study

In this study, the training environments of FL, ML, and FML are considered as independent variables, while e-lecturing skills is considered as dependent variables. Hamdan (2015) defines moderator variables as secondary independent variables that have an effect on the relationship between the independent and dependent variables. Oppenheim (2000) describes control variables as the source of differences which affect the independent variables, whereas Hamdan (2015) says that control variables are controlled by the researcher to avoid any interference in the relationship between the independent and dependent variables. To avoid Type I errors and increase the study validity, the control variables are determined carefully (Cohen et al., 2011; Field, 2013). Intervening variables (also known as uncontrolled variables) can interfere with the relationship between the independent and dependent variables but cannot be observed or controlled by the researcher (Hamdan, 2015). It is impossible to control the intervening variables due to lack of knowledge or misunderstanding the phenomenon under investigation (Oppenheim, 2000). Both the confounded and error variables are considered types of uncontrolled variables (Oppenheim, 2000). As this study involves human participants, the researcher was not able to control all of the influences on the participants and what they gained in terms of information between pre- and post-testing. It must be acknowledged that some changes may have been due in part to the participants' culture or work habits (i.e., intervening variables).

Technology acceptance and technological background are determined as the intervening variables in this study; these cannot be observed or controlled by the researcher as they differ from one participant to another (Oppenheim, 2000; Hamdan, 2015). If a prospective participant does not agree with technology use in teaching they would be deemed as unsuitable, since technology is central to the study topic (Knowles et al., 2015). Similarly, if a participant does not have at least a basic technological background, they would not be ready to use the more complex technology demanded by the study (Koehler & Mishra, 2009) since they would thus be unable to create an e-lecture. This viewpoint is supported by Koehler and Mishra (2009) and Graham (2011), who state that technological knowledge (TK) can assist or impede the achievement of a particular aim. TK requires a deep understanding and mastery of information technology for communication, information processing, and problem-solving. TK helps teachers accomplish a diversity of tasks in different ways via ICT (National Research Council, 1999; Koehler & Mishra, 2009).

Four variables that may influence the relationship between IV and DV have been controlled in this study. The first variable is CPD, which is the reason for the training session for all groups. The second variable is the gender of the teachers (female only). Although Wang et al. (2009) and Terzis and Economides (2011) confirm that there is no significant relationship between ML and gender, the researcher keeps this variable controlled to respect the Saudi education system, which separates genders. The third variable involves synchronistic training for teachers in all groups, because in the case of the flipped learning environment for Group A, it is not possible to present the content asynchronously. Finally, concerning nationality, although many foreign teachers work in Saudi universities, Saudi nationals have been chosen as participants in this study because teacher-preparing programmes vary from country to country in terms of content, quality, and time. The following section offers a brief overview of Umm Al-Qura University (UQU), Saudi Arabia, where the research data were collected.

4.6 Umm Al-Qura University (UQU)

Umm Al-Qura University (UQU) is the only university in Makkah city. Despite its recent inception, it has taken on a scientific and cultural importance because of its place in Makkah (Umm Al-Qura University, 2017). The university was founded in 1949 with the establishment of the Faculty of Sharia (Islamic Law) and the subsequent establishment of the Teachers College. In 1962, the College of Education was established and the second phase in the growth of the university was accession of the faculties of Sharia and Education to form under the umbrella of King Abdul Aziz University in

Jeddah in 1971. During this period, some new sections were established and several educational centres were created. In 1980, a Royal Order was issued to establish Umm Al-Qura University (Ministry of Education, 2017). Furthermore, it has established ten new colleges in addition to the Institute of Arabic Language to Non-Native Speakers and the Hajj Research Institute. The university is pursuing career teaching and accommodating an increasing number of students. It offers bachelors' degrees, masters' degrees and doctorates in different disciplines. Currently, there are around 30,000 students and 1,500 faculty members. There are 35 faculties which offer approximately 215 specialisations. There is a specific deanship for EL and distance education (Umm Al-Qura University, 2017).

UQU has been chosen to represent the rest of Saudi universities as the researcher is an academic member of this organisation. Subsequently, gaining access to the university and gathering data will be much easier for the researcher. Familiarity with this institution enabled the researcher to recruit participants for the study from among the lecturers. In order to comply with ethical considerations and minimise bias, the researcher assured the participants that this research project was conducted under the supervision of the University of Southampton in the United Kingdom within a PhD programme. They were also informed that they had a right to withdraw from the study at any time. Several permissions were required when conducting this research project but due to the researcher's positionality at this institution was considered an insider, issues such as delays in obtaining access and permission did not arise. The next section gives an outline of the Acadox application, which was used by two of the experimental groups (Groups B and C) in the CPD training.

4.7 The Acadox Platform

The name 'Acadox' derives from 'academic' and 'document' and this application uses social communication technologies to manage the learning process, organise materials, communicate with teachers and colleagues, support knowledge exchange between learners around the world, document the academic journey, and facilitate access to educational goals according to international standards (Fawzan, 2013; Alshawi, 2016). Amin et al. (2015) defined Acadox as an integrated environment based on communication technologies and modern concepts, and this environment attempts to change learning from instructional methods that depend on student memorisation to teaching styles that foster creativity, innovation and content production. Acadox (2020) presents itself as a virtual, online environment, which permits users to manage coursework, connect and collaborate with other learners, exchange information in the academia, and document their achievements. In recent research conducted by Amin et al. (2015) and Alshawi (2016), Acadox was recommended as an educational platform for teacher training.

The Acadox system uses the latest cloud technologies to guarantee the highest levels of protection, security and confidentiality of user data encryption. It also reduces technology costs related to hosting, maintenance and continuous updates. It includes automatic expansion of the program in case of heavy use, and distribution of use on servers to ensure speedy performance. Acadox also provides backup copies of the data to ensure that it is not lost (Amin et al., 2015; Acadox, 2020; Al-Wakeel,2020). The application is easy to download and subscribe to; it facilitates sharing materials and resources, and has a progress-tracking function (Amin et al., 2015; Acadox, 2020; Al-Wakeel, 2020). Acadox provides teacher tools for resources and file management, and brings students together into groups for ease of communication and information-sharing. Acadox enables users to talk to other communities on the site and allows them to share activities and educational content. This functionality has led to Acadox becoming well-regarded as a comfortable and flexible educational environment (Amin et al., 2015; Acadox, 2020; Al-Wakeel, 2020), not only for students but for teachers as well. Knowles et al. (2015) observe that having a comfortable and flexible environment is one of the principles of successful adult learning. Since it is compatible with Arabic and English speakers, it is ideal for use in this study (Amin et al., 2015; Acadox, 2020). Other attractive features of Acadox are that it is free (Amin et al., 2015; Acadox, 2020) and that the app interface is simple and user friendly (Acadox, 2020; Al-Wakeel, 2020).

Acadox offers advanced social media tools which are easy to use and interactive. Users can share questions, opinions, discussions, news, messages and everything that matters to their community in and out of the classroom (Amin et al., 2015; Al-Wakeel, 2020). Acadox allows the user to document, store and archive everything written and read during their academic career (Amin et al., 2015; Al-Wakeel, 2020). In addition, Acadox offers virtual educational classrooms, whereby an educational institution can expand activities outside of its physical boundaries by using virtual classes (Amin et al., 2015; Al-Wakeel, 2020). Acadox enables the learner to have academic updates in real-time via the smartphone app, and they can be in constant contact with the learning community (Amin et al., 2015; Al-Wakeel, 2020). Finally, Acadox provides an application software interface that allows the linking of it with any other program used by the educational institution. For example: student information, financial software, and enrollment are seamless and secure via effective management and user performance (Amin et al., 2015; Al-Wakeel, 2020).

It must be noted that many other apps also perform the same tasks as Acadox, such as Rwaq and Edraak. Melhuish and Falloon (2010) strongly recommend that teachers learn to manage their time effectively when using the apps and propose that teachers devote some time to choosing the best one for their needs. The researcher chose Acadox for this project because its characteristics were a good fit for the needs of the research and because the researcher and the UQU community were aready very familiar with it.

The interface of the Acadox platform includes the following:

1. **Course Information Tab:** Containing the subject name, description, start date, end date, time, type of subject, and location.
2. **Discussion Tab:** Discussions are presented with new questions and enquiries from learners.
3. **Assignments Tab:** The assignments are listed in this tab with performance requirements.
4. **Sources Tab:** Where links and folders are placed. It can assist learners in performing their tasks efficiently and effectively.
5. **Course Management:** Attendance options of how to join the environment. In addition to the number of seats, the addition of teachers, and lists of invitees for the material.
6. **Pages:** To control the different tabs of the environment or add pages in HTML, and Application Center.
7. **Advanced Options:** Control the material advantages in terms of enabling or disabling presentation of content or advanced features of the material.
8. **Statistics:** To track students' activities in the course.

Instructors can also add other tabs as needed, and indeed one of the advantages of this system is the option to add more capability for the teacher to communicate effectively with learners. The researcher made interaction and communication available for the learners via their e-mail. This was done to secure their entry and their reliance on the remote access control system, and the system logs the number of times learners enter and move between the pages and tools of the system.

Figure 11 shows a screenshot of the Acadox interface created for Group C, and Figure 12 for Group B. As the screenshots are of the Arabic interface of Acadox, the tabs and discriptions have been translated from Arabic to English and posted on the screenshot inside the shapes. Tabs in both screenshots are similar, but the difference is only in the group code. In the next section, the sampling for the study is presented in detail.

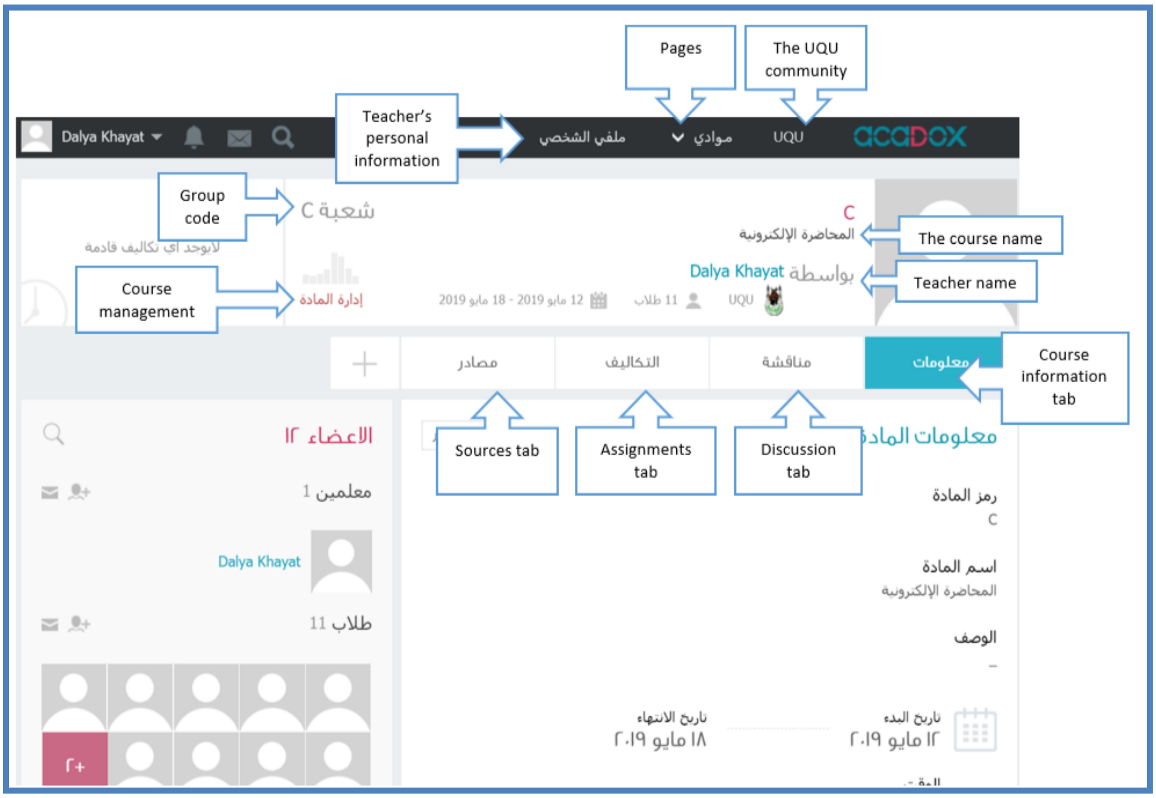


Figure 11. Screenshot of the Acadox platform for Group C

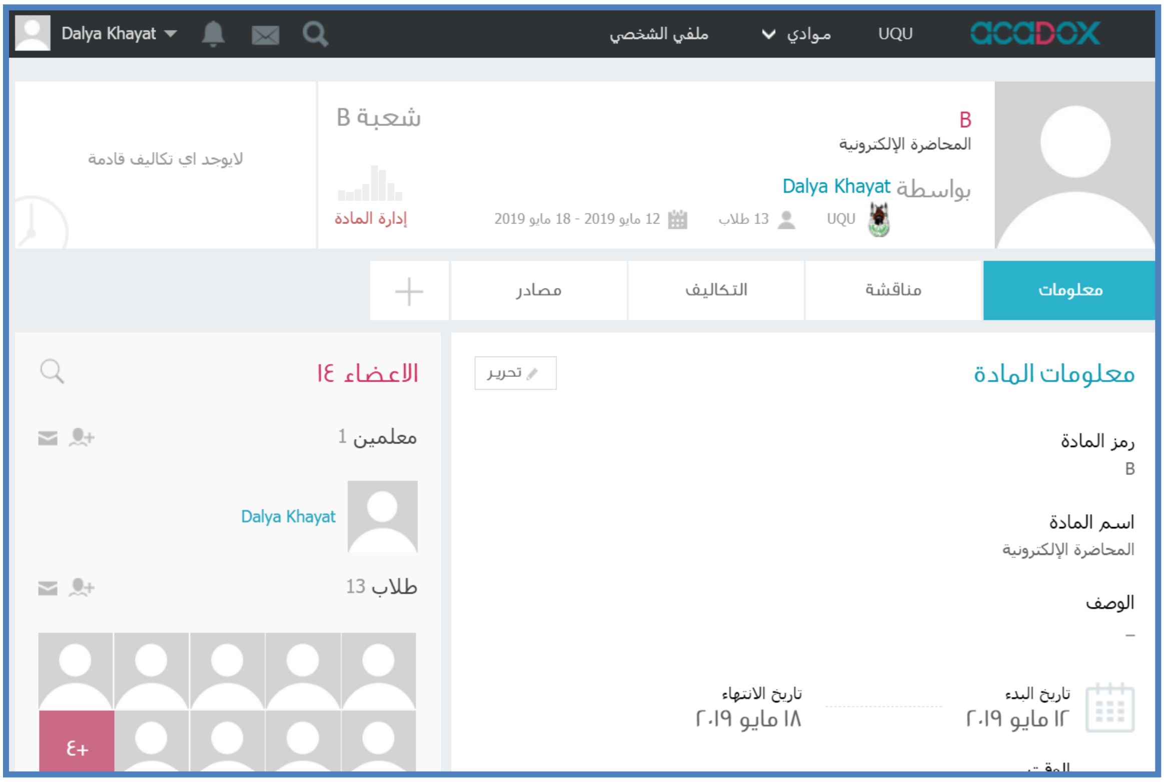


Figure 12. Screenshot of the Acadox platform for Group B

4.8 Sampling

Researchers are not always in agreement about how the terms 'community' and 'population' should be used. Silverman (2013) suggests that the term 'community' implies the group from which individual participants are chosen for the study, whereas 'population' implies the specific sample drawn from the community. In the context of this study, community refers to all of the teachers at UQU in KSA who formed the population from which the respondents were drawn. Sivan et al. (2000) and Draugalis and Plaza (2009) emphasise the impossibility of including all members of a community; thus, researchers need to ensure the accuracy of sampling representatives from the community through setting out certain criteria for the sample.

Kemper et al. (2003) and Cohen et al. (2011) mention five key factors that the researcher should take into consideration in sampling, and these include (a) the sample size (see below); (b) sample representativeness, where a valid sample represents the whole population, which can be achieved by a list of the sample criteria; (c) access to the sample at no or minimal cost; (d) sampling strategy; and (e) type of research.

4.8.1 Sample Size

There is no straightforward answer to the right sample size. Cohen et al. (2011) say that the sample size depends on the nature of the population, the required level of accuracy, the expected response rate, the number of the variables, the aims of the study, and the type of research (i.e. qualitative or quantitative). In quantitative research, a large sample affords significant reliability and facilitates developing statistics (Cohen et al., 2011). A sample size of 30 participants is the minimum number in quantitative research, indicating 30 cases for each variable (Cohen et al., 2011). However, because the researcher was unable to invite all university teachers at UQU, it was planned that 30 participants at least should be selected for each group (N = 90 participants) in order to give a representative sample of Umm Al-Qura University teaching staff. On the one hand, these 90 participants were considered a large enough sample for the quantitative data to facilitate developing statistics and giving a high level of reliability (Cohen et al., 2011). On the other hand, a large sample size for qualitative data presents the opportunity to obtain rich descriptive data (Onwuegbuzie & Leech, 2007; Cohen et al., 2011; Punch & Oancea, 2014).

In order to avoid the risk of potential bias and to ensure a fair sample at the data collection phase, the email invitation to participate in this research was sent using an email list of teaching staff in each faculty in a stratified purposive strategy. The email was sent by the Curriculums Department of the Education College of UQU on behalf of the researcher. It is worth noting the researcher had read and confirmed the email content. The original plan was to choose two university teachers from each college to join the experiment sample. Unfortunately, some of them did not respond to the initial invitation to participate in the research study, which was perhaps due to their preoccupation with organising final examinations during the conducting of the research study. Consequently, the researcher instead had to accept all those who responded positively to the invitation, regardless of the number planned for each college. Indeed, the number of participants further decreased in each group due to subsequent withdrawals from the study. Table 4 shows the number of participants who initially registered in this study compared to the final number. The initial sample size was 90 participants. After dropout, as can be seen in Table 4, the sample size became 70 participants (N=70). As dropout was quite evenly spread across the three groups (4, 8 and 8 respectively), the researcher did not consider that the decrease would significantly affect the findings.

Group Code / **The Situation**	**A (FL Group)**	**B (ML Group)**	**C (FML Group)**	**The Total**
The number of participants who registered at the beginning of the study	30	30	30	90
The number of participants who withdrew from the study (after the pre-training questionnaire)	7	6	9	22
The number of participants who re-enrolled after withdrawal, after being told they would receive an attendance certificate	3	1	3	7
The number of participants who did not complete all tasks and whose data has been destroyed	0	3	2	5
The number of participants who did not re-enrol after withdrawal, and whose data has been destroyed.	4	5	6	15
The final dropout number of participants in each group	4	8	8	20
The final number of participants in each group	26	22	22	70

Table 4. The number of participants at different stages of the study

4.8.2 The Sample Criteria

As a faculty member at Umm Al-Qura University (UQU), the researcher was able to access the participants without incurring travel expenses. Based on the aim of this research, the following inclusion criteria were chosen:

1. Only current university teachers from UQU;

2. Only female teachers;
3. All university teachers, regardless of their level of academic position (teaching assistant: a university teacher who holds a bachelor's degree as the highest qualification; lecturer: a university teacher who holds a master's degree as the highest qualification; assistant professor, associate professor, and professor: a university teacher who holds a doctoral degree as the highest qualification);
4. Only Saudi university teachers;
5. All university teachers, regardless of their majors;
6. Only academic staff (i.e. only university teachers);
7. All university teachers, regardless of their experiences;
8. Only those who accept the use of technology; and
9. Only those who have a technological background.

Accepting technology and having a basic knowledge of technology were added to the inclusion criteria (and were chosen as intervening variables, as well) as participants without either would not be eligible (Koehler & Mishra, 2009) since they would be unprepared for learning to create an e-lecture. This viewpoint has been supported by Koehler and Mishra (2009) and Graham (2011), who point out that Technological Knowledge (TK), can assist or impede the achievement of a particular aim. TK is an understanding and mastery of information technology for communication, information processing, and problem-solving. TK helps teachers to accomplish diverse tasks in different ways via ICT (The National Research Council, 1999; Koehler & Mishra, 2009).

In order to recruit the study participants, the researcher requested the Curriculums Department of Umm Al-Qura University (UQU) to email all of the female university teachers to invite them to take part in the study. The email included the researcher's contact details so that teachers who were willing to take part could contact the researcher directly and sign the consent form and the Curriculums Department attached the Arabic version of the information sheet and consent form. In case of agreement to participate in the study, the teacher was asked to forward the email to the researcher and sign the consent form. Since the Saudi Embassy requires PhD candidates to be supervised at the place where data collection is to take place, Prof Faiza Maghrabi kindly agreed to supervise the researcher throughout this phase.

4.8.3 The Sampling Strategy

Kemper et al. (2003), Draugalis and Plaza (2009), and Cohen et al. (2011) have identified two strategies for choosing a sample: probability (random) and non-probability (purposive). Probability sampling encompasses random selection, whereas non-probability does not. The difference between both strategies is that random sampling presents an equal opportunity for each member in the population to be in the sample, while in the purposive sample, each member of the population does not have an equal opportunity to be in the sample (Cohen et al., 2011). Because this research is mixed methods, quasi-experimental (with several subgroups), and involves comparisons across all three groups, the researcher decided on a stratified purposive sampling strategy, which permitted identification of the different strata (e.g. the subgroups) within the population under study; afterwards, a particular number of cases could be selected from within each subgroup (Tashakkori & Teddlie, 2010; Cohen et al., 2011).

In the context of this study, 90 participants were distributed into 10 strata, each stratum had 9 participants. The first three participants were chosen from each stratum for Group A, the next three participants from each stratum for Group B, and the last three participants from each stratum for Group C (see Figure 13).The researcher allocated the participants to each group randomly and without any external influence. The researcher expected that if participants were given the freedom to select their own groups, they would choose the method of training they felt was easiest and that this would probably be ML or FML, which involved training via Acadox on their mobile device, rather than attending a class required by the flipped training.

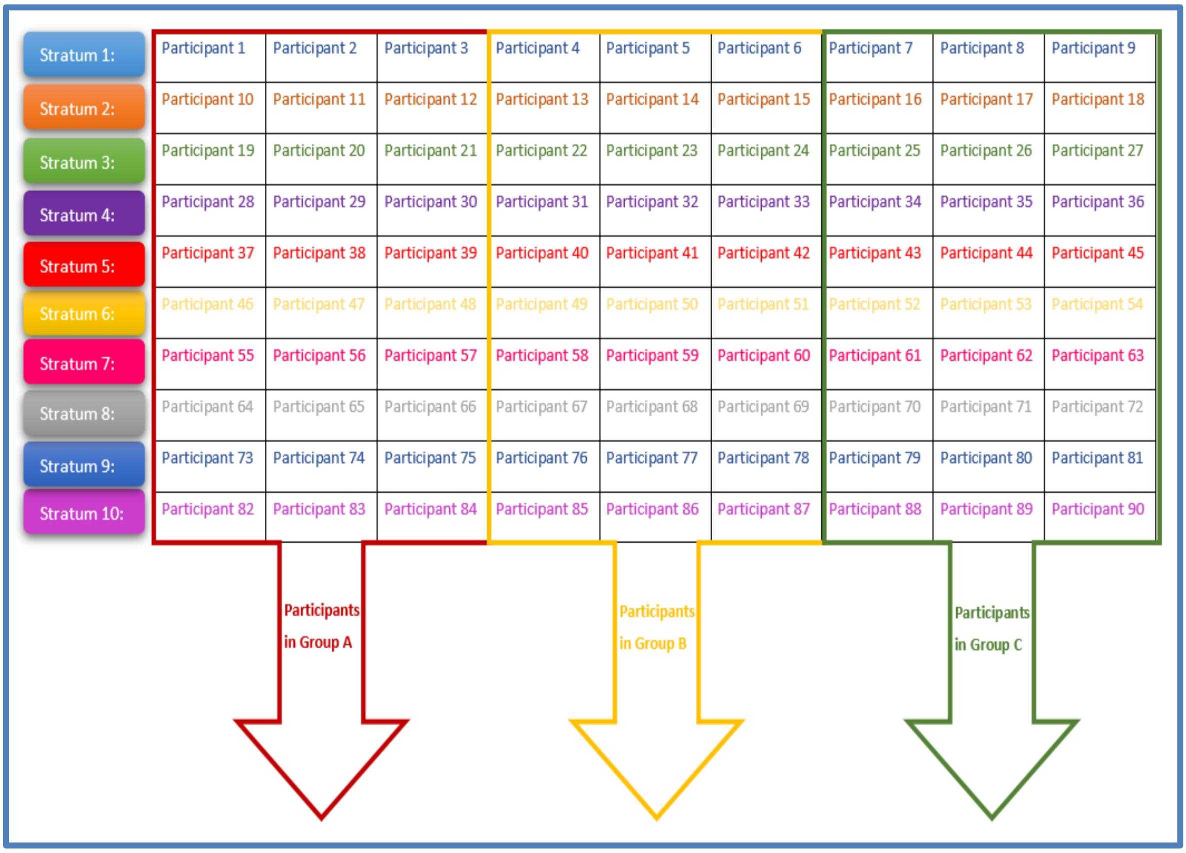


Figure 13. The sampling strategy of this study

Quantitative research is often linked to random sampling, whilst qualitative research is connected to purposive sampling (Cohen et al., 2011). Quantitative research is the only type that allows statistical generalisation of the findings from the sample to the population (Onwuegbuzie & Leech, 2007). Whereas, qualitative research interprets the data to achieve analytic generalisation or case-to-case transfer (Firestone, 1993; Curtis et al., 2000). Thus, 'qualitative researchers generalise words and observations to the population of words/observations representing the underlying context' (Onwuegbuzie, 2003: 400). This research uses mixed methods and is quasi-experimental; twelve participants interviewed were not randomly allocated. In order to generalise the results when an experimental research design is used, both internal and external validity should be maximised (Hulstijn, 1997; Chaudron, 2003; Gravetter & Forzano, 2018). The results of this research could be generalised to an external context because the validity has been increased (see section 4.11 'Reliability and Validity').

For the interview stage of the study, the researcher did not choose specific interviewees since it was impossible to select them according to who showed the most, the least, or the same improvement in perceived and actual skills in each group. This was due to lack of time, as well as many withdrawals from the study and participants not completing tasks. Therefore, volunteer interviewees were those participants who answered affirmatively in Part B of the post-training questionnaire to express their consent to an interview. Moreover, the researcher analysed these research data after the major data collection procedures. The next section discusses the data collection methods.

4.9 Data Collection Methods

Scotland (2012) notes that the choice of investigation methods in a research study is affected by researcher positionality. Researchers with different ontological and epistemological positions often take different research approaches towards the same phenomenon (Scotland, 2012). Punch and Oancea (2014) also emphasise that the research questions help to determine the methods. In the present context, the research questions seek to gather data in the form of numbers and words, thus indicating the suitability of a mixed-methods approach that uses multiple data-collection instruments (see Table 5 which is a repetition of Table 1). However, Scotland (2012) describes methods as being the specific tools or procedures used in the research study to collect and analyse data. Because this study aims to gain a better understanding of university teachers' use of FML and e-lectures, a pragmatic mixed-methods approach has been chosen which has multiple data-collection instruments.

	Research Aims	Research Questions	Methods
1.	Gaining a better understanding of the perceived effects of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills	RQ 1. What are the perceived outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills? (Quantitative data)	Pre- and post-training questionnaire
2.	Gaining a better understanding of the actual effects of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills	RQ 2. What are the actual outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills? (Quantitative data)	Pre- and post-evaluation product card
3.	Exploring university teachers' opinions of the concerns, challenges, and affordances of using FML	RQ 3. What are university teachers' opinions of the concerns, challenges, and affordances of flipped mobile learning? (Qualitative data)	Semi-structured interview

Table 5. Research aims, research questions, and methods [repeated in Table 1]

As far as the researcher is aware, up until the time of publishing this study, no other research has been conducted to measure teachers' e-lecture production skills, and no other research has measured the effectiveness of delivering CPD via FML. In the interests of clarity in designing all instruments, the researcher wrote out the aims and research questions manually as a diagram in Arabic. A clear formulation of the statements to be measured was then set out, and the estimated time and measurement scales were determined carefully. The construction of all instruments involved identifying the themes associated with the research questions and re-considering them several times. After this, strands in Arabic and international literature were reviewed to compare the statements with those in the proposed instruments. Then, the initial version was shared with experts (see Table 19 in Appendix A), after which some of the statements and themes were modified. The second versions of the instruments were shared with the experts and the participants in the pilot study. Finally, the third version of the instruments was used for gathering these research data, which was improved based on the pilot study recommendations. The next sections present the details of the last version of each instrument.

4.9.1 The Pre-Training Questionnaire

The purpose of the pre-training questionnaire was to gain a better understanding of the perceived skills of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers e-lecture skills before the intervention. An account was created on SurveyMonkey (https://www.surveymonkey.co.uk/) and the pre-training questionnaire link was emailed to the participants via SurveyMonkey before the intervention (see Figure 14).

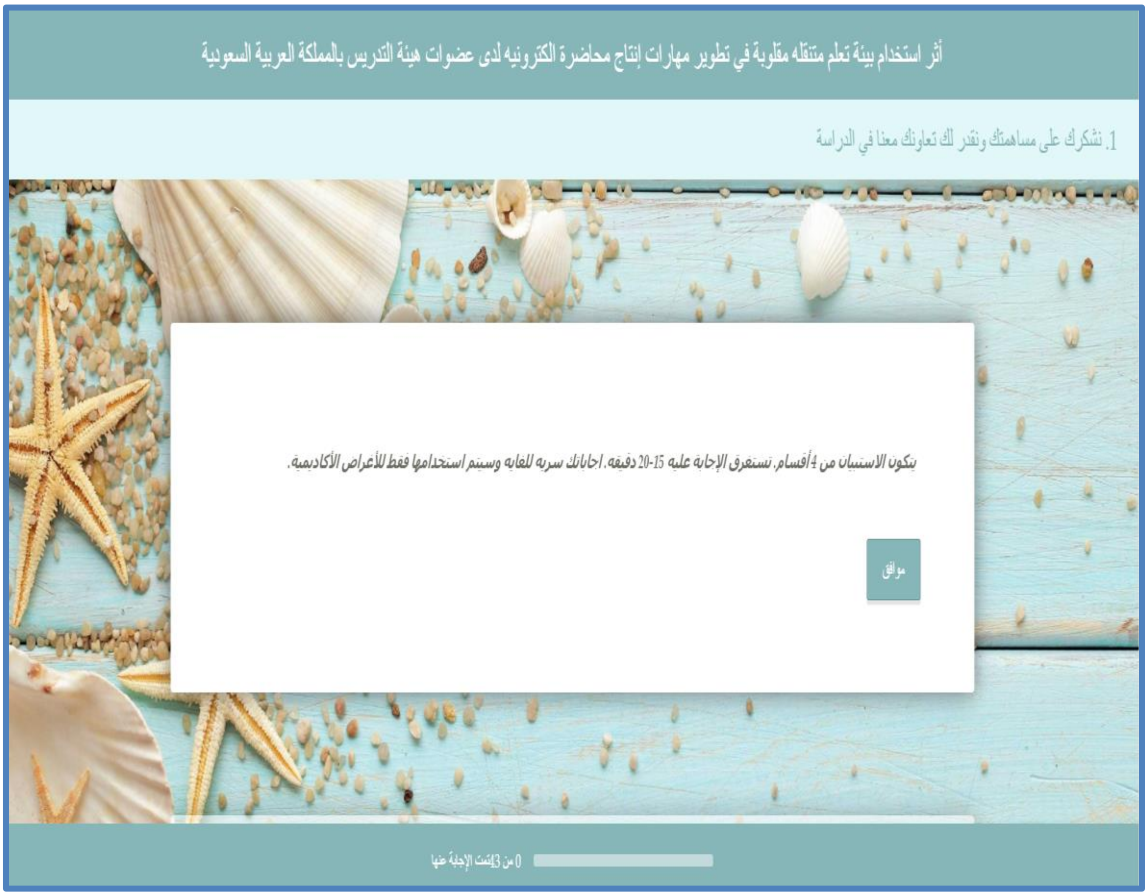


Figure 14. Screenshot of the pre-training questionnaire

The final version of the pre-training questionnaire involves closed-ended questions to allow the participants to select one of several answers (Taylor-Powell, 1998). The time needed to complete the questionnaire was estimated at around 15-20 minutes and in both the pre- and post-training questionnaires, the participants were asked to answer all the questions as accurately as they could. In order to avoid the problem of participants skipping questions, a star sign (*) was marked on all questions to indicate that the participant could move to the next question only after answering the current question. Some questions required more than one answer, and in each case this was indicated below the question. Some settings were specified in the SurveyMonkey app to ensure that the search sample was non-repetitive. For example, determining the option of a single response for the device. As well, closing the questionnaire link before starting the new task (i.e. after a week had passed from beginning the questionnaire). These settings were also applied for the post-training questionnaire.

The questionnaire starts by introducing the research and continues with the procedures and questions. Questions were organised into four core sections. In the first section, the participants are required to answer the first two questions using a five-point Likert scale, ranging from 5

(Strongly agree) to 1 (Strongly disagree). The participant is allowed to continue the questionnaire if the answers are between 3-5 point in each case. Otherwise, she will be notified of the end of the questionnaire and that she does not fit the participation criteria. Likert scales are used to reflect the participants' opinions, attitudes, or the extent of their agreement or disagreement with a question. Likert scales can achieve a degree of data sensitivity, which closed-ended questions cannot afford (Cohen et al., 2011). Thus, Oppenheim (2000) recommends that researchers use five-point Likert scales for accurate results. This is followed by nine questions, which aim to gather demographic information about the participants.

The second section consists of nine questions, aimed at CPD at UQU. The participants are required to select the appropriate answers, which reflect the extent of the utilisation of CPD. The third section includes eight questions associated with the learning environments. The participants are required to determine the answers according to a limited three-point Likert scale, ranging from 3 (Yes) to 1 (No). The fourth section asks questions that reflect the extent of participants' knowledge and perceived skills about e-lectures. This section has two sub-sections. The first sub-section (part A) asks the participants to choose the appropriate level of e-lecturing skills (14 skills). The participants are required to answer according to a limited five-point Likert scale, ranging from 5 (Most adequate) to 1 (Least adequate). Part B asks the participant kindly to create an e-lecture and send it to the researcher's personal email. The final Arabic/English version of the scale is shown in Appendix I.

4.9.2 The Post-Training Questionnaire

The purpose of the post-training questionnaire is to gain a better understanding of the perceived skills outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills after the intervention. The post-training questionnaire is similar to the pre-training questionnaire in only the fourth section, which includes two sub-sections (A and B). The fourth section in the pre-training questionnaire reflects the extent of participants' knowledge and perceived skills about e-lectures. Hence, the questions are closed-ended questions. The post-training questionnaire (see Figure 15) was created and sent to the participants' email via SurveyMonkey after the intervention, as well as being posted on the relevant Acadox page for Group B and C. The estimated time to complete the questionnaire is around 10−15 minutes. The participants were asked to answer all the questions accurately. The final format of the post-training questionnaire involves two core sections. The first section has only two questions about the participants' demographic information (only group code and participant ID). The second section reflects the extent of participants' knowledge and perceived skills in e-lectures after the intervention. This section was divided into two sub-sections. The first sub-section (Part A) asks the participants to choose the appropriate level of e-lecturing skills (14 skills). The participants are required to answer according to a limited five-point Likert scale, ranging from 5 (Most adequate) to 1 (Least adequate). Part B requires the participants to revise the produced e-lecture and resend it to the researcher's personal email. The participants are asked to answer Yes or No to express their consent to an interview. The final Arabic/English version of the scale is shown in Appendix J. The length of time between the pre- and post-training questionnaires is 4 weeks.

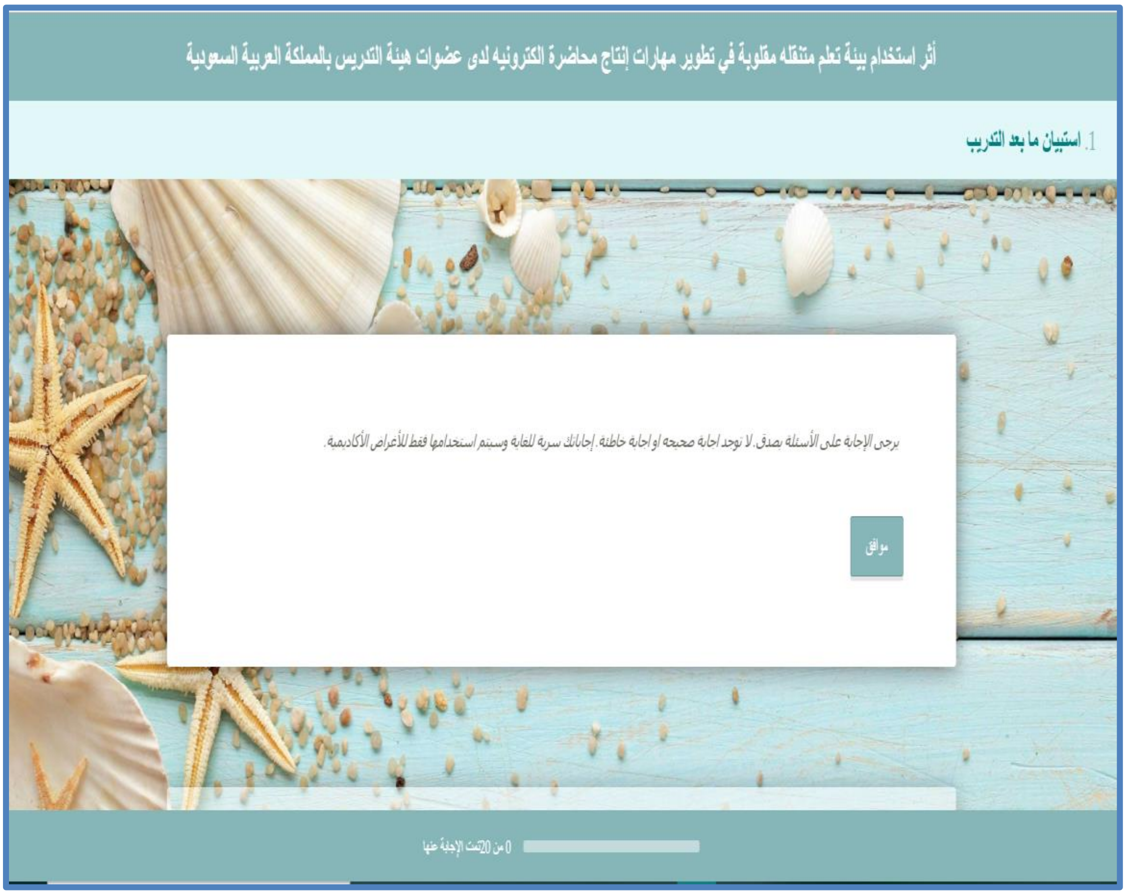


Figure 15. Screenshot of the post-training questionnaire

4.9.3 The Pre-and Post-Evaluation Product Card

The purpose of the evaluation product card is to gain a better understanding of the actual effects of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills. It also aims to evaluate the quality of e-lectures, which are created before and after the training by comparing the actual skills before and after the intervention in all groups. The researcher designed the evaluation product card and evaluated the e-lectures that were produced by the participants. The evaluation product card was prepared as a list of e-lecture creation skills that teachers were expected to acquire as a result of training (see section 3.7.2 'E-Lectures

Producing Skills'). The final format of the evaluation product card includes 14 closed-ended questions of a five-option Likert scale, ranging from 5 (To a very large degree) to 1 (To a very low degree). There was no separate instrument for the evaluation product card and just one version only for both pre-and post-intervention. The evaluation product card was completed by the researcher to each participant before the intervention and after. It is worth noting that in existing Arabic research the evaluation card instrument is widely used to measure skills (e.g. Amin et al., 2015; Ammar, 2015; Alshawi, 2016), while studies published in English appear to use it rarely. The Arabic/English version of the evaluation product card is shown in Appendix K.

4.9.4 The Semi-Structured Interview

The purpose of the semi-structured interviews was to gain a better understanding of the university teachers' opinions of using FML which, in turn, can help university teachers to utilise FML for teaching students. Zohrabi (2013) says that researchers use interviews to gather information directly from knowledgeable informants. Through interviews, researchers can understand how people perceive and interpret the world (Cohen et al., 2011). Researchers can observe their participants' feelings and thinking (Merriam, 1998). They have the freedom to decide on the questions beforehand. The structure of the interviews can be rigid and inflexible or otherwise (Cohen et al., 2011). Thus, Burns (1999) and Cohen et al. (2011) introduce three types of interviews: (a) structured interviews, which are inflexible and have a strict content and structure; (b) unstructured interviews, which are flexible in nature, content, and structure; and (c) semi-structured interviews, which are structured but the interviewer can ask new questions based on what the interviewee says.

The semi-structured interview was chosen for this research, because this form of interview is flexible and gives the researcher leeway regarding the questions. This type of interview allows the researcher to ask probing questions when she needs to, leading to more information from participants, and, of course, gaining richer data. Twelve participants were interviewed. The final version of the interview starts by asking the participants about their group code and ID. The interview begins with general topics, such as 'How would you describe your relationship with technology' and then, 'Do you employ technology in the educational process? Or do you only use it in everyday life situations? Why?' 'What type of mobile device did you use in the experiment?', 'What applications did you use in the experiment? What is the purpose of each one?'.

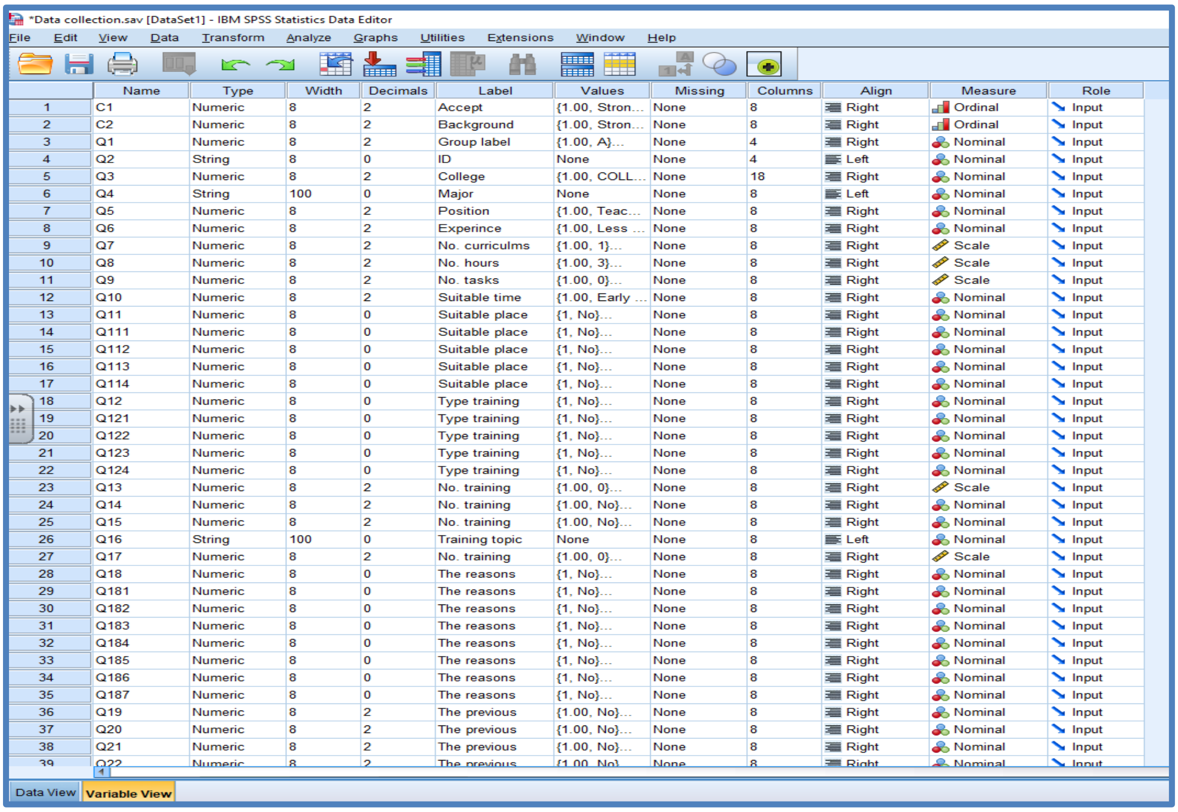
Several questions ask for the participants' impressions of the training and how they experienced it (e.g. the most interesting/ boring activity), and concern the types of training in terms of benefits, challenges, and recommendations. Four questions are asked for Group A (flipped learning environment) and Group B (mobile learning environment), whereas six questions are asked for Group C (flipped mobile learning environment). The Arabic/English version of the interview is presented in Appendix L. The next section discusses the analysis of the data in some detail.

4.10 Data Analysis

In this mixed-methods approach, both quantitative and qualitative data were collected. Quantitative data were gathered via pre- and post-training questionnaires and the pre- and post-evaluation product card; whereas qualitative data were gathered via semi-structured interviews. Thus, several form of software analysis and techniques were used to undertake the analysis of these two types of collected data, which will be presented in the next parts.

4.10.1 Quantitative data

The quantitative data analysis was conducted via statistical methods. In this study, the reason for using the quantitative method is not to test hypotheses but to complete the data description obtained from semi-structured interviews statistically. However, statistical programs used to analyse quantitative data differ in their features. These software packages can make the data analysis process accurate and quick, thereby allowing the researcher to obtain greater insights, for instance Statistical Packages for Social Sciences (SPSS), Microsoft Excel, and MATLAB. SPSS software was used in this study as the researcher had access and was familiar with it. The SPSS program allows researchers to record quantitative data and analyse in different ways and obtain accurate results. The program is also characterised by its ability to arrange the variables without the researchers' need for rekeying tests (Muijs, 2011). Due to these features, SPSS is considered as one of the reliable programs. To this end, quantitative data collected through the pre- and post-tests of both questionnaires and evaluation product cards were coded in preparation for input into the SPSS software, then analysised. Figure 16 shows data coding and addressing as variables in SPSS.



	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	C1	Numeric	8	2	Accept	{1.00, Stron...	None	8	Right	Ordinal	Input
2	C2	Numeric	8	2	Background	{1.00, Stron...	None	8	Right	Ordinal	Input
3	Q1	Numeric	8	2	Group label	{1.00, A}...	None	4	Right	Nominal	Input
4	Q2	String	8	0	ID	None	None	4	Left	Nominal	Input
5	Q3	Numeric	8	2	College	{1.00, COLL...	None	18	Right	Nominal	Input
6	Q4	String	100	0	Major	None	None	8	Left	Nominal	Input
7	Q5	Numeric	8	2	Position	{1.00, Teac...	None	8	Right	Nominal	Input
8	Q6	Numeric	8	2	Experince	{1.00, Less ...	None	8	Right	Nominal	Input
9	Q7	Numeric	8	2	No. curriculms	{1.00, 1}...	None	8	Right	Scale	Input
10	Q8	Numeric	8	2	No. hours	{1.00, 3}...	None	8	Right	Scale	Input
11	Q9	Numeric	8	2	No. tasks	{1.00, 0}...	None	8	Right	Scale	Input
12	Q10	Numeric	8	2	Suitable time	{1.00, Early ...	None	8	Right	Nominal	Input
13	Q11	Numeric	8	0	Suitable place	{1, No}...	None	8	Right	Nominal	Input
14	Q111	Numeric	8	0	Suitable place	{1, No}...	None	8	Right	Nominal	Input
15	Q112	Numeric	8	0	Suitable place	{1, No}...	None	8	Right	Nominal	Input
16	Q113	Numeric	8	0	Suitable place	{1, No}...	None	8	Right	Nominal	Input
17	Q114	Numeric	8	0	Suitable place	{1, No}...	None	8	Right	Nominal	Input
18	Q12	Numeric	8	0	Type training	{1, No}...	None	8	Right	Nominal	Input
19	Q121	Numeric	8	0	Type training	{1, No}...	None	8	Right	Nominal	Input
20	Q122	Numeric	8	0	Type training	{1, No}...	None	8	Right	Nominal	Input
21	Q123	Numeric	8	0	Type training	{1, No}...	None	8	Right	Nominal	Input
22	Q124	Numeric	8	0	Type training	{1, No}...	None	8	Right	Nominal	Input
23	Q13	Numeric	8	2	No. training	{1.00, 0}...	None	8	Right	Scale	Input
24	Q14	Numeric	8	2	No. training	{1.00, No}...	None	8	Right	Nominal	Input
25	Q15	Numeric	8	2	No. training	{1.00, No}...	None	8	Right	Nominal	Input
26	Q16	String	100	0	Training topic	None	None	8	Left	Nominal	Input
27	Q17	Numeric	8	2	No. training	{1.00, 0}...	None	8	Right	Scale	Input
28	Q18	Numeric	8	0	The reasons	{1, No}...	None	8	Right	Nominal	Input
29	Q181	Numeric	8	0	The reasons	{1, No}...	None	8	Right	Nominal	Input
30	Q182	Numeric	8	0	The reasons	{1, No}...	None	8	Right	Nominal	Input
31	Q183	Numeric	8	0	The reasons	{1, No}...	None	8	Right	Nominal	Input
32	Q184	Numeric	8	0	The reasons	{1, No}...	None	8	Right	Nominal	Input
33	Q185	Numeric	8	0	The reasons	{1, No}...	None	8	Right	Nominal	Input
34	Q186	Numeric	8	0	The reasons	{1, No}...	None	8	Right	Nominal	Input
35	Q187	Numeric	8	0	The reasons	{1, No}...	None	8	Right	Nominal	Input
36	Q19	Numeric	8	2	The previous	{1.00, No}...	None	8	Right	Nominal	Input
37	Q20	Numeric	8	2	The previous	{1.00, No}...	None	8	Right	Nominal	Input
38	Q21	Numeric	8	2	The previous	{1.00, No}...	None	8	Right	Nominal	Input
39	Q22	Numeric	8	2	The previous	{1.00, No}...	None	8	Right	Nominal	Input

Figure 16. Screenshot of coding and variables for processing data via SPSS

The analysis of the quantitative data was conducted by defining and coding the data variables on paper and then transforming this into numbers in preparation for entering them into SPSS. This was followed by applying the appropriate statistical analysis to the data. It is worth showing the meaning of the three types of variable measure. The first type includes nominal variables (also known as categorical), which represent data in two or more classes without class grouping (e.g. gender is categorised as female or male) (Cohen et al., 2011). The second type comprises ordinal variables, which rank the categories in order (e.g. Likert scales). The final type includes scale variables, which can be either interval or ratio. Interval variables represent the same interval between one and the next (e.g. the hours spent on studying between 5 and 7 hours), while ratio variables have a true zero-point (e.g. the value of zero centimeters in height variable means no height) (Cohen et al., 2011).

In the current study, descriptive statistics and tabulations were used. In order to compare between the groups and show the differences between them clearly, comparison parametric statistical tests were utilised. These parametric tests were based on testing normality for RQ1 and RQ2 data, e.g., the Shapiro-Wilk test. The first research question is: What are the perceived outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills? In order to answer this, a comparison was first made between university teachers' perceived skill levels in creating e-lectures in each group before and after CPD. To this end, the pre- and post-training questionnaires for all the groups were analysed using the paired-samples t-test because data were normally distributed. Secondly, a comparison was made between perceived skill levels in creating e-lectures in the three groups after CPD training. Because this research was performed with three groups, ANOVA (analysis of variance) is used to obtain results. One-way ANOVA was specifically chosen because it compares the means across one independent variable (the training environment) that divides the sample into three groups. The Tukey post-test is used to compare the means of all treatments with the mean of every other treatment, thus highlighting the most effective training environment for improving university teachers' e-lecture skills determined by statistical means.

In order to answer RQ2 (What are the actual outcomes of FL, ML and FML CPD on university teachers' e-lecture skills?), a comparison between university teachers' actual skills in creating e-lectures was made in each group before and after CPD. To this end, the pre- and post-evaluation product cards for all groups were analysed using the paired-samples t-test because data were normally distributed. Secondly, the comparison between teachers' actual skills in creating e-lectures was made between the three groups after CPD. Because this research was performed with three groups, one-way ANOVA was used because it compares the means across one independent variable (which is the training environment) that divided the sample into three groups. Then, the Tukey post-test is used to determine the means of all treatments to the mean of every other treatment, thus, highlighting the most effective training environment for improving university teachers' e-lecture skills determined by statistical means.

The confidence interval percentage was determined at 95%, which represents 0.05 as a level of significance. Valid percentage was chosen rather than percentage because the former represents the percentage of only the non-missing cases, whereas the latter represents the percentage of all cases, including the missing cases. However, the category of missing information was ignored because the participants were requested to answer all questions in all instruments.

4.10.2 Qualititative data

Thematic analysis (coding and themeing) is one of the qualitative methods which was used to analyse the interviews. Charmaz and Belgrave (2012) state that coding is a critical link between data collection and the explanation of meaning. Kerlinger (1986) and Vogt et al. (2014) demonstrate that coding is generated by a researcher in order to construct a translation of question responses and respondent information into particular categories. Gibbs (2018) points out that coding enables researchers to identify similar information as well as enabling researchers to search and restore the data that bear the same code, whereas the theme is the outcome of coding categorisation (Saldana, 2016). In this research, themes within data were identified in an inductive rather than a deductive way. The data were collected via interviews; therefore, a process of coding the data was done without trying to fit it into a pre-existing coding frame because this topic had not been discussed previously (i.e. the use of FML). Patton (2002) and Braun and Clarke (2006) illustrate that this form of thematic analysis is strongly linked to the data themselves, in contrast to the deductive approach which is driven by the researcher's theoretical interest in the area.

However, qualitative research methodologists cannot agree regarding the amount of data that should be coded. The first approach (e.g. Strauss, 1987; Lofland et al., 2006; Wolcott, 2009) states that all recorded fieldwork detail is worthy of consideration because it is the patterned minutiae of daily life which could potentially generate significant social insights. This leads to huge data samples, much of which may be irrelevant to the research questions. In contrast, the second approach (Morse, 1994; Guest & MacQueen, 2008; Seidman, 2013) holds that only the most prominent parts of the corpus related to the research questions deserve examination and that even up to one-half to two-thirds of the total records can be summarised or deleted, leaving the remainder for intensive data analysis. The potential risk with this approach is that the deleted parts could contain data, forever unknown, which could draw everything together, or include negative cases that motivates a rethinking of a code, theme, or concept (Saldana, 2016).

In this study, the interviewed participants from Group A who were trained via a flipped learning environment (FL) are referred to as F1, F2, and F3. As for the interviewed participants from Group B who were trained via a mobile learning environment (ML), they are referred to as M4, M5, M6, and M7, whereas the interviewed participants from Group C who were trained via a flipped mobile learning environment (FML) are referred to as FM8, FM9, FM10, FM11, and FM12. All of the one-to-one interviews were conducted in Arabic except participants FM8 and FM9 from Group C, who expressed their desire to answer in English. The researcher transcribed the interviews from recorded audio to paper directly after each interview. This step helped to keep the data safe and away from damage, as well as enabling familiarity with the data and critical thinking about it. This step of writing the participants' transcript early is an important step, as Bryman (2012) recommended. He justified this as supporting the responses of the participants by clarifying some points, recording notes, and enabling making adjustments, if necessary, to the following interviews. The whole interview was transcribed but only the information related to the third research question was coded (see Appendix W). This research seeks to discover the participants' opinions about FML as a new concept, and investigate those issues which could potentially limit using FML whether in teaching students or training teachers. However, coding all of the interview questions was judged to be too time-consuming and would have taken up a significant amount of the allowed word count of the thesis as well. However, coding by numbers was used instead of using the participants' real names to maintain confidentiality and anonymity. The transcripts were then translated from Arabic into English, and reviewed by back-translation procedures (see translation and back-translation in section 4.11 'Reliability and Validity'). The codes and themes of the English transcripts were produced manually and then presented as a mind map in the interests of clarity (see Figure 24, as well as, Figures 1 and 31). The thematic analyses were also conducted manually in order to organise and sort the data (see Figure 36 in Appendix V). This step has been supported by researchers such as Saldana (2016) and Gibbs (2018).

The researcher read each transcript once in order to be aware of and understand the general ideas, and then reread them with more concentration. Several initial codes were generated across all of the data and then the connected initial codes were under sub-themes. The researcher used different highlighting colours in order to clarify the data, for example red for themes, blue for codes, and the notes inserted into codes or themes in orange.

Cohen et al. (2011) expressed that researchers should bear in mind that different socio-cultural contexts could influence interviews differently. Therefore, the participants' response transcripts and translated transcripts were reviewed, as well as double-checked to match the meanings in both Arabic and English responses (see back translation procedures in section 4.11 'Reliability and Validity'). An important point that must be clarified about Arab culture is that the self is recognised as a 'we-self' rather than an 'I-self' in a collective family. The readers of the participants' transcripts in Appendix W will find that the interviewees use *we* as well as *I*. As well, readers of the transcripts in Appendix W will find that some questions did not obtain very informative answers, with some of the respondents simply stating, 'I cannot really recall any'. However, a total of 11 themes were initially extracted from the interviews. After conducting several reviews, this number decreased to six. The codes were re-organised so that each theme has basic codes as well as several sub-codes, which branch from the basic code. Some codes that have the same meaning have been merged. For instance, in the theme 'The benefits of using FML', two codes had the same meaning: 'Permitting the learner to participate in the educational process' and 'Taking responsibility for learning'. These two codes were integrated into one code. Analysing data manually in this research was manageable because the number of participants volunteered for the interviews was small, meaning that the sample size was considered small. The following section discusses the reliability and validity procedures that were taken into account in this research.

4.11 Reliability and Validity

The terms reliability and validity are fundamental criteria for quality in a quantitative approach, while the terms credibility, neutrality (or confirmability), consistency (or dependability), and applicability (or transferability) are essential criteria for quality in qualitative approach (Lincoln & Guba, 1985). In a quantitative approach, Cohen et al. (2011: 161) define reliability as 'a synonym for dependability, consistency, and replicability over time, over instruments, and over groups of respondents, it is concerned with precision and accuracy'. The statistical measurements are used to assure reliability, although they do not represent reality but aim to achieve results that are as close as possible to what we investigate (Brancato et al., 2006). A high degree of stability refers to the results that are repeatable, illustrating a high degree of reliability (Golafshani, 2003). Although the researcher may be able to demonstrate the research instrument repeatability and internal consistency, the reliability of the instrument itself may not be valid (Golafshani, 2003).

Lincoln and Guba (1985) and Seale (1999) use 'dependability' in qualitative approaches, which corresponds to 'reliability' in quantitative approaches. To obtain the dependability of data, the steps of the research are verified through the examination of such items as raw data, process notes, and data reduction products (Campbell, 1996). While Corbin and Strauss (2014) announce that the usual canon of good science requires redefinition to make it appropriate for qualitative studies, Stenbacka (2001) regards the quality of qualitative research cannot be judged through the subject of reliability. Lincoln and Guba (1985) and Merriam (1998) set out three parameters to ensure the dependability of the results in qualitative research: (a) the researcher's position, where they should explain the different procedures, describe the rationale, and the design of the study; (b) triangulation, which involves the use of multiple methods and respondents; and (c) audit trial, which includes describing how data will be collected and analysed, and how the findings will be obtained. All these techniques were applied in this research. As for the pilot study, the reliability of the quantitative data was measured statistically by determining the value of Cronbach's alpha α. To this end, the data were prepared for input into the SPSS and coded.

The reliability index for each item was determined, and Cronbach's alpha was obtained using IBM SPSS Statistics 26. Cronbach's alpha is a number range from zero to one and α measures the average correlation of items in an instrument. Both Nunnally (1979) and George and Mallery (2003) agree that the acceptable score for a reliability coefficient is located between 0.8 and 0.7. In contrast, Tavakol and Dennick (2011) argue that a higher score does not mean a significant reliability, where α value is affected by test length. The value of α increases as long as a test is lengthy and vice versa. Cohen et al. (2011) declare that the α value is also affected by sample size, in that whenever the sample size is small, the reliability is low. In the context of this study, the reliability statistics for all data collection methods show that all the α values were 0.70 and more, which is considered an acceptable reliability coefficient, suggesting that the items of the instruments were connected (see Table 30 in Appendix F).

Joppe (2000) and Winter (2000) define validity in quantitative approaches as the extent to which research measures what it is intended to measure or how trustworthy the research results are. Burns (1999: 160) emphasises that ‘validity is an essential criterion for evaluating the quality and acceptability of research’. The question of the principles underlying validity in a qualitative approach is slightly different than a quantitative approach, hence multiple styles (Golafshani, 2003; Punch & Oancea, 2014). On the one hand, validity might be measured by random sampling, using an appropriate instrument, asking many questions and seeking answers in the research of others (Joppe, 2000) and making appropriate treatments of the numerical data in a quantitative approach (Winter, 2000). On the other hand, validity can be measured through the credibility, depth, richness (Winter, 2000), transferability, and trustworthiness of the worded data in a qualitative approach (Lincoln & Guba, 1985; Hoepfl, 1997; Seale, 1999; Golafshani, 2003). The issue of validity in qualitative approaches has been debated among researchers (Golafshani, 2003), where they argue that validity is not applicable to qualitative research, although they were subsequently convinced of the necessity of conducting some kind of measure to examine their qualitative research (Golafshani, 2003). Stenbacka (2001) announces that the qualitative research validity concept should be redefined. Creswell and Miller (2000) point out that the researcher’s perception of validity and their choice of paradigm affect the validity of the study.

It is widely acknowledged that in experimental research design there is a constant tension between internal and external validity (Hulstijn, 1997; Chaudron, 2003). For this, Gravetter and Forzano (2018) strongly recommend maximising both internal and external validity through a balance between study design and generalisability. Hence, several procedures can be undertaken to validate the instruments used to collect data. One is to examine content validity by asking experts to review the material (Zohrabi, 2013; Loewen & Plonsky, 2016; Rogers & Révész, 2020). The content validity of this research was thus reviewed in a pilot study by experts in the field of educational technology (see Table 19 in Appendix A). Zohrabi (2013: 258) mentions that ‘content validity is related to a type of validity in which different elements, skills and behaviours are adequately and effectively measured’. Using this expert feedback, unclear and overly complex statements were revised, and inadequate questions were removed (see Table 20 in Appendix B). Another procedure to ensure validity was that the researcher herself instructed and presented the CPD training to all the experimental groups. Ary et al. (1996) found that an implementer effect can occur when different individuals are assigned to implement different methods, and that this can have an effect on the outcome.

A second way of ensuring validity is to look at the internal validity of the research. This was done in line with the chosen approach of using triangulation (see section 4.2 'Philosophical Assumptions of Research' and section 4.3 'The Research Approach'). Internal validity illustrates the congruence of the research findings with reality and the degree to which the researcher observes and measures what is expected to be measured (Zohrabi, 2013; Rogers & Révész, 2020). Merriam (1998) suggests triangulation to achieve internal validity. To make triangulation possible, the data of this study were gathered through a variety of methods. Recalling the aim of this study, there was a need to gather quantitative data to measure the skills (perceived and actual) before and after the intervention. To this end, the researcher utilised closed-ended questions in the pre- and post-evaluation product cards and pre- and post-training questionnaires. There was also a need to collect qualitative data to learn about the participants' perceptions of the FML. To this end, the researcher utilised open-ended questions in the semi-structured interviews. The triangulation of these two types of data provided a better understanding of FML and ensured that the findings were valid and unbiased (Zohrabi, 2013). Although the researcher is an insider, she sought to guarantee the internal validity of the data. Therefore, in addition to triangulation, care was taken to reduce bias as much as possible (Zohrabi, 2013). Several procedures were followed to reduce bias (see section 4.2 'Philosophical Assumptions of Research'). For instance, this study is quasi-experimental, which means that the participants in each group were allocated non-randomly, but there was also no external influence. Sample criteria were listed, justified, and followed. The email invitation to participate in this research was sent using the email list of the teaching staff in each faculty as a stratified purposive strategy and it was sent by Curriculums Department of the Education College of UQU only after the researcher had seen and confirmed the content.

The final procedure of validating the instruments relates to translation, relevant here because the research was conducted in Arabic and presented in English. The researcher used several translation websites to ensure that the Arabic and English versions of the questionnaire and interview transcriptions matched as accurately as possible. Unfortunately, these websites could not deliver the quality needed (i.e. a translation to give the same meaning, not a literal translation) or a high level of professionality. To add an additional layer of quality, a back-translation technique was employed to obtain the same meaning for the sentences or statements in the Arabic and English transcripts. Tyupa (2011: 36) defined back-translation as 'a process whereby the translated text is re-translated back into the source language by a translator who does not see the original text. If any discrepancies are found between the back-translation and the original, this is taken as an indication of translation errors in the target language version'.

Although back-translation is considered as the most popular technique used in international and cross-cultural social research (Brislin, 1970; Maneesriwongul & Dixon, 2004; Tyupa, 2011), there have been critical voices. On the one hand, Temple (1997) draws attention to the fact that there is no ‘wrong’ translation but there are different versions, whereby translations can be influenced not only by language but also by culture. On the other hand, Sireci (1997) and Chang et al. (1999) acknowledge that the errors in translation could distort the original intent of the instrument, hence potentially compromising the validity and reliability of the resulting instrument. Brislin (1986: 161), one of the most quoted authors on back-translation, warns against uncritical use of the back-translation technique. Some researchers indicate that back-translation is used to validate translation without describing the details. Other criticism, e.g. McKenna and Doward (2005:89), note that 'back translation has no clear scientific basis and its use casts doubts on the ability of translators'. However, the researcher believes that a match of meaning in the Arabic and English instruments and transcripts is more important than a literal translation. Nida (1964), Brislin (1970), and Cohen et al. (2011) agree that equivalence of meaning is the most important aspect of translation.

Back-translation was employed in this research firstly because it ensures more accuracy (Flaherty, et al., 1988) and enhances instrumental reliability, research validity, and findings credibility simultaneously (Maneesriwongul & Dixon, 2004). In other words, the instrument in Arabic and English will serve as one tool and will measure what it has been intended to measure even if it was designed in English and implemented with the participants in Arabic.

As well, the use of three different bilingual translators contributed to avoiding possible bias as in the case of having only a single translation at each stage. This means accuracy of the translation of the general content, thus, ensuring even greater validity and reliability of the translated version. The translators produced Arabic versions of the instruments’ equivalent in meaning to the English version. Though the instruments were designed in English and implemented with the participants in Arabic, these interventions were appropriate for establishing the validity of this study since the English and Arabic versions were equal in meaning; hence, the research will measure what it intended to measure (Twinn, 1998; Esposito, 2001; Cohen et al., 2011). The back-translation guidelines of Wild et al. (2005) were adopted in this study. The whole process of back-translation was started before carrying out the pilot study and ended with the implementation of the main study. The back-translation started with the researcher preparing all the instruments in Arabic and translating them into English. Then, forward-translation was conducted by two independent bilingual translators, whereby all instruments were then translated from Arabic back to English. This was followed by forward-translation reconciliation, in which forward translations were compared and merged into one version by one of the forward translators. The next step was back-translation by an independent translator. This was then followed by an expert review of the back-translation. The expert compared the back-translations with the original text, identifying discrepancies and making some changes accordingly. In each step of back translation, the researcher carried out comparisons between the original and back-translated versions (also in the source language), as well as comparisons between source and target language versions. Tang and Dixon (2002) indicate that it is necessary to compare versions of the instrument systematically as an aspect of the translation process.

This was then followed by a harmonisation step, which aims to compare back-translations of a number of language versions to achieve a consistent approach in addressing translation issues. This version was used in a pilot study on a small sample of participants (N=12), see section 4.12 'Pilot Study'. Finally, a third party proofread the instruments for a final version of them and Figure 17 presents the complete translation process.

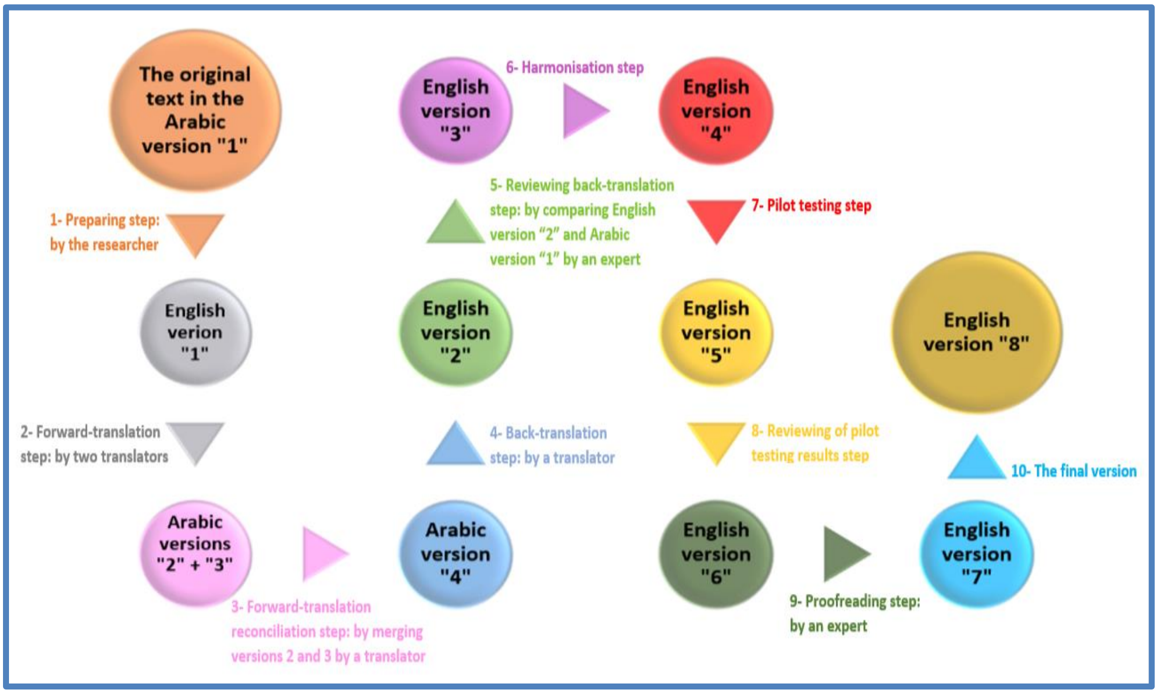


Figure 17. Translation and back-translation procedures to develop the instruments

Einola and Alvesson (2020) stated the importance of the impact of language, multiple meanings, and interpretation on the quality of studies in qualitative researches. Due to factors influencing the quality of translation, i.e. translator, back-translation, culture, and language (Chen & Boore, 2009), the researcher tried to take these into account. For example, all translators who were asked to translate the instruments and transcript were bilingual (able to speak Arabic and English equally well). As well, all translators were familiar with the technological concepts and relatively formal language presented in the record forms. As well as being fluent in both Arabic and English, the translators were knowledgeable about both cultures. This minimised potential for error in translation.

External validity refers to the degree to which the findings of a particular study hold true outside of a particular study (Rogers & Révész, 2020) and are generalisable and applicable to other subjects or contexts (Zohrabi, 2013; Rogers & Révész, 2020). Porte and McManus (2018) and Rogers and Révész (2020) state that external validity is best controlled through replication, therefore, it is recommended that this research should be repeated in other contexts (see section 6.5 'Recommendations and Suggestions for Further Research'). However, the researcher assumed that the results of this study can be applied to other subjects in KSA and in other nations. The following section presents the design and procedures of the pilot study, which served to highlight problems and allow for modifications in the main study.

4.12 Pilot Study

Although piloting a study is one of the essential phases of any research and may increase the likelihood of its success, there is no guarantee that this will occur (Van Teijlingen & Hundley, 2001). It is difficult for some researchers to conduct a pilot study prior to the main research project because of the time constraints and a rush to obtain the findings of the main research project (Abu Hassan et al., 2006). Some researchers ignore this step as they believe it to be unnecessary (Abu Hassan et al., 2006). However, no matter how accurate the planning of the study, there will be unexpected difficulties and risks. However, it was decided that in this case the results of a pilot study would allow any alterations and refinements to be made to the instruments before the main study.

A pilot study can be defined as a strategy to test the data collection instruments before using them in data collection, with the aim of improving the research tool questions and determining the appropriate time for answering (Oppenheim, 2000; Kannan, 2015; Kirklees, 2015; Tools for Development, 2015). Abu Hassan et al. (2006) describe the pilot study as a small study, aiming to test the research procedures, check the validity and reliability of the instruments that will be used to collect data later, and help the researcher become familiar with the sampling strategies in preparation for a larger study. Arain et al. (2010) define the pilot study as a version of the main study, which is run in miniature to test whether the components of the main study can all work together. Morin (2013) advises that a pilot study should have sample sizes large enough to detect the differences.

4.12.1 Pilot Study Aims

The pilot study is useful because if the questions are not appropriate, the tools will not obtain the desired information (Taylor-powell, 1998). A pilot study is conducted to detect the potential weaknesses and deficiencies not only in the research instruments but also in the procedures, prior to implementing the full study (Van Teijlingen & Hundley, 2001; Lancaster et al., 2004; Abu Hassan et al., 2006; Morin, 2013). Specifically, a pilot study tests the formulation, the order of the questions, and the appropriate time for answering the questions (Van Teijlingen & Hundley, 2001; Lancaster et al., 2004). In this study, the instruments seek to obtain the participants' perceptions of and reflections on the experiment. Therefore, the researcher seeks to confirm that the participants fully understand the questions, and that task descriptions are easy to understand. In addition, the researcher will check to see whether the questions yield relevant information.

A pilot study provides the possibility of applying a smaller version of the main study under the same conditions (Van Teijlingen & Hundley, 2001) in order to find potential practical problems in conducting the research (Van Teijlingen & Hundley, 2001; Morin, 2013). For example, Lancaster et al. (2004) and Morin (2013) point out that pilot studies support researchers in locating the initial data for the initial outcome measure, which helps to calculate the correct sample size for a main study. It can also work towards convincing any funding organisations to fund the research (Van Teijlingen & Hundley, 2001). The researcher's use of a pilot study provides information about the local situation that might impact on the continuing research process (Van Teijlingen & Hundley, 2001; Morin, 2013). Cohen et al. (2011) stress that the researcher should pilot the experimental procedures before the actual experiment to identify the potential issues in connection with any aspect of the investigation.

Regarding qualitative approaches, Frankland and Bloor (1999) state that the pilot studies support the researcher in focusing data collection within a narrow range of projected analytical topics. Holloway (1997) supports the use of a pilot study, especially when the researcher is a novice or lacks confidence, particularly when they are using interviews in qualitative research.

4.12.2 Pilot Study Procedures

The instruments were reviewed by a panel of experts before the pilot study was conducted. Obtaining feedback improves instruments and procedures, addresses potential misunderstandings in questionnaire statements, ensures the validity of the instruments' content and increases their reliability. The researcher gave all the instruments to a group of academic experts in the technology field. Since this research was conducted under the supervision of an English university, and carried out in an Arabic university, the instruments were created in Arabic and then translated into English. Brislin (1980) and Prieto (1992) set out some techniques to ensure the equivalency of translations: (a) back-translation, where the researcher compares the meaning between the original and the back-translated forms; (b) the bilingual technique, where the bilingual individuals or the translators compare the meaning between the original and the translated form; (c) the committee approach, where a group of bilinguals translate from the source to the target; and (d) pilot testing the translated form. Therefore, the researcher first compared the meaning between the original and the translated form to check that the Arabic statements match those in English. Then, the researcher asked three bilingual researchers to compare the meanings of the original and the translated forms. During the pilot study, the researcher used the translated form to test and to ensure the equivalency of translations. Based on the results of the piloting instruments, the Arabic and English versions of all the instruments were changed in several aspects. Specifically, some questions were removed, others were added, and some phrases were reformulated to avoid common mistakes in writing the questionnaires, and the match between the Arabic and English phrases was verified. All versions of the instruments before and after piloting were saved in a specific file on the researcher's laptop. Table 20 in Appendix B lists the changes that were made after piloting the instruments. The experts in the technology domain and bilingual translators were happy for their names to be used in this research.

The pilot study was tested on a small sample of participants (four persons in each group). The data were collected in March 2018 in the United Kingdom from university teachers and PhD students from Southampton Education School. The experiment was carried out with three groups of university teachers. There was a control group (Group A, traditional learning) and two intervention groups (Group B, mobile learning and Group C, flipped mobile learning). Procedurally, the researcher provided the participant information sheet and asked the participants' consent to take part in this research via email or face-to-face.

In short, the pre-training questionnaires were answered, and the initial versions of the e-lectures were produced. Then, the sessions were presented to the participants via different types of learning: traditional learning for Group A, mobile learning for Group B, and flipped mobile learning for Group C. The post-training questionnaires were answered, and the final version of the e-lectures were revised. The pre- and post-training questionnaires were emailed to the participants so that they could answer them. Finally, the interviews took place. The results of the pilot study can be found in Appendix D.

4.12.3 Pilot Study Limitations

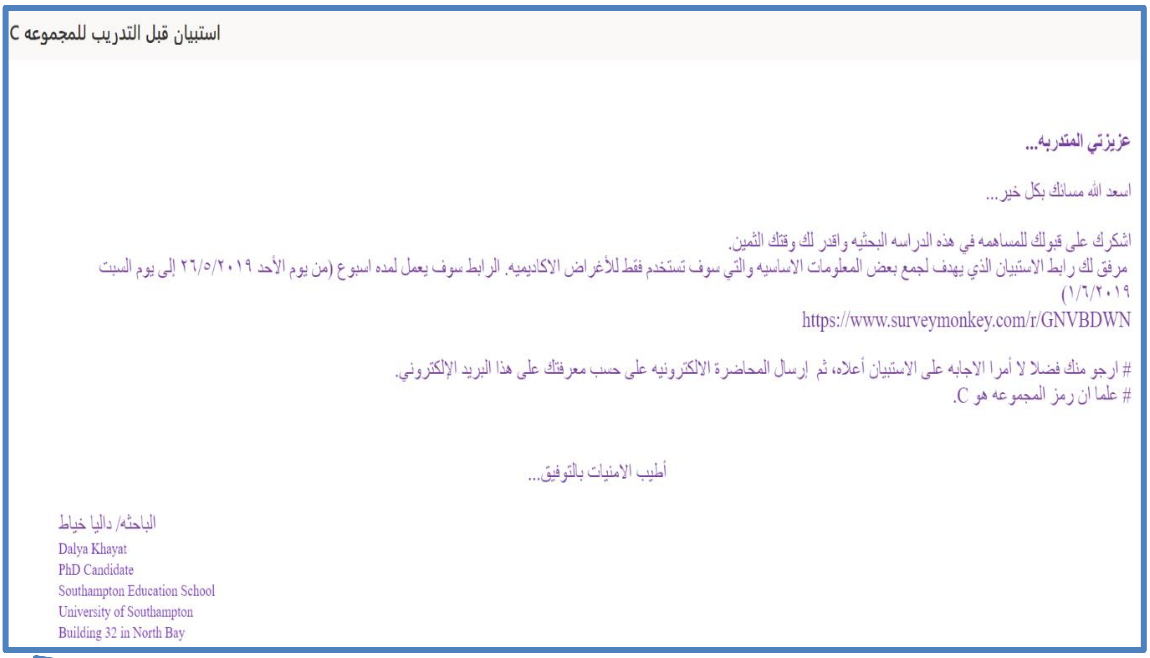
After the pilot study, the researcher may identify problems with the instruments. A prime example of this is when the pilot study gives an indication of the response rate in the main instrument, which may compromise the statistical foundation (Van Teijlingen & Hundley, 2001). To avoid this problem, the researcher attempted to collect the data from a reasonable number of participants (i.e. four participants in each group). Unfortunately, further issues would not be discernible until the full-scale study was conducted (Van Teijlingen & Hundley, 2001).

Another concern is contamination. Contamination means that either the data collected from the pilot study are included in the main findings or that the participants in the pilot study become included in the main study (Van Teijlingen & Hundley, 2001). Lancaster et al. (2004) mention that the inclusion of such data or participants introduces bias and will lead to an inflated Type I error. Peat (2001) observes that those interested in quantitative research argue that pilot study data should not be used to test a hypothesis nor should its findings be included in the main study. The researcher believes that participants who have already been exposed to an intervention (e.g. FML) could respond differently than those who have not previously experienced the intervention. In such a situation, participants can be more familiar with the instruments or the research procedures, which leads to negative or positive results. Moreover, there was a change in the university teachers' training methods in the actual study, as the researcher was convinced that it was not logical to study the outcomes of the traditional environment if the research aimed to obtain a better understanding of flipped learning via mobile devices. Therefore the training for Group A, traditional learning in the pilot study, was modified to a flipped learning environment (FL) for the real study. To address the above concerns, the researcher will not enclose any data collected from the pilot study in the main findings and will not ask those participants who took part in the pilot study to participate in the main study. After the pilot study, the main research was ready to be conducted, as described in the next section.

4.13 Main Study Procedures

The primary data were collected from Umm Al-Qura University at Makkah in the Kingdom of Saudi Arabia from April to July 2019. Procedurally, assistance was provided to the researcher by Prof Faiza Maghribi (a professor in the educational technology field at UQU) in asking for the university teachers' consent in order to participate in this research project. In addition to Prof Faiza Maghribi, the Curriculums Department of the Education College of UQU cooperated with the researcher by inviting all the university teachers at UQU to participate in this research study via the UQU portal. The content of the sent e-mail informed university teachers of their preliminary approval to contribute to this research and asked them to reply to my email with their signature on the consent form. It must be noted that many participants asked to be excused (see Table 4), but all of those who participated in the training agreed voluntarily. The email included two attachments; an Arabic copy of the participant information sheet and consent form without specifying the method of training (see appendices N and P for Arabic, and appendices O and Q for English). Until the number of participants was completed, the participants were then distributed in the three groups without any external interferences in choosing the training method; and they had been given a copy of the information sheet for their group.

After gathering 30 participants for each group, a detailed list of the participants in each group was created by the researcher based on their ID codes (see Table 34 in Appendix U). An account was created on the Acadox system https://www.acadox.com/ and the researcher then emailed the participants of each group separately with the pre-questionnaire link and notified them of their group code (A, B, or C). Only emails that were sent to Group C are illustrated in the main text, while Group A and Group B's emails are presented in appendices. The participants were asked to complete an online pre-training questionnaire by clicking the link and they were given a week to answer. The participants were also asked to create an e-lecture based on their knowledge and send it to my email (see Figure 18, and Figures 32 and 33 in Appendix G). The researcher evaluated all of the produced e-lectures using a pre-and post-evaluation product card (see Appendix K). For reasons of internal validity (more specifically, implementation or implementer threat), the researcher of this project evaluated the produced e-lectures, instructed the experimental groups, presented the CPD for all groups, and evaluated the re-produced e-lectures. It should be noted that all instruments used in this experiment were the Arabic version. This was followed by sending invitation emails to attend the training course with its details for each of the three groups (see Figure 19, and Figures 34 and 35 in Appendix H). The three intervention groups are: (1) Group A (flipped learning environment), (2) Group B (mobile learning environment), and (3) Group C (flipped mobile learning environment).


استبيان قبل التدريب للمجموعه C

عزيزتي المتدربه...

اسعد الله مسائك بكل خير...

اشكرك على قبولك للمساهمه في هذه الدراسه البحثيه واقدر لك وقتك الثمين.
مرفق لك رابط الاستبيان الذي يهدف لجمع بعض المعلومات الاساسيه والتي سوف تستخدم فقط للأغراض الاكاديميه. الرابط سوف يعمل لمده اسبوع (من يوم الأحد ٢٦/٥/٢٠١٩ إلى يوم السبت ١/٦/٢٠١٩)
https://www.surveymonkey.com/r/GNVBDWN

ارجو منك فضلا لا أمرا الاجابه على الاستبيان أعلاه، ثم إرسال المحاضرة الالكترونيه على حسب معرفتك على هذا البريد الإلكتروني.
علما ان رمز المجموعه هو C.

أطيب الامنيات بالتوفيق...

الباحثه/ داليا خياط
Dalya Khayat
PhD Candidate
Southampton Education School
University of Southampton
Building 32 in North Bay

Dear trainee,

Thank you for accepting to participate in this research study and I appreciate your valuable time. Please see the questionnaire link below which aims to collect some background information that will only be used for academic purposes.
https://www.surveymonkey.com/r/GNVBDWN

Please kindly fill the above questionnaire, then send an e-lecture based on your knowledge on this email. The link will be active for one week **(from Sunday 26/5/2019 to Saturday 1/6/2019)**. Your group code is **C**.

Best wishes,

Researcher / Dalya Khayat

Figure 18. Email sent to Group C before the intervention (with translation)

دعوه للتدريب للمجموعه C

اسعد الله مسائك بكل خير..

سيكون تقديم الدوره التدريبيه عن (المحاضره الإلكترونيه واهميتها في العمليه التعليميه) لمده اسبوعين. الجلسة الأولى سوف تكون يوم الأربعاء ١٢ يونيو ٢٠١٩م في تمام الساعة العاشره صباحا، اما الجلسه الثانيه فسوف تكون يوم الاربعاء ١٩ يونيو ٢٠١٩م في تمام الساعه الثانيه عشر ظهرا.

سيكون التدريب عبر منصة اكادوكس (Acadox) من خلال الرابط: http://www.acadox.com/join/HSH75T
علما بأن رمز الدعوه هو: HSH75T

فضلا.. يرجى الإطلاع على الفيديو الموجود في الرابط قبيل حضورك التدريب بوقت كاف مع تسجيل:
١- ملخص حول المعلومات التي حصلت عليها من الفيديو
٢- اسئله حول محتوى الفيديو
٣- اسئله حول المعلومات التي لم يتسنى لك فهمها

أطيب الامنيات بالتوفيق...

الباحثه/ داليا خياط
Dalya Khayat
PhD Candidate
Southampton Education School
University of Southampton
Building 32 in North Bay

Dear trainee,

The training course about (Electronic Lecture and its Importance in the Educational Process) will be presented in two weeks. The first session will be on Wednesday 12ndJune 2019 at 10 a.m., and the second session will be on Wednesday 19th June 2019 at 12 p.m. The training will be presented via Acadox platform, through the link:
http://www.acadox.com/join/HSH75T

The invitation code is: HSH75T

Please see the video in the link in advance before attending the session then complete the following assignments:

1. Write a summary about the information you got from the video

2. Write questions about the video contents

3. Write questions about the information that you could not understand

Best wishes,

Researcher / Dalya Khayat

Figure 19. Email sent to Group C to attend the training session (with translation)

The next step consisted of providing a CPD programme for each group but via a different method (see Figure 20). For Groups A and C, the participants were asked kindly to watch the video before attending the session then to complete the following assignments: write a summary about the information you got from the video, write questions about the video contents, and write questions about the information that you could not understand. Figure 21 shows a screenshot of the same scientific content, which is the given presentation for Group B, as well, the presented video produced by the researcher for Groups A and C. It is important to clarify that the researcher contacted the General Department of Educational Services at Umm Al-Qura University to book a training hall for a month in order to provide the training for Group A. The Acadox app was downloaded to the researcher's smartphone in order to provide the training for Groups B and C.

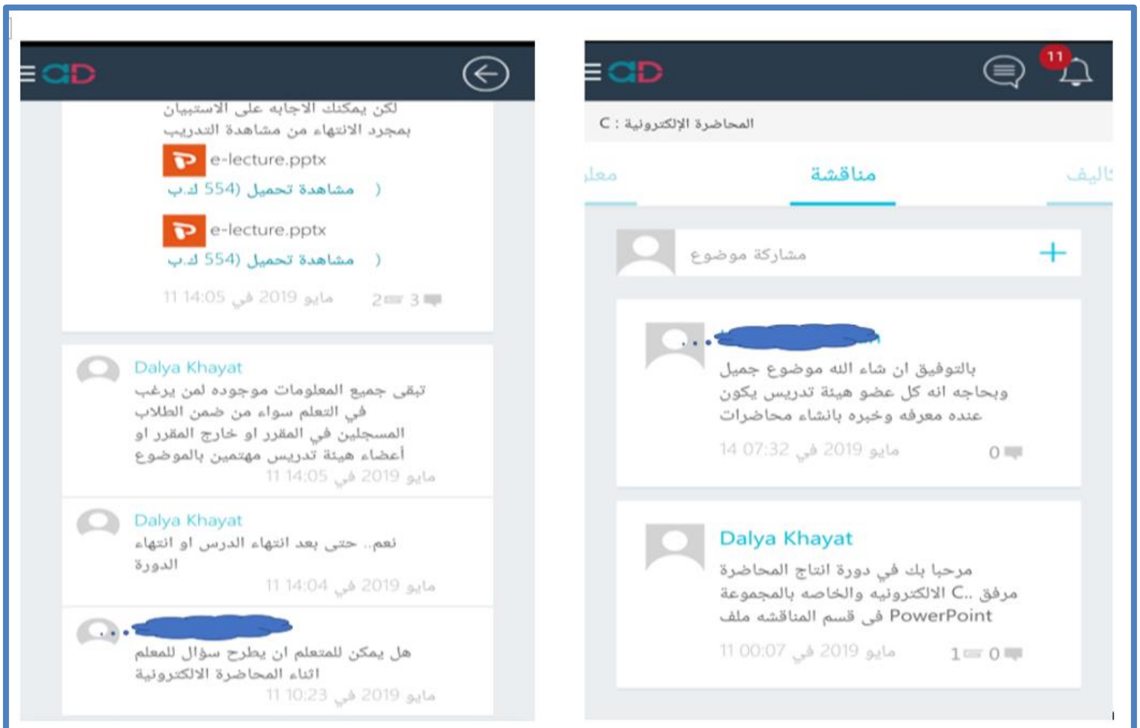
Two sessions were presented to the participants, each weekly session comprising 90 minutes. The first session aimed to introduce the e-lecture, its importance in the educational process, the commonly used devices to create e-lectures, the commonly used applications to create e-lectures and the required skills to create e-lectures. The second session endeavored to illustrate how to create e-lectures and the criteria for each element; by using recorded video, a combination of pictures, text, MS PowerPoint slides, and audio recordings. The training times for the e-lectures production content were organised such that all groups could be trained in the same subjects separately but simultaneously (i.e. synchronous). The discussions were effective after providing the CPD, and it was still available for all participants to benefit from again when they would like (see Figure 22).

The physical environment which is used for group A

The screenshot of the Acadox environment which is used for groups B and C

Figure 20. The differences between the environments for each group

Figure 21. Screenshot of the same scientific content for all groups



The screenshot of the group B discussion in Acadox platform

The screenshot of the group C discussion in Acadox platform

Figure 22. Screenshot of the discussion in Acadox platform for Groups B and C

The experiment took place under similar conditions for all groups. The researcher was careful to ensure that the information offered to each group was identical to minimise the variation of the training experience. All provided lectures were devised by the author. The training sessions did not consist solely of lectures but also included sections where trainees (i.e. the university teachers) were asked to answer activity questions. As well, the trainees discovered facts on their own and with guidance from the trainer. In other words, the researcher did not give the participants exact instructions to create the e-lecture but rather the opportunity to develop the ability (e.g. in the session about using MS PowerPoint to produce an e-lecture, the researcher does not tell the participants to press on this button then press on that one to add a picture). The participants were trained to produce electronic lectures with a duration of between 5 and 10 minutes. They were given the opportunity to create it by recording video lectures or a combination of pictures, MS PowerPoint slides, text, audio records, and video records. The produced e-lecture did not include the image of the participants themselves or their personality, but general images, texts, and sounds.

Then, to gain a better understanding of the effects on university teachers of the FL, ML, and FML in creating electronic lecture skills, the participants were asked to complete an online post-questionnaire. The post-training questionnaire link was emailed to all three groups. In addition to that the link was posted on the Acadox page for Group B and Group C. The participants were reminded of their group code (A, B, or C). They were asked to complete the online post-training questionnaire by clicking the link and they were given a week to answer. The participants were asked also to revise their e-lecture and resend it. Group A were to send theirs by email, while Group B and Group C were asked to post their e-lectures in the discussion room (see Figure 23). The researcher evaluated all re-produced e-lectures again by employing the pre-and post-evaluation product card. In order to measure the improvement of e-lectures production skills, all e-lectures before and after the intervention were compared by the researcher.

استبيان بعد التديب

عزيزتي المتدربه...

اسعد الله مسائك بكل خير...

اشكرك على فعاليتك أثناء حضورك للتدريب.. نتمنى أن تكون الدوره حققت هدفها المنشود.

مرفق لك رابط الاستبيان والذي سوف يستخدم فقط للأغراض الاكاديميه. الرابط سوف يعمل لمده اسبوع (من يوم الأحد ١٦/٦/٢٠١٩ إلى يوم السبت ٢٢/٦/٢٠١٩)

https://www.surveymonkey.com/r/TSKB893

ارجو منك الاجابه على الاستبيان أعلاه، ثم التعديل على المحاضرة الالكترونيه التي صممتيها مسبقا على حسب ماتم توضيحه خلال التدريب، ومن ثم اعاده إرسالها على هذا البريد الإلكتروني.
المحاضره الإلكترونيه يجب ان:
١- تقدم موضوعا واحدا
٢- مده المحاضره الإلكترونيه مابين ٥-١٠ دقائق
٣- يمكن أن تتضمن المحاضره الإلكترونيه محاضره مسجله، صور بأنواعها، عرض بوربوينت، نصوص، تسجيل صوتي، أصوات مسجله، أو خليط منها جميعا
٤- يرجى عدم استخدام صور تظهر شخصيتك

ان كانت لك الرغبه في إجراء المقابله (سيتم تسجيلها صوتيا) ، فلا تترددي في اختيار الاجابه نعم في الاستبيان.

أطيب الامنيات بالتوفيق...

الباحثه/ داليا خياط
Dalya Khayat
PhD Candidate
Southampton Education School
University of Southampton
Building 32 in North Bay

Dear trainee,

Thank you for your effectiveness while attending the training course. I hope that the course has achieved its desired goals and your expectations. Please see the questionnaire link below which will only be used for academic purposes. The link will be active for one week (from Sunday 16/6/2019 to Saturday 6/22/2019). https://www.surveymonkey.com/r/TSKB893

Please use the same group code that was allocated to you since the beginning of the experiment. Please kindly fill out the above questionnaire, then amend the electronic lecture that you designed in advance according to what was clarified during the training course, and then send it back to this email.
The e-lecture should:
1- Present one topic
2- The duration of the e-lecture is between 5-10 minutes
3- Include a recorded lecture, pictures of all kinds, PowerPoint presentation, texts, audio recording, recorded sounds, or a mixture of them all.
4- Not use pictures that show your personality

If you have the desire to conduct the interview (it will be audio recorded), do not hesitate to choose the answer, yes, in the questionnaire.

Best wishes,

Researcher / Dalya Khayat

Figure 23. Email sent to all groups after the intervention (with translation)

Finally, the researcher of this project did not choose specific participants for the interviews (i.e. participants who showed the most improvement, the least, improvement or stayed the same in their perceived and actual skills in each group). This was due to lack of time as well as many withdrawals from the study, and some participants did not complete all of the tasks. Moreover, the researcher analysed these research data after the major data collection procedures. Therefore, the volunteer interviewees were those participants who answerd ‘Yes’ in part B of the post-training questionnaire to express their consent to an interview. Only 12 participants contributed to the interviews. Five participants volunteered from Group C to contribute to the interviews, alongside four participants from Group B and only three from Group A. Each interviewee was been allocated a code number in the thesis to avoid using participants’ real names to maintain confidentiality and anonymity. Only the researcher knows which code number represented which individual participant.

The interview time was arranged according to the researcher’s agreement with the participants. The interview was conducted at a secured designated training classroom at UQU, but some participants preferred to conduct it via Skype. The participants were informed that the interviews would be used only for scientific purposes; and that only the researcher would listen to each participant’s voice. Procedurally, the interviews were transcribed from recorded audio to paper and then translated from Arabic into English; and reviewed by back-translation procedures (see section 4.11 'Reliability and Validity').

The tasks which the participants were asked to do and which were included in the findings were answering all of the pre-training questionnaire, creating an e-lecture, attending two training sessions, answering all questions of the post-training questionnaire, and revising the produced e-lecture. Those who carried out these tasks each received an email to thank them for participating in this study and attached was an Attendance Certificate (see Figure 37 in Appendix X). UQU issued a letter respecting their completion of collecting this research data (see Figure 38 in Appendix Y). Roger (2017) recommended that researchers include details when writing up reports on experimental research, such as information about the number and length of sessions and the amount of time between them. This is because the frequency and duration of intervention sessions and the interval between them has been shown to influence learning and retention (Rogers, 2017). Table 6 therefore summarises the data collection procedures and their timing. The following section presents the ethical considerations followed in this study.

Month	Week number	From	To	Action
1	From the first week to the fourth week	7^{th} April 2019	8^{th} May 2019	➢ Waiting ERGO approval
2	The first and the second week	9^{th} May 2019	22^{nd} May 2019	➢ Requesting Curriculums Department of the Education College of UQU to contact all the university teachers regardless of their level of academic position and regardless of their majors ➢ The department invites the university teachers at UQU to participate in this research study via the UQU portal and attaching the Arabic version of the information sheet and consent form ➢ If the participant agrees to take part in the study, she is asked to forward an e-mail to the researcher and sign the consent form
	The third week • Sunday: distributing • Tuesday: emailing participants	23^{rd} May 2019	1^{st} June 2019	➢ Distributing the sample into three groups without any external interferences ➢ Emailing the pre-training questionnaire link to all participants and gathering the produced e-lectures
	The fourth week	2^{nd} June 2019	8^{th} June 2019	➢ NOTHING WILL BE DONE BECAUSE IT IS EID HOLIDAY
3	The first week (CPD in the early morning) • Sunday: reviewing the material • Monday: CPD for Group A • Tuesday: CPD for Group B • Wednesday: CPD for Group C • Thursday: writing my notes	9^{th} June 2019	15^{th} June 2019	➢ Presenting the first training session for all groups, which aims to answer these questions: 1. What is an e-lecture? 2. What is the importance of using e-lectures in the educational process? 3. What are the used devices to create e-lectures? 4. What are the e-lecture's elements? 5. What are the typical criteria to create e-lectures? (skills)

Month	Week number	From	To	Action
	The second week (CPD in the late morning) • Sunday: reviewing the material • Monday: CPD for Group A • Tuesday: CPD for Group B (cancelled) • Wednesday: CPD for Group C • Thursday: CPD for Group B and writing my notes	16th June 2019	22nd June 2019	➢ Presenting the second training sessions for all groups, which aims to answer these questions: 1. How can an instrcutor create e-lectures? 1) recorded video, 2) combination of pictures, 3) text, 4) PowerPoint slides, 5) audio recordings, and 6) video recordings ➢ After the conclusion of the second session, the post-training questionnaire link emailed to all three groups. Link also posted in Acadox page for Grousp B and C ➢ Gathering the reproduced e-lecture via email from Group A participants, while Groups B and C were asked to post e-lectures in the discussion room on Acadox
	The third and fourth week	23rd June 2019	6th July 2019	➢ Conducting the interviews ➢ Emailing the attendance certificate to those who carried out all tasks, and thank them for participating in this study
3 months	**12 Weeks**	**7th April 2019**	**6th July 2019**	**Steps of conducting the study in KSA**

Table 6. Data collection procedure

4.14 Ethical Considerations

Ethics is an essential and sensitive issue in educational research, mainly because research involves collecting data not only from individuals but also learning about peoples' personal lives (Punch & Oancea, 2014). Oppenheim (2000), Cohen et al. (2011), and Southampton (2017) point out that the concept of ethics refers to a combination of integrity, transparency, and quality in the design and conduct of research and considers the implications of conducting research. Indeed, the principles of ethical considerations in any research not only relate to participants but also researchers (Kumar, 2005). Oppenheim (2000), Kumar (2005), Dawson (2006), Cohen et al. (2011), and Southampton (2017) say that the main principles of ethical research are shaped when participants agree to participate voluntarily in research without any coercion. Participants should be informed of everything involved in the research, including its procedures and instruments. Those who volunteer to participate need to be treated with honesty and respect. There is also the need to reassure participants that any information given by them will remain confidential, and that their privacy is respected. It is imperative to heed the importance of avoiding harm, arising from the research (if any at all), and taking the necessary measures to ensure that the advantages of the research will outweigh any potential damage caused. Furthermore, it is crucial to offer participants a pressure-free environment.

This study involves human participants, and therefore this research is registered in the electronic document management system, Ethics and Research Governance Online (ERGO) at the University of Southampton. Consequently, the relevant ethical consideration forms were completed (see Appendix M). In addition, all the ethical forms for the pilot study were reviewed via ERGO and the University of Southampton's ethical board, ERGO No. 31318 (see Appendix C). After completing the pilot study, many changes were made to the research instruments. The researcher then applied to ERGO to run the experiment and gather data from the study sample (ERGO No. 48268: see Appendix E).

The Data Protection Act of 1998, the British Educational Research Association (BERA) policy, and the University of Southampton's policy will be closely adhered to during all the phases of this research, including the search, data collection, data analysis, and data storage. Based on that, a number of procedures have been taken into account during applying the pilot study and the main study. The participants in this research were informed prior to the field research that their personal data would be stored in a private folder on a password-protected laptop. They were also informed that their responses would remain confidential and would only be used for the purpose of this research. Moreover, they were informed that in case they wished to know the findings of this research, it would be possible to give them the results after the completion of the research. All the data were saved on the researcher's own laptop or personal computer and no-one else was allowed to see or use it. Also, all documents were stored in a file on the hard disk; each document was protected by a password. All paper documents, as well, were kept in a safe place until end of the study. All the personal information and data gathered will be removed once the research is completed and electronic documents of personal data will be stored securely as above.

To maintain participant confidentiality and anonymity in this study, participants were asked not to put their names or the image of themselves or their personality to the e-lectures they produced. The participants' responses were anonymous and their real names and details were not asked for in either the pre- or post-training questionnaires. Therefore, the data collected were used only for the purposes of this study and were stored in password-protected files on the researcher's personal laptop. The participants are therefore not identifiable.

Although the participants had obtained the Arabic version of the participants' information sheets (see Appendix N) and the consent forms (see Appendix P) via email before conducting the research, a sample of which is posted on the first page of the online pre-training questionnaire. The participants were asked to tick a box at the bottom of the pre-training questionnaire page, indicating their agreement to participate in the research. The participants were informed that they had full right to withdraw from the research at any point or even refuse to complete the questionnaire without any penalty. Leading questions, loaded words and jargon were avoided in the design of all instruments and simple words were used. The researcher's gratitiude was expressed to the participants at the end of each intervention and training session. The participants were asked to produce e-lectures without including images of themselves or representations of their personality; i.e. using only general images, texts, and sounds. Since the evaluation product cards were used by the researcher, there was no need to seek the participants' consent (see Appendix K).

Qualitative research demands considerable human interaction; therefore, the ethical considerations in the case of the qualitative data tend to be more complex than in the quantitative data (Mertens, 2014), illustrating its significance for this mixed methods research. The researcher adhered to the health and safety guidelines for herself and the participants (Arksey & Knight, 1999), which involve carrying a mobile telephone during the interviews, specifying the interview days, dates, times, venues (name of the building and the room number), and the participants' names. Coding by numbers was used throughout the research instead of using participants' real names, as a way of maintaining participants' confidentiality and anonymity. The researcher took a neutral position in carrying out the interviews, giving gestures to show sympathy and feedback, but avoiding any attempt to impose views on the interviewees. Because the participants are female, the researcher ensured that no men could access any of the interview recordings except for the researcher’s supervisor(s). Challenges that faced the researcher are demonstrated in section 6.6 'Limitations'.

The above discussions demonstrated that designing a research study in social sciences is a complex process. The research process begins by identifying an appropriate paradigm and then identifying positionality aids in specifying the researcher’s philosophical assumptions, personal beliefs, values, politics, and biases. Positionality also illustrates the researcher’s relationship with the research. In this inquiry, for example, the author is an insider researcher; she is a Saudi woman who achieved her scientific degree and work experience in the same place where the research will be conducted. This information determined the paradigm components of ontology, epistemology, axiology, and methodology. In subsequent stages of the study, the appropriate instruments were designed and then the pilot study was conducted, followed by the central study. The following chapter will present the results and answer the research questions.

Chapter 5 Results

5.1 Introduction

This chapter presents the results of the study for each RQ after outlining participants' demographic information, the nature of the CPD offered at UQU, and the learning environments. This study has three research questions (see Table 7 which is adapted from Table 1), with the first and second questions focusing on the effect of three methods of developing the skills for creating e-lectures. These questions are now answered by the quantitative findings for the three groups (pre- and post-training questionnaire, and pre- and post-evaluation product card). The differences in each individual group before and after the intervention will be presented first, followed by the differences between all groups together after the intervention. The third research question about participants' opinions of FML is answered by presenting the qualitative findings for twelve interviews. This order of presentation was chosen to give precedence to insights gained from the findings for the larger group, focusing on the comparison between the three groups. How the participants viewed the concept of FML is discussed subsequently. In this chapter, the main statements for the significance values are italicised and in bold.

	Research Aims	Research Questions	Methods	The Data Analysis	Findings in Section
1.	Gaining a better understanding of the perceived effects of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills	RQ 1. What are the perceived outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills? (Quantitative data)	Pre- and post-training questionnaire	The statistical tests are: 1) Testing normality via using a Shapiro-Wilk test 2) Exploring the differences in each group before and after the intervention using paired-samples T-test 3) Exploring significant effects between groups after the intervention using the one-way ANOVA test and the Tukey post-test	5.3
2.	Gaining a better understanding of the actual effects of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills	RQ 2. What are the actual outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills? (Quantitative data)	Pre- and post-evaluation product card	The statistical tests are: 1) Testing normality via using a Shapiro-Wilk test 2) Exploring the differences in each group before and after the intervention using paired-samples T-test 3) Exploring significant effects between groups after the intervention using the one-way ANOVA test and the Tukey post-test	5.4

	Research aims	Research questions	Methods	The data analysis	Findings in section
3.	Exploring university teachers' opinions of the concerns, challenges, and affordances of using FML	RQ 3. What are university teachers' opinions of the concerns, challenges, and affordances of flipped mobile learning? (Qualitative data)	Semi-structured interview	Thematic analysis	5.5

Table 7. Research aims, research questions, methods, and findings [adapted from Table 1]

5.2 Participants' Information

This section displays information about the research project participants' demographics, which were gathered from sections One, Two, and Three of the pre-training questionnaire. It is important to clarify that decimal numbers have been rounded off to whole numbers in this chapter. In order to obtain the desired results from the research sample defined by specific criteria (see section 4.8.2 'The Sample Criteria') two questions were asked at the beginning of the pre-training questionnaire. The results show that around ***76 percent of the participants strongly accepted technology***, whereas 23 percent accepted technology, with only one percent neutral response. In regard to technological background, ***48 percent of the participants had an extensive technological background***, while 46 percent of the participants had a basic background, with six percent neutral response. None of the participants disagreed or strongly disagreed about accepting technology. As well, none of the participants disagreed or strongly disagreed about having a technological background. Hence, the sample criteria can be said to apply to the participants (see Table 8 for the participants' relationship with technology).

1) Acceptance of Technology		
	Frequency	**Valid Percent**
Strongly agree	***53***	***76***
Agree	16	23
Neither disagree nor agree	1	1
Disagree	0	0
Strongly disagree	0	0
Total	**70**	**100.0**
2) Technological Background		
	Frequency	**Valid Percent**
Strongly agree	***34***	***48***
Agree	32	46
Neither disagree nor agree	4	6
Disagree	0	0
Strongly disagree	0	0
Total	**70**	**100.0**

[1] Table 8. The participants' relationship with technology

Table 9 outlines the participants' demographic information. The participants were equally distributed into three groups but due to withdrawals or required tasks not being completed (see

[1] The "valid percent" category was chosen rather than "percent" because "valid percent" presents the percentage of only the non-missing cases, whereas "percent" represents the percentage of all cases, including the missing cases. However, missing information has been ignored because there was none, as the participants had to answer all questions in all instruments.

section 4.8.1 'Sample Size'), ***the final number of participants was 26 university teachers in the flipped learning group (i.e. Group A)***, and 22 university teachers in each of mobile learning and flipped mobile learning groups (i.e. Groups B and C). ***The highest percentage of participants from the College of Education was approximately 29%***, while the College of Arabic Language and Literature and the College of Design had the lowest percentage of participants with 3%. The majors of the participants varied, and ***the highest percentage (20%) was in biology***. ***Around 40% of the participants were lecturers***, while 39% were teaching assistants and only 21% were assistant professors. ***Thirty-nine percent of the university teachers had a teaching experience of 1–5 years***, whereas 36% of the university teachers had between 5 and 10 years of experience; only 3% of the university teachers had 15-20 years and the same number had a teaching experience of more than 20 years.

There was great disparity between the number of syllabi that were taught in one semester; ***36% of the university teachers indicated that they were teaching 3 syllabi***, while over 14% of the university teachers were teaching 6 different syllabi, and only 6% of the university teachers were teaching 5 different syllabi. Regarding the number of teaching hours in one semester, ***71% of the university teachers indicated that they taught for more than 10 hours in one semester***, while 3% of the university teachers had 9 teaching hours. In addition to the above teaching hours, the university teachers have a number of assigned administrative tasks. ***Thirty-seven percent of the university teachers had 2 tasks***, whereas 3% of them had 6 tasks.

3) Group Code		
	Frequency	**Valid Percent**
FL Group (Group A)	***26***	***38***
ML Group (Group B)	22	31
FML Group (Group C)	22	31
Total	**70**	**100.0**
4) College		
	Frequency	**Valid Percent**
College of Applied Sciences	16	23
College of Computers and Information Systems	6	8
College of Applied Medical Sciences	6	8
College of Arabic Language and Literature	2	3
College of Education	***20***	***29***
College of Social Sciences	18	26
College of Design	2	3
Total	**70**	**100.0**

5) Major		
	Frequency	**Valid Percent**
Teaching English to speakers of other languages (TESOL)	1	1
Applied linguistics	3	4
Arabic language	2	3
Biochemistry	1	1
Biology	***13***	***20***
Childhood	3	4
Computer	2	3
Data Science	3	4
E-administration	1	1
Educational technology	4	6
English language	12	17
General education	1	1
History	3	4
Housing design	2	3
Management and educational planning	2	3
Medical mycology	5	7
Statistics	2	3
The curricula and educational supervision	2	3
The curricula and educational technology	2	3
The curricula and teaching methodologies	4	6
The curricula and teaching methodologies of the English language	2	3
Total	**70**	**100.0**
6) Academic Position		
	Frequency	**Valid Percent**
Teaching assistant	27	39
Lecturer	***28***	***40***
Assistant professor	15	21
Total	**70**	**100.0**
7) Teaching Experience		
	Frequency	**Valid Percent**
Less than 1 year	6	8
1 year to less than 5 years	***27***	***39***
5 years to less than 10 years	25	36
10 years to less than 15 years	8	11
15 years to less than 20 years	2	3
More than 20 years	2	3
Total	**70**	**100.0**

8) Number of Syllabi Taught in One Semester		
	Frequency	**Valid Percent**
1	16	23
2	7	10
3	***25***	***36***
4	8	11
5	4	6
More than 6	10	14
Total	**70**	**100.0**
9) Number of Teaching Hours in One Semester		
	Frequency	**Valid Percent**
4	4	6
8	5	7
9	2	3
10	9	13
More than 10	***50***	***71***
Total	**70**	**100.0**
10) Number of Assigned Administrative Tasks in One Semester		
	Frequency	**Valid Percent**
1	20	29
2	***26***	***37***
3	22	31
6	2	3
Total	**70**	**100.0**

Table 9. Participants' demographic information

Regarding the nature of CPD programmes, Table 10 shows the participants' experiences of CPD and training environments. It should be mentioned that * here means that the participant can choose more than one option. The university teachers had different preferences regarding times to attend the training sessions, ***around 39% of the participants preferred to attend the training sessions late in the evening (5-7pm)***, whereas 24% preferred late morning (11am- 1pm) and 21% preferred early morning (9-11am). The minority, which represents 16%, preferred early evening (3-5pm). This result supports the idea of allowing university teachers to choose a convenient time for their training course, which was mentioned under section 3.6.1 'Views on Continuing Professional Development'. The results showed that ***the traditional, mobile and flipped mobile learning environments were the most popular, with 26% for each environment***, while the online environment was the least preferred with 3%. As for the previous question, participants mentioned online environment when they chose the other option in the questionnaire. ***The traditional learning environment was the most popular type of training environment (63%)***, followed by mobile learning environments (21%), in contrast to 7% for the flipped environment. ***Thirty-four percent of university teachers attended only two training sessions during a semester***, whereas only 3% attended five training sessions. Around 14% of the university teachers did not attend any training sessions during a semester.

About 41% of the university teachers thought that the number of training courses attended during a semester was insufficient, whereas 33% did not have knowledge of the adequacy of the number of training courses that were attended during a semester. Twenty-six percent of the university teachers thought that the number of training courses attended during a semester was sufficient. In support of the previous results, ***57% of the university teachers claimed a need to increase the number of training courses presented during a semester***, whereas 13% said the opposite. The university teachers expressed the need for necessary training around a number of interesting topics. ***Thirty percent requested extra courses in how to integrate technology with education practice***, while 14% specified the need for courses about EL; and the same percentage wanted to learn about modern teaching methods. A very low percentage of university teachers (1%) requested augmented reality training and lesson design. In the previous question, participants were allowed to enter an unlimited number of topics. Surprisingly, ***76% of the university teachers intended to go on training courses but were unable to for several reasons*** (regardless of the number of training courses that were attended). In contrast, 24% had no intention of attending a training course and were also unable to during a semester. ***A high number of teaching hours was the most common reason (32%)*** for this, followed by timing of the training program (30%) and then the fact that training programmes focus on theoretical aspects and neglect practical aspects (4%).

11) * Suitable Time to Attend Training Sessions		
	Frequency	**Valid Percent**
Early morning (9-11am)	15	21
Late morning (11am-1pm)	17	24
Early evening (3-5pm)	11	16
Late evening (5-7pm)	***27***	***39***
Total	**70**	**100.0**
12) * Suitable Place to Attend Training Sessions		
	Frequency	**Valid Percent**
Traditional learning environment	***19***	***26***
Flipped learning environment	14	19
Mobile learning environment	***19***	***26***
Flipped mobile learning environment	***19***	***26***
Other	2 (Online)	3
Total	**73**	**100.0**

13) * Type of Training Environment Experienced Before		
	Frequency	**Valid Percent**
Traditional learning environment	***52***	***63***
Flipped learning environment	6	7
Mobile learning environment	17	20
Other	8 (Online)	10
Total	**83**	**100.0**

14) Number of Training Courses or Workshops Attended During a Semester		
	Frequency	**Valid Percent**
0	10	14
1	6	9
2	***24***	***34***
3	10	14
4	10	14
5	2	3
More than 5	8	12
Total	**70**	**100.0**

15) Number of Training Courses or Workshops Attended During a Semester – Is it Sufficient?		
	Frequency	**Valid Percent**
No	***29***	***41***
I don't know	23	33
Yes	18	26
Total	**70**	**100.0**

16) Number of Training Courses or Workshops Presented During a Semester – Should There Be More?		
	Frequency	**Valid Percent**
No	9	13
I don't know	21	30
Yes	***40***	***57***
Total	**70**	**100.0**

17) Preferred Topics for Extra Training Courses or Workshops (participant can enter an unlimited number of topics)		
	Frequency	**Valid Percent**
Active learning	2	3
Augmented reality	1	1
EL (e-learning)	11	14
Educational environments	4	5
Data analysis via SPSS	2	3
Power Point Alternative Tools	2	3
Integrating technology with education practice	***23***	***30***
Effective academic personal for university teachers	3	3
Making effective activities for learners	2	3
Designing exams	2	3
Scientific research	3	3
Publishing in Arabic and English	2	3
Mixed research methods	2	3
Modern teaching methods	11	14
Quality	4	5
Developing classroom organization skills	2	3
Designing the lesson	1	1
Total	**77**	**100.0**
18) Number of Training Courses or Workshops that the Respondent Would Like to Have Attended but Was Unable to Attend During a Semester		
	Frequency	**Valid Percent**
0	17	24
1	15	21
2	***20***	***29***
3	11	16
4	4	6
5	2	3
More than 5 workshops	1	1
Total	**70**	**100.0**
19) * Reason for not Attending		
	Frequency	**Valid Percent**
High number of teaching hours	***34***	***32***
High number of administrative tasks	7	7
Unsuitable scheduling of implementation of training programs	32	30
Unsuitable places for training programs	12	11
Traditional training methods used in training sessions	9	8
Lack of training programs that fit the needs of faculty members	9	8
Exaggerated focus on theoretical aspects in training programs compared to practical ones	4	4
Total	**107**	**100.0**

Table 10. The participants' experiences with CPD

Regarding the participants' experiences with training environments, Table 11 presents the participants' experiences with the training environments in detail. A high proportion ***(76%) of university teachers indicated that they had not attended any training courses about mobile learning,*** and ***the same proportion indicated that they had not attended any training courses about flipped learning***. Around ***68% did not provide any educational activities via mobile learning***, and ***81% did not provide any educational activities via flipped learning***. However, ***66% expressed a desire to attend a training session via a flipped mobile learning environment***. ***Eighty percent of university teachers expressed their enthusiasm for attending a training session about the flipped mobile learning environment***. Finally, ***56% of the participants did not present e-lectures, and the same percentage mentioned that they had not attended any training courses about creating e-lectures***. The next section presents the findings for RQ1, which were gathered from Part A from Section Four of the pre-training questionnaire.

20) Attendance of Training Courses or Workshops about Mobile Learning		
	Frequency	**Valid Percent**
No	***53***	***76***
I don't know	2	3
Yes	15	21
Total	**70**	**100.0**
21) Were any Educational Activities Provided via Mobile Learning Environment?		
	Frequency	**Valid Percent**
No	***48***	***68***
I don't know	4	6
Yes	18	26
Total	**70**	**100.0**
22) Attendance of any Training Courses or Workshops about Flipped Learning		
	Frequency	**Valid Percent**
No	***53***	***76***
I don't know	2	3
Yes	15	21
Total	**70**	**100.0**
23) Were any Educational Activities via Flipped Learning Environment Provided?		
	Frequency	**Valid Percent**
No	***57***	***81***
I don't know	4	6
Yes	9	13
Total	**70**	**100.0**
24) Would you Prefer to Attend a Training Session via Flipped Mobile Learning Environment?		
	Frequency	**Valid Percent**
No	4	6
I don't know	20	28
Yes	***46***	***66***
Total	**70**	**100.0**

25) Would you Like to Attend a Training Session about Flipped Mobile Learning Environment?		
	Frequency	**Valid Percent**
No	6	9
I don't know	8	11
Yes	***56***	***80***
Total	**70**	**100.0**
26) Presentation of an Electronic Lecture		
	Frequency	**Valid Percent**
No	***39***	***56***
I don't know	3	4
Yes	28	40
Total	**70**	**100.0**
27) Attendance of any Training Courses or Workshops about Creating Electronic Lectures		
	Frequency	**Valid Percent**
No	***39***	***56***
I don't know	2	3
Yes	29	41
Total	**70**	**100.0**

Table 11. The participants' experiences with training environments

5.3 The Perceived Outcomes of FL, ML, and FML CPD on University Teachers' E-lecture Skills

Statistical errors are considered common in scientific literature, where around half of the publications have at least one error (Curran-Everett & Benos, 2004; Ghasemi & Zahediasl, 2012). The normal distribution is important, whereby a number of statistical tests require the data to be normally distributed, while the majority of statistical procedures are based on the assumption that the data have been normally distributed (so-called Gaussian as mentioned in Altman & Martin, 1995; Ghasemi & Zahediasl, 2012). This assumption of normality, and other assumptions, should be taken seriously because they are crucial to draw accurate and reliable test results (Öztuna et al., 2006; Ghasemi & Zahediasl, 2012; Field, 2013). Therefore, the first step of data analysis is to test normality. Through the SPSS package, there are many tests to assess the assumption of normality. Öztuna et al. (2006) state that evaluation graphs are the best way to decide whether data are normal or not. However, both Elliott and Woodward (2007) and Field (2013) report that the sampling distribution in large samples (i.e. > 30 or 40) tends to be normal regardless of the shape of the data. The sampling of this research is considered a large sample (i.e. 70 participants), which is could point out that data distributed normally. The **Sig.** value of the Shapiro-Wilk test is greater than 0.05 (i.e. **Sig**. is 0.140> 0.05), which means the data are normally distributed for all perceived skills of creating e-lectures (see Table 31 in Appendix R).

Cohen et al. (2011: 606) point out that, 'the parametric data assume knowledge of the characteristics of the population, in order for inferences to be able to be made securely; they often assume a normal, Gaussian curve of distribution'. Due to the fact that the samples were allocated randomly, distributed normally, and the data collected were continuous, this research employed parametric tests for analysis (Murphy, 2012; Corder & Foreman, 2014). These tests are statistically stronger than others and are easy to write and compute (Corder & Foreman, 2014).

In order to answer RQ1 (What are the perceived outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills?), a comparison between university teachers' perceived skill level in creating e-lectures in each group before and after CPD will first be made. To this end, the pre- and post-training questionnaires for all the groups are analysed by paired-samples T-test. Secondly, a comparison between university teachers' perceived skill level in creating e-lectures among the three groups after CPD will be made. Because this research was performed with three groups, ANOVA (short for analysis of variance) is used to obtain results. In particular, one-way ANOVA is used because it compares the means across one independent variable (which is the training environment) that divided the sample into three groups.

Table 12 demonstrates the correlation **r** between the skill level before and after the intervention for all groups taken together. In addition, it shows the average difference between the skill level before and after the intervention for all groups. Generally, the skills of creating e-lectures include fourteen sub-skills, distributed under three main skills (see section 3.7.2 'E-Lectures Producing Skills'). The results are offered from general to detail. Therefore, the results are presented first for the perceived skills of creating e-lectures combined in general. Then, the results are presented for each main skill (i.e. all sub-skills which fall under each main skill), and at the end, the results are shown for the 14 sub-skills separately.

Looking at the first group in Table 12, which represents the perceived skills of creating an e-lecture in general, the Paired Samples Correlation indicates that the **p-value** score is 0.001 <0.05, which means there is a significant difference and positive correlation (i.e. **r** is positive) between the means of the skills before and after CPD in all groups. The results indicate that the mean score of skills of creating an e-lecture in general before CPD was -0.942 points lower than the mean skill score after CPD. This means there was an improvement of the perceived means of skills of creating an e-lecture in general after CPD.

As for the three main perceived skills in Table 12, which are the skills of designing and organising the structure of the presentation, the skills of creating the content of the e-lecture, and the skills of presenting an e-lecture, the Paired Samples Correlation indicates that the **p-value** scores are 0.001 <0.05. This means they are significantly different and positively correlated (i.e. **r** is positive). The findings show that the mean scores of skills of creating an e-lecture in the three main skills before CPD were -.982, -.911, and -.772 points lower than these means skills score after CPD. This means there was an improvement in the three means of the main perceived skills of creating an e-lecture after CPD on average.

Finally, the last group in Table 12 which represent the fourteen perceived sub-skills of creating an e-lecture shows that the means of these sub-skills before and after CPD scores are significantly different (i.e. **p-value** =0.001 <0.05) and positively correlated (i.e. **r** is positive). On average, the mean of each perceived sub-skill before CPD is lower than the mean of the perceived sub-skill after CPD, and this simply refers to the existence of an improvement in the university teachers' perceived sub-skills in creating e-lectures. In general, the results point out **t**(69) <0.05, suggesting a significant difference in all means of skills before and after the CPD on average.

Paired Samples Statistics											
Skill		**Mean**		**N**	**Correlation**	**Paired Differences**				**Sig.**
						Mean for the Before and After Skill	**Std. Deviation**	**t**	**df**	
The skills of creating e-lectures in general	***All 14 sub-skills combined***	Before	3.11	70	.29	-.942	.829	-9.50	69	***.001***
		After	4.05							
The three main skills	***1. The skills of designing and organising the structure of the presentation***	Before	3.10	70	.29	-.982	.813	-10.11	69	***.001***
		After	4.08							
	2. The skills of creating the content of the e-lecture	Before	3.10	70	.26	-.911	1.033	-7.39	69	***.001***
		After	4.01							
	3. The skills of presenting an e-lecture	Before	3.29	70	.20	-.772	1.106	-5.84	69	***.001***
		After	4.06							
The fourteen sub-skills	***1.1. The ability to determine the purpose of the e-lecture***	Before	2.97	70	.32	-.786	1.102	-5.97	69	***.001***
		After	3.76							
	1.2. The ability to determine the content of the e-lecture	Before	3.01	70	.24	-1.071	1.108	-8.09	69	***.001***
		After	4.09							
	1.3. The ability to design an e-lecture framework in proportion to the characteristics of the learners	Before	2.86	70	.15	-1.143	1.231	-7.77	69	***.001***
		After	4.00							
	1.4. The ability to give an introduction to gain learners' attention	Before	3.06	70	.05	-1.171	1.129	-8.68	69	***.001***
		After	4.23							
	1.5. The ability to give an explanation to clarify concepts and terms when presenting information	Before	3.33	70	.19	-.986	1.097	-7.52	69	***.001***
		After	4.31							
	1.6. The ability to give a summary to emphasise the key points presented during an e-lecture	Before	3.30	70	.15	-.886	.956	-7.75	69	***.001***
		After	4.19							

Paired Samples Statistics									
Skill	Mean		N	Correlation	Paired Differences				Sig.
					Mean for the Before and After Skill	Std. Deviation	t	df	
1.7. The ability to design the activities in proportion to the content of the e-lecture	Before	3.11	70	.33	-.943	1.128	-6.99	69	***.001***
	After	4.06							
1.8. The ability to design the activities in proportion to the characteristics of the learners	Before	3.16	70	.41	-.871	.962	-7.58	69	***.001***
	After	4.03							
2.1. The ability to use audio and visual aids appropriate to the content	Before	3.13	70	.23	-.843	1.150	-6.13	69	***.001***
	After	3.97							
2.2. The ability to determine the appropriate time to present audio and visual aids	Before	3.24	70	.15	-.886	1.097	-6.75	69	***.001***
	After	4.13							
2.3. The ability to deal with devices needed to create an e-lecture	Before	2.99	70	.02	-1.029	1.329	-6.47	69	***.001***
	After	4.01							
2.4. The ability to deal with several applications needed to create an e-lecture	Before	2.83	70	.29	-1.029	1.329	-6.47	69	***.001***
	After	3.86							
2.5. The ability to create a presentation	Before	3.30	70	.38	-.771	1.253	-5.15	69	***.001***
	After	4.07							
3.1. The ability to make the e-lecture interactive	Before	3.29	70	.20	-.771	1.106	-5.84	69	***.001***
	After	4.06							

[2]Table 12. Statistics of the correlation and the average difference between the perceived skills before and after the intervention for all groups taken together

[2] The Confidence Interval Percentage has been determined with 95%, which represents 0.05 as a level of significance

By moving to the second comparison, a one-way ANOVA test is used to study the impact of educational environments (flipped, mobile, and flipped mobile) on the development of the perceived e-lecturing skills after the intervention for all groups. A factorial 3x2 ANOVA could have been used to analyse the pre-and post-training questionnaires and the differences between groups at the same time, but the researcher preferred to use first the one-way ANOVA test, then the Tukey post-test. Justification for this is that both tests will give the same results but utilising different methods. As well, the researcher has already had experience of running these tests in the pilot study.

Table 13 illustrates the output of the ANOVA analysis and whether there is a statistically significant difference between the groups. In general, the results show that there is no statistically significant difference in the perceived skills of creating e-lectures between the groups. By looking at the three main perceived skills, ***there is a statistically significant difference in the skills of creating the content of e-lectures*** (i.e. **p-value** =0.03 <0.05). Finally, the results demonstrate that ***only four perceived sub-skills have a statistically significant difference*** (i.e. **p-values** ≤0.05). ***These skills are the ability to determine the purpose of the e-lecture; the ability to determine the content of the e-lecture; the ability to use audio and visual aids appropriate to the content; and the ability to deal with several applications which are needed to create an e-lecture***, whereas there is no statistically significant difference in the remaining sub-skills.

ANOVA				
Skill			**F**	**Sig.**
The skills of creating e-lectures in general	All 14 sub-skills combined	Between Groups	2.060	.14
		Within Groups		
		Total		
The three main skills	1. The skills of designing and organising the structure of the presentation	Between Groups	1.401	.25
		Within Groups		
		Total		
	2. The skills of creating the content of an e-lecture	Between Groups	3.596	***.03***
		Within Groups		
		Total		

ANOVA				
Skill			**F**	**Sig.**
	3. The skills of presenting an e-lecture	Between Groups	1.548	.22
		Within Groups		
		Total		
The fourteen sub-skills	***1.1. The ability to determine the purpose of the e-lecture***	Between Groups	18.241	***.01***
		Within Groups		
		Total		
	1.2. The ability to determine the content of the e-lecture	Between Groups	3.117	***.05***
		Within Groups		
		Total		
	1.3. The ability to design an e-lecture framework in proportion to the characteristics of the learners	Between Groups	1.035	.36
		Within Groups		
		Total		
	1.4. The ability to give an introduction to gain learners' attention	Between Groups	.904	.41
		Within Groups		
		Total		
	1.5. The ability to give an explanation to clarify concepts and terms when presenting information	Between Groups	.314	.73
		Within Groups		
		Total		
	1.6. The ability to give a summary to emphasise the key points presented during an e-lecture	Between Groups	.159	.85
		Within Groups		
		Total		
	1.7. The ability to design the activities in proportion to the content of the e-lecture	Between Groups	.248	.78
		Within Groups		
		Total		

ANOVA				
	Skill		**F**	**Sig.**
	1.8. The ability to design the activities in proportion to the characteristics of the learners	Between Groups	.100	.91
		Within Groups		
		Total		
	2.1. The ability to use audio and visual aids appropriate to the content	Between Groups	4.225	***.02***
		Within Groups		
		Total		
	2.2. The ability to determine the appropriate time to present audio and visual aids	Between Groups	1.433	.25
		Within Groups		
		Total		
	2.3. The ability to deal with devices needed to create an e-lecture	Between Groups	1.710	.19
		Within Groups		
		Total		
	2.4. The ability to deal with several applications needed to create an e-lecture	Between Groups	3.348	***.04***
		Within Groups		
		Total		
	2.5. The ability to create a presentation	Between Groups	2.328	.11
		Within Groups		
		Total		
	3.1. The ability to make the e-lecture interactive	Between Groups	1.548	.22
		Within Groups		
		Total		

Table 13. Statistics of the ANOVA analysis for the perceived skills

However, to determine which of the specific groups differed, the Multiple Comparisons in Table 14 which contain the results of the Tukey post hoc test explains these differences. By looking at Tables 13 and 14 together, it would seem that there are no differences between the groups in the perceived skills of creating e-lectures in general, but the significant improvement for those trained via the flipped mobile learning (FML).

In the three main skills, there are statistically significant differences between the groups' mean in the skills of creating the content of an e-lecture which is listed under the three main skills. The **p-value** =0.03 <0.05 whereby Groups A and C have significant differences when compared to Group B, meanwhile, Group C has significant differences when compared to Group A. This means that ***the skills of creating the content of an e-lecture have been improved via the flipped mobile learning (FML)***, where the mean difference between Groups A and C is -0.467.

By looking at each of the fourteen sub-skills, there are statistically significant differences between the group mean in the skill to determine the purpose of the e-lecture between all groups whereby **p-value** =0.01 <0.05. Groups B and C have significant differences when compared to Group A; meanwhile, Group B has significant differences when compared to Group C. This means that ***the skill of the ability to determine the purpose of the e-lecture has been improved via the mobile learning (ML)***, where the mean difference between Groups C and B is -0.227. ***There is a statistically significant difference in the skill of the ability to determine the content of the e-lecture*** whereby **p-value** =0.05 ≤0.05. Groups B and C have significant differences when compared to Group A, where there is a difference in favour of the group who trained via FML (i.e. Group C). ***There is also a statistically significant difference in the skill of the ability to use audio and visual aids appropriate to the content*** between all the groups whereby the **p-value** =0.02 <0.05. Groups B and C have significant differences when compared to Group A, where there is a difference in favour of the group who trained via FML (i.e. Group C). There is a statistically significant difference as well in the skill of the ability to deal with several applications needed to create an e-lecture in favour of groups A and C, and Group C is better than A in improving this skill. This means ***the skill of the ability to deal with several applications needed to create an e-lecture has been improved by training via FL and FML but the significance is higher for those trained via FML***. However, there are no differences between the groups in the remaining perceived sub-skills, where the **p-value** >0.05.

Generally speaking, the last column in Table 14 demonstrates the group that has a significant improvement in each perceived skill of creating e-lectures. ***Training via the flipped mobile learning improved the skills of creating e-lectures in general***, as well as the three main skills. In the same way, training via a flipped learning (FL) improved two of the perceived sub-skills of creating e-lectures; and training via mobile learning (ML) improved two of the perceived sub-skills of creating e-lectures, whereas training via flipped mobile learning (FML) improved 11 of the perceived sub-skills of creating e-lectures. However, as explained above, the training via ML was equally effective to training via FML in one skill.

To sum up, the statistics from the above comparisons between the perceived skills of creating e-lectures among groups show that there are no significant differences in the perceived skills of creating e-lectures in general although there are improvements from pre- to post-measures in favour of the group trained via FML. The next section presents the answer to RQ2.

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
The skills of creating e-lectures in general	All 14 sub-skills combined	A	B	-.117	.761	-.515	.281	***C***
			C	***-.335***	.116	-.733	.064	
		B	A	.117	.761	-.281	.515	
			C	***-.218***	.424	-.632	.197	
		C	A	.335	.116	-.064	.7323	
			B	.218	.424	-.197	.632	
The three main skills	1. The skills of designing and organising the structure of the presentation	A	B	-.221	.390	-.622	.181	***C***
			C	***-.255***	.288	-.656	.147	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
		B	A	.221	.390	-.181	.622	
			C	***-.034***	.979	-.452	.384	
		C	A	.255	.288	-.147	.656	
			B	.034	.979	-.384	.452	
	2. The skills of creating the content of an e-lecture	A	B	.024	.992	-.457	.505	***C***
			C	***-.467***	.059	-.948	.014	
		B	A	-.024	.992	-.505	.457	
			C	***-.491***	.056	-.992	.010	
		C	A	.467	.059	-.014	.948	
			B	.491	.056	-.010	.992	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
	3. The skills of presenting an e-lecture	A	B	.007	.999	-.475	.489	***C***
			C	***-.311***	.276	-.793	.171	
		B	A	-.007	.999	-.489	.475	
			C	***-.318***	.288	-.820	.183	
		C	A	.311	.276	-.171	.793	
			B	.318	.288	-.183	.820	
The fourteen sub-skills	***1.1. The ability to determine the purpose of the e-lecture***	A	***B***	***-1.318****	***.000***	-1.885	-.752	***B***
			C	-1.091*	***.000***	-1.657	-.525	
		B	A	1.318*	***.000***	.752	1.885	
			C	.227	.627	-.362	.817	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
		C	A	1.091*	***.000***	.525	1.657	
			B	***-.220***	.627	-.817	.362	
	1.2. The ability to determine the content of the e-lecture	A	B	-.542	.110	-1.178	.094	***C***
			C	***-.587***	.076	-1.224	.049	
		B	A	.542	.110	-.094	1.178	
			C	***-.045***	.985	-.708	.617	
		C	A	.587	.076	-.049	1.224	
			B	.045	.985	-.617	.708	
	1.3. The ability to design an e-lecture framework in proportion to the characteristics of the learners	A	B	-.192	.788	-.891	.507	***C***
			C	***-.420***	.327	-1.119	.279	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
		B	A	.192	.788	-.507	.891	
			C	***-.227***	.735	-.955	.500	
		C	A	.420	.327	-.279	1.119	
			B	.227	.735	-.500	.955	
	1.4. The ability to give an introduction to gain learners' attention	A	B	.248	.488	-.270	.767	***A***
			C	.248	.488	-.270	.767	
		B	***A***	***-.248***	.488	-.767	.270	
			C	.000	1.000	-.540	.540	
		C	***A***	***-.248***	.488	-.767	.270	
			B	.000	1.000	-.540	.540	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
	1.5. The ability to give an explanation to clarify concepts and terms when presenting information	A	***B***	***-.133***	.778	-.604	.338	***B & C***
			C	***-.133***	.778	-.604	.338	
		B	A	.133	.778	-.338	.604	
			C	.000	1.000	-.490	.490	
		C	A	.133	.778	-.338	.604	
			B	.000	1.000	-.490	.490	
	1.6. The ability to give a summary to emphasise the key points presented during an e-lecture	A	B	.049	.954	-.353	.451	***A***
			C	.094	.840	-.308	.497	
		B	***A***	***-.049***	.954	-.451	.353	
			C	.045	.963	-.373	.464	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		**(I) Training Environment**	**(J) Training Environment**	**Mean Difference (I-J)**	**Sig.**	**95% Confidence Interval**		**Significant Improvement in Group**
						Lower Bound	**Upper Bound**	
		C	***A***	***-.094***	.840	-.497	.308	
			B	-.045	.963	-.464	.373	
	1.7. The ability to design the activities in proportion to the content of the e-lecture	A	B	.122	.880	-.486	.731	***C***
			C	***-.059***	.970	-.668	.549	
		B	A	-.122	.880	-.731	.486	
			C	***-.182***	.771	-.815	.451	
		C	A	.059	.970	-.549	.668	
			B	.182	.771	-.451	.815	
	1.8. The ability to design the activities in proportion to the characteristics of the learners	A	B	.000	1.000	-.549	.549	***C***
			C	***-.091***	.917	-.640	.458	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
		B	A	.000	1.000	-.549	.549	
			C	***-.091***	.923	-.662	.480	
		C	A	.091	.917	-.458	.640	
			B	.091	.923	-.480	.662	
	2.1. The ability to use audio and visual aids appropriate to the content	A	B	-.133	.827	-.675	.409	***C***
			C	***-.633****	***.018***	-1.175	-.091	
		B	A	.133	.827	-.409	.675	
			C	***-.500***	.092	-1.064	.064	
		C	A	.633*	.018	.091	1.175	
			B	.500	.092	-.064	1.064	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
	2.2. The ability to determine the appropriate time to present audio and visual aids	A	B	.077	.913	-.377	.531	***C***
			C	***-.241***	.415	-.695	.213	
		B	A	-.077	.913	-.531	.377	
			C	***-.318***	.247	-.791	.154	
		C	A	.241	.415	-.213	.695	
			B	.318	.247	-.154	.791	
	2.3. The ability to deal with devices needed to create an e-lecture	A	B	.059	.964	-.496	.614	***C***
			C	***-.350***	.293	-.905	.205	
		B	A	-.059	.964	-.614	.496	
			C	***-.409***	.214	-.987	.169	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
		C	A	.350	.293	-.205	.905	
			B	.409	.214	-.169	.987	
	2.4. The ability to deal with several applications needed to create an e-lecture	A	B	.269	.662	-.475	1.013	***C***
			C	***-.549***	.188	-1.293	.195	
		B	A	-.269	.662	-1.013	.475	
			C	***-.818****	***.036***	-1.59	-.044	
		C	A	.549	.188	-.195	1.293	
			B	.818*	***.036***	.044	1.592	
	2.5. The ability to create a presentation	A	B	-.154	.833	-.793	.485	***C***
			C	***-.563***	.095	-1.202	.076	

Multiple Comparisons									
Tukey HSD									
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
		B	A	.154	.833	-.485	.793	
			C	***-.409***	.309	-1.07	.256	
		C	A	.563	.095	-.076	1.202	
			B	.409	.309	-.256	1.074	
	3.1. The ability to make the e-lecture interactive	A	B	.007	.999	-.475	.489	***C***
			C	***-.311***	.276	-.793	.171	
		B	A	-.007	.999	-.489	.475	
			C	***-.318***	.288	-.820	.183	
		C	A	.311	.276	-.171	.793	
			B	.318	.288	-.183	.820	

Table 14. Statistics for the perceived skills among groups

5.4 The Actual Outcomes of FL, ML, and FML CPD on University Teachers' E-lecture Skills

The first step of data analysis is to test the normality, which was described in section 5.3. However, the **Sig**. value of the Shapiro-Wilk Test is greater than 0.05 (i.e. **Sig.** is 0.105> 0.05), which means the data are normally distributed (see Table 32 in Appendix S). In order to answer the RQ2 (What are the actual outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers' e-lecture skills?), the comparison between university teachers' actual skills level in creating e-lectures in each group before and after CPD will be presented first. To this end, the pre- and post-evaluation product cards for all the groups are analysed by using Paired-Samples T-test. Secondly, a comparison between university teachers' actual skills in creating e-lectures among the three groups after CPD will be made. Because this research was performed with three groups, ANOVA was used to obtain results. In particular, one-way ANOVA was used because it compares the means across one independent variable (which is the training environment) that divided the sample into three groups.

According to the first comparison, Table 15 demonstrates the correlation **r** between the skill level before and after the intervention for all groups taken together. The table also shows the average difference between the skill level before and after the intervention for all groups. The results are offered from general to detail. Therefore, the results are presented first for the actual skills of creating e-lectures combined in general. Then, the results are presented for each main skill (i.e. all sub-skills which fall under each main skill), and in the end, the results are shown for the 14 sub-skills separately.

By looking at the first group in Table 15, which represents the actual skills for creating an e-lecture in general, the Paired Samples Correlation indicates that the **p-value** score is 0.001 <0.05, which means there is a significant difference and positive correlation (i.e. **r** is positive) between the means of the skills before and after CPD in all groups. The results indicate that the mean score of skills of creating an e-lecture in general before CPD was -2.218 points lower than the mean skill score after CPD. This means there was an improvement of the actual means of skills of creating an e-lecture in general after CPD.

As for the three main skills in Table 15, which are the skills of designing and organising the structure of the presentation, the skills of creating the content of the e-lecture, and the skills of presenting an e-lecture, the Paired Samples Correlation indicates that the **p-value** scores are 0.001 <0.05. This means they are significantly different and positively correlated (i.e. **r** is positive). The findings show that the mean scores of skills of creating an e-lecture in the three main skills before CPD were -1.955, -2.677, and -2.029 points lower than these mean skills score after CPD. This means there was an improvement in the three means of the main actual skills of creating an e-lecture after CPD on average.

Finally, the last group in Table 15 which represent the fourteen actual sub-skills of creating an e-lecture shows that the means of these sub-skills before and after CPD scores are significantly different (i.e. **p-value** =0.001 <0.05) and positively correlated (i.e. **r** is positive). On average, the mean of each actual sub-skill before CPD is lower than the mean of the actual sub-skill after CPD, and this simply refers to the existence of an improvement in the university teachers' actual sub-skills in creating e-lectures. In general, the results point out **t**(69)<0.05, suggesting a significant difference in all means of skills before and after the CPD on average.

Paired Samples Statistics											
Skill		**Mean**		**N**	**Correlation**	**Paired Differences**				**Sig.**
						Mean Before and After Skill	**Std. Deviation**	**t**	**df**	
The skills of creating e-lectures in general	***All 14 sub-skills combined***	Before	2.01	70	.057	-2.218	1.158	-16.027	69	***.001***
		After	4.23							
The three main skills	***1. The skills of designing and organising the structure of the presentation***	Before	1.98	70	.105	-1.955	.930	-17.585	69	***.001***
		After	3.93							
	2. The skills of creating the content of the e-lecture	Before	2.06	70	.033	-2.677	2.068	-10.829	69	***.001***
		After	4.74							
	3. The skills of presenting an e-lecture	Before	2.01	70	-.086	-2.029	1.372	-12.368	69	***.001***
		After	4.04							
The fourteen sub-skills	***1.1. The ability to determine the purpose of the e-lecture***	Before	1.96	70	.188	-1.686	1.269	-11.115	69	***.001***
		After	3.64							
	1.2. The ability to determine the content of the e-lecture	Before	2.06	70	.226	-2.114	1.198	-14.762	69	***.001***
		After	4.17							
	1.3. The ability to design an e-lecture framework in proportion to the characteristics of the learners	Before	2.09	70	.222	-2.243	1.109	-16.920	69	***.001***
		After	4.33							
	1.4. The ability to give an introduction to gain learners' attention	Before	1.84	70	-.058	-2.029	1.251	-13.570	69	***.001***
		After	3.87							
	1.5. The ability to give an explanation to clarify concepts and terms when presenting information	Before	2.10	70	.223	-2.143	1.158	-15.478	69	***.001***
		After	4.24							
	1.6. The ability to give a summary to emphasise the key points presented during an e-lecture	Before	1.90	70	.070	-1.686	1.336	-10.560	69	***.001***
		After	3.59							

Paired Samples Statistics										
Skill		Mean		N	Correlation	Paired Differences				Sig.
						Mean Before and After Skill	Std. Deviation	t	df	
	1.7. The ability to design the activities in proportion to the content of the e-lecture	Before	1.96	70	.139	-1.857	1.289	-12.058	69	***.001***
		After	3.81							
	1.8. The ability to design the activities in proportion to the characteristics of the learners	Before	1.93	70	.206	-1.886	1.269	-12.434	69	***.001***
		After	3.81							
	2.1. The ability to use audio and visual aids appropriate to the content	Before	1.96	70	.044	-3.786	8.558	-3.701	69	***.001***
		After	5.74							
	2.2. The ability to determine the appropriate time to present audio and visual aids	Before	2.04	70	.181	-2.357	1.091	-18.083	69	***.001***
		After	4.40							
	2.3. The ability to deal with devices needed to create an e-lecture	Before	2.04	70	.166	-2.457	1.176	-17.486	69	***.001***
		After	4.50							
	2.4. The ability to deal with several applications needed to create an e-lecture	Before	2.13	70	-.046	-2.357	1.263	-15.614	69	***.001***
		After	4.49							
	2.5. The ability to create a presentation	Before	2.14	70	.007	-2.429	1.137	-17.876	69	***.001***
		After	4.57							
	3.1. The ability to make the e-lecture interactive	Before	2.01	70	-.086	-2.029	1.372	-12.368	69	***.001***
		After	4.04							

Table 15. Statistics of the correlation and average difference between the actual skills before and after the intervention for all groups taken together

By moving to the second comparison, a one-way ANOVA test was used to study the effects of the educational environments (flipped, mobile, and flipped mobile) on the development of the actual e-lecturing skills after the intervention for all groups. A factorial 3x2 ANOVA could have been used to analyse the pre- and post- evaluation product card and the differences between groups at the same time, but the researcher preferred to use first the one-way ANOVA test, then the Tukey post-test. Justification for this is that both tests will give the same results but utilising different methods. As well, the researcher has already had experience of running these tests in the pilot study.

Table 16 illustrates the output of the ANOVA analysis and whether there is a statistically significant difference between the groups. In general, the results show that there is no statistically significant difference in the actual skills of creating e-lectures between the groups. By looking at the three main actual skills, ***there is a statistically significant difference in the skills of creating the content of e-lectures*** and ***the skills of presenting an e-lecture*** (i.e. **p-value** <0.05). Finally, the results demonstrate that ***eight actual sub-skills have a statistically significant difference*** (i.e. **p-values** ≤0.05). ***These skills are the ability to determine the content of the e-lecture; the ability to design an e-lecture framework in proportion to the characteristics of the learners; the ability to give an explanation to clarify concepts and terms when presenting information; the ability to determine the appropriate time to present audio and visual aids; the ability to deal with devices needed to create an e-lecture; the ability to deal with several applications needed to create an e-lecture; the ability to create a presentation; and the ability to make the e-lecture interactive***, whereas there is no statistically significant difference in the remaining sub-skills.

ANOVA				
Skill			**F**	**Sig.**
The skills of creating e-lectures in general	All 14 sub-skills combined	Between Groups	2.681	.08
		Within Groups		
		Total		
The three main skills	1. The skills of designing and organising the structure of the presentation	Between Groups	.266	.77
		Within Groups		
		Total		
	2. The skills of creating the content of an e-lecture	Between Groups	4.266	***.02***
		Within Groups		
		Total		

ANOVA				
Skill			F	Sig.
	3. The skills of presenting an e-lecture	Between Groups	5.123	***.01***
		Within Groups		
		Total		
The fourteen sub-skills	1.1. The ability to determine the purpose of the e-lecture	Between Groups	.869	.42
		Within Groups		
		Total		
	1.2. The ability to determine the content of the e-lecture	Between Groups	4.323	***.02***
		Within Groups		
		Total		
	1.3. The ability to design an e-lecture framework in proportion to the characteristics of the learners	Between Groups	8.123	***.01***
		Within Groups		
		Total		
	1.4. The ability to give an introduction to gain learners' attention	Between Groups	1.355	.27
		Within Groups		
		Total		
	1.5. The ability to give an explanation to clarify concepts and terms when presenting information	Between Groups	4.796	***.01***
		Within Groups		
		Total		
	1.6. The ability to give a summary to emphasise the key points presented during an e-lecture	Between Groups	2.246	.11
		Within Groups		
		Total		
	1.7. The ability to design the activities in proportion to the content of the e-lecture	Between Groups	.942	.40
		Within Groups		
		Total		

ANOVA					
Skill				F	Sig.
	1.8. The ability to design the activities in proportion to the characteristics of the learners	Between Groups	.901	.41
		Within Groups		
		Total		
	2.1. The ability to use audio and visual aids appropriate to the content	Between Groups	2.708	.07
		Within Groups		
		Total		
	2.2. The ability to determine the appropriate time to present audio and visual aids	Between Groups	5.680	***.01***
		Within Groups		
		Total		
	2.3. The ability to deal with devices needed to create an e-lecture	Between Groups	4.399	***.02***
		Within Groups		
		Total		
	2.4. The ability to deal with several applications needed to create an e-lecture	Between Groups	3.920	***.03***
		Within Groups		
		Total		
	2.5. The ability to create a presentation	Between Groups	5.302	***.01***
		Within Groups		
		Total		
	3.1. The ability to make the e-lecture interactive	Between Groups	5.123	***.01***
		Within Groups		
		Total		

Table 16. Statistics of the ANOVA analysis for the actual skills

However, to determine which of the specific groups differed, the Multiple Comparisons in Table 17 which contain the results of the Tukey post hoc test explains these differences. By looking at Tables 16 and 17 together, it would seem that there are no differences between the groups in the actual skills of creating e-lectures in general, but the significant improvement for those trained via the flipped mobile learning (FML).

There is a statistically significant difference in two of the three actual main skills, which are the skills of creating the content of an e-lecture and the skills of presenting an e-lecture, whereby the **p-value** <0.05. However, Groups B and C have significant differences when compared to Group A, while Group C has significant differences when compared to Group B. This means that ***the skills of creating the content of an e-lecture*** and ***the skills of presenting an e-lecture have been improved via the flipped mobile learning (FML)***, where the mean difference between Groups B and C for these skills are -1.027 and -0.133.

By looking at each of the fourteen sub-skills, ***there are statistically significant differences between the group mean in the skill to determine the content of the e-lecture; the skill of the ability to design an e-lecture framework in proportion to the characteristics of the learners; the skill of the ability to determine the appropriate time to present audio and visual aids; the skill of the ability to create a presentation;*** and ***the skill of the ability to make the e-lecture interactive***. The **p-values** are ≤ .05 in those five skills. Groups B and C have significant differences when compared to Group A, while Group C has significant differences when compared to Group B. ***This means that these skills have been improved via the flipped mobile learning (FML)***. ***There is a statistically significant difference as well in the skill of giving an explanation to clarify concepts and terms when presenting information,*** and ***the skill to deal with devices needed to create an e-lecture*** in favour of Groups B and C, but Group B is better than C in improving these skills. This means those skills have been improved by training via ML and FML but the highest significance is for those trained via ML. The statistical difference between Groups A and B, as well as between Groups A and C, are ***significant differences in the skill to use audio and visual aids appropriate to the content***. This statistical difference is similar between Groups A and B, as well as between Groups A and C. This means that training via ML was equally effective to training via FML regarding the skill to use audio and visual aids appropriate to the content. The statistical difference between Groups A and B, as well as between Groups A and C, are ***significant differences in the skill to deal with several applications needed to create an e-lecture***. This statistical difference is similar between Groups A and B, as well as between Groups A and C. This means that training via ML was equally effective to training via FML regarding the skill to deal with several applications needed to create an e-lecture. However, there are no differences between the groups in the remaining skills where **p-value** >0.05.

Generally speaking, the last column in Table 17 demonstrates the group that has a significant mean improvement in each actual skill of creating e-lectures. ***Training via flipped mobile learning improved the skills of creating e-lectures in general.*** In the same way, training via flipped mobile learning improved two of the main actual skills, while one actual skill was improved via the mobile learning. Finally, training via a flipped learning (FL) improved three of the actual sub-skills of creating e-lecture; and training via mobile learning (ML) improved five of the actual sub-skills of creating e-lectures, whereas training via flipped mobile learning (FML) improved nine of the actual sub-skills of creating e-lectures. However, as explained above, the training via FL was equally effective to training via ML in one skill, while the training via ML was equally effective to training via FML in two skills.

To sum up, the statistics from the above comparisons of the actual skills of creating e-lectures among groups show that there are no significant differences in the actual skills of creating e-lectures in general although there are improvements from pre- to post-measure in favour of the group trained via FML.

In conclusion, Table 33 in Appendix T displays a summary of the detailed findings presented in sections 5.3 and 5.4. Table 33 displays the effect of the different training environments on the perceived and actual e-lecture skills, either by looking at the skills in general, or skills presentation divided into three main skills, or by displaying the 14 sub-skills separately. For instance, the findings from the table indicate that the perceived and actual skills of creating an e-lecture in general were improved via flipped mobile learning (FML). In more detail, the three main perceived skills of e-lectures were all improved via FML, whereas only two of the three main actual skills of e-lectures were improved via FML and one was improved via mobile learning environment (ML).

Around 11 of the 14 perceived sub-skills improved via FML, while 9 of the 14 actual sub-skills improved. Two of the perceived and actual sub-skills which improved via the flipped learning environment were the ability to give an introduction to gain learners' attention and the ability to give a summary to emphasise the key points presented during an e-lecture. As well, one of the perceived and actual sub-skills that improved via the mobile learning environment was the ability to give an explanation to clarify concepts and terms when presenting information. Moreover, some of the perceived and actual sub-skills improved significantly via two types of training. For instance, the actual skill of giving an introduction to gain learners' attention improved via flipped learning as well as mobile learning. This means that the flipped learning alone or mobile learning alone could be effective in order to improve some perceived and actual sub-skills, or, it could give the same impact of improvement as a flipped learning environment for some perceived and actual sub-skills. The next section presents the answer to the RQ3.

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
The skills of creating e-lectures in general	All 14 sub-skills combined	A	B	-.205	.738	-.865	.455	***C***
			C	***-.630***	.064	-1.290	.030	
		B	A	.205	.738	-.455	.865	
			C	***-.425***	.305	-1.112	.261	
		C	A	.630	.064	-.030	1.290	
			B	.425	.305	-.261	1.112	
The three main skills	**1.** The skills of designing and organising the structure of the presentation	A	***B***	***-.142***	.801	-.680	.395	***B***
			C	-.137	.815	-.675	.401	
		B	A	.142	.801	-.395	.680	
			C	.006	1.000	-.554	.566	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
		C	A	.137	.815	-.401	.675	
			B	***-.006***	1.000	-.566	.554	
	2. The skills of creating the content of an e-lecture	A	B	-.492	.620	-1.753	.769	***C***
			C	-1.520*	***.014***	-2.781	-.259	
		B	A	.492	.620	-.769	1.753	
			C	***-1.027***	.154	-2.340	.285	
		C	A	1.520*	***.014***	.259	2.781	
			B	1.027	.154	-.285	2.340	
	3. The skills of presenting an e-lecture	A	B	.731*	***.031***	.056	1.405	***C***
			C	***-.133***	.885	-.807	.542	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
		B	A	-.731*	***.031***	-1.405	-.056	
			C	***-.864****	***.012***	-1.566	-.162	
		C	A	.133	.885	-.542	.807	
			B	.864*	***.012***	.162	1.566	
The fourteen sub-skills	1.1. The ability to determine the purpose of the e-lecture	A	B	.210	.803	-.585	1.005	***A***
			C	.437	.390	-.358	1.232	
		B	***A***	***-.210***	.803	-1.005	.585	
			C	.227	.788	-.600	1.055	
		C	***A***	***-.437***	.390	-1.232	.358	
			B	-.227	.788	-1.055	.600	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
	1.2. The ability to determine the content of the e-lecture	A	B	-.329	.479	-1.006	.349	***C***
			C	***-.829****	***.013***	-1.506	-.152	
		B	A	.329	.479	-.349	1.006	
			C	***-.500***	.213	-1.205	.205	
		C	A	.829*	***.013***	.152	1.506	
			B	.500	.213	-.205	1.205	
	1.3. The ability to design an e-lecture framework in proportion to the characteristics of the learners	A	B	-.745*	***.004***	-1.280	-.210	***C***
			C	***-.790****	***.002***	-1.325	-.255	
		B	A	.745*	***.004***	.210	1.280	
			C	***-.045***	.979	-.602	.512	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
		C	A	.790*	***.002***	.255	1.325	
			B	.045	.979	-.512	.602	
	1.4. The ability to give an introduction to gain learners' attention	A	***B***	***-.413***	.392	-1.165	.340	***A & B***
			C	.087	.958	-.665	.840	
		B	***A***	.413	.392	-.340	1.165	
			C	.500	.283	-.283	1.283	
		C	A	-.087	.958	-.840	.665	
			B	***-.500***	.283	-1.283	.283	
	1.5. The ability to give an explanation to clarify concepts and terms when presenting information	A	***B***	***-.790****	***.009***	-1.409	-.171	***B***
			C	-.472	.168	-1.091	.147	

Multiple Comparisons									
Tukey HSD									
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
		B	A	.790*	***.009***	.171	1.409	
			C	.318	.467	-.326	.962	
		C	A	.472	.168	-.147	1.091	
			B	***-.318***	.467	-.962	.326	
	1.6. The ability to give a summary to emphasise the key points presented during an e-lecture	A	B	.248	.739	-.552	1.049	***A***
			C	.703	.097	-.098	1.503	
		B	***A***	***-.248***	.739	-1.049	.552	
			C	.455	.396	-.379	1.288	
		C	***A***	***-.703***	.097	-1.503	.098	
			B	-.455	.396	-1.288	.379	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
	1.7. The ability to design the activities in proportion to the content of the e-lecture	A	B	.339	.566	-.457	1.135	***C***
			C	***-.115***	.936	-.912	.681	
		B	A	-.339	.566	-1.135	.457	
			C	***-.455***	.392	-1.283	.374	
		C	A	.115	.936	-.681	.912	
			B	.455	.392	-.374	1.283	
	1.8. The ability to design the activities in proportion to the characteristics of the learners	A	B	.339	.580	-.475	1.153	***C***
			C	***-.115***	.938	-.930	.699	
		B	A	-.339	.580	-1.153	.475	
			C	***-.455***	.408	-1.302	.393	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
		C	A	.115	.938	-.699	.930	
			B	.455	.408	-.393	1.3019	
	2.1. The ability to use audio and visual aids appropriate to the content	A	***B***	***-.829***	.937	-.662	.496	***B & C***
			C	-.532	**.051**	-1.112	.469	
		B	A	.829	.937	-.496	.662	
			C	***-.450***	.182	-1.053	1.535	
		C	A	.532	**.051**	-.469	1.112	
			B	.450	.182	-1.535	1.053	
	2.2. The ability to determine the appropriate time to present audio and visual aids	A	B	-.035	.984	-.524	.454	***C***
			C	***-.626****	***.009***	-1.115	-.137	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
		B	A	.035	.984	-.454	.524	
			C	***-.591****	***.019***	-1.099	-.082	
		C	A	.626*	***.009***	.137	1.115	
			B	.591*	***.019***	.082	1.010	
	2.3. The ability to deal with devices needed to create an e-lecture	A	***B***	***-.657****	***.023***	-1.241	-.074	***B***
			C	-.566	.059	-1.150	.017	
		B	A	.657*	***.023***	.074	1.241	
			C	.091	.932	-.516	.698	
		C	A	.566	.059	-.017	1.150	
			B	***-.091***	.932	-.698	.516	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
	2.4. The ability to deal with several applications needed to create an e-lecture	A	***B***	***-.528***	***.051***	-1.057	.001	***B &C***
			C	***-.528***	***.051***	-1.057	.001	
		B	A	.528	***.051***	-.001	1.057	
			C	.000	1.000	-.551	.551	
		C	A	.528	***.051***	-.001	1.057	
			B	.000	1.000	-.551	.551	
	2.5. The ability to create a presentation	A	B	-.413	.059	-.838	.013	***C***
			C	***-.549****	***.008***	-.974	-.124	
		B	A	.413	.059	-.013	.838	
			C	***-.136***	.742	-.579	.307	

Multiple Comparisons								
Tukey HSD								
Dependent Variable		(I) Training Environment	(J) Training Environment	Mean Difference (I-J)	Sig.	95% Confidence Interval		Significant Improvement in Group
						Lower Bound	Upper Bound	
		C	A	.549*	***.008***	.124	.974	
			B	.136	.742	-.307	.579	
	3.1. The ability to make the e-lecture interactive	A	B	.731*	***.031***	.056	1.405	***C***
			C	***-.133***	.885	-.807	.542	
		B	A	-.731*	***.031***	-1.405	-.056	
			C	***-.864****	***.012***	-1.566	-.162	
		C	A	.133	.885	-.542	.807	
			B	.864*	***.012***	.162	1.566	

Table 17. Statistics for the actual skills among group

5.5 The University Teachers' Opinions with Regard to the Concerns, Challenges, and Affordances of FML

This section answers RQ3: What are the university teachers' opinions with regard to the concerns, challenges, and affordances of flipped mobile learning? The one-to-one interviews were carried out only with university teachers who gave their consent to be interviewed in the last part of the post-training questionnaire. A total of twelve participants were interviewed. Five of them were from Group C, four from Group B and three from Group A. Most of the participants had appreciated the opportunity to participate in the CPD programme, but enthusiasm was evident in the participants from Group B as well as Group C in regards to participation in the study in general. This appeared from their rich questions posted on the discussion board on Acadox. This was in contrast to Group A, who posted no questions after completing the training session. The timing of the final university examinations and the effort expended at the time of the tests during the presentation of the training sessions may have been a reason for this decision. Although the timing and location of the interviews were based on the preferences of each individual participant, some of them did not appear to fully adequately provide their opinions and their interviews did not enrich the study in terms of gathering information about FML. The researcher did not have any previous experience in carrying out formal interviews, except for conducting three interviews in the pilot study. Table 18 presents the codes and themes relating to the aims of this research; these are shown in italics and underlined. Direct quotations from participants and indirect questions asked by the interviewer are set out in Appendix W.

Themes	Answers from the three groups		
	Participants from Group A (Flipped learning environment): 1- F1; 2- F2; and 3- F3	**Participants from Group B (Mobile learning environment):** 1- M4; 2- M5; 3- M6; and 4- M7	**Participants from Group C (Flipped mobile learning environment):** 1- FM8; 2- FM9; 3- FM10; 4- FM11; and 5- FM12
Theme No. 1: The impression about FML CPD			**FM8:** This method was *successful* and I would *definitely use it*. I am a big fan of making learning as engaging as possible by playing games online and using useful websites. So my number one tool in teaching would always be *integrating technology in my classrooms* and in the future, I plan to use the blackboard, that the university has recently launched
			FM9: It was *useful and rich*
			FM10: The training method was *beautiful*. The video helped me to understand how to create e-lectures. Using the mobile app as a training environment made it *easier to attend the session* and *see the discussion when I want*. I meant the questions that are sent after the training time in the discussion panel

Themes	Answers from the three groups		
	Participants from Group A (Flipped learning environment): 1- F1; 2- F2; and 3- F3	**Participants from Group B (Mobile learning environment):** 1- M4; 2- M5; 3- M6; and 4- M7	**Participants from Group C (Flipped mobile learning environment):** 1- FM8; 2- FM9; 3- FM10; 4- FM11; and 5- FM12
			FM11: *Good*. This method *showed us one of the benefits of technology in the educational process*, as it can be used to train members of the academic staff also. I think using this technological environment in training, *teachers' integration into the technology will be increased*; and then, this environment will be employed with their students. My opinion is that *using technology in the educational process in a good manner makes the topic attractive and interesting*. Overall, I found myself *more excited to see the video* and write down my questions about the content. I was also *excited to attend* the training via the application on my mobile phone. It is true that I produced an electronic lecture and I think it was not good enough, but I was *sincerely eager to amend it and show* it well in the end
			FM12: *I like it*, honestly. *The Acadox app was easy*, and that information was presented in the *video in a nice manner*. I can *pause the video to understand and re-read the text*

Themes	Answers from the three groups		
	Participants from Group A (Flipped learning environment): 1- F1; 2- F2; and 3- F3	Participants from Group B (Mobile learning environment): 1- M4; 2- M5; 3- M6; and 4- M7	Participants from Group C (Flipped mobile learning environment): 1- FM8; 2- FM9; 3- FM10; 4- FM11; and 5- FM12
Theme No. 2: The reasons to like FML CPD			**FM8:** Yes, *I liked it*. It was *easy to follow*
			FM9: *Yes*, because it was *rich, useful, and practical*
			FM10: As I said previously, *I like* the training method. *I enjoyed watching* the video, and I can *watch it again. I was able to manage my time*, so, I can improve myself from anywhere if I have free time. In contrast, with the traditional method, which obliges the trainee to attend the training session. And the duration of that training session could be more than two hours
			FM11: *Yes, I liked it*. I had previously heard about flipped learning, but *I had no opportunity* to try it or attend a training course on it. Now, I am aware of flipped learning as well as inverted learning combined with mobile learning

Themes	Answers from the three groups		
	Participants from Group A (Flipped learning environment): 1- F1; 2- F2; and 3- F3	**Participants from Group B (Mobile learning environment):** 1- M4; 2- M5; 3- M6; and 4- M7	**Participants from Group C (Flipped mobile learning environment):** 1- FM8; 2- FM9; 3- FM10; 4- FM11; and 5- FM12
			FM12: As I said *I like* the Acadox app. The reasons that I totally agree with this method are: 1. The Acadox app was *easy*, and the information was presented in the video in a *nice manner*. I can *pause the video to understand and re-read the text, or if I am not in a good mood to continue* 2. I think this method will encourage academics *to attend several training courses without any barrier of time, place, or having my children with me*. I will be the first one to use this if this environment is applied 3. I believe if the higher education institutions offer opportunities for academics to have training about this method and how to use it with students, this will *reflect on students, their motivations, and their responsibility towards learning*

Themes	Answers from the three groups		
	Participants from Group A (Flipped learning environment): 1- F1; 2- F2; and 3- F3	**Participants from Group B (Mobile learning environment):** 1- M4; 2- M5; 3- M6; and 4- M7	**Participants from Group C (Flipped mobile learning environment):** 1- FM8; 2- FM9; 3- FM10; 4- FM11; and 5- FM12
Theme No. 3: The benefits of using FML whether in training or teaching	**F1:** Sorry, I can't really think of any	**M4:** 1. *Saving the teacher's time* 2. *Saving the teacher's effort* 3. *Investing in technology*	**FM8:** I cannot really recall any
	F2: 1. The learner in general whether teacher or student will *enjoy learning from their devices and from a new environment* 2. The learner can also *prepare themselves before class* 3. By applying FML, the *teacher can evaluate that environment and be able to ask students questions when necessary*	**M5:** 1. *Preparing the learner* 2. *Building the basic information for specific knowledge by the learner* 3. *Asking questions about information that was not understood*	**FM9:** 1. *Saving the learner's time* 2. *Obtaining information quickly* 3. *The ease of information transfer for the learner*
	F3: 1. *Saving the teacher's effort* 2. *Allowing a student to refer to the educational subject at any time and any place* 3. *Attracting the new generation who is interested in technology*	**M6:** 1. *Giving the learner an initial idea about the scientific subject to be presented* 2. *Involving the learner in the educational process* 3. *Motivating learners to keep an eye on the additional information that they will get later, which will help them to have solutions and clarifications for their inquiries*	**FM10:** 1. *Allowing the learner to learn in their preferred time* 2. *Obtaining the information or the inquires* which could arise after the training session *quickly* (from the discussion panel) 3. *The ability to see the content several times*

Themes	Answers from the three groups		
	Participants from Group A (Flipped learning environment): 1- F1; 2- F2; and 3- F3	**Participants from Group B (Mobile learning environment):** 1- M4; 2- M5; 3- M6; and 4- M7	**Participants from Group C (Flipped mobile learning environment):** 1- FM8; 2- FM9; 3- FM10; 4- FM11; and 5- FM12
		M7: 1. *Enrich class time* by questioning the learners' ability 2. The *learners will learn by self-study*, this method as you know *helps learners store information they acquire for a longer period*	**FM11:** 1. *Preparing the learner to learn* 2. *Supporting the lifelong learning concept* 3. *Changing the teacher's role* in the educational process, where the role will be more than a provider of information. The teacher uses technology to help a learner to learn on their own. Meanwhile, the teacher will use that time to improve or to focus more on another student who needs more support
			FM12: 1. *Encouraging the learner to take responsibility for learning* 2. *Encouraging the teacher to improve themselves without any barrier of place or time* 3. *Raising the teacher's confidence*

Themes	Answers from the three groups		
	Participants from Group A (Flipped learning environment): 1- F1; 2- F2; and 3- F3	**Participants from Group B (Mobile learning environment):** 1- M4; 2- M5; 3- M6; and 4- M7	**Participants from Group C (Flipped mobile learning environment):** 1- FM8; 2- FM9; 3- FM10; 4- FM11; and 5- FM12
Theme No. 4: The difficulties of using FML	**F1:** Sorry, I can't really think of any **F2:** 1. As long *as it is new*, it will face several difficulties. *Some learners will not accept that environment* 2. As you know, the *Internet is not reliable* **F3:** Because I am one of those people who prefers verbal and face-to-face interaction, I can list these difficulties: 1. The *lack of an instantaneous reaction* 2. *Difficulty to focus and restraint to end the lecture at a certain time compared to the traditional lectures* 3. The *difficulty of understanding the exact meaning* of the question, because I cannot communicate and ask at the moment	**M4:** 1. The university teacher might find *using technology difficult* 2. The university teacher *might not have the desire to use technology* **M5:** *Weak technical knowledge*, whether for the teacher or the students **M6:** The difficulty maybe just *to start working with something new*, never used before. But after providing the clarifications and descriptions, this environment will be easy	**FM8:** There were not any difficulties **FM9:** There were not any difficulties **FM10:** There were no difficulties but I have a question. It is too strange that *the teachers did not participate in the discussion*. The e-lecture concept is not well known among university teachers as you know, so when you asked us to write our questions or our inquiries around the video content, just a few teachers asked. So, do all the other teachers know about e-lectures, programs to create e-lectures etc? I believe they don't know but I don't have any idea of why they did not participate **FM11:** The difficulties appeared when you asked us to produce e-lectures when *I don't know about the elements* of it

Themes	Answers from the three groups		
	Participants from Group A (Flipped learning environment): 1- F1; 2- F2; and 3- F3	**Participants from Group B (Mobile learning environment):** 1- M4; 2- M5; 3- M6; and 4- M7	**Participants from Group C (Flipped mobile learning environment):** 1- FM8; 2- FM9; 3- FM10; 4- FM11; and 5- FM12
		M7: 1. In this method, as you said, learners will first watch a video. Then, they will have to wait until the training is over. For myself, *I do not need to wait* and can search for the information I need 2. *The time to create a good video* may challenge me if I use FML with my students. I must choose an effective activity to attract students. Of course, I need to learn about several programs that help me to deal with FML and create e-lectures 3. *Accessing the Internet* 4. Accessing the devices, *especially since some students don't have a laptop or smartphone*, as you know the situation in some families	**FM12:** I think the difficulty is *lack of awareness of the importance of FML* as well as the awareness of the importance of other technological concepts. It should encourage teachers to use FML. However, I found some limitations, which are: 1. *Some teachers will see this method as an additional burden* 2. I think if FML is applied, *the educational institution may need to provide incentives* for those who use it. So, they will have the motivation to employ it 3. The issue of *access to the Internet* 4. *The lack of technological background* especially those teachers who don’t like technology

Themes	Answers from the three groups		
	Participants from Group A (Flipped learning environment): 1- F1; 2- F2; and 3- F3	**Participants from Group B (Mobile learning environment):** 1- M4; 2- M5; 3- M6; and 4- M7	**Participants from Group C (Flipped mobile learning environment):** 1- FM8; 2- FM9; 3- FM10; 4- FM11; and 5- FM12
Theme No. 5: To what extent will the FML method be effective in teaching students	**F1:** I think *yes*, it will be effective but *not for all majors*	**M4:** Using FML is *possible* especially in higher education, as well as, *in some majors*. In these two points, there is no need for continuous communication between learners and teacher	**FM8:** *Yes*, but with *some specific rules such as number of students, levels, and streams (medical, technology, commerce, etc)*
	F2: *Yes*, I think it is possible. But it is important that *academics are aware of the benefits of FML*, then it will be *possible to use it*	**M5:** I think *it is a good idea* but to achieve its goals, it is important *to train university teachers well about this environment.* This will *help them to describe the new environment and the instructions for students*	**FM9:** *Yes*, if it is *applied correctly with a clear plan*
	F3: *Yes*, it is possible. It is a very beautiful idea, but it needs *to be fully developed compared to the traditional environment*	**M6:** I see *it as an excellent method* for pre-learning, for *preparing the learner for new knowledge.* I see this method as *enriching the learner*	**FM10:** *Yes*. Because it will *allow students to achieve the biggest opportunity of participating*. It may *support cooperative learning*. The most important point is *allowing the students to learn anytime and anywhere*
		M7: *Yes*, it is possible but it's very important to *providing staff with computer technology to help teachers in case they face any challenges*	**FM11:** *Yes*, of course
			FM12: *Yes*, I think so. It will be effective with students

Themes	Answers from the three groups		
	Participants from Group A (Flipped learning environment): 1- F1; 2- F2; and 3- F3	**Participants from Group B (Mobile learning environment):** 1- M4; 2- M5; 3- M6; and 4- M7	**Participants from Group C (Flipped mobile learning environment):** 1- FM8; 2- FM9; 3- FM10; 4- FM11; and 5- FM12
Theme No. 6: The limitations to employing FML at universities	**F1:** I think the limitation is only in *preparing the teachers and training them about this environment*. After getting your degree and going back to KSA, you can provide a training course like this one and introduce a lot of information about this environment	**M4:** I think yes, where there is *no specific learning area for the learners* who already attended the university. As you know, those the computer labs are not authorised for learners to access without teachers, so they cannot benefit. I would like to suggest to university officials that they allow learners to access these labs and give them instructions on using the equipment	**FM8:** *I think that it is feasible* to implement this strategy at our university. *We have qualified teachers who are open to change, have the tools and creativity to make it happen*
	F2: No, I think there are not. Through *workshops that have to be provided to the teacher prior to using FML*, the teachers will learn about FML, its benefits, its importance, the programs or the application. *Then they can employ this environment easy*		**FM9:** *I think so*, but I am concerned *about students accepting this method and their commitment to watching the video before they attend* the virtual classroom. I am also *afraid about some students who do not have a smartphone or laptop*
	F3: *Infrastructure, Internet speed, and lack of secure electrical outlets in offices are a temporary hindrance* in case that teacher or student are at the uni	**M5:** I think the limitation is only in *providing computer labs or increasing the number of computers in the library*; in order to *help students look to the lectures especially since some students don't have smartphone or laptop*	**FM10:** The *slow Internet* at the university could negatively affect learning if students or teachers wanted to attend sessions at the university
		M6: I don't think so	

Themes	Answers from the three groups		
	Participants from Group A (Flipped learning environment): 1- F1; 2- F2; and 3- F3	**Participants from Group B (Mobile learning environment):** 1- M4; 2- M5; 3- M6; and 4- M7	**Participants from Group C (Flipped mobile learning environment):** 1- FM8; 2- FM9; 3- FM10; 4- FM11; and 5- FM12
		M7: I think if there are any limitations, they will be related to *academics that teach several different curriculums, deal with several administrative tasks, and the huge number of students*	**FM11:** *No*, I don't think so. To employ this environment, we *need Internet + teachers' awareness regarding the importance of technology + training around technology.* By looking at each element separately in our university; we can say that *Internet is slow*, but the other two elements are lacking. So, *what we need is to increase teachers' awareness regarding employing technology in the educational process and to raise the number of training courses around technology and its benefits*, its variety of uses
			FM12: As I mentioned, *some teachers will see FML as an additional burden. Some teachers will not accept the new environment because they are familiar with the traditional environment and maybe this does not require much effort in terms of preparation. FML requires preparation and video creation. As you know some teachers don't accept technology or they don't have enough experience to use it* in the educational process like me

Table 18. Data from the interviews for the three groups

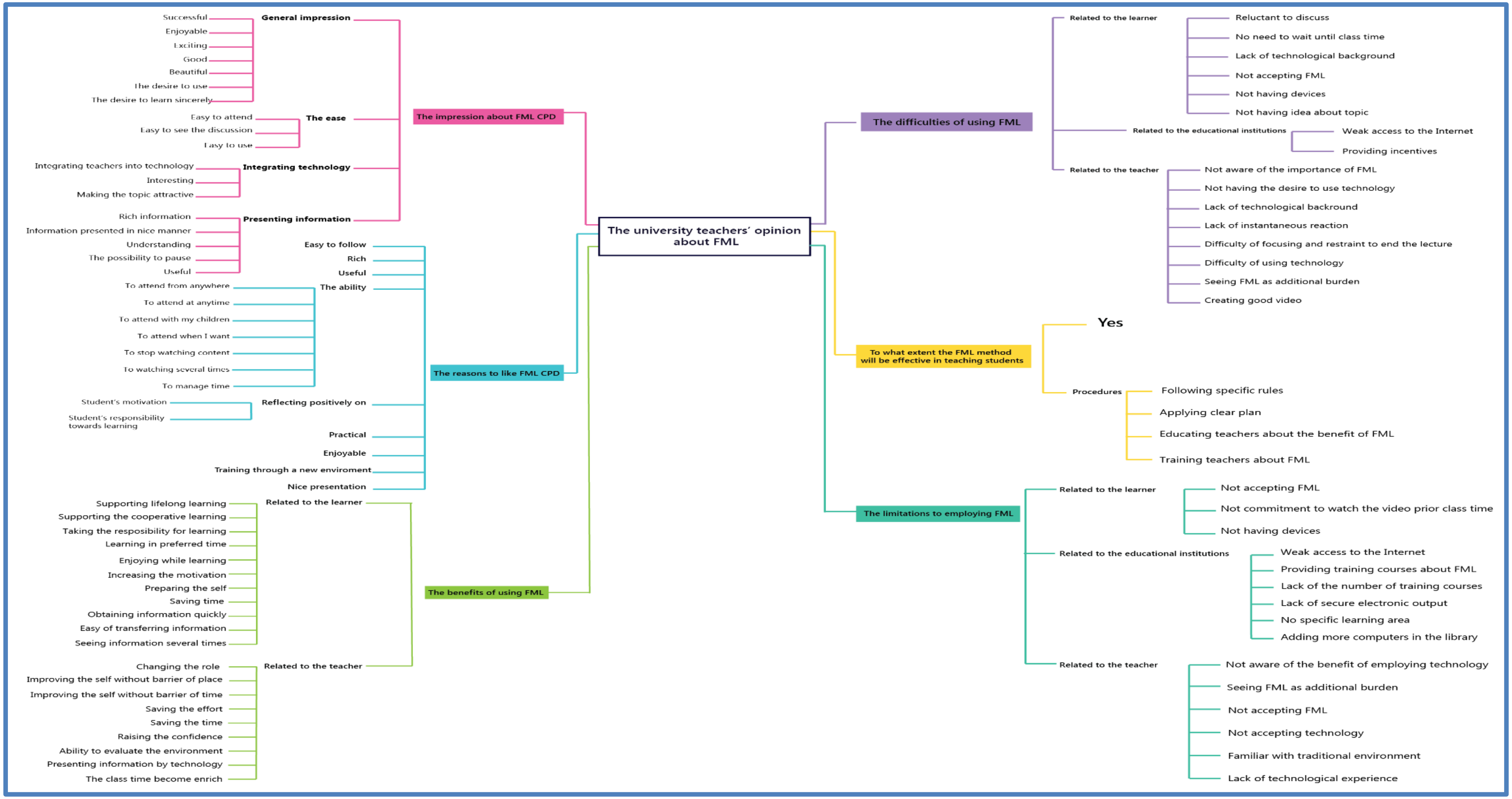


Figure 24. Summary of interviewees' opinions of FML

Figure 24 illustrates the university teachers' opinions regarding FML, which express the codes and themes extracted from the participants' transcripts in Table 18, while the sub-headings present each theme separately.

5.5.1 The University Teachers' Impressions about FML CPD

The interviewees were asked about their impressions of the CPD training they recieved. The answers and findings from Group C are presented here in the main text, while answers from Group A (the group trained via a flipped learning environment) and Group B (the group trained via a mobile learning environment) are given in Appendix W, as the study aims to gather information about FML not about FL or ML separately. However, all five responses from participants were positive about using FML. When the researcher asked participant FM8 about her impression about FML, she said:

> "This method was successful and I would definitely use it. I am a big fan of making learning as fun as possible by playing games online and using useful websites. So my number one tool in teaching would always be integrating technology in my classrooms and in the future, I plan to use the blackboard, that the university has recently launched" (FM8).

Participant FM9 stated simply that her impression of FML was that "It was useful and rich". When the researcher asked participant FM10 about FML, she replied: ''The training method was beautiful. The video helped me to understand how to create e-lectures. Using the mobile app as a training environment made it easier to attend the session and see the discussion when I want. I meant the questions that are sent after the training time in the discussion panel". Participant FM11 gave a longer and very positive endorsement:

> "Good. This method showed us one of the benefits of technology in the educational process, as it can be used to train members of the academic staff also. I think using this technological environment in training will help teachers to integrate the technology more and then they can use this environment with their students. My opinion is that using technology in the educational process in a good manner makes the topic attractive and interesting. Overall, I found myself more excited to see the video and write down my questions about the content. I was also excited to attend the training via the application on my mobile phone. It is true that I produced an electronic lecture and I think it was not good enough, but I was sincerely eager to amend it and show it well in the end" (FM11).

Participant FM12 expressed her impression by stating: "I like it, honestly. The Acadox app was easy, and that information was presented in the video in a nice manner. I can pause the video to understand and re-read the text". Figure 25 summarises all codes for the themes developed from teachers' impressions of FML in CPD, and these have been classified under several main codes.

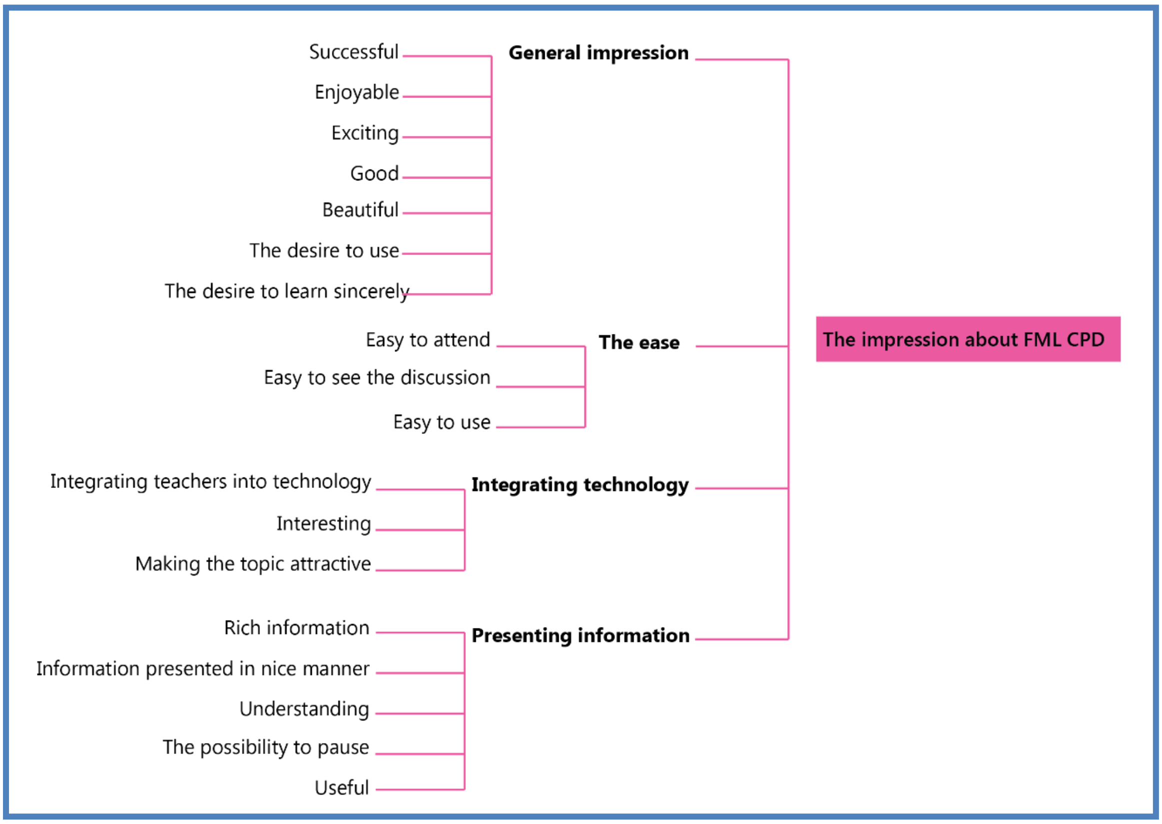


Figure 25. Theme No 1: Impressions about FML CPD

5.5.2 Reasons Why University Teachers Favour FML CPD

The researcher questioned the interviewees about whether they liked the training method or not, and asked them to state the reasons for their answer. The answers from Group C are included within the findings, while the answers from Group A (the group trained via a flipped learning environment) and Group B (the group trained via a mobile learning environment) are not included here with the findings section but rather are included in the transcript (see Appendix W). This was done because this research aims to gather information about FML not about FL or ML separately. However, all five participants liked FML for several reasons. Participant FM8 stated: "Yes, I liked it. It was easy to follow", while participant FM9 mentioned: "Yes, because it was rich, useful, and practical".

The remaining participants provided detailed reasons when the researcher asked them about the reasons for liking FML. For instance, participant FM10 explained her reasons by saying: "As I said previously, I like the training method. I enjoyed watching the video, and I can watch it again. I was able to manage my time, so, I can improve myself from anywhere if I have free time, in contrast, with the traditional method, which obliges the trainee to attend the training session. And the duration of that training session could be more than two hours". Participant FM11 elaborated: "Yes, I like it. I had previously heard about flipped learning, but I had no opportunity to try it or attend a training course on it. Now, I am aware of flipped learning as well as inverted learning combined with mobile learning". Participant FM12 explained her reasons by saying:

> "As I said I like the Acadox app. The reasons that I totally agree with this method are: (1) the Acadox app was easy, and that information has been presented in the video in a nice manner. I can pause the video to understand and re-read the text, or if I am not in a good mood to continue; (2) I think this method will encourage academics to attend several training courses without any barrier of time, place, or having my children with me. I will be the first one to use this if this environment is applied; and (3) I believe if the higher education institutions offer opportunities for academics to have training about this method and how to use it with students, this will reflect on students, their motivations, and their responsibility towards learning" (FM12).

Figure 26 presents all codes for the 'reasons to like FML CPD' theme, classified under several main codes.

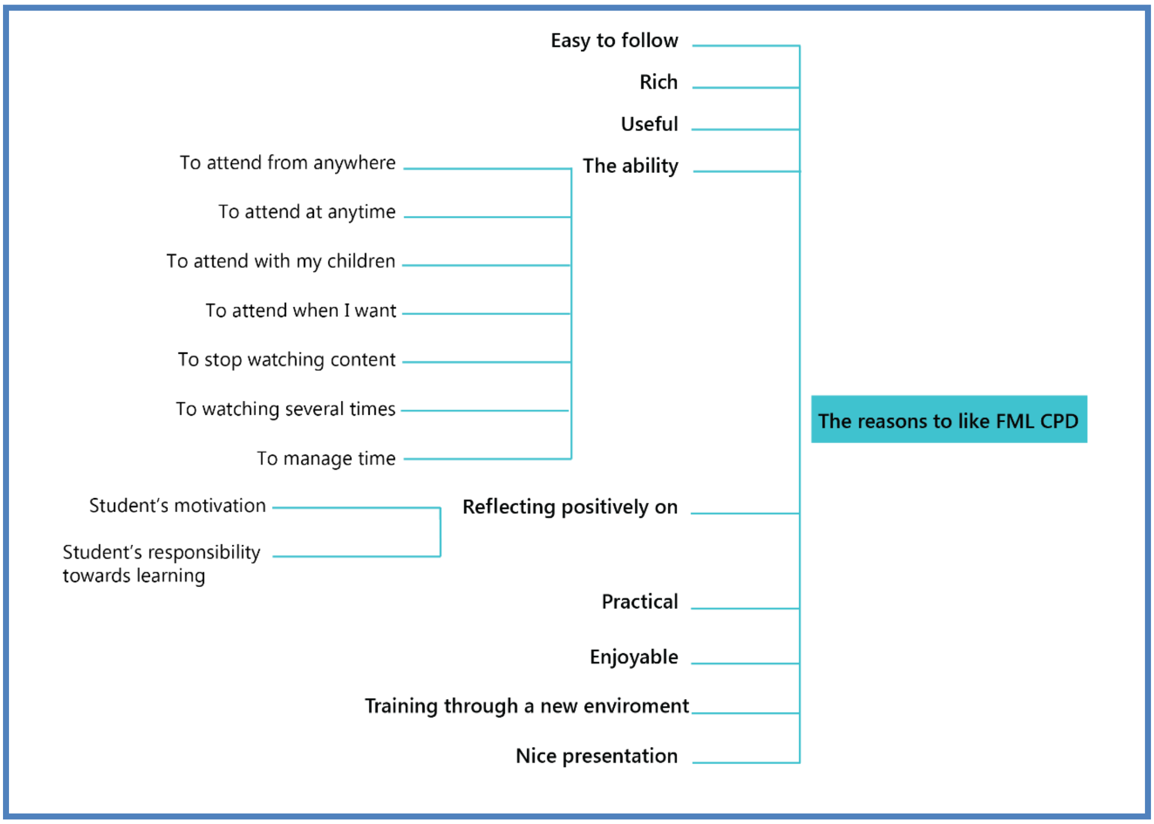


Figure 26. Theme No 2: The reasons to like FML CPD

5.5.3 The Benefits of Using FML

This theme includes all of the answers from the twelve interviewees. When the researcher asked the participants about the benefits that could be obtained by using FML whether in training or teaching, participants F1 and FM8 declined to answer, while the rest of the participants gave thoughtful responses about the benefits of using FML whether in training or teaching. When the researcher asked the participants from Group A about the benefits of using FML from their point of view, participant F2 said: “(1) The learner in general whether teacher or student will enjoy learning from their devices and from a new environment; (2) the learner will also prepare themselves before class; and (3) by applying FML, the teacher can evaluate that environment and be able to ask students questions when necessary”. Participant F3 states that FML helped by “(1) Saving the teacher’s effort; (2) allowing a student to refer to the educational subject at any time and any place; and (3) attracting the new generation who is interested in technology”.

Group B’s interview participants agreed on the point about ‘preparing the self’ and participant M4 highlighted the benefits as: “(1) Saving the teacher’s time; (2) saving the teacher’s effort; and (3) investing in technology”. Participant M5 identified other benefits of FML as: “(1) preparing the learner; (2) building the basic information for specific knowledge by the learner; and (3) asking questions about information that was not understood”. Participant M6 found the training useful for: “(1) Giving the learner an initial idea about the scientific subject to be presented; (2) involving the learner in the educational process; and (3) motivating learners to keep an eye on the additional information that they will get later, which will help them to have solutions and clarifications for their inquiries”. Participant M7 found that FML: “(1) Enriches class time by challenging learners and (2) the learners will learn by self-study, this method as you know helps learners store information they acquire for a longer period”.

The participants from Group C had trained within the FML environment and were thus well-placed to give their opinions. Participant FM9 mentioned benefits as: “(1) saving the learner’s time; (2) obtaining information quickly; and (3) the ease of information transfer for the learner”. Participant FM10 also said that FML had the advantages of: “(1) allowing the learner to learn in their preferred time; (2) being able to quickly obtain information or answers to questions arising after the training session (from the discussion panel); and (3) the ability to see the content several times”. The viewpoints of participants FM11 and FM12 were similar:

> “(1) Preparing the learner to learn; (2) supporting the lifelong learning concept; and (3) changing the teacher’s role in the educational process, where his role will be more than a provider of information. The teacher uses technology to help a learner to learn by

him/herself. Meanwhile, the teacher will use that time to improve himself or to focus more on another student who needs more support" (FM11).

FM12 stated that the posititves of FML were: "(1) encouraging the learner to take responsibility for learning; (2) encouraging the teacher to improve themselves without any barrier of place or time; and (3) raising the teacher's confidence". Figure 27 provides all codes for the benefits of using FML theme. The researcher decided that all answers (codes) should be classified under two main codes of: benefits related to the learner and benefits related to the teacher.

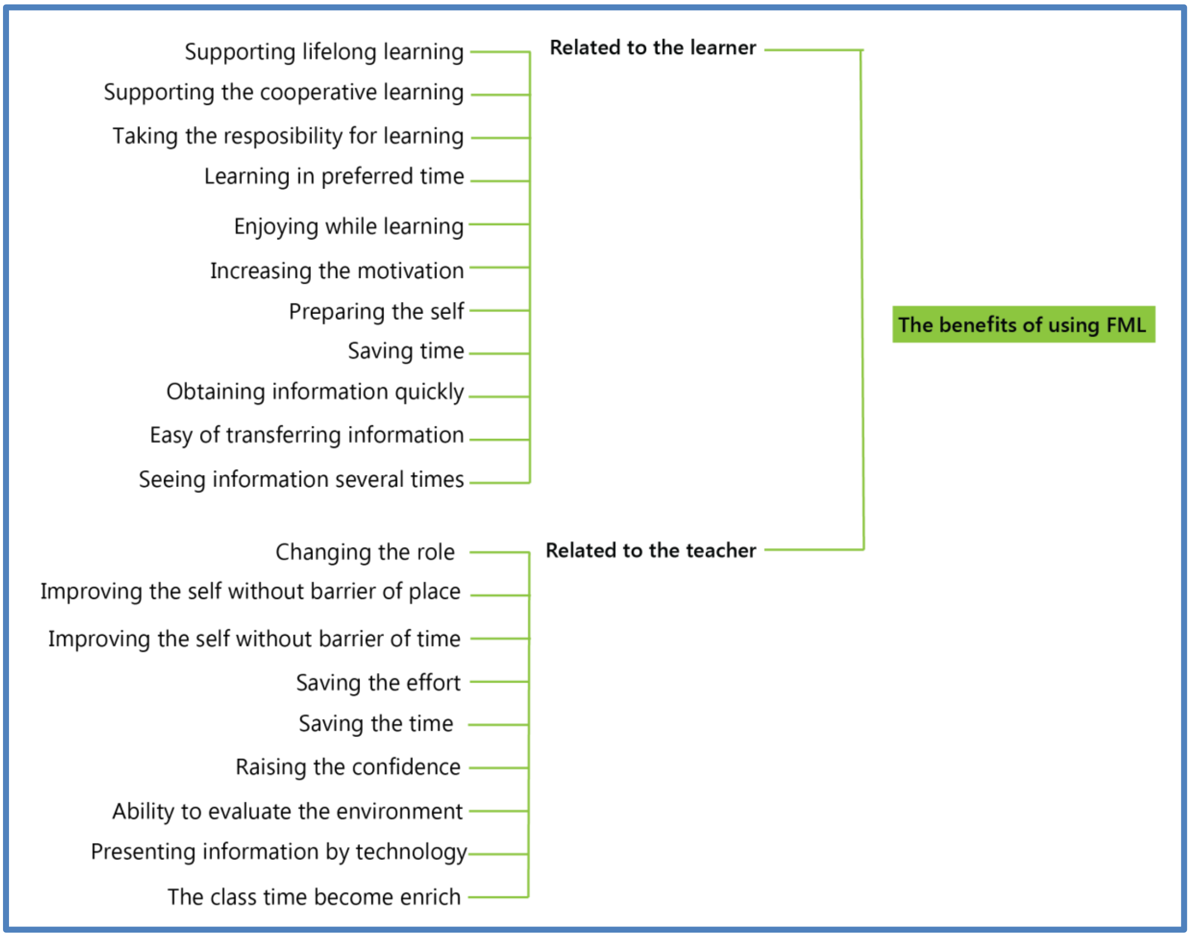


Figure 27. Theme No 3: The benefits of using FML

5.5.4 The Difficulties of Using FML

This theme includes all answers from the twelve interviewees. When the researcher asked the participants about the difficulties that they could face in using FML whether in training or teaching, participant F1 declined to answer while participants FM8, FM9, and FM10 said there were not any difficulties. However, FM10 found it odd that some of the teachers would not participate in the discussion, since the concept of e-lectures is a relatively new and interesting one. As for the Group A, when the researcher asked the participants about the difficulties of using FML from their point of view, participant F2 said: "(1) Some learners will not accept that environment; and (2) the Internet is not reliable". Participant F3 explained the difficulties of using FML by saying:

"Because I am one of the people who prefer the verbal and face to face interaction, I can list these difficulties: (1) the lack of an instantaneous reaction; (2) difficulties of focusing and the pressure to end the lecture at a certain time compared to the traditional lectures; and (3) the difficulty of understanding the exact meaning of questions, because I cannot communicate and ask in the moment" (F3).

The researcher replied: "This method is based on watching a video that exists on the application (i.e. Acadox) before the class time. Then, the learner will attend the class, which is in that app. The class time is used to ask questions about anything you did not understand. Therefore, you can ask in the class time, which is used basically for the discussion. Or simply, if you cannot wait, you can easily post it in the discussion panel".

Group B's participant M4 suggested that some difficulties were: "(1) the university teacher might find using technology difficult; and (2) the university teacher might not have the desire to use technology". Participant M5 mentioned that weak technical knowledge, whether for the teacher or the students could be a barrier to using FML. Participant M6 expressed that any difficulty from her point of view would be the newness of the environment, but that could be overcome by providing clarifications and descriptions. Participant M7 suggested other difficulties of FML: "(1) learners first watch a video then they have to wait until the training is over. For myself, I do not need to wait and can search for the information I need; (2) the time to create a good video may challenge me if I use FML with my students. I must choose an effective activity to attract students. Of course, I need to learn about several programs that help me to deal with FML and create e-lectures; (3) accessing the Internet; and (4) accessing the devices, especially since some students do not have a laptop or smartphone, as you know the situation in some families".

The participants from Group C dealt with FML environment to participate in the training course, therefore they told their direct use experience during the interview. Participant FM11 mentioned that the difficulty was only in producing e-lectures for the first time, since she did not know about them. Participant FM12 illustrated several difficulties, and said: "I think the difficulty is lack of awareness of the importance of both FML and also the other technological concepts. It should encourage teachers to use FML. However, I found some limitations, which are: (1) some teachers will see this method as an additional burden; (2) I think if FML is applied, the educational institution may need to provide incentives for those who use it. So, they will have the motivation to employ it; (3) the issue of access to the Internet; and (4) the lack of technological background especially those teachers who don't like technology". Figure 28 presents all codes for the 'difficulties of using FML' theme. The researcher decided that all answers (codes) should be classified under three main codes, which are: difficulties related to the learner, difficulties related to the educational institutions, and difficulties related to the teacher.

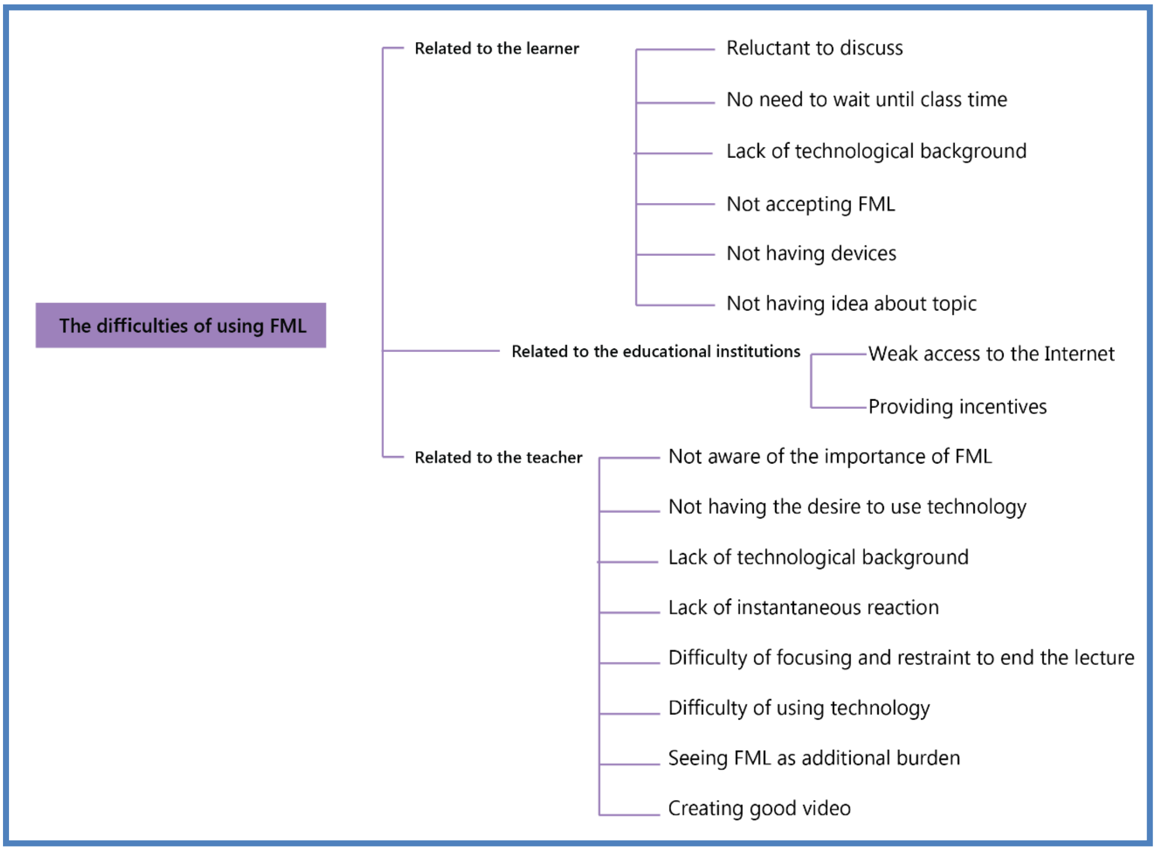


Figure 28. Theme No 4: The difficulties of using FML

5.5.5 To What Extent Would Using FML Be Effective for Teaching Students

This theme includes all answers from the twelve interviewees about to what extent using FML would be effective for teaching students. The twelve participants agreed that using FML for teaching students could be effective; and they clarified some procedures regarding this point. For instance, when the researcher asked participant F1 about using FML for teaching students, she thought that FML will be effective but not for all majors. This opinion has also been given by participants M4 and FM8. Participant FM8 expressed the importance of following specific rules such as the number of students and levels. Participant F2 saw the importance of academics being aware of the benefits of FML, while participant M5 stated the importance of training the university teachers well about this environment, and participant M7 thought that providing staff with computer technology is very important. Participant F3 mentioned the need for FML to be fully developed compared to the traditional environment. However, participant M6 said that FML is an excellent method to prepare the learner for new knowledge. Finally, participant FM9 mentioned the importance of applying a clear plan when using FML with students. Figure 29 presents all codes that express the extent that using FML could be effective for teaching students theme.

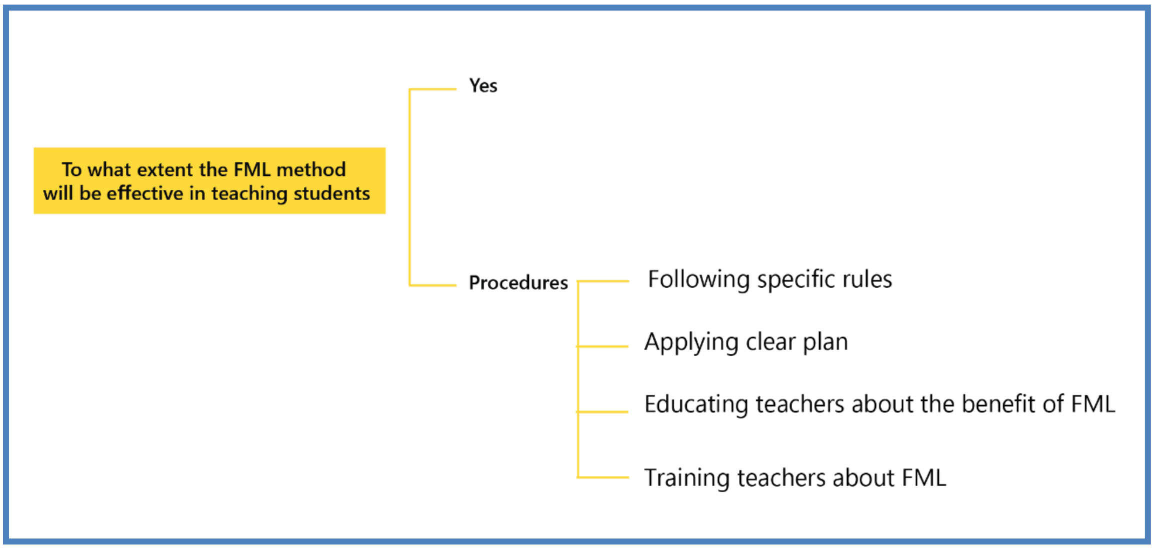


Figure 29. Theme No 5: To what extent the FML method will be effective in teaching students

5.5.6 The Limitations of FML

This theme includes all answers from the twelve interviewees. When the researcher asked the participants about the limitations of FML whether in training or teaching at universities, several answers were offered. Figure 30 shows all codes that express the 'limitations to employing FML' theme. The researcher decided that all answers (codes) should be classified under three main codes, which are: limitations related to the learner, limitations related to the educational institutions, and limitations related to the teacher.

1. **Limitations Related to the Learner:** participants M5 and FM9 mentioned that some learners do not have a device (a smartphone or laptop), which is basic for using FML. Participant FM9 also indicated her concern over the issue of not accepting FML, or not committing to watching the video before they attend the virtual classroom.

2. **Limitations Related to the Educational Institutions:** participants F1 and F2 said that there are limitations related to the educational institutions which are preparing teachers and providing training about FML. Participant FM11, however, said that the problem of limited numbers of training courses on technology and its benefits should be solved in order to use FML correctly. Each of the participants F3, FM10, and FM11 pointed out that slow Internet speed could affect FML negatively, whereas participants M4 and M5 reported another limitation which is that there is no designated learning area for learners or that learners could not be authorised to access the computer laboratories without the teachers.

Therefore, these two participants suggested increasing the number of computers in the library and allowing the learners to enter these laboratories by providing instructions for them to take care of the laboratories and hardware during their use. Lastly, participant F3 thought the lack of secure electrical outlets in offices could be a temporary hindrance.

3. **<u>Limitations Related to the Teacher:</u>** participant FM11 talked about the limitations related to the university teacher, related to the teachers' awareness of employing technology in the educational process. However, both participants M7 and FM12 said that FML could be an additional burden for university teachers, since they teach several different curriculums, deal with several administrative tasks, and a huge number of students. Finally, participant FM12 made several points, saying: "Some teachers will not accept the new environment because they are familiar with the traditional environment or maybe the traditional does not require much effort in preparation. FML requires preparing themselves and creating a video. As you know some teachers do not accept using technology or they do not have enough experience to use technology in the educational process like me".

In contrast to these limitations, participants M6 and FM8 felt that there were no limitations to FML use.

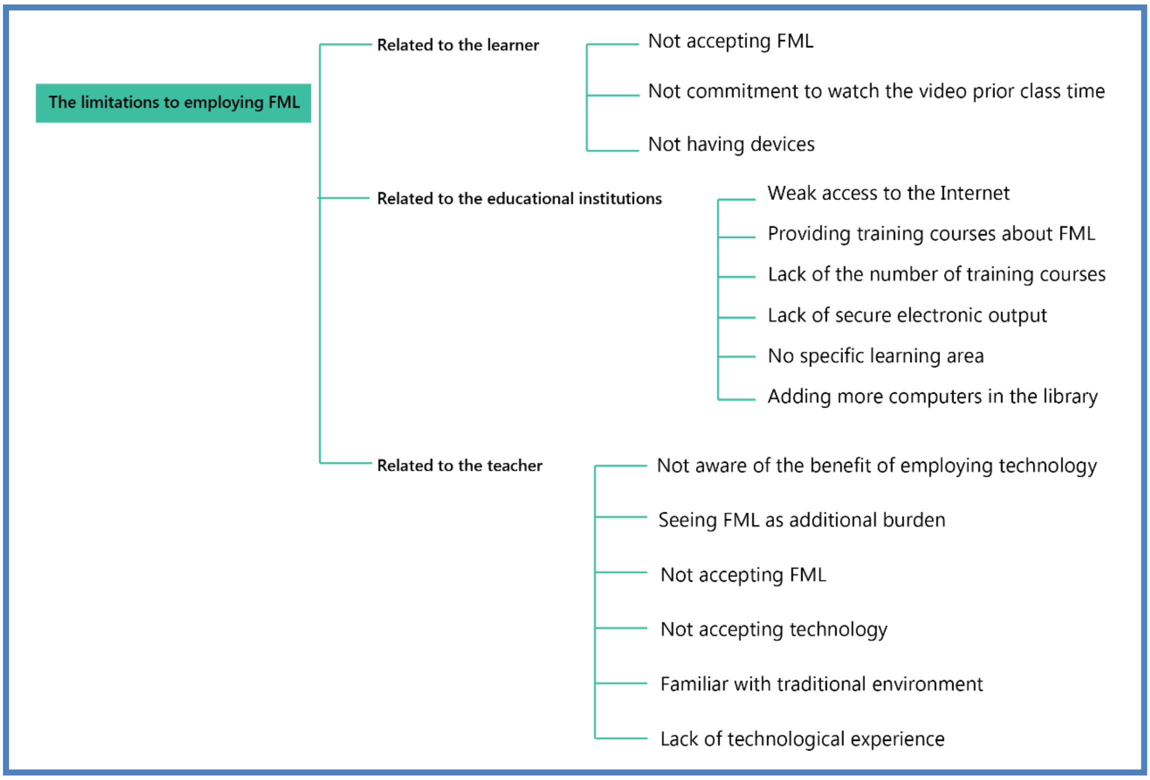


Figure 30. Theme No 6: The limitations to employing FML

At the end of the interviews, the researcher thanked the participants for their valuable contributions and their opinion, time, and knowledge in order to enrich the current research topic and achieve a better understanding of FML as a new environment for the teaching and training process. The following section presents the findings derived from the pre-training questionnaires and interviews, which may indirectly contribute to educational practice and CPD programmes.

5.6 Extra Results Extracted from Interviewees

This section provides additional results which have been quoted from interviewees (see Appendix W). These results are not presented as the core 'themes' for the findings of this study, but as additional results, because they did not directly address the objectives that this research seeks to achieve. The main aim of this research is to provide a better understanding of the perceived and actual effects of FML on university teachers' skills to create e-lectures with a view to increasing e-lectures in teaching throughout HE institutions in KSA. Increasing the use of e-lectures would potentially solve a number of problems in HE institutions as previously discussed. The main findings of the interviews add to the knowledge required to improve technology use in HE by students and teachers, and these further findings may also indirectly contribute to improvements in educational practices and CPD programmes.

5.6.1 University Teachers' Relationship with Technology

This research included only those participants who accepted the use of technology and who had some technological knowledge. Table 8 in section 5.2 'Participants' Information' shows that around 76 percent of the participants strongly accepted technology, whereas 23 percent accepted technology, with only one percent neutral response. In regard to technological background, 48 percent of the participants had an extensive technological background, while 46 percent of the participants had a basic background. The researcher would like to know the nature of the relationship between university teachers and technology. Therefore, the twelve interviewees were asked in the interview about their relationships with technology.

The responses were positive. Some representative answers were: "It is a good relationship, I love technology" and "It is a normal and excellent relationship". However, two interviewees did not give a clear answer but stated that they need to use technology and it is necessary for them. Finally, one participant admitted that she has a love-hate relationship with technology: "because of the constant need for it in particular at the present time during my doctoral study. Although I don't imagine living without technology, my day relies heavily on it. Even to pay through points of sale, I use my digital watch. At some moments, I feel that I need to get away from technology for a short time and then come back again".

5.6.2 The Usage of Technology Among University Teachers in the Educational Process and in Everyday Life Situations

The interviewees agreed that they use technology not only in the educational process but also in everyday life situations. Generally speaking, they justified their reasons for using technology as: (1) obtaining information, (2) providing a learning environment for students that allows them to share information, add comments, participate in a discussion each of them in a different place, (3) transferring information to students, (4) exchanging information with other academics around the world, (5) saving teachers' time, (6) saving teachers' effort, (7) there is no consideration of time and place when using technology, (8) providing enjoyment for learners in the 21st century, (9) facilitating information for learners, (10) making life easier, (11) trying to minimise printing papers, (12) using technology in the classroom is considered a type of change in education, (13) motivating a student to learn, (14) contributing to produce a technologically empowered generation, and (15) improving educational activities.

In contrast to this, one of the interviewees pointed out that she used technology in everyday life but did not feel she had enough experience with technology in education. She said that in her experience, the university did not support recently-employed teachers with the necessary training in using technology in education. However, the attitudes of two participants towards the use of technology in education differed. One of them said that using technology is difficult for her specialisation (participant M7), while the other mentioned that technology is an important thing in her speciality (participant FM8).

5.6.3 The Mobile Devices Most Used during the Experiment

Three types of mobile devices were used by the participants in the experiment. The laptop was the most used device, then the smartphone, with a small number using a Personal Digital Assistant.

5.6.4 The Applications Most Used in the Experiment

The participants used several apps in order to create e-lectures. Unsurprisingly perhaps, MS PowerPoint was the most frequently used software for this. Next most common was Video Maker, followed by KMPlayer, for video creation. The participants also used Xmind to create mind maps, Quizlet to make a list of vocabulary associated with pictures for medical students, YouTube to upload completed videos, and Camtasia to take screenshots of a montage.

5.6.5 Suggestions to Improve CPD

The participants recommended that (1) training programmes be provided under certain criteria. For instance, intensive courses are offered even if they are for two or three days at different times, providing the same training via different environments, focusing on practical training, and increasing training about technological topics. Some participants suggested (2) doing lesson studies, (3) applying reflective practice, and (4) applying teacher continuous evaluation. It was also recommended that (5) dependence on the traditional environment should be reduced, and (6) acceptance of unlimited numbers of trainees.

5.7 Comparative Analysis and Triangulation

The aim of the current research is to better understand the perceived and actual effects of delivering mobile learning in a flipped format by combining the advantages of each in a university teachers' continuing professional development programme. This research investigates whether FML improves the e-lecture skills of university teachers in a leading university in Saudi Arabia, with a view to increasing the use of e-lectures in HE institutions. Additionally, this research explores university teachers' opinions of the concerns, challenges, and affordances of the FML approach to determine whether FML is viable for teaching large numbers of students.

Mixed-methods research was adopted and a quasi-experimental and multiple interventions approach was employed. Participants were Saudi university teachers, and they were assigned to one of three groups; the first group trained in a FL environment (Group A), the second were trained using ML (Group B), and the third via FML (Group C). This research used multiple methods in order to achieve the aims. Data analysis compared the perceived outcomes of FL, ML, and FML CPD on university teachers' e-lecture skills through questionnaires before and after the experiment. An evaluation product card was used by the researcher before and after CPD to identify the actual outcomes of the interventions on the university teachers' e-lecture skills. This was followed by semi-structured interviews to record rich data about the university teachers' opinions of FML. This section provides a comparative analysis and triangulation of the quantitative and qualitiative results of this research across the three instruments used for data collection.

5.7.1 ANOVA Data Consideration

In order to compare the three groups and to clearly show the differences between them after CPD, one-way ANOVA was used to compare the means across one independent variable (i.e., the training environment). The Tukey post-test was then used to compare the means of all treatments with the mean of every other treatment, thus identifying the most effective training environment for improving university teachers' e-lecture skills determined by statistical means. By analysing the quantitative measurements (i.e., the pre- and post-training questionnaires and the pre- and post-evaluation product cards) for all groups, no statistically significant difference was found between the groups in the perceived skills, as well as the actual skills, of creating e-lectures in general; however, the Tukey post-test showed a significant improvement in Group C, who trained via flipped mobile learning (FML) (see Table 14 and Table 17). Hence, it could be said that there is no difference in variance between the data from the questionnaires, in which self-perception was ascertained using multiple ratings, and data from the evaluation product cards, which used a single rating.

By looking at the three main perceived and actual skills, one-way ANOVA showed statistically significant differences between the groups, after the CPD intervention, with regard to the skills of creating e-lecture content. The use of the Tukey post-test showed a significant improvement for Group C, who trained via flipped mobile learning (FML) (see Table 14 and Table 17). In contrast, no statistically significant differences were found between the groups, post-CPD, in the skills of designing and organising the structure of the presentation. The Tukey post-test demonstrated that the significant improvement in perceived skills of creating e-lecture content was in favour of Group C, who trained via flipped mobile learning (FML), whereas the significant improvement in actual skills was in favour of Group B, who trained via mobile learning (ML). One-way ANOVA identified a statistically significant difference in the actual skills of presenting an e-lecture between the groups after CPD, with significant improvement in Group C, who trained via flipped mobile learning (FML). In contrast, there was no statistically significant difference in the perceived skills of presenting an e-lecture between the groups after CPD but a significant improvement was found in Group C, who trained via flipped mobile learning (FML).

Finally, the results demonstrate statistically significant difference in only four perceived sub-skills, and significant improvement was also in favour of Group C, who trained via FML (see Table 14). These four sub-skills are the ability to determine the purpose of the e-lecture; the ability to determine the content of the e-lecture; the ability to use audio and visual aids appropriate to the content; and the ability to deal with several applications which are needed to create an e-lecture. There was no statistically significant difference in the remaining perceived sub-skills. Five actual sub-skills showed a statistically significant difference and again, significant improvement was found in Group C (see Table 17). These skills are the ability to determine the content of the e-lecture; the ability to design an e-lecture framework in proportion to the characteristics of the learners; the ability to determine the appropriate time to present audio and visual aids; the ability to create a presentation; and the ability to make the e-lecture interactive. Only two actual sub-skills showed a statistically significant difference and significant improvement was observed in Group B, who trained via ML. These skills are the ability to give an explanation to clarify concepts and terms when presenting information; and the ability to deal with devices needed to create an e-lecture. Only one sub-skill showed a statistically significant difference, and Groups B and C showed significant improvement, indicating that mobile learning alone or a combination of flipped learning and mobile learning could be effective in improving these actual sub-skills. Either or both together could have the same impact on improvement. This sub-skill is the ability to deal with the several applications needed to create an e-lecture; there was no statistically significant difference in the remaining actual sub-skills.

Interestingly, the perceived and actual skills of the ability to determine the content of e-lectures showed a statistically significant difference and the significant improvement was in favour of Group C, who trained via FML. In the same way, the perceived and actual skills of the ability to deal with the several applications needed to create an e-lecture showed a statistically significant difference, and significant improvement was found in Group C with regard to perceived skill, and in Groups B and C for actual skill. It is possible that the technology used to train Groups B and C greatly contributed to the improvement of the perceived and actual skills of their ability to deal with several applications needed to create an e-lecture.

In three sub-skills, significant improvement was recorded in two groups, which means that the first learning environment alone or the second learning environment alone may be effective in improving some perceived and actual sub-skills, or, they could have the same impact on improvement. For example, the actual skill of the ability to give an introduction to gain learners' attention improved via flipped learning as well as mobile learning. The improvement in Group A could be due to the participants watching the video before the training, which may have influenced them to think more and thus to give a more interesting introduction. It could also be that the way Group B used the technology aroused their curiosity and led to their finding more attention-worthy information for the introduction. This may mean that flipped learning alone or mobile learning alone are effective in improving this perceived sub-skill, or that mobile learning could lead to a level of improvement matching that gained from a flipped learning environment. However, the perceived skill of the ability to give an introduction to gain learners' attention improved only via flipped learning.

The perceived skill of the ability to give an explanation to clarify concepts and terms when presenting information improved via mobile learning as well as flipped mobile learning. This could be interpreted as meaning that the improvement that occurred in Group C, via FML, may be due to this technology supporting them to search and obtain ideas related to clarifying concepts and terms when presenting information. On the other hand, it may have been due to their watching the video before the training. Also, it may be that the Group B participants' use of ML aroused their curiosity and led them to search for useful information that helped to clarify terms and concepts. This means that ML, either alone or in combination with FL, could be effective in improving this perceived sub-skill, or, ML and FL could be equally effective alone. However, the actual skill of the ability to give an explanation to clarify concepts and terms when presenting information improved only via mobile learning.

The actual skill of the ability to use audio and visual aids appropriate to the content and the actual skill of the ability to deal with several applications needed to create an e-lecture improved via mobile learning as well as flipped mobile learning. This means that ML alone or ML integrated with FL could be effective in order to improve these two actual sub-skills, or, they could each have the same impact on improvement on their own. However, the perceived skill of the ability to use audio and visual aids appropriate to the content and the actual skill of the ability to deal with several applications needed to create an e-lecture improved only via FML. Findings showed that the use of technology is a key indicator of improving the perceived and actual sub-skills.

5.7.2 Qualitative and Quantitative Comparisons

The quantitative data gathered from the pre-and post-training questionnaires, and from the pre- and post-evaluation product cards from the three groups revealed that the participants who had trained via FML improved their perceived and actual skills of creating e-lectures more than those who had trained via ML and FL, although the differences were not significant. Demographic information gathered from the pre-training questionnaires indicated that participants were, on the whole, equal in their acceptance of technology (including only one percent neutral response) and in their having a technological background (including a six percent neutral response). On the one hand, watching a recorded video before the training could have contributed to the improved e-lecture skills of Group C compared to Group B, who received training directly in the virtual classroom in Acadox. However, both Group B and Group C attended the training through a virtual classroom on the Acadox app on their mobile devices. On the other hand, employing technology more in Group C compared to Group A, who received training in a real classroom after watching a recorded video, may have had an effect on improving e-lecture skills for Group C. However, both Group A and Group C watched a recorded video before class time, and class time was used to address complex concepts and answer questions collaboratively.

The above quantitative results can be linked with the qualitative results. The qualitative measurements using semi-structured interviews for Group C illustrated participants' impressions of the FML CPD, which showed how they may have contributed to Group C improving their skills more than the other groups. It was found that FML CPD was successful, enjoyable, and exciting. The participants expressed a sincere desire to use it and learn about it. Additionally, the ease of using FML CPD on the Acadox app, the ease of attending, and the ease with which participants could access previous discussions left a positive impression of FML. Findings also showed that using technology in FML helped the participants to integrate technology into their teaching processes, making the topic attractive and interesting. The presentation of useful and rich information in an attractive manner played an important part in their engagement with training and increased their enthusiasm, and having the opportunity to pause and write down comments led to better understanding. Group B's impressions of the ML CPD were that using mobile devices for training purposes was excellent, and that using technology could enhance their pedagogical skills and abilities. Some participants from Group A experienced FL CPD as normal for them, while for the remaining participants it was a new training method. These opinions had been expressed previously by all three groups in the pre-training questionnaires, where around 80 percent communicated their desire to attend a training course about the application of FML.

In the interviews, participants from all three groups expressed their enjoyment of the training content (i.e., creating e-lectures) and felt it was useful information which could support the educational process. This opinion had been reflected previously in the pre-training questionnaires, where around 56 percent of participants expressed their desire to learn about e-lectures. The participants' opinions about suitable environments for training sessions were expressed in the pre-training questionnaire, with roughly equal numbers of participants supporting each of the learning environments: traditional, ML, FL and FML; FL being the least popular. This could explain why flipped learning had the lowest impact on perceived and actual sub-skill improvement. Around eleven of the fourteen perceived sub-skills improved via FML, while nine of the fourteen actual sub-skills improved. Two of the perceived and five of the actual sub-skills improved via the mobile learning environment. As well, two of the perceived and two of the actual sub-skills improved via the flipped learning environment. This quantitative result, that the flipped learning environment was the least suitable environment for training sessions compared to the others, was expressed qualitatively by Group A on two points: Group A felt that FL CPD was the normal form of training, and enthusiasm was not much in evidence during their participation in the study, in contrast with Groups B and C.

5.8 Summary

This chapter provided the answers to the research questions in a quantitative and qualitative manner in order to gain a better understanding of the perceived and actual effects of flipped mobile learning CPD on university teachers' e-lecture skills, in order to explore university teachers' opinions around using FML in educational practice. The quantitative results indicate firstly that the perceived and actual skills of creating e-lectures, in general, have not statistically significant differences although there are improvements from pre- to post-measures in favour of the group trained via FML. Second, by looking at the three main perceived and actual skills of creating e-lectures, the findings show that there are statistically significant differences in favour of the group who were trained via FML. Third, by looking at each perceived and actual sub-skills of creating e-lectures, the findings present that there are statistically significant differences in some sub-skills in favour of the group who trained via FML; however, the remaining sub-skills showed that there are statistically significant differences in favour of the groups who were trained via FL and ML. Finally, the qualitative analysis presented the university teachers' opinions about FML as a new environment for teaching and training, which were positive. The benefits and difficulties that may hinder applying FML in HE institutions have been gathered from participants' points of view. The following chapter presents the discussion and conclusion.

Chapter 6 Discussion and Conclusion

6.1 Introduction

Saudi higher education faces several challenges (see Chapter 2 for details), such as the high numbers of new university students (Onsman, 2010; Almalki, 2011) coupled with a shortage of tutors (Abdulkarim, 2009; Alebaikan, 2010; Alissa, 2011; Al Alhareth et al., 2015) and the consequent need to fund additional university teacher training courses (Abdulkarim, 2009), all while trying to keep costs down and also maintain gender segregation (Almalki, 2011). These challenges are difficult to resolve under the umbrella of the traditional learning environment setting but utilising technology as an educational resource may lighten the burden considerably, since mobile technology especially enables learning without the usual constraints of time, place, teacher numbers and gender.

This study examines the potential benefits of the mobile learning approach but in flipped form, known as flipped mobile learning (FML). This integration of the flipped format (i.e. from teacher-centred to student-centred learning) with mobile technologies attempts to overcome the disadvantages of the independent application of each learning method and makes use of the advantages of both FL and ML in continuing professional development programmes (CPD). The main focus of this study is to gain a better understanding of how FML can be used in university CPD by investigating whether it can improve the perceived and actual e-lecture creation skills of university teachers in KSA. In addition, the research explored university teachers’ opinions about FML which, in turn, may help them to get the best out of FML in their work. The study was done with a view to increasing the use of e-lectures in teaching throughout HE institutions in KSA. As well as solving the problem of having too few teachers available for the high numbers of students, the study may also help to overcome some of the traditional restrictions faced by female teachers, since FML would allow them to teach men as well as women.

This research seeks to answer the following three questions:

RQ 1. What are the perceived outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers’ e-lecture skills?

RQ 2. What are the actual outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers’ e-lecture skills?

RQ 3. What are university teachers’ opinions of the concerns, challenges, and affordances of flipped mobile learning?

Briefly, the study tracked the progress of seventy Saudi female university teachers who were divided into three groups for a CPD training session on e-lecture production; the first group was trained using a flipped learning approach, the second through mobile learning, and the third via the integration of the first two, flipped mobile learning. The results of pre- and post-training questionnaires and pre- and post-evaluation product cards were analysed and compared, as were the transcripts of twelve semi-structured interviews about the university teachers' opinions of FML.

This chapter summarises the study results and discusses their significance in relation to the findings of previous studies. Further, some key recommendations for CPD programmes at Umm Al-Qura University are made. Finally, this chapter points out the limitations of the current research study; and provides suggestions for future research.

6.2 Summary of Findings

The researcher has summarised the overall findings of the data at the beginning of this chapter. The overall findings of the analysis in Chapter 5 can be categorised into findings about (1) the perceived skills of creating e-lectures, (2) the actual skills of creating e-lectures, and (3) the university teachers' opinions about using FML as a new environment for teaching and training.

First, the findings for **Category 1**, **the perceived skills of creating e-lectures**, indicate that there are no statistically significant differences in the perceived skills of creating e-lectures in general although there are improvements from pre- to post-measures in favour of the group trained via FML. The **p-value** is < 0.05, showing that Groups A and C have significant differences compared to Group B, while Group C has significant differences when compared to Group A. This means that the mean of perceived skills of creating e-lectures were improved via flipped mobile learning (FML). Second, going into detail and looking at the three main perceived skills of creating e-lectures, the findings show statistically significant differences in the skills of creating the content of e-lectures in favour of the group trained via FML. Third, with regard to the fourteen perceived sub-skills of creating e-lectures, the findings show statistically significant differences in three sub-skills in favour of the FML group which were the ability to determine the content of the e-lecture; the ability to use audio and visual aids appropriate to the content; and the ability to deal with several applications which are needed to create an e-lecture. There were statistically significant differences in favour of the group trained via ML in the skill of the ability to determine the purpose of the e-lecture.

The findings for Category 2, the actual skills of creating **e-lectures,** indicate that there are no statistically significant differences in the actual skills of creating e-lectures in general although there are improvements from pre- to post-measures in favour of the group trained via FML. The **p-value** is < 0.05, with Groups B and C showing significant differences when compared to Group A, while

Group C showed significant differences compared to Group B. This indicates that the actual skills of creating e-lectures were generally improved as a result of the FML training. Second, looking in more detail at the three main skills of creating e-lectures, the findings show statistically significant differences in favour of the group trained via FML in both the skills of creating content and presenting e-lectures. Third, regarding the fourteen actual sub-skills of creating e-lectures, the findings show statistically significant differences in some of the actual sub-skills (i.e. five skills) in favour of the group trained via FML. However, statistically significant differences were equal in the ability to deal with several applications needed to create an e-lecture between Groups B and C. This means that training via ML was equally as effective as training via FML regarding this sub-skill. There were statistically significant differences in two sub-skills in favour of the group trained via ML (explaining concepts and terms when presenting information and correct use of devices needed to create an e-lecture).

Finally, the qualitative analysis produced **the findings for Category 3, the university teachers' opinions about using FML as a new environment for teaching and training.** In general, opinions about FML were positive. The interviewees were asked about their impressions of the training method in which they learned, and responses were positive about using FML. In general, they indicated that it was a useful, attractive, and interesting method. They also pointed out ease of attendance, ease of use, ease of viewing discussions and the advantages of its flexibility. Some thought that FML allows teachers to integrate their knowledge of technology and that this is interesting, and makes the topic of creating e-lectures skills attractive. The participants agreed that this method allowed for the rich presentation of information, as it led them to search and investigate. Also, the information was presented in an understandable and attractive manner. As well, the ability to pause the content to record notes and questions was found to be useful. The participants gave specific reasons for liking FML in CPD training. The most frequently cited reasons were the ability to attend from anywhere, at anytime, whenever they wanted to, even with children around. In addition, participants liked being able to pause watching the content, having the option to watch the content several times, and the freedom to manage their time. The participants pointed out that FML could potentially influence learners' motivation in a positive way, as well as encouraging their responsibility towards the learning process. Further reasons for liking FML were that it was easy to follow, rich, useful, and practical, and that it was enjoyable training through a new environment with nice presentation.

The participants listed some of the benefits and difficulties of applying FML from their point of view, both for learners and teachers. The benefits of using FML for learners included that it supports lifelong and cooperative learning, encourages students to take responsibility for learning, enables them to learn at their preferred times, helps students to enjoy learning, increases motivation, and saves time as learners do their own preparation before class. Other benefits for students are that FML helps them to obtain and transfer information easily and quickly, and they are able to watch or read the information as many times as they need to. For teachers, FML allows them to deal with information via technology, changes their role from instructor to faciliator, saves time and effort, improves their own knowledge without barriers of place or time, allows them to evaluate the environment, and makes class time a richer and more valuable experience. Regarding the potential difficulties of FML, whether for training or teaching, the participants suggested a number of possible obstacles, related either to learners, educational institutions or teachers. For example, learners may be reluctant to take part in class discussions, not want to wait until class time to ask questions, lack technological background, not accept FML, not have the right devices or not be sufficiently interested in the topic to direct their own learning. The educational institutions themselves may have weak or slow Internet, or be unequipped to provide the right incentives. Teachers may be unaware of the importance of FML, lack technological background or the motivation to use technology. They may find it difficult to teach without receiving immediate feedback from students or find it hard to stick to time limits, possibly experiencing FML as an additional burden and finding it challenging to create good quality videos.

The interviewees predicted that FML would be effective for teaching students as long as certain procedures were observed, such as following specific rules, making clear plans, and educating and training teachers to get the most out of FML. As above, the interviewees also suggested that FML could have limitations in the three areas of learners, institutions, and teachers, and these were similar to the limitations suggested by the participants. Learners, for example, may not accept FML or have suitable devices, and they may not be willing to commit to watching the videos before classes. Educational institutions may suffer from having weak or slow Internet connection depending on their location, and they may not have the infrastructure to provide adequate FML training for teachers in terms of enough classroom space or sufficient electrical provision for the activities to be carried out. The interviewees felt that university teachers on the whole could be unaware of the benefits of technology and see FML as an additional burden. As well, they may not want to accept technology or FML as a teaching or training tool, lack experience with technology, or prefer to teach in their familiar, traditional educational environment. The following segment compares the findings of this study with those in the existing literature.

6.3 Discussion

It is worth remembering that no research studies have specifically discovered the effects of FML training on university teachers’ knowledge and skills to create electronic lectures and to teach their students via FML. However, this present research’s findings are consistent with the findings of literature whether on ML or FL topics, and these shall be considered separately. To take ML first, numerous studies have measured the effects of ML on teacher training within CPD programmes and its effect on learners' skills. Research by Seppälä and Alamäki (2003), Aubusson et al. (2009), Mahruf et al. (2010), Uzunboylu and Ozdamli (2011), Kearney and Maher (2013) and Ekanayake and Wishart (2015) have found generally positive effects. With regard to FL, studies have measured the effects of this method on teacher training within CPD programmes and also on learners' skills. Studies by Lage et al. (2000), Pierce and Fox (2012), Critz and Knight (2013), Davies et al. (2013), Mason et al. (2013), Smith (2013), Tune et al. (2013), Chen et al. (2014), McLaughlin et al. (2014), Moffett and Mill (2014), Gilboy et al. (2015), Kong (2015) and Alsowat (2016) all drew positive conclusions about FL as a useful educational method.

Since the results were positive for each kind of learning separately, the current researcher expected to find that the merging of ML and FL into the FML method would also have a positive effect. This has turned out to be the case, and the results of this research indicate that there are no statistically significant differences in the perceived and actual skills of creating e-lectures although there are improvements from pre- to post-measures in favour of the group trained via FML. In addition, the qualitative analysis of this study has found that university teachers' opinions about FML are positive. Thus, it is similar to those of previous studies. As well, it could be said that the use of a mixed-methods approach with a quasi-experimental design and multiple interventions approach were appropriate for this study.

To look at educational technology in a balanced way, it must be noted that some studies have identified challenges related to ML. For instance, Corbeil and Valdes-Corbeil (2007) concluded that lack of broadband, even in developed countries, could limit the use of ML and that this could potentially frustrate learners, as Mehdipour and Zerehkafi (2013) have cautioned. This is in line with the current study, which reveals similar results. The participants of this study mentioned that they struggled with slow Internet, and this problem could potentially limit the use of FML. Corbeil and Valdes-Corbeil (2007) also warn that attempting to teach learners who are not adequately familiar with the technology could lead them to experience feelings of isolation. The qualitative analysis of this study shows findings close to those of previous research, in that participants suggested a lack of basic grounding in technology would hinder the more useful aspects of FML.

Similarly, studies have mentioned challenges related to FL. For example, Strayer (2012) reported that learners have to adjust to different learning activities like student-centred learning, group discussion with teachers and peers, and collaborative work. This limitation was also mentioned by the participants of this research study, where they stated that familiarity with traditional learning could limit acceptance of any other kind of learning. Hence, it could limit the use of FML. Hwang et al. (2015) suggested that ensuring adequate teacher preparation is an important step before applying the flipped approach. The participants of this research also identified the importance of teacher preparation via increasing the number of high-quality CPD training courses available.

The triangulation between qualitative and quantitative data of this research (see section 5.7.2) showed that Group A perceptions of experiencing FL is mixed. Some participants mentioned in their interviews that they see FL as normal for them, while for the remaining participants it was a new training method. These opinions had been expressed previously by all three groups in the pre-training questionnaires, with roughly equal numbers of participants supporting each of the learning environments: traditional, ML, FL and FML; FL being the least popular. This is consistent with Bishop and Verleger (2013) and Lundin et al. (2018), who found in their literature review that learners' perceptions of FL are mixed, although positive.

The results of studies by Khalaf Allah (2010), Al-Fawzan (2013), Abbadi (2014), Amin et al. (2015) and Alshawi (2016) show that Acadox improves learners' skills, and discussions between learners, as well as between learners and teachers, contributed to giving learners the opportunity to concentrate and not be distracted. Acadox also has the ability to create documents which can be stored and shared, and this could assist other learners and help them obtain immediate answers to their inquiries. Enabling learners to watch presentations or videos several times and pause them at any point gives them the freedom to learn at their own pace, wherever and whenever they want. These findings were consistent with this research in terms of both the quantitative and the qualitative analyses (see section 5.7.2 'Qualitative and Quantitative Comparisons'). Two of the study groups, B and C, used Acadox for ML and FML and the findings show that the participants did not significantly improve their perceived and actual skills on average in e-lecture production although there are improvements from pre- to post-measures in favour of the group trained via FML. Watching a recorded video before the training could have contributed to the improved e-lecture skills of Group C compared to Group B, who received training directly in the virtual classroom in Acadox. However, both Group B and Group C attended the training through a virtual classroom on the Acadox app on their mobile devices. In the qualitative semi-structured interviews, the participants identified similar advantages of using Acadox for FML to those listed above, which may have contributed to Group C improving their skills more than the other groups.

One of the difficulties and limitations of FML identifed by the participants in the current research is that teachers may view FML as an additional burden. Creating high-quality and engaging videos for students to view ahead of class time can be a very time-consuming and effortful endeavour. This agrees with Smith (2013) and Al-Wakeel (2020) in terms of using Acadox effectively in flipped learning to improve cognitive achievement and teaching skills. The findings of Al-Wakeel (2020) also show that setting up and using a flipped learning environment takes considerable time and effort on the part of the teachers. This is consistent with Bisciglia and Monk-Turner (2002), who found that online learning allows students to receive immediate feedback on their work; this was noted as one of the benefits of FML by some of the participants.

The findings of Al Mutlaq (2017) point out significant challenges to university teachers' participation in CPD programmes in KSA, such as time and workload, realistic programme content, and awareness of CPD courses, in addition to having access to a range of courses that address their subject area and needs. The findings of the present research are consistent with those of Al Mutlaq (2017) in that the participants indicated via the pre-training questionnaire that their current workload was a challenge to taking part in CPD; 36% of the participants said they taught three modules per semester and 14% taught more than six modules per semester. If the modules are translated into teaching hours, 71% said that they taught more than ten hours per week in the semester, and 13% taught ten teaching hours per week in the semester. On this point, Bennell and Mukyanuzi (2005) concluded that reducing the number of teaching hours allows teachers time to update their skills and supports them to change their work routine. In the current research, 37% of the participants said they had two assigned administrative tasks in the semester and 31% of the participants had three. However, 76% had registered to attend training sessions but were unable to attend; 32% of the participants said this was due to too many teaching hours and 30% indicated unsuitable scheduling of the training programmes. In terms of time and programme content, 39% of the participants preferred to attend training sessions in the late afternoon or early evening (5-7pm), which was not in alignment with the times offered to female university teachers. CPD programmes for women tend to be scheduled in the mornings and early afternoons only, that is, between 9am and 3pm. Sixty-three percent of the participants said they had attended training sessions previously via a traditional learning environment (face-to-face learning). The participants in the current study also highlighted problems around awareness of the importance of CPD courses and the need to obtain a range of CPD qualifications suited to their subject area. Most of the participants were aware that CPD was important, with 86% attending training courses or workshops during a semester in contrast to only 14% who did not. 41% felt that the number of training courses or workshops provided during a semester was not sufficient, and 57% of them wanted more to be offered by the university. Thirty percent thought that extra training should be offered on integrating technology with education practice, while 14% wanted to know more about electronic learning (EL) and 14% about modern teaching methods.

Alfahad (2012) explored the part played by teacher demographics, specifically age and institutional support, on integrating technology in education, since older faculty members may not have the technological knowledge or training to do this successfully. In addition, Peluchette and Rust (2005) demonstrated that educational institutions may not offer enough support to motivate their teachers to use technology in education. As well, Alfarani (2015) suggested that resistance to change significantly affects the use of ML by older rather than younger teachers. The demographic data of the participants in this research (see section 5.2 'Participants' Demographic Information') were similar to Peluchette and Rust (2005), Alfahad (2012), and Alfarani (2015). The demographic data in this research shows that the majority (40%) of participants were lecturers, 39% were teaching assistants and only 21% were assistant professors and also categorised as older teachers. In addition, the majority (39%) of the participants had between one and five years of teaching experience, while 36% had between five and ten years, only 3% had between fifteen and twenty years of teaching and around the same number had more than twenty years of experience. This means that the majority of participants in this study were in the younger age bracket and had less experience of teaching than the small number of older teachers, who were higher in rank and had taught the longest. Regarding institutional support for technology in education and technological training provision, 41% of the participants felt that the number of training courses or workshops was insufficient, and 57% of them expressed a wish for more training to be provided. Thirty percent of the participants wanted courses that dealt specifically with integrating technology into educational practice, whereas only 14% needed training in the basics of e-learning and the same number wanted more information on modern teaching methods.

The successful CPD design is characterised by flexibility of content and making it applicable to the participants' particular targets while adequately addressing the components of CPD and how to apply the content to pedagogy and the curriculum (Galanouli et al., 2004; Daly et al., 2009; Hramiak & Boulton, 2013). These researchers also showed that adoption of implementing knowledge during the offered CPD programme grants teachers familiarity with the appropriate investment of integrating technology into educational practices and how to apply it. Galanouli et al. (2004) and McCarney (2004) pointed out that some teachers could resist positive change towards technology adoption within education practices because they had obtained poor quality training programmes previously. In this regard, the university teachers in the current study who were interviewed after they had attended the CPD programme said that the content was interesting, flexible, and useful. They also mentioned that they had become more aware of FML (as well as FL and ML) and wished to use it with their students now they knew how to create and deliver the material. This strongly suggests that the CPD offered in this study was successful in its aims. The interaction of the TPACK components emphasises the importance of combining mobile with flipped learning in successfully designing a technology-based learning environment (Koehler & Mishra, 2009).

Many of the studies that were reviewed in Chapter 3 indicate that the methodology most used to research ML, FL, and Acadox in education was either qualitative or quantitative, and only a few used mixed methods. These took experimental and quasi-experimental approaches with interviews, questionnaires (or surveys), or pre- and post-questionnaires. The current study also used mixed-methods with a quasi-experimental and multiple interventions approach. Pre-and post-training questionnaires, pre-and post-evaluation cards, and semi-structured interviews were used in line with the aim of this research and to answer the research questions.

At the University of Southampton, the iSurvey tool is often used to generate a survey, as it facilitates the free distribution of questionnaires online. Although the researcher is a member of the University of Southampton, SurveyMonkey was used instead for the same purpose. Several reasons led the researcher to this decision. This study was conducted in KSA and the pre-and post-training questionnaires were directed to female university teachers, whose first language is Arabic. However, iSurvey does not support Arabic very well and it was not possible to coordinate the Arabic statements throughout font patterns provided, or allow the user to use ready-made pictures and formats that fit the research topic. In the literature review in Chapter 3, it can be seen that the questionnaire was the most commonly used instrument whether for FL or ML research. However, questionnaires are considered as instruments of perception; they can be difficult to understand and are complex in that it is impossible to reduce answers to single clear statements and therefore scales such as Likert are needed (Einola & Alvesson, 2020). This may lead participants to say something about what they think, but maybe not their real skill. For instance, a question about a suitable place to attend training sessions has been asked of participants in section Two of the pre-training questionnaire. Around 26% of the participants chose FML as a suitable option to attend training sessions, although the FML topic is discussed for the first time in the literature by this research study. Einola and Alvesson (2020: 3) find that, ‘Survey respondents routinely ignore our questions, fail to follow instructions, answer carelessly, adapt their reality to the survey, reinvent questions, and misunderstand words and sentences’. Hence, to avoid unreal results, the researcher followed certain procedures to ensure the validity of questionnaires (see section 4.10 'Data Analysis').

6.4 Original Contributions and Implications

This section recognises several significant contributions of this research study whether in terms of (1) contribution to knowledge, or (2) contribution to practice. In terms of contribution to knowledge, as far as the researcher is aware, this is the first study conducted in KSA on using mobile learning in a flipped form, whereby FL and ML are integrated into the educational environment (FML) in an attempt to overcome disadvantages arising from the independent application of each learning method; and to use FL and ML to develop university teachers’ e-lecture skills. This bridges the gap between FML intervention effectiveness and development of e-lecture skills among university teachers in KSA. This thesis attempts to bridge the conceptual gap (i.e., FML), where FML was designed to improve teacher effectiveness in a low cost, easy manner, and via available devices. The TPACK framework was employed in this research in order to provide a better understanding of the perceived and actual effects of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers e-lecture skills to support teaching in HE. The TPACK framework was used to fill the gaps identified in this research (ML, FL, creating e-lectures, CPD, and HE). This framework was appropriate, whereby each gap in this research was covered by an element of the framework (content relates to creating e-lectures, pedagogy relates to flipped learning, technology relates to mobile learning, and context relates to higher education). The research draws on the statistical findings to make significant recommendations that can be brought to the attention of policymakers in higher education in the KSA. Thus, it can be used to think about how education systems can help to make better use of research knowledge. In addition to this, the findings may contribute to providing new data about ML and FL, providing the opportunity to conduct further research on the effects of these types of learning on individual performance.

As regards the contribution to practice, due to the issues which led to the choice of this topic (see section 1.2 'Research Rationale'), this research could contribute to the provision of teacher training for university teachers whether in KSA or elsewhere. Teacher training is associated with student quality, therefore effective training could potentially influence achieving effective learners (Clotfelter et al., 2006). This research also could assist university teachers in creating accessible e-lectures, which could in turn enhance student learning. Finally, this thesis could potentially contribute to addressing issues specific to the KSA, such as gender segregation in the education system. For instance, FML allows women to provide training (as well as teaching) for men without using the voice or image of the trainer. Moreover, this thesis proposes an efficient and cost-effective teacher training environment by efficiently using resources and minimising financial waste, which is one of the goals of the Saudi Vision 2030 (Saudi Vision 2030, 2017). Based on these implications, the following section presents some recommendations and suggestions for future research.

Figure 31 (repeated in Figure 24 and Figure 1) confirms that the FML model has the potential to offer a conceptual framework that would not only support further research in this field, but also inform practice and policy. In addition, its application within HE institutions could identify and hence help to solve many of the issues currently facing this sector. Applying the FML environment to CPD programmes was a successful and positive experience for the university teacher participants, who found their training enjoyable, exciting, and useful. This is also reflected in their sincere desire to learn about and use FML. Some of the reasons for this positive regard for FML CPD are ease of course attendance, the ease of use, and ease of viewing discussions afterwards. Well-presented and useful information was another reason for participants' positive impressions of FML CPD. The technology allows for this flow of interesting information to be paused so that the trainee can write comments or complete other tasks. Employing FML CPD is an opportunity to integrate technology into learning and teaching processes and to use the potential of technology to make topics attractive and interesting.

FML CPD has many advantages, including ease of following information and the presentation of rich data through, for example, a discussion panel or well-presented training content. FML is considered a useful, practical, and enjoyable method. FML presenting CPD through a new environment gives the ability to attend from anywhere, at anytime, and whenever the learner wants. As well, it gives learners the option to pause watching content and to re-watch content any number of times. This kind of learning technology allows learners to manage their time, since viewing course content can be done when convenient. It is therefore a suitable method for those with children and other responsibilities. FML reflects positively on student motivation and responsibility for learning.

The importance of FML arises from its benefits to both learners and teachers. For learners, FML supports lifelong and cooperative learning. It prepares the learner to learn for themselves, giving the responsibility back to the learner and increasing the motivation to learn. FML affords an enjoyment of learning, and at preferred times, with the opportunity to view information multiple times. FML saves the learner's time by allowing information to be obtained quickly and transferred easily. FML benefits teachers similarly, saving the teacher much time and effort and overcoming barriers of time and place. In addition to changing the teacher's role and raising confidence, FML supports teachers in using technology to present information, making class time more enriching. Due to these benefits and advantages, it may be possible to apply the FML method to the process of teaching students, including procedural matters such as following specific rules, applying clear plans, educating teachers about the benefits of FML, and training teachers about FML.

It must be acknowledged also, in this discussion, that FML can also present some difficulties which relate to the learner, to the teacher, and to the educational institution. Learners, for example, may lack an up-to-date device, they may not be interested in or have ideas about class topics, and they may not be able to attend at the right class time. As well, learners may be reluctant to participate in discussions; they may not accept FML, or they may lack the necessary technological knowledge to use it successfully. Teachers, on the other hand, face their own problems; for example, not being aware of the importance of FML, not having the desire to use technology, or a lack of technological background. In addition to the difficulties of presenting e-lectures and of creating good videos, they may see FML as an additional burden. Issues such as poor Internet access or failure to provide sufficient incentives to use technology are some of the problems encountered by educational institutions.

There are also limitations that may hinder the employment of FML whether related to the learner, the educational institutions or the teacher. Learners, for example, may not be prepared to accept FML, they may not have appropriate devices, or they may find it difficult to commit to watching the videos prior to class time. Teachers also may not accept FML or other technology and may want to work only within a traditional learning environment. In addition, they may not be aware of the benefits of employing technology and instead see FML as an additional burden, especially if they lack technological experience. Educational institutions may have problems of infrastructure relating to Internet connections, electrical access, numbers of computers and other devices on site. They may lack funding to provide training in FML or have insufficient space for training teachers. The next section considers recommendations and suggestions for further research.

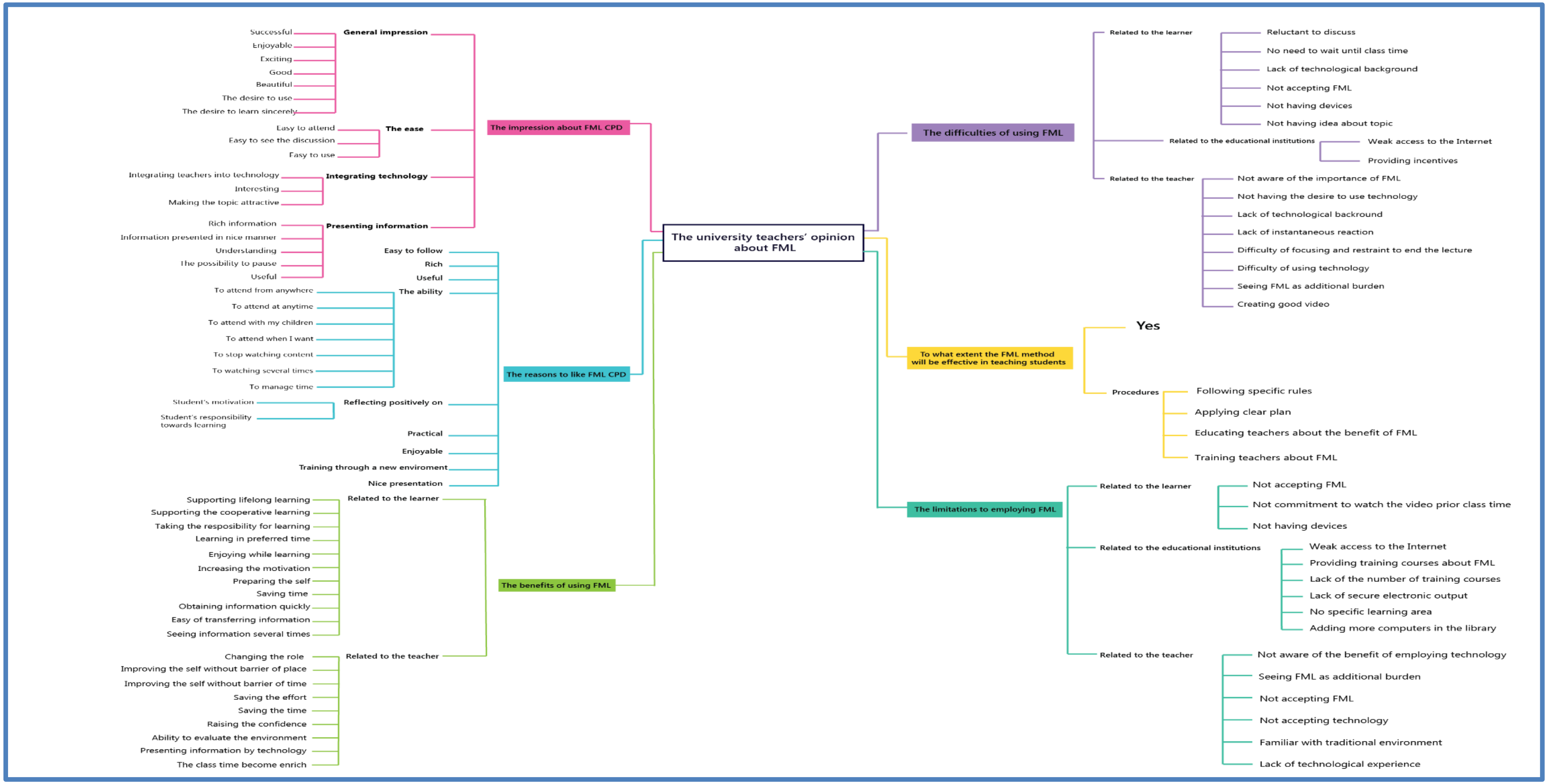


Figure 31. Summary of interviewees' opinions of FML [repeated in Figure 24]

6.5 Recommendations and Suggestions for Further Research

In light of the leading conclusions, the writer would like to provide a summary of recommendations suggested to HE policymakers in KSA, as well as outlining areas for future research. (1) It is necessary to improve technological infrastructures such as accessibility and connectivity. During the application of this study from April to July 2019, the researcher and some participants experienced poor connectivity and slow Internet speeds (see section 5.5.4 'The Difficulties of Using FML'). With the spread of the COVID-19 pandemic, the Saudi government locked down its borders with other countries and also locked-down each city. The Saudi Ministry of Education has therefore resorted to online learning in both state schools and higher education. Traditional face-to-face set-ups and routines for work and study now during the pandemic rely on computer and mobile access, as does home entertainment. Students, administrators and teachers all now require speedy training in a range of new digital environments because they are becoming increasingly confused about using this new standard, and are unsure how to deal with it. The need for high-level wireless network bandwidth in order for it to work well is paramount to the continuation of educational programmes. This change from traditional to electronic interface has caused great pressure on Internet services, provision and connectivity. One positive consequence of the COVID-19 pandemic is that KSA has significantly improved its technological infrastructure. Its global ranking has been raised in Internet speed from 105th to the tenth in the world (Saudi Press Agency (SPA), 2020). (2) It is important also that universities provide full support to students on how to use technology effectively in teaching and learning whether by presenting workshops or seminars. It was one of the positive consequences of the COVID-19 pandemic in KSA that universities and the educational organisations provided webinars and workshops on several issues which focused on technological topics and its future in education. (3) External educational institutions which provide training for university teachers (e.g. the National Centre for E-learning and Distance Learning (NCEL)) need to work hand-in-hand with these centres and deanships in each university in order to support university teachers and raise the level of technological knowledge. This can happen by organising workshops and training courses periodically, at different times of day, via different environments, focusing on practical training, and increasing training about technological topics and its future in education (see section 5.6.5 'Suggestions to Improve CPD').

(4) The writer considers it important to apply continuous evaluation for university teachers as it is applied for general education teachers. (5) Universities should also prepare pre-service teachers technologically from the theoretical and practical aspect by offering an updated technology curriculum during their study time in university. Given those limitations that have been faced in the current research, (6) additional research on the effects of flipped and mobile learning integration is

recommended. Several factors may have influenced the outcomes of this study. This study encompasses frameworks developed in the context of the Kingdom of Saudi Arabia, which is distinguished from other countries in terms of the presence of social and cultural priorities. Therby further research of this kind should identify modifications to ensure FML applicability in this context. (7) Further research may look at the inclusion of FML not only as a training environment in CPD programmes but also as a teaching environment for students. (8) The researchers could explore in the future if the FML environment is appropriate for the general education phase (schools), the university education phase, and the higher education phase. (9) Additionally, researchers could design studies that allow longer-term integration efforts (treatment) to take place. The treatment period in this study was only two weeks and may not have allowed the participants the necessary time to fully engage themselves in CPD. Lastly, (10) it is recommended that other researchers develop work on FML by applying it in other countries and also attempt to have a bigger sample size than the one in the current study, and look at replicability and the effect of the size of the research. The next section considers limitations that were faced in this research study.

6.6 Limitations

Numerous practical circumstances have led to limitations in this research study. Hence, reporting them could help to make them recognised and addressed in future research. However, some limitations were able to be addressed but changed some outlines of the research. The author classified these limitations into five types, which are related to: the site of data collection, the organisations responsible for this research, the research methodology, the participants, and unforeseen disruptions. The following section presents these challenges in detail.

1. **Limitations Related to the Site of Data Collection:** Despite the many Internet service supplier companies in the KSA, some areas of the Kingdom experience poor Internet speed. As a result, communications with Groups B and C were delayed. High summer temperatures and electric generator overloads also contributed to several power outages, leading to rescheduling of Group B’s session.

2. **Limitations Related to the Organisations Responsible for this Research:** The data collection procedures for this research were carried out through requesting the approval of several concerned parties, namely:

    1. The University of Southampton: the organisation supervising the research,

2. Umm Al-Qura University: the organisation in which the research was carried out, and

3. The Royal Embassy of Saudi Arabia Cultural Bureau in London: the organisation funding the research.

Due to the routines and procedures for each organisation, the coordination between these organisations was difficult, and lead to loss of around a month without progress. Another challenge was rejections and requests for several fundamental changes to the ERGO forms before obtaining ethical approval which authorised the researcher to collect data. This caused a delay in carrying out the experiment, which required rescheduling the plans (see Table 38 in Appendix Z). It was originally planned to present the training sessions over a month, in four weekly sessions, but the content of the training was combined and presented in only two sessions. Combining two training sessions into one lengthened the time of each session. In other words, each of the original four 30-minute weekly sessions became two 90-minute sessions. It was also scheduled that the e-lectures would be evaluated and marked by the researcher and the independent assessor in an attempt to avoid bias. However, because of the delay in getting approval, as well as the start of the UQU examinations at the time, the independent assessor declined to provide her volunteered service to conduct the e-lecture evaluation process.

3. **<u>Limitations Related to the Research Methodology:</u>** The translations and back-translation consumed a lot of time and effort. Translations and back-translation were conducted for the ERGO forms (i.e. participant information sheet for Groups A, B, and C, and consent form for these three groups), instruments (i.e. pre-, post-training questionnaire, pre-, post-evaluation product card, and interview), twelve interview transcripts, CPD content, and also emails exchanged with each group separately. Time is one of the biggest challenges in applying mixed methods research as Johnson and Onwuegbuzie (2004) state. Mixed-methods involves applying several methods to collect quantitative and qualitative data, which was more time-consuming and demanded more effort than a single method. Also related to time was reorganising the planning and integrating of the training content. Another challenge was that the researcher had planned to interview those participants who showed the highest and the lowest skills improvement in creating e-lectures. Unfortunately, the particpants declined this further interview because of commitment to UQU final examinations at the time, some of which involved coursework deadlines. Therefore, the researcher accepted only those who answered ‘Yes’ in the last part of the post-training questionnaire to give their consent to be interviewed.

4. **Limitations Related to the Participants:** It was the researcher's intention to gather a significant number of participants to obtain rich data but many of the potential participants declined to take part. It was the original plan to choose two university teachers from each college for the research sample (see section 4.8.1 'Sample Size'). Unfortunately, there was no response from some faculties, which led the researcher to accept more than two participants from each college. The next challenge was that although the researcher attempted to retain the majority of the participants, twenty-two of them declined to continue in the experiment and withdrew. Five of the participants' data were rejected since they did not complete all tasks. Rossiter (2001) and Cohen et al. (2011) warn that a reduced number of participants may negatively affect the research. In Rossiter's (2001) quasi-experimental study, the sample was reduced because of participant withdrawals. The occurrence of this limitation in the current research study may have had a considerable effect on the dynamics of the training course for the participating groups. The withdrawals also required more time-consuming searching for other participants. The researcher then decided, after consultation with the head of the Curriculums Department of the Education College of UQU, to offer attendance certificates to participants who completed the study tasks. Thus, attendance certificates were designed by the researcher and approved by UQU to encourage participants in this research study to stay and motivate other university teachers to join the sample (see Figure 37 in Appendix X). Indeed, when the participants and those withdrawing from participation were notified that there was an attendance certificate after the completion of all the stages of the experiment, the majority of those withdrawing returned and a new number joined the research (7 participants).

   Not all of the participants who applied to join the study accepted technology or had a basic knowledge of technological skills, and were excluded from the study on the basis that they did not possess enough of the essential skills for designing and creating e-lectures, which was the topic of the CPD training. Since this study was limited to a smaller number of teachers who did meet the criteria, there was difficulty in grouping these in the way that had originally been planned.

   Another challenge was some participants chose a different group code from the initial one which was given to them at the beginning of the experiment. For instance, participant ID 1234567 had been enrolled in Group B and this participant also knew about her group code either through the sent email or as pointed out in the participant information sheet. She chose code B in the pre-training questionnaire but chose Group C in the post-training questionnaire. This made that group change from 30 to 31 participants. The pre- and post-training questionnaires, therefore, had to be printed out separately for each participant. The results report issued from the SurveyMonkey app could not be used, but instead results were quantified through the ID number. The responses were compared, recounted, and categorised (also the researcher communicated via email with that category in order to clarify this confusion in the data).

5. **Limitations Related to Unforeseen Disruptions:** The researcher in charge of this study was affected by the global COVID-19 pandemic, causing the review and conclusion of this study to be delayed for several months (see Table 38 in Appendix Z).

6.7 Concluding Statement

During the 21st century for many of us, mobile technologies have taken over our lives and changed the ways entire societies look at and use information. And thanks to rapid developments in mobile technologies, our ways to communicate, to collaborate and to interact with and through technologies have changed. These developments have a deep effect on the educational sector, which expands almost daily as technologies become increasingly integrated and available to learners, as well as teachers, of all ages. This has resulted in the concept of mobile learning (ML), which takes place via wireless handheld digital mobile devices, and thus can be accessed anywhere and at any time. In the educational field, flipped learning (FL) has been recognised as an innovative and effective instructional approach and it has recently gained prominence. FL is defined as a type of learning that occurs by presenting new information for the learners outside the classroom and prior to actual exposure inside the classroom.

However, in this era, learning environments (as well as training environments) became diverse, including either traditional learning environments or electronic learning environments. Since each environment has its advantages and disadvantages, this research suggests presenting a mobile learning approach but in flipped form, which is called Flipped Mobile Learning (FML). This integration is an attempt to overcome disadvantages arising from the independent application of each learning method, and to make use of the advantages of FL and ML in continuing professional development programmes (CPD). This research aimed to gain a better understanding of the perceived and actual effects of the flipped mobile learning approach (FML) CPD in creating electronic lecture (e-lecture) skills for university teachers by investigating whether FML could improve perceived and actual e-lecture creation skills among university teachers in the Kingdom of Saudi Arabia with a view to increasing the use of e-lectures in teaching throughout HE institutions in KSA. Additionally, this research seeks to evaluate university teachers' opinions (concerns, challenges, and affordances) of using FML which, in turn, can help university teachers to utilise FML for teaching high numbers of students with less effort and less cost, including the removal of space and time limits, allowing women to teach not only women but men as well without having to be in the same space.

Overall, the findings indicate first, with regard to the average level of perceived and actual skills of creating e-lectures in general, there are improvements from pre- to post-measures in favour of the group trained via FML but there are no significant differences. Second, there are statistically significant differences in the three main perceived and actual skills in favour of the group trained via FML. Third, by looking at each perceived and actual sub-skill of creating e-lectures, there are statistically significant differences in some sub-skills in favour of the group trained via FML. However, the remaining sub-skills showed statistically significant differences in favour of the groups trained via FL or ML. The qualitative analysis of teachers' opinions about FML showed generally positive attitudes and viewpoints while identifying some of the limitations of FML from an educator's standpoint. Based on the research findings of this study, it can be seen that the TPACK framework gives a better understanding of the effects of FML in teacher training CPD and in helping teachers to improve their e-lecture skills.

The findings presented in this dissertation have positively addressed the gap in existing research knowledge about the use of FML in designing CPD for teachers in a low cost, easy, yet effective way, and via readily available digital devices. This research could contribute to the training of university lecturers in KSA and elsewhere. Since teacher training is positively associated with teaching quality, effective CPD is expected to influence the achievement of student excellence. The findings could significantly contribute towards recommendations for policymakers in higher education in KSA. The findings could also contribute new data to the growing body of research on the effects of ML and FL on individual performance.

In conclusion, it must be pointed out that the findings do not constitute a call to completely replace traditional face-to-face training or teaching with FML, but rather they suggest that FML offers options in education which provide many benefits for learners and that ML, as well FL, are nowadays an accepted and convenient tool with which to effectively enhance training and learning in higher education.

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Glossary of Terms

Items	Abbreviations	Definitions
1.	ICT	Information and Communication Technology
2.	HE	Higher Education
3.	DL	Distance Learning
4.	EL, E-learning	Electronic Learning
5.	ML, M-learning, U-learning	Mobile Learning
6.	VL	Virtual Learning
7.	FL	Flipped Learning
8.	FML	Flipped Mobile Learning
9.	e-lecture	Electronic Lecture
10.	SPA	Saudi Press Agency
11.	NCEL	National Centre for E-learning and Distance Learning
12.	RQ	Research Question
13.	UNESCO	United Nations Educational Scientific and Cultural Organisation
14.	CPD	Continuing Professional Development
15.	UQU	Umm Al-Qura University
16.	KSA	Kingdom of Saudi Arabia
17.	USA	United States
18.	NCAAA	National Commission for Assessment and Academic Accreditation
19.	CDSI	Central Department of Statistics and Information
20.	KAUST	King Abdullah University of Science and Technology
21.	TEL	Technology Enhanced Learning
22.	TLTP	Teaching and Learning Technology Programme
23.	PDA	Personal Digital Assistant
24.	App	Application
25.	CITC	Communications and Information Technology Commission
26.	STC	Saudi Telecom Company
27.	TPD	Teacher Professional Development
28.	PD	Professional Development
29.	CFIT	China-Funds-in-Trust
30.	DVD	Digital Versatile Disc
31.	MS	Microsoft
32.	TK	Technological Knowledge
33.	CK	Content Knowledge
34.	PK	Pedagogical Knowledge
35.	TCK	Technological Content Knowledge
36.	PCK	Pedagogical Content Knowledge
37.	TPK	Technological Pedagogical Knowledge
38.	TPACK	Technological Pedagogical and Content Knowledge
39.	SDR	Social Desirability Reporting

40.	IV	Independent Variable
41.	DV	Dependent Variable
42.	SPSS	Statistical Packages for Social Sciences
43.	BERA	British Education Research Association
44.	ERGO	Ethics and Research Governance Online
45.	TESOL	Teaching English to Speakers of Other Languages

Appendix A List of experts who reviewed the instruments and e-lecture skills

	Name	Email address
1.	Prof. Faiza Al-Maghrabi	proffaiza2018@ gmail.com
2.	Prof. Sawsan Kousa	drskousa@ hotmail.com
3.	Prof. Suhail Al-Harbi	ssharbi@ uqu.edu.sa
4.	Dr Amal Nasr Al-Den	dr.amal.nasralden@sedu.edu.eg
5.	Dr Ghanem Al-Enazi	ghanem-edu@hotmail.com
6.	Dr Hanaa Yamani	Ahdear_2008@yahoo.com
7.	Dr Haniah Al-Saadawi	haasaadawi@uqu.edu.sa
8.	Dr Ibrahim Al-Zahrani	attfe2003@hotmail.com
9.	Dr Nabil Elsayed	nabil5_elsayed@yahoo.com
10.	Dr Sahar Alzahrani	Saharmatar2@gmail.com

Table 19. List of experts who reviewed the instruments and e-lecture skills

Appendix B Changes that were made after piloting the instruments

	The Place of Changes	The Changes
1.	The pre-questionnaire	➢ Changing the title from (The pre-questionnaire) to **(The pre-training questionnaire)** ➢ Adding to the study procedures section the sentence **(four sessions)** in order for the participants to be aware of the number of training sessions required from them to attend ➢ Deleting the duration and the elements of the e-lecture which were included within the study procedures section ➢ Deleting the definition of the e-lecture from the study procedures section as that definition is a question for the participant in the fourth part of the questionnaire, section A ➢ Adding the sentence **(* It refers to that you can choose more than one option)** before starting the questionnaire in order for the participant to be aware that they have the ability to choose more than one option in some questions ➢ Asking two questions within the first section to double check that participants within the sample domain; **(To what extent do you accept technology?)** and **(How do you describe your technological background?).** The participant is able to continue the study based on the answers. The acceptable answer for these two questions is (neither disagree nor agree), which allows participants to continue this study ➢ Deleting **(The nationality)** which was within the first section ➢ Adding the **(Teaching experience)** within the first section ➢ Adding the choice **(More than 6)** within the first section in question 9 **(The number of curriculums that you teach during the current semester)** ➢ Adding the choice **(More than 10)** within the first section in question 10 **(The number of hours charged for teaching during the current semester)** ➢ Adding the choice **(0)** within the first section in question 11 **(The number of administrative tasks assigned during the current semester (Deanship of Faculty, Head of Department, Membership of the committee, etc):** ➢ Transferring the question **(Which type of training environment have you experienced before?)** from the third section to be in the second section ➢ Adding question 8 **(Do you present a lecture in electronic way?)** to the third section of the questionnaire ➢ Transferring the question **(What are the types of mobile devices that you normally use in the education process?)** from the third section of the questionnaire to be included with the interview questions ➢ Amending the e-lecture skills and organising them under 10 basic skills

		➢ Adding the third part **(Part C)** to the fourth section in order to ask participants to create e-lecture and email it to the researcher
2.	The post-questionnaire	➢ Changing the title from (The post-questionnaire) to **(The post-training questionnaire)** ➢ Deleting the basic demographic information about the participant which was included within the first section and is already included in the pre-training questionnaire ➢ Amending the e-lecture skills and organising them under 10 basic skills ➢ Adding the third part **(Part C)** to the second section in order to ask the participants to revise the e-lecture that was created previously and resending it to the researcher's email ➢ Asking the participant at the end of the questionnaire if she accept to interview
3.	The interview	➢ A request to write the ID number as the required information ➢ Adding question 1 **(How do you describe your relationship with technology?)** ➢ Adding question 2 **(Talk about your experiences in using technology in the teaching process. Do you employ technology in the education process? Or only use in general life? Why?)** ➢ Adding question 3 **(What are the types of mobile devices that you normally use in the experiment?)**, which was in the pre-training questionnaire to be included within the interview questions ➢ Adding question 4 **(What are the applications that you used in the experiment? What are their aims?)** ➢ Adding question 6 **(Do you like the training method? Why?)** ➢ Adding a question for Group A & B, which is question 15 **(Do you think there are limitations to applying this method at UQU?)** ➢ Adding six questions for Group C, which are: **1. Do you attend sessions via mobile?** **2. Do you provide a session via mobile?** **3. Do you attend sessions via flipped way?** **4. Do you provide a session via flipped way?** **5. Do you think FML will be effective way for students?** **6. Do you think there are limitations to applying this environment at UQU?**
4.	The evaluation card	➢ Changing the title from (The evaluation card) to **(The evaluation product card)** ➢ Adding the ID number as the required information

		➢ Adding the statement within the required information **(The time of skills measured with two options: Before and after the intervention).** Adding this statement allows the researcher to store participant's information in one sheet rather than have two separate sheets; one before intervention and the second after the intervention ➢ Amending the e-lecture skills and organising them under 10 basic skills
5.	Formulate sentences	➢ The majority of statements, sentences, and questions have been reformulated to make them clear and understandable whether in Arabic or English forms
6.	The general coordination for the instruments	➢ All instruments have been amended to be organised
7.	The research procedures	➢ Amending the time to produce e-lecture. Previously, the participants were required to produce e-lecture after answering the post-training questionnaire. Currently, the participants are required to produce e-lecture after answering the pre-training questionnaire. After attending the training sessions, the participants will be asked to answer the post-training questionnaire. Lastly, the participants will be asked to revise the produced e-lecture. This step allows the researcher to measure the participants' skills before and after intervention ➢ Reorganising the control and intervention groups. Previously, the groups were (1) ***Group A:*** in the first control group, the participants will be trained using the traditional method. (2) ***Group B:*** in the second control group, the participants will be trained using a mobile device method. (3) ***Group C:*** in the experimental group, the participants will be trained using the flipped mobile method. Currently, there are three intervintion groups, which are: (1) ***Group A:*** the participants will be trained using the flipped method. (2) ***Group B:*** the participants will be trained using a mobile device method. (3) ***Group C:*** the participants will be trained using the flipped mobile method

Table 20. The changes that happened after piloting the instruments

Appendix C Ethics approval email for pilot study

Ergo

Wed 21/03/2018 10:04

To:

Khayat D.O.S.

important

You forwarded this message on 22/03/2018 00:13

Submission Number: 31318

Submission Name: THE IMPACT OF USING A FLIPPED MOBILE LEARNING ENVIRONMENT IN DEVELOPING SKILLS FOR CREATING ELECTRONIC LECTURES AMONG FEMALE FACULTY MEMBERS IN THE KINGDOM OF SAUDI ARABIA (For piloting study only)

This is email is to let you know your submission was approved by the Ethics Committee.

You can begin your research unless you are still awaiting specific Health and Safety approval (e.g. for a Genetic or Biological Materials Risk Assessment)

Comments

1.Thank you for attending to the necessary adjustments and for summarising these in your submission comments. Good luck with your project.

Click here to view your submission

Coordinator: Dalya Khayat

ERGO : Ethics and Research Governance Online

http://www.ergo.soton.ac.uk

DO NOT REPLY TO THIS EMAIL

Appendix D Pilot study results report

Report of the pilot study results

Participants' Information

Before specifying the aims, the researcher determined the participants in the sample domain. Two questions were asked at the beginning of the pre-training questionnaire (see Table 9 for the participants' relationship with technology). The results show that seven participants accepted technology strongly and four participants accepted technology, with one neutral response for only one participant. In regard to the technological background, three participants had an extensive technological background, while nine participants had a basic background.

Table 21 outlines the participants' demographic information. There were 12 participants (four in each group); six of them came from the College of Applied Sciences and two participants from the College of Computers and Information Systems, the College of Applied Medical Sciences, and the College of Education. The participants' fields of study were diverse, but the dominant major was biology (three participants). Five participants were teaching assistants while six participants were lecturers and assistant professors. Eight participates had a teaching experience of 1–5 years, whereas three participants had an experience between five and 10 years; only one participant had an experience of less than a year. Half the participants (six) taught three courses during one semester, whilst two participants taught four courses, and another two taught five courses. Each semester comprised ten hours of teaching for seven participants, whereas two participants taught for more than 10 hours. Regarding the administrative tasks assigned during a semester, five participants had one task and the same number of participants had two tasks, while only one participant has three tasks.

1) Accept technology				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Neither disagree nor agree	1	8.3	8.3	8.3
Agree	4	33.3	33.3	41.7
Strongly agree	7	58.3	58.3	100.0
Total	**12**	**100.0**	**100.0**	
2) Technological Background				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Agree	9	75.0	75.0	75.0
Strongly agree	3	25.0	25.0	100.0
Total	**12**	**100.0**	**100.0**	
3) Group code				

	Frequency	Percent	Valid Percent	Cumulative Percent
A	4	33.3	33.3	33.3
B	4	33.3	33.3	66.7
C	4	33.3	33.3	100.0
Total	12	100.0	100.0	
4) College				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
College of applied sciences	6	50.0	50.0	50.0
College of computers and information systems	2	16.7	16.7	66.7
College of applied medical sciences	2	16.7	16.7	83.3
College of education	2	16.7	16.7	100.0
Total	**12**	**100.0**	**100.0**	
5) Major				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Animals Biology	1	8.3	8.3	8.3
Biochemistry	1	8.3	8.3	16.7
Biology	3	25.0	25.0	41.7
Computer	1	8.3	8.3	50.0
E-administration	1	8.3	8.3	58.3
Educational technology	1	8.3	8.3	66.7
English language	1	8.3	8.3	75.0
General education	1	8.3	8.3	83.3
Medical Mycology	1	8.3	8.3	91.7
Statistics	1	8.3	8.3	100.0
Total	**12**	**100.0**	**100.0**	
6) Academic position				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Teaching assistant	5	41.7	41.7	41.7
Lecturer	6	50.0	50.0	91.7
Assistant professor	1	8.3	8.3	100.0
Total	**12**	**100.0**	**100.0**	
7) Teaching experience				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Less than a year	1	8.3	8.3	8.3
1-5 years	8	66.7	66.7	75.0
5-10 years	3	25.0	25.0	100.0
Total	**12**	**100.0**	**100.0**	
8) Number of curriculums you are teaching during a semester				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
2	1	8.3	8.3	8.3
3	6	50.0	50.0	58.3
4	2	16.7	16.7	75.0
5	2	16.7	16.7	91.7
6	1	8.3	8.3	100.0

Total	**12**	**100.0**	**100.0**	
9) Number of hours teaching during a semester				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
8	1	8.3	8.3	8.3
9	2	16.7	16.7	25.0
10	7	58.3	58.3	83.3
More than 10	2	16.7	16.7	100.0
Total	**12**	**100.0**	**100.0**	
10) Number of administrative tasks assigned during a semester				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
0	1	8.3	8.3	8.3
1	5	41.7	41.7	50.0
2	5	41.7	41.7	91.7
3	1	8.3	8.3	100.0
Total	**12**	**100.0**	**100.0**	

Table 21. The participants' demographic information in piloting study

<u>University teachers' perceived skills level in creating e-lectures in each group</u>

To learn about the tutors' level of perceived skills in creating e-lectures before and after the intervention, data were collected from the pre- and post-training questionnaires for all the groups using Paired-Samples T-test. Table 22 demonstrates correlation *r* between the skills level before and after the intervention for all the groups. The *r* scores are significantly positively correlated. The *r* scores of six skills are significantly negatively correlated. *N* is the total number of participants.

Paired Samples Correlations					
The skill		**Mean**	**N**	**Correlation**	**Sig.**
The ability to determine the purpose of lecture	Before	3.67	12	.63	.03
	After	4.00			
The ability to define the content of lecture	Before	3.58	12	.59	.05
	After	4.08			
The ability to present Introduction (to gains the learners attention and provides the framework)	Before	3.00	12	.21	.52
	After	4.08			
The ability to present Explaining (clarifies concepts and terms when presenting information)	Before	3.67	12	.60	.04
	After	4.17			
The ability to present Summarizing (emphasize the key points were presented in the lecture)	Before	3.58	12	.57	.06
	After	4.17			
The ability to utilise questioning, exampling, comparing, and contrasting	Before	3.42	12	.13	.69
	After	4.08			
The ability to create, edit, and choose the appropriate of audio aids and visual aids	Before	3.50	12	.38	.23
	After	4.42			
The ability to use the appropriate audio aids and visual aids to the content	Before	3.42	12	.33	.30
	After	4.42			
	Before	3.59	12	-.23	.47

The ability to involve activities for the learners to keep them awake	After	3.83			
The ability to deal with devices that need it to create e-lecture	Before	2.75	12	-.12	.72
	After	4.33			
The ability to deal with several applications for different purposes, which need it to create e-lecture	Before	2.67	12	-.12	.71
	After	4.25			
The ability to create a presentation which may include it in e-lecture	Before	3.08	12	-.49	.10
	After	4.25			
The ability to determine the appropriate pattern and size of the text	Before	3.67	12	-.05	.88
	After	4.42			
The ability to contrast of colour between the text and the background	Before	3.67	12	.00	1.00
	After	4.50			

Table 22. Statistics for the correlation between the perceived skills before and after the intervention in piloting study

Table 23 shows the average difference between the skills level before and after the intervention for all the groups. *t* indicates the *t*-value, *df* refers to the degrees of freedom, and Sig. (2-tailed) indicates the significance level. Six skills, highlighted in yellow, illustrate $t(11) < 0.001$, suggesting a significant difference. The rest of the skills point to a small difference.

Paired Samples Test								
The skills before and after intervention	**Paired Differences**					**t**	**df**	**Sig. (2-tailed)**
	Mean	**Std. Deviation**	**Std. Error Mean**	**95% Confidence Interval of the Difference**				
				Lower	**Upper**			
The ability to determine the purpose of lecture	-.33	.65	.19	-.75	.08	-1.77	11	.10
The ability to define the content of lecture	-.50	.67	.19	-.93	-.07	-2.57	11	.03
The ability to present Introduction (to gains the learners attention and provides the framework)	-1.08	.90	.26	-1.66	-.51	-4.17	11	.00
The ability to present Explaining (clarifies concepts and terms when presenting information)	-.50	.52	.15	-.83	-.17	-3.32	11	.01
The ability to present Summarizing (emphasize the key points were presented in the lecture)	-.58	.90	.26	-1.16	-.01	-2.24	11	.05
The ability to utilise questioning, exampling, comparing, and contrasting	-.67	.89	.26	-1.23	-.10	-2.60	11	.03
The ability to create, edit, and choose the appropriate of audio aids and visual aids	-.92	.90	.26	-1.49	-.34	-3.53	11	.00
The ability to use the appropriate audio aids and visual aids to the content	-1.00	.85	.25	-1.54	-.46	-4.06	11	.00
The ability to involve activities for the learners to keep them awake	-.25	1.36	.39	-1.11	.61	-.64	11	.53
The ability to deal with devices that need it to create e-lecture	-1.58	1.44	.42	-2.50	-.67	-3.80	11	.00
The ability to deal with several applications for different purposes, which need it to create e-lecture	-1.58	1.44	.42	-2.50	-.67	-3.80	11	.00
The ability to create a presentation which may include it in e-lecture	-1.17	1.11	.32	-1.87	-.46	-3.63	11	.00
The ability to determine the appropriate pattern and size of the text	-.75	1.29	.37	-1.56	.07	-2.02	11	.07
The ability to contrast of colour between the text and the background	-.83	1.11	.32	-1.54	-.13	-2.60	11	.03

Table 23. Statistics for the average difference between the skills level before and after intervention for all groups in piloting study

University teachers' perceived skills level in creating e-lectures among groups

A one-way ANOVA test was used to study the impact of the educational environments (traditional, mobile, and flipped mobile) on the development of e-lecturing skills after the intervention. Table 24 illustrates the perceived skills level after the intervention for all the groups. The table indicates no statistically significant difference between the groups, as determined by one-way ANOVA. A Tukey post hoc test revealed that the significance value was higher than 0.05. In general, the skills improvement was statistically significantly higher for Groups B and C ($p = .112$).

Multiple Comparisons							
Tukey HSD							
Dependent Variable	**(I) Group code**	**(J) Group code**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
						Lower Bound	**Upper Bound**
The ability to determine the purpose of lecture	A	B	-.75	.50	.34	-2.15	.65
		C	.00	.50	1.00	-1.40	1.40
	B	A	.75	.50	.34	-.65	2.15
		C	.75	.50	.34	-.65	2.15
	C	A	.00	.50	1.00	-1.40	1.40
		B	-.75	.50	.34	-2.15	.65
The ability to define the content of lecture	A	B	-.50	.46	.54	-1.77	.77
		C	.25	.46	.85	-1.02	1.52
	B	A	.50	.46	.54	-.77	1.77
		C	.75	.46	.28	-.52	2.02
	C	A	-.25	.46	.85	-1.52	1.02
		B	-.75	.46	.28	-2.02	.52
The ability to present Introduction (to gains the learners attention and provides the framework)	A	B	.25	.39	.80	-.84	1.34
		C	.25	.39	.80	-.84	1.34
	B	A	-.25	.39	.80	-1.34	.84
		C	.00	.39	1.00	-1.09	1.09
	C	A	-.25	.39	.80	-1.34	.84
		B	.00	.39	1.00	-1.09	1.09
The ability to present Explaining (clarifies concepts and terms when presenting information)	A	B	-.50	.24	.14	-1.16	.16
		C	.00	.24	1.00	-.66	.66
	B	A	.50	.24	.14	-.16	1.16
		C	.50	.24	.14	-.16	1.16
	C	A	.00	.24	1.00	-.66	.66
		B	-.50	.24	.14	-1.16	.16
The ability to present Summarizing (emphasize the key points were presented in the lecture)	A	B	-.75	.44	.26	-1.98	.48
		C	.25	.44	.84	-.98	1.48
	B	A	.75	.44	.26	-.48	1.98
		C	1.00	.44	.11	-.23	2.23
	C	A	-.25	.44	.84	-1.48	.98
		B	-1.00	.44	.11	-2.23	.23
The ability to utilise questioning, exampling, comparing, and contrasting	A	B	-1.00	.49	.15	-2.36	.36
		C	.00	.49	1.00	-1.36	1.36
	B	A	1.00	.49	.15	-.36	2.36
		C	1.00	.49	.15	-.36	2.36

	C	A	.00	.49	1.00	-1.36	1.36
		B	-1.00	.49	.15	-2.36	.36
The ability to create, edit, and choose the appropriate of audio aids and visual aids	A	B	-.50	.49	.58	-1.86	.86
		C	.00	.49	1.00	-1.36	1.36
	B	A	.50	.49	.58	-.86	1.86
		C	.50	.49	.58	-.86	1.86
	C	A	.00	.49	1.00	-1.36	1.36
		B	-.50	.49	.58	-1.86	.86
The ability to use the appropriate audio aids and visual aids to the content	A	B	-.50	.49	.58	-1.86	.86
		C	.00	.49	1.00	-1.36	1.36
	B	A	.50	.49	.58	-.86	1.86
		C	.50	.49	.58	-.86	1.86
	C	A	.00	.49	1.00	-1.36	1.36
		B	-.50	.49	.58	-1.86	.86
The ability to involve activities for the learners to keep them awake	A	B	.00	.55	1.00	-1.54	1.54
		C	-.25	.55	.90	-1.79	1.29
	B	A	.00	.55	1.00	-1.54	1.54
		C	-.25	.55	.90	-1.79	1.29
	C	A	.25	.55	.90	-1.29	1.79
		B	.25	.55	.90	-1.29	1.79
The ability to deal with devices that need it to create e-lecture	A	B	-.25	.50	.87	-1.65	1.15
		C	.00	.50	1.00	-1.40	1.40
	B	A	.25	.50	.87	-1.15	1.65
		C	.25	.50	.87	-1.15	1.65
	C	A	.00	.50	1.00	-1.40	1.40
		B	-.2	.50	.87	-1.65	1.15
The ability to deal with several applications for different purposes, which need it to create e-lecture	A	B	-.50	.46	.54	-1.77	.77
		C	-.25	.46	.85	-1.52	1.02
	B	A	.50	.46	.54	-.77	1.77
		C	.25	.46	.85	-1.02	1.52
	C	A	.25	.46	.85	-1.02	1.52
		B	-.25	.46	.85	-1.52	1.02
The ability to create a presentation which may include it in e-lecture	A	B	-.75	.39	.19	-1.84	.34
		C	-.75	.39	.19	-1.84	.34
	B	A	.75	.39	.19	-.34	1.84
		C	.00	.39	1.00	-1.09	1.09
	C	A	.75	.39	.19	-.34	1.84
		B	.00	.39	1.00	-1.09	1.09
The ability to determine the appropriate pattern and size of the text	A	B	.00	.39	1.00	-1.09	1.09
		C	.25	.39	.80	-.84	1.34
	B	A	.00	.39	1.00	-1.09	1.09
		C	.25	.39	.80	-.84	1.34
	C	A	-.25	.39	.80	-1.34	.84
		B	-.25	.39	.80	-1.34	.84
The ability to contrast of colour between the text and the background	A	B	-.25	.37	.79	-1.29	.79
		C	.25	.37	.79	-.79	1.29
	B	A	.25	.37	.79	-.79	1.29
		C	.50	.37	.41	-.54	1.54
	C	A	-.25	.37	.79	-1.29	.79
		B	-.50	.37	.41	-1.54	.54

Table 24. Statistics for the persevered skills among groups in piloting study

Appendix D

University teachers' actual skills level in creating e-lectures in each group

To this end, Paired-Samples T-test was used to analyse the evaluation product card for all the groups before and after the intervention. The test was also used to compare the level of actual skills in producing e-lectures after training among all the groups. Table 25 demonstrates correlation *r* between the skills level before and after the intervention for all the groups. All of the *r* scores are significantly positively correlated.

Paired Samples Correlations					
		Mean	N	Correlation	Sig.
The ability to determine the purpose of lecture	Before	2.33	12	.30	.35
	After	3.42	12		
The ability to define the content of lecture	Before	2.08	12	.27	.39
	After	3.33			
The ability to present Introduction (to gains the learners attention and provides the framework)	Before	2.25	12	.28	.38
	After	3.42			
The ability to present Explaining (clarifies concepts and terms when presenting information)	Before	2.17	12	.47	.12
	After	3.08			
The ability to present Summarizing (emphasize the key points were presented in the lecture)	Before	2.33	12	.41	.19
	After	3.42			
The ability to utilise questioning, exampling, comparing, and contrasting	Before	2.67	12	.44	.15
	After	3.50			
The ability to create, edit, and choose the appropriate of audio aids and visual aids	Before	2.33	12	.48	.12
	After	3.17			
The ability to use the appropriate audio aids and visual aids to the content	Before	2.17	12	.63	.03
	After	3.17			
The ability to involve activities for the learners to keep them awake	Before	1.83	12	.47	.12
	After	3.25			
The ability to deal with devices that need it to create e-lecture	Before	2.17	12	.59	.04
	After	3.08			
The ability to deal with several applications for different purposes, which need it to create e-lecture	Before	2.67	12	.73	.01
	After	3.58			
The ability to create a presentation which may include it in e-lecture	Before	2.75	12	.48	.11
	After	3.67			
The ability to determine the appropriate pattern and size of the text	Before	2.67	12	.66	.02
	After	3.67			
The ability to contrast of colour between the text and the background	Before	2.75	12	.66	.02
	After	3.67			

Table 25. Statistics for the correlation between the real skills before and after the intervention in piloting study

Table 26 shows the average difference between the actual skills level before and after the intervention for all the groups. The mean was t(11) ≤ 0.001, suggesting a significant difference. The rest of the skills indicate a small difference.

Paired Samples Test								
The skills before and after intervention	**Paired Differences**					**t**	**df**	**Sig. (2-tailed)**
	Mean	**Std. Deviation**	**Std. Error Mean**	**95% Confidence Interval of the Difference**				
				Lower	**Upper**			
The ability to determine the purpose of lecture	-1.08	1.08	.31	-1.77	-.39	-3.46	11	.005
The ability to define the content of lecture	-1.25	1.14	.33	-1.97	-.53	-3.80	11	.003
The ability to present Introduction (to gains the learners attention and provides the framework)	-1.17	1.19	.34	-1.92	-.41	-3.39	11	.006
The ability to present Explaining (clarifies concepts and terms when presenting information)	-.92	.90	.26	-1.49	-.34	-3.53	11	.005
The ability to present Summarizing (emphasize the key points were presented in the lecture)	-1.08	1.08	.31	-1.77	-.39	-3.46	11	.005
The ability to utilise questioning, exampling, comparing, and contrasting	-.83	1.11	.32	-1.54	-.13	-2.59	11	.025
The ability to create, edit, and choose the appropriate of audio aids and visual aids	-.83	.83	.24	-1.36	-.30	-3.46	11	.005
The ability to use the appropriate audio aids and visual aids to the content	-1.00	.85	.25	-1.54	-.46	-4.06	11	.002
The ability to involve activities for the learners to keep them awake	-1.42	1.08	.31	-2.11	-.73	-4.53	11	.001
The ability to deal with devices that need it to create e-lecture	-.92	.90	.26	-1.49	-.34	-3.53	11	.005
The ability to deal with several applications for different purposes, which need it to create e-lecture	-.92	.67	.19	-1.34	-.49	-4.75	11	.001
The ability to create a presentation which may include it in e-lecture	-.92	.79	.23	-1.42	-.41	-4.01	11	.002
The ability to determine the appropriate pattern and size of the text	-1.00	.74	.21	-1.47	-.53	-4.69	11	.001
The ability to contrast of colour between the text and the background	-.92	.79	.23	-1.42	-.41	-4.00	11	.002

Table 26. Statistics for the average difference between the real skills level before and after intervention for all groups in piloting study

University teachers' actual skills level in creating e-lectures among the groups

A one-way ANOVA test was used to study the impact of the educational environments (traditional, mobile, and flipped mobile) on the development of the actual e-lecturing skills after the intervention. Table 27 illustrates the actual skills level after the intervention for all the groups. The table shows that there was no statistically significant difference between the groups, as determined by one-way ANOVA. A Tukey post hoc test revealed that the significance value was higher than 0.05. In general, the skills improvement was statistically significantly higher for Group A (p = .07).

Multiple Comparisons							
Tukey HSD							
Dependent Variable	**(I) Group code**	**(J) Group code**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
						Lower Bound	**Upper Bound**
The ability to determine the purpose of lecture	A	B	1.00	.39	.07	-.09	2.09
		C	.75	.39	.19	-.34	1.84
	B	A	-1.00	.39	.07	-2.09	.09
		C	-.25	.39	.80	-1.34	.84
	C	A	-.75	.39	.19	-1.84	.34
		B	.25	.39	.80	-.84	1.34
The ability to define the content of lecture	A	B	.50	.65	.73	-1.30	2.30
		C	.75	.65	.50	-1.05	2.55
	B	A	-.50	.65	.73	-2.30	1.30
		C	.25	.65	.92	-1.55	2.05
	C	A	-.75	.65	.50	-2.55	1.05
		B	-.25	.65	.92	-2.05	1.55
The ability to present Introduction (to gains the learners attention and provides the framework)	A	B	.75	.51	.35	-.68	2.18
		C	1.00	.51	.18	-.43	2.43
	B	A	-.75	.51	.35	-2.18	.68
		C	.25	.51	.88	-1.18	1.68
	C	A	-1.00	.51	.18	-2.43	.43
		B	-.25	.51	.88	-1.68	1.18
The ability to present Explaining (clarifies concepts and terms when presenting information)	A	B	.50	.57	.66	-1.08	2.08
		C	.75	.57	.42	-.83	2.33
	B	A	-.50	.57	.66	-2.08	1.08
		C	.25	.57	.90	-1.33	1.83
	C	A	-.75	.57	.42	-2.33	.83
		B	-.25	.57	.90	-1.83	1.33
The ability to present Summarizing (emphasize the key points were presented in the lecture)	A	B	.50	.57	.66	-1.08	2.08
		C	1.25	.57	.12	-.33	2.83
	B	A	-.50	.57	.66	-2.08	1.08
		C	.75	.57	.42	-.83	2.33
	C	A	-1.25	.57	.12	-2.83	.33
		B	-.75	.57	.42	-2.33	.83
The ability to utilise questioning, exampling, comparing, and contrasting	A	B	.00	.53	1.00	-1.47	1.47
		C	.00	.53	1.00	-1.47	1.47
	B	A	.00	.53	1.00	-1.47	1.47
		C	.00	.53	1.00	-1.47	1.47

	C	A	.00	.53	1.00	-1.47	1.47
		B	.00	.53	1.00	-1.47	1.47
The ability to create, edit, and choose the appropriate of audio aids and visual aids	A	B	.50	.53	.63	-.97	1.97
		C	.50	.53	.63	-.97	1.97
	B	A	-.50	.53	.63	-1.97	.97
		C	.00	.53	1.00	-1.47	1.47
	C	A	-.50	.53	.63	-1.97	.97
		B	.00	.53	1.00	-1.47	1.47
The ability to use the appropriate audio aids and visual aids to the content	A	B	.50	.71	.77	-1.47	2.47
		C	.50	.71	.77	-1.47	2.47
	B	A	-.50	.71	.77	-2.47	1.47
		C	.00	.71	1.00	-1.97	1.97
	C	A	-.50	.71	.77	-2.47	1.47
		B	.00	.71	1.00	-1.97	1.97
The ability to involve activities for the learners to keep them awake	A	B	-.50	.87	.84	-2.94	1.94
		C	-.25	.87	.96	-2.69	2.19
	B	A	.50	.87	.84	-1.94	2.94
		C	.25	.87	.96	-2.19	2.69
	C	A	.25	.87	.96	-2.19	2.69
		B	-.25	.87	.96	-2.69	2.19
The ability to deal with devices that need it to create e-lecture	A	B	-1.25	.90	.38	-3.76	1.26
		C	-.75	.90	.69	-3.26	1.76
	B	A	1.25	.90	.38	-1.26	3.76
		C	.50	.90	.85	-2.01	3.01
	C	A	.75	.90	.69	-1.76	3.26
		B	-.50	.90	.85	-3.01	2.01
The ability to deal with several applications for different purposes, which need it to create e-lecture	A	B	-.50	.49	.58	-1.86	.86
		C	-.50	.49	.58	-1.86	.86
	B	A	.50	.49	.58	-.86	1.86
		C	.00	.49	1.00	-1.36	1.36
	C	A	.50	.49	.58	-.86	1.86
		B	.00	.49	1.00	-1.36	1.36
The ability to create a presentation which may include it in e-lecture	A	B	.25	.46	.85	-1.02	1.52
		C	-.50	.46	.54	-1.77	.77
	B	A	-.25	.46	.85	-1.52	1.02
		C	-.75	.46	.28	-2.02	.52
	C	A	.50	.46	.54	-.77	1.77
		B	.75	.46	.28	-.52	2.02
The ability to determine the appropriate pattern and size of the text	A	B	-.50	.44	.52	-1.73	.73
		C	-.75	.44	.26	-1.98	.48
	B	A	.50	.44	.52	-.73	1.73
		C	-.25	.44	.84	-1.48	.98
	C	A	.75	.44	.26	-.48	1.98
		B	.25	.44	.84	-.98	1.48
The ability to contrast of colour between the text and the background	A	B	-.50	.44	.52	-1.73	.73
		C	-.75	.44	.26	-1.98	.48
	B	A	.50	.44	.52	-.73	1.73
		C	-.25	.44	.84	-1.48	.98
	C	A	.75	.44	.26	-.48	1.98
		B	.25	.44	.84	-.98	1.48

Table 27. Statistics for the real skills among groups in piloting study

University teachers' perceptions of training environment in CPD

The data were gathered from the second and third parts of the pre-training questionnaire and the semi-structured interview. Table 28 shows the participants' experiences of CPD and training environments. The results showed that 50% of the participants preferred to attend the training sessions early in the morning (9−11), while 17% preferred other times. Mobile learning environment was the most suitable training session to attend by 50%, while the flipped environment was the least preferred one with 17%. The traditional learning environment was the most common type of training environment (56%), in contrast to 11% for the flipped environment. Only two participants attended more than five training sessions during a semester, and the same number attended only one training session. However, 42% thought that the number of training courses attended during a semester was insufficient, whereas 17% thought the opposite. About 50% agreed that the number of the training courses presented during a semester should increase, with 24% demanding courses in teaching methods and quality, with another 18% requesting courses in how to integrate technology with education practice.

Surprisingly, 75% had the intention of attending a training course but were unable to during a semester for several reasons. For example, the responsibility of teaching several courses was the most common reason (58%), followed by the timing of the training programmes (41%) and the traditional training methods used in the training sessions (33%). Around 75% did not attend any training courses on mobile learning, while 92% did not attend any training courses on flipped learning. About 83% did not provide any educational activities via mobile learning, and 92% did not provide any educational activities via flipped learning. However, 67% expressed a desire to attend a training session on and via flipped mobile learning environment. Finally, 75% of the participants did not present any e-lectures and around 92% did not attend any training courses about creating e-lectures. Table 29 presents the participants' perceptions of each intervention in detail.

1) *Most suitable time to attend a training session is				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Early morning (9-11)	6	50.0	50.0	50.0
Late morning (11-1)	2	16.7	16.7	66.7
Early evening (3-5)	2	16.7	16.7	83.3
Late evening (5-7)	2	16.7	16.7	100.0
Total	**12**	**100.0**	**100.0**	
2) *Most suitable place to attend a training session is				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Traditional learning environment	4	33.3	33.3	100.0
Flipped learning environment	2	16.7	16.7	100.0

Mobile learning environment	6	50.0	50.0	100.0
Total	**12**	**100.0**	**100.0**	
3) *Which type of training environment have you experienced before				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Traditional learning environment	10	55.56	55.56	100.0
Flipped learning environment	2	11.11	11.11	100.0
Mobile learning environment	6	33.33	33.33	100.0
Total	**18**	**100.0**	**100.0**	
4) Number of training courses or workshop attended during a semester				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
1	2	16.7	16.7	16.7
2	3	25.0	25.0	41.7
3	2	16.7	16.7	58.3
4	3	25.0	25.0	83.3
More than 5	2	16.7	16.7	100.0
Total	**12**	**100.0**	**100.0**	
5) Number of training courses or workshop attended during a semester is sufficient				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
No	5	41.7	41.7	41.7
I don't know	5	41.7	41.7	83.3
Yes	2	16.7	16.7	100.0
Total	**12**	**100.0**	**100.0**	
6) Number of training courses or workshop presented during a semester could be more				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
No	1	8.3	8.3	8.3
I don't know	5	41.7	41.7	50.0
Yes	6	50.0	50.0	100.0
Total	**12**	**100.0**	**100.0**	
7) The extra training courses or workshop that is presented should be in the topic				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Improve teacher	1	5.88	5.88	100.0
teaching methods	4	23.53	23.53	100.0
Scientific search	2	11.76	11.76	100.0
The quality	4	23.53	23.53	100.0
How adopting technology within education practice	3	17.66	17.66	100.0
EL	2	11.76	11.76	100.0
How design the perfect lesson	1	5.88	5.88	100.0
Total	**17**	**100.0**	**100.0**	
8) Number of training courses or workshops you wanted to attend but were unable to attend during a semester				

	Frequency	Percent	Valid Percent	Cumulative Percent
0	3	25.0	25.0	25.0
1	1	8.3	8.3	33.3
2	4	33.3	33.3	66.7
3	2	16.7	16.7	83.3
4	1	8.3	8.3	91.7
More than 5 workshops	1	8.3	8.3	100.0
Total	**12**	**100.0**	**100.0**	
9) *Reason for not attending				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Due to the responsibility of covering and teaching several curriculums	7	58.3	58.3	100.0
Due to a high number of teaching hours	3	25.0	25.0	100.0
Due to several numbers of administrative tasks	2	16.7	16.7	100.0
Timing of implementation of training programs is not suitable	5	41.7	41.7	100.0
The place of implementation of training programs is not suitable	2	16.7	16.7	100.0
The topic of implementation of training programs is not suitable	1	8.3	8.3	100.0
Due to traditional training methods used in training sessions	4	33.3	33.3	100.0
Due to the lack of training programs that fit the needs of faculty members	2	16.7	16.7	100.0
Due to the fact of that training programs focus on theoretical aspects and neglect practical aspects	2	16.7	16.7	100.0
Total	**28**	**100.0**	**100.0**	
10) Have you attended any training courses or workshops about mobile learning				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
No	9	75.0	75.0	75.0
Yes	3	25.0	25.0	100.0
Total	**12**	**100.0**	**100.0**	
11) Have you provided any educational activities via mobile learning environment				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
No	10	83.3	83.3	83.3
Yes	2	16.7	16.7	100.0
Total	**12**	**100.0**	**100.0**	
12) Have you attended any training courses or workshops about flipped learning				

	Frequency	Percent	Valid Percent	Cumulative Percent
No	11	91.7	91.7	91.7
Yes	1	8.3	8.3	100.0
Total	**12**	**100.0**	**100.0**	
13) Have you provided any educational activities via flipped learning environment				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
No	11	91.7	91.7	91.7
Yes	1	8.3	8.3	100.0
Total	**12**	**100.0**	**100.0**	
14) Do you prefer to attend a training session via flipped mobile learning environment				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
I don't know	4	33.3	33.3	33.3
Yes	8	66.7	66.7	100.0
Total	**12**	**100.0**	**100.0**	
15) Do you prefer to attend a training session about flipped mobile learning environment				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
No	1	8.3	8.3	8.3
I don't know	3	25.0	25.0	33.3
Yes	8	66.7	66.7	100.0
Total	**12**	**100.0**	**100.0**	
16) Have you ever present an electronic lecture				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
No	9	75.0	75.0	75.0
Yes	3	25.0	25.0	100.0
Total	**12**	**100.0**	**100.0**	
17) Have you attended any training courses or workshops about creating electronic lectures				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
No	11	91.7	91.7	91.7
Yes	1	8.3	8.3	100.0
Total	**12**	**100.0**	**100.0**	

Table 28. The participants' experiences with CPD and training environment in piloting study

Questions	Answers		
	Participant number 400 from Group A (traditional environment)	**Participant number 800 from Group B (mobile environment)**	**Participant number 1200 from Group C (flipped mobile environment)**
How do you describe your relationship with technology?	I love technology so much.	I love technology but not much. I love to use it, learn about what I want to learn about technology. I attended an online workshop about e-learning and its benefits. It was via Collaprete website.	I think technology has become essential to our life. I use technology for everything whether for me or for my family. Any question I don't know the answer to, technology provides me with the answer.
Talk about your experiences in using technology during the teaching process. Do you employ technology in the education process- or only use it in everyday life situations? Why?	Yes, I use technology in the teaching process. I think technology is an enjoyable way for learners in the 21st century. Also, technology facilitates information for learners.	I used to use the traditional method but a few months ago, I used an educational video from YouTube to explain some concepts of a lesson. I would like to change my method to the best if there is another alternative, but the problem is in my major, which is Statistics. It is easy to write symbols on a traditional board. It is difficult to use any technological devices to create a presentation, video, or e-lecture with these symbols. As well, academics face the problem of having a lot of administrative tasks.	Unfortunately, I don't use technology in teaching practice, although I use it in the everyday life. May be because the university does not support us or provide training for teachers in the use of technology in education.
What types of mobile devices did you utilise in the experiment? ○ **Smart Phone** ○ **Tablet** ○ **Laptop**	Smart phone	Laptop	Laptop

○ **Personal Media Players** ○ **Digital media players** ○ **Personal Digital Assistant (PDA)** ○ **Other…………..**			
What applications did you utilise in the experiment and what were their aims?	Video maker to create video	Because I used technology in education practice a few months ago, I used PowerPoint now.	PowerPoint (I can create video by adding photos, audios, text, animations by one app). I also used video maker.
What is your perception of the experiment?	Normal. I like the content, where it was new to me. I have not heard about e-lectures before.	I like Acadox but as I mentioned previously, my major does not allow me to use this environment with students. Perhaps I will use it with the theoretical parts of the curriculum and the traditional environment with these statistical symbols. Of course, students will like the new environment and the diversity in environments to have knowledge instead of just the classroom	I like this new method of training. Acadox app is easy. The information is presented nicely in the video, but I think it was presented quickly. I can pause it to understand and read the text.
Did you like the training method? Why?	It was the regular environment. I used to attend workshops via traditional classroom. To be honest, I attended two workshops through Rawaq application, it was interesting more than the regular training (sorry this is my opinion)	Yes. I attended a training session last month online via Collaprete website and now attending your training session via Acadox app. Both of them were the best training. I attended while I was at home. In your environment, I watched the content several times and can download it whenever and wherever I want.	I totally agree with this method. I think this method will encourage academics to attend several training courses without any barrier of time, place, or having my children with me. I will be the first one to use this if this environment is applied. I believe if the HE institutions offer opportunities for academic to have training about this method and how to use it with students, this will reflect on students, their motivations, and their responsibility towards learning.

Could you mention three benefits of using this method in training?	Direct interaction between teacher and students.	Allow the learner to learn in the preferred time and in the preferred place.	1) Encourage the teacher to take responsibility for learning 2) Encourage the teacher to improve the self without any barrier of place or time 3) Raise teacher confidence
Could you mention three difficulties you encountered while using this method in training?	The issue of limitation of people attending.	This is the first time using this application.	1) I think the difficulty in awareness about FML and encourage teachers to use it. Where some teachers will see this method as an additional burden 2) I think if FML is applied, the educational institution may need to provide incentives for those who use it. So, they will have motivation to employ it 3) The issue of access to Internet 4) The lack of technological background specially those teachers who don't like technology
Do you have any suggestions on how the continuing professional development programme could be improved?	1) It should emphasis the need of training from the UQU academics 2) Presenting the workshop via variety environments	Presenting the workshop via several environments (online, via mobile or traditional classroom). When I attended e-learning workshop, the presenter mentioned the virtual classroom, it is a smart idea to use this type of classes to train academics who have curriculums and several administrative tasks.	1) I think FML will be effective in CPD 2) Focus on the practical training to improve skills. It's enough to provide theoretical courses
What was the most interesting activity?	The discussion	The whole session.	I can say I like the whole session

What was the most un interesting activity?	Nothing	Nothing.	At the beginning, I thought it would be difficult. After watching the video, I thought it was wonderful.
For Group C only: **1) Have you ever attended a session via mobile?** **2) Have you ever presented a session via mobile?** **3) Have you ever attended a session via flipped method?** **4) Have you ever presented a session via flipped method?** **5) Do you think FML will be an effective method to utilise with students?** **6) Do you think there are limitations to employing this method at UQU?**			1) No 2) No 3) No 4) No 5) Yes, I think it will be effective with students. 6) As I mentioned, some teachers will see FML as an additional burden. Some teachers will not accept the new environment because they are familiar with the traditional environment or may be the traditional does not require much effort in preparation. FML requires preparing them self and creating a video.
For Group A and B only: **If you have the opportunity to attend training provided by the trainer through any application on a mobile device (e.g. Acadox application or any other application that is used as**	1)The students will enjoy learning from their devices and from a new environment. The students will also prepare themselves before class. 2) As long as its new, it will face several difficulties. Some students will not accept that environment. As you know, the Internet is not reliable.	1) I think this environment which you called FML will enrich class time by questioning the learners' ability. There was not enough time to discuss in the workshops that I attended. When learners watch a video, they will have to wait for a long period until training is over. As for me, I do not need to wait and	

an educational platform) to trainees prior to attending the training session. **The trainees will watch a recorded video before the class, whereas class time will be used to solve complex concepts and answer questions.** **This environment is defined as flipped mobile learning environment (FML).** **Could you please think about this environment and answer some questions?** **1) Can you mention three benefits you may obtain by using this method in training/ teaching?** **2) Can you mention three difficulties you may encounter by using this method in training/ teaching?** **3) What do you think about the possibility of**	3) By apply FML, the teacher can evaluate that environment and be able to ask students questions when necessary. 4) It is important that academics are aware of FML. Then, through workshops learn about how academics perceive FML.	can search for the information I need. Self-study is known to help learners store information to acquire for a long period. 2) I do not know about difficulties, but I would say there are challenges. The question of time to create a good video may challenge me if I use FML with my students. I must choose an effective activity to attract students. Of course, I need to learn about several programs that help me to deal with FML and create e-lecture. There is also the problem of accessing the Internet and the ability to access devices. 3) Using FML is possible but if teachers are faced with challenges, staff from computing technology should be available to assist. 4) Yes, but limitations related to academics such as teaching 5 different curriculums, several administrative tasks, and the huge number of students	

using FML in teaching students? **4) Do you think there are limitations to applying this environment at UQU?**			

Table 29. The interview in piloting study

Appendix E Ethics approval email for main study

Approved by Faculty Ethics Committee - ERGO II 48268

Wed 08/05/2019 13:25

To:

Khayat D.O.S.

Inbox

Approved by Faculty Ethics Committee - ERGO II 48268

UNIVERSITY OF Southampton

ERGO II – Ethics and Research Governance Online https://www.ergo2.soton.ac.uk

Submission ID: 48268
Submission Title: The Impact of Using a Flipped Mobile Learning Environment on the Development of Skills for Creating Electronic Lectures among Female Faculty Members in the Kingdom of Saudi Arabia
Submitter Name: Dalya Khayat

Your submission has now been approved by the Faculty Ethics Committee. You can begin your research unless you are still awaiting any other reviews or conditions of your approval.

Comments:

- I think the issues have been dealt with successfully. Two minor points: 1/ this demands a lot of the participants. Will the administration of UQU be encouraging participation? 2/ the English is sometimes a bit shaky -- As the material will be in Arabic, I presume this does not matter.

Click here to view the submission

TId: 23011_Email_to_submitter___Approval_from_Faculty_Ethics_committee__cat_B___C_ Id: 135992

D.O.S.Khayat@soton.ac.uk coordinator

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Appendix F Reliability statistics for all data collection methods

Reliability Statistics			
Reliability Statistics for:		**Cronbach's Alpha**	**N of Items**
Pre- training questionnaire	In pilot study	0.7 (Acceptable)	15
	In real study	0.9 (Excellent)	14
Post- training questionnaire	In pilot study	0.8 (Good)	15
	In real study	0.9 (Excellent)	14
Pre- evaluation product card	In pilot study	0.9 (Excellent)	15
	In real study	0.9 (Excellent)	14
Post- evaluation product card	In pilot study	0.8 (Good)	15
	In real study	0.8 (Good)	14

Table 30. Reliability statistics for all data collection methods

Appendix G Emails sent to Group A and B before the intervention (with translation)

استبيان قبل التدريب للمجموعه A

عزيزتي المتدربه...

اسعد الله مسائك بكل خير...

اشكرك على قبولك للمساهمه في هذه الدراسه البحثيه واقدر لك وقتك الثمين.
مرفق لك رابط الاستبيان الذي يهدف لجمع بعض المعلومات الاساسيه والتي سوف تستخدم فقط للأغراض الاكاديميه. الرابط سوف يعمل لمده اسبوع (من يوم الأحد ٢٦/٥/٢٠١٩ إلى يوم السبت ١/٦/٢٠١٩)
https://www.surveymonkey.com/r/GNVBDWN

ارجو منك فضلا لا أمرا الاجابه على الاستبيان أعلاه، ثم إرسال المحاضرة الالكترونيه على حسب معرفتك على هذا البريد الإلكتروني.
علما ان رمز المجموعه هو A.

أطيب الامنيات بالتوفيق...

الباحثه/ داليا خياط
Dalya Khayat
PhD Candidate
Southampton Education School
University of Southampton
Building 32 in North Bay

Dear trainee,

Thank you for accepting to participate in this research study and I appreciate your valuable time. Please see the questionnaire link below which aims to collect some background information that will only be used for academic purposes.
https://www.surveymonkey.com/r/GNVBDWN

Please kindly fill the above questionnaire, then send an e-lecture based on your knowledge on this email. The link will be active for one week **(from Sunday 26/5/2019 to Saturday 1/6/2019)**. Your group code is **A**.

Best wishes,

Researcher / Dalya Khayat

Figure 32. Email sent to Group A before the intervention (with translation)

استبيان قبل التدريب للمجموعه B

عزيزتي المتدربه...

اسعد الله مسائك بكل خير...

اشكرك على قبولك للمساهمه في هذه الدراسه البحثيه واقدر لك وقتك الثمين.
مرفق لك رابط الاستبيان الذي يهدف لجمع بعض المعلومات الاساسيه والتي سوف تستخدم فقط للأغراض الاكاديميه. الرابط سوف يعمل لمده اسبوع (من يوم الأحد ٢٦/٥/٢٠١٩ إلى يوم السبت ١/٦/٢٠١٩)
https://www.surveymonkey.com/r/GNVBDWN

ارجو منك فضلا لا أمرا الاجابه على الاستبيان أعلاه، ثم إرسال المحاضرة الالكترونيه على حسب معرفتك على هذا البريد الإلكتروني.
علما ان رمز المجموعه هو B.

أطيب الامنيات بالتوفيق...

الباحثه/ داليا خياط
Dalya Khayat
PhD Candidate
Southampton Education School
University of Southampton
Building 32 in North Bay

Dear trainee,

Thank you for accepting to participate in this research study and I appreciate your valuable time. Please see the questionnaire link below which aims to collect some background information that will only be used for academic purposes.
https://www.surveymonkey.com/r/GNVBDWN

Please kindly fill the above questionnaire, then send an e-lecture based on your knowledge on this email. The link will be active for one week **(from Sunday 26/5/2019 to Saturday 1/6/2019)**. Your group code is **B**.

Best wishes,

Researcher / Dalya Khayat

Figure 33. Email sent to Group B before the intervention (with translation)

Appendix H Emails sent to Group A and B to attend the training session (with translation)

دعوه للتدريب للمجموعه A

e-lecture (convert-video-onli...
32 MB

عزيزتي المتدربه..

اسعد الله مسائك بكل خير..

سيكون تقديم الدوره التدريبيه عن (المحاضره الإلكترونيه واهميتها في العمليه التعليميه) لمده اسبوعين. الجلسة الأولى سوف تكون يوم الاثنين الموافق ١٠ يونيو ٢٠١٩م في تمام الساعة العاشره صباحا، اما الجلسه الثانيه فسوف تكون يوم الاثنين الموافق ١٧ يونيو ٢٠١٩م في تمام الساعه الثانيه عشر ظهرا.
سيكون التدريب في مبنى (ي), قاعة (ورشة عمل٣).

فضلا.. يرجى الإطلاع على الفيديو المرفق قبيل حضورك التدريب بوقت كاف مع تسجيل:
١- ملخص حول المعلومات التي حصلت عليها من الفيديو
٢- اسئله حول محتوى الفيديو
٣- اسئله حول المعلومات التي لم يتسنى لك فهمها

أطيب الامنيات بالتوفيق...

الباحثه/ داليا خياط
Dalya Khayat
PhD Candidate
Southampton Education School
University of Southampton
Building 32 in North Bay

Dear trainee,

The training course about (Electronic Lecture and its Importance in the Educational Process) will be presented in two weeks. The first session will be on Monday 10th June 2019 at 10 a.m., and the second session will be on Monday 17th June 2019 at 12 p.m. The training will be presented in **Building Y, Hall (Workshop 3)**.

Please see the attached video in advance before attending the session then complete the following assignments:

1. Write a summary about the information you got from the video

2. Write questions about the video contents

3. Write questions about the information that you could not understand

Best wishes,

Figure 34. Email sent to Group A to attend the training session (with translation)

دعوه للتدريب للمجموعه B

اسعد الله مسائك بكل خير..

سيكون تقديم الدوره التدريبيه عن (المحاضره الإلكترونيه واهميتها في العمليه التعليميه) لمده اسبوعين. الجلسة الأولى سوف تكون يوم الثلاثاء ١١ يونيو ٢٠١٩م في تمام الساعة العاشره صباحا، اما الجلسه الثانيه فسوف تكون يوم الثلاثاء ١٨ يونيو ٢٠١٩م في تمام الساعه الثانيه عشر ظهرا.

سيكون التدريب عبر منصة اكادوكس (Acadox) من خلال الرابط: http://www.acadox.com/join/BAWH97
علما بأن رمز الدعوه هو: BAWH97

أطيب الامنيات بالتوفيق...

الباحثه/ داليا خياط
Dalya Khayat
PhD Candidate
Southampton Education School
University of Southampton
Building 32 in North Bay

Dear trainee,

The training course about (Electronic Lecture and its Importance in the Educational Process) will be presented in two weeks. The first session will be on Tuesday 11st June 2019 at 10 a.m., and the second session will be on Tuesday 18th June 2019 at 12 p.m. The training will be presented via Acadox platform, through the link:
http://www.acadox.com/join/BAWH97

The invitation code is: BAWH97

Best wishes,

Researcher / Dalya Khayat

Figure 35. Email sent to Group B to attend the training session (with translation)

Appendix I Arabic / English version of the pre-training questionnaire

<u>استبيان ما قبل التدريب</u>

<u>Pre-training questionnaire</u>

أثر استخدام بيئة تعلم متنقله مقلوبة في تطوير مهارات إنتاج محاضرة الكترونيه لدى عضوات هيئة التدريس بالمملكة العربية السعودية

The Impact of Using a Flipped Mobile Learning Environment on the Development of Skills for Creating Electronic Lectures among Female Faculty Members in the Kingdom of Saudi Arabia

معلومات البحث

Research Information Sheet

الباحثة الرئيسية:

داليا أسامه خياط

Main Researcher:

Dalya Osama Khayat

الغرض من الدراسة:

هذه الدراسة جزء من متطلبات الحصول على درجة الدكتوراه من كلية التربية بجامعة ساوثامبتون في المملكة المتحدة. يهدف هذا المشروع البحثي إلى الحصول على فهم أفضل للآثار المتصورة والفعلية للتعلم المقلوب، التعلم المتنقل، والتعلم المتنقل المقلوب (FML)في برامج التطوير المهني المستمر(CPD) على مهارات عضوات هيئة التدريس بالجامعات. بالإضافة إلى ذلك ، تسعى الدراسة إلى توفير فهم أفضل لاستخدام FML في التطوير المهني المستمر لزيادة استخدام المحاضرات الإلكترونية في دعم التدريس في مؤسسات التعليم العالي. يسعى هذا البحث أيضًا إلى استكشاف رأي عضوات هيئة التدريس بالجامعات (الاهتمامات, التحديات, والقدرة على التحمل) نحو استخدام FML.

Purpose of Study:

This study is part of the requirements for the Doctoral degree from the Education School, at the University of Southampton in the UK. The main aim of this research project is to gain a better understanding of the perceived and actual effects of flipped learning (FL), mobile learning (ML), and flipped mobile learning (FML) CPD on university tutors e-lecture skills. Additionally, the study seeks to provide a better understanding of the use of FML in continuing professional development to increase the use of e-lectures in supporting teaching in higher educational institutions. This research also seeks to explore university tutors’ opinion (concerns, challenges, and affordances) of using a FML.

إجراءات الدراسة:

إذا وافقت على المشاركة في هذه الدراسة، سيُطلب منك:

1. الاجابة على استبيان ما قبل التدريب. يجب عليك اختيار الرمز الذي تم إعطاؤه لك مسبقًا في قسم رمز المجموعة. يستغرق استكمال الاستبيان حوالي 20-15 دقيقة.
2. حضور اربعة جلسات تدريبية.
3. الاجابة على استبيان ما بعد التدريب. من المقدر أن يستغرق استكمال الاستبيان حوالي 10-15 دقيقة. يجب عليك اختيار نفس الرمز ، والذي تم تقديمه لك مسبقًا في قسم رمز المجموعة.
4. في حال موافقتك على إجراء مقابلة، سيُطلب منك الإجابة على أسئلة المقابلة. سيتم إبلاغك بكافة التفاصيل قبل جلسة المقابلة.

يشير مصطلح "التعلم التقليدي" إلى التدريب (أو التدريس) الذي يقدمه المدرب (أو المعلم) للمتدربين (أو المتعلمين) في وقت محدد في غرفة تدريب حقيقية.

يشير مصطلح "التعلم المقلوب" إلى التدريب (أو التدريس) المقدم قبل حضور الدورة التدريبية. يشاهد المتدربون (أو المتعلمون) مقطع فيديو مسجلًا قبل وقت الفصل الدراسي، في حين يتم استخدام وقت الفصل الدراسي في حل المفاهيم المعقدة والإجابة عن الأسئلة.

يشير مصطلح "التعلم المتنقل" إلى التدريب (أو التدريس) المقدم من المدرب (أو المعلم) إلى المتدربين (أو المتعلمين) من خلال تطبيق موجود في الجهاز النقال (الاجهزة النقاله مثل الاجهزة الذكية, الايباد, اللاب توب, وغيرها).

يشير مصطلح "التعلم المتنقل المقلوب" إلى التدريب (أو التدريس) المقدم قبل حضور الدورة التدريبية. يشاهد المتعلم مقطع فيديو مسجل من خلال تطبيق موجود في الجهاز المحمول قبل الفصل الدراسي. في حين يتم استخدام وقت الفصل الدراسي في حل المفاهيم المعقدة والإجابة عن الأسئلة. الفصل الدراسي ليس حقيقيا انما عبارة عن تطبيق موجود في الجهاز المحمول.

Study Procedures:

If you agree to take part in this study, you will be asked to:

1. Complete the pre-training questionnaire. You should choose the label, which is given to you in advance in the group label section. It will take approximately 15-20 minutes to complete the questionnaire.
2. Attend four training sessions.
3. Complete the post-training questionnaire. It is estimated that you will take about 10-15 minutes to complete the questionnaire. You should choose the same label, which was given to you in advance in the group label section.
4. In case you agree to take part in an interview, you will be asked to answer the interview questions. You will be informed prior to the interview session.

The term ‘Traditional learning’ refers to the training (or teaching) provided by the trainer (or teacher) to trainees (or learners) at a specific time in a real designated training room.

The term ‘Flipped learning’ refers to the training (or teaching) provides by the trainer to trainees (or learners) prior to attending the training session. The trainees watch a recorded video before the class while the class time used to solve complex concepts and answer questions. The training conducted in a real designated training room.

The term ‘Mobile learning’ refers to the training (or teaching) provided by the trainer (or teacher) to trainees (or learners) through an application on the mobile device (mobile devices such as smart phones, iPad, laptop, ….. etc).

The term ‘Flipped mobile learning’ refers to the training (or teaching) provided prior to attending the training session. The learner watches a recorded video before the class through an application on the mobile device, whereas the class time used to solve complex concepts, and answer questions. The training session conducted also through an application on the mobile device.

المشاركة:

من خلال استكمال هذا الاستبيان، فإنك توافق على المشاركة في هذه الدراسة. هذا البحث مخصص فقط لعضوات هيئة التدريس السعوديات في جامعة أم القرى بغض النظر عن الدرجات العلمية او التخصصات.

لا توجد اجابة صحيحه او اجابة خاطئة. إجاباتك سرية للغاية وسيتم استخدامها فقط للأغراض الأكاديمية.لا يمكن تحديد هوية أي شخص في هذه الدراسة أو معرفتها.

يرجى **الضغط على زر**موافق لإعطاء موافقتك والسماح ببدء الاستبيان.

Participation:

By completing this questionnaire, you are agreeing to participate in this study. Participation in this research is only for Saudi female university teachers (the academic staff) of Umm Al-Qura University from several academic positions and disciplines.

There is no right or wrong answer. Your responses will be strictly confidential and will be used only for academic purposes. Any participant can't be identified or be known.

Please **press the agree button** to give your consent and to start the questionnaire.

Appendix I

القسم الاول: معلومات عامه عنك

Section One: Information about you

Questions	***الاجابات Answers***					***الاسئلة***
	1 Strongly disagree **5** اوافق بشده	**2** Disagree **4** اوافق	**3** Neither disagree nor agree **3** محايد	**4** Agree **2** لا اوافق	**5** Strongly agree **1** لا اوافق بشده	
I accept technology						اتقبل التكنولوجيا
I have good background about technology						لدي خلفيه تكنولوجيه جيده

اذا كانت الاجابات مابين 3-5 فيسمح للمشاركه بمتابعة الاستبيان, خلاف ذلك سيتم اشعارها بالنتهاء الاستبيان وعدم انطباق معايير المشاركه عليها.

If the answers between 3-5, the participant is allowed to continue the questionnaire. Otherwise, she will be notified of the end of the questionnaire and the participation criteria don't apply her.

Questions		***Answers***	***الاجابة***	***السؤال***	
1.	Group Code:	☐A ☐B ☐C	A ☐ B ☐ C ☐	رمز المجموعة:	**(1**
2.	ID Number:	....	....	رقم المنسوب:	**(2**
3.	College (Faculty):	☐ College of Shari'ah 'Islamic Law' And Islamic Studies ☐ College of Da'wa 'Islamic Call' And Fundamentals of Religion ☐ College of Judicial Studies and The Regulations ☐ College of Applied Sciences ☐ College of Computers and Information Systems ☐ College of Medicine ☐ College of Applied Medical Sciences ☐ College of Dental Medicine ☐ College of Public Health and Health Informatics ☐ College of Pharmacy ☐ College of Nursing ☐ College of Arabic Language and Literature ☐ College of Education ☐ College of Social Sciences ☐ College of Design	☐كلية الشريعة والدراسات الإسلامية ☐كلية الدعوة واصول الدين ☐كلية الدراسات القضائية والقوانين والانظمة ☐كلية العلوم التطبيقية ☐كلية الحاسب الالي ونظم المعلومات ☐كلية الطب ☐كلية العلوم الطبية التطبيقية ☐كلية طب الاسنان ☐كلية الصحة العامة والمعلومات الصحية ☐كلية الصيدلة ☐كلية التمريض ☐كلية اللغة العربية والآداب ☐كلية التربية ☐كلية العلوم الاجتماعية ☐كلية التصاميم	الكلية:	**(3**
4.	Major:	....	....	التخصص:	**(4**
5.	Academic Position:	☐Teaching assistant ☐Lecturer ☐Assistant professor ☐Associate professor ☐Professor	☐معيد ☐محاضر ☐أستاذ مساعد ☐أستاذ مشارك ☐أستاذ	الدرجة العلمية:	**(5**
6.	Teaching Experience:	☐Less than a year ☐A year to less than 5 years ☐A 5 years to less than 10 years ☐A 10 years to less than 15 years	☐اقل من سنه ☐ من سنه الى اقل من 5 سنوات ☐ من 5 الى اقل من 10سنوات	خبرة التدريس:	**(6**

		□A 15 years to less than 20 years □More than 20 years	□ من 10 الى اقل من 15سنه □ من 15 الى اقل من 20سنه □اكثر من 20 سنه		
7.	The number of syllabi you teach in one semester:	□1 □2 □3 □4 □5 □6 □More than 6	1□ 2□ 3□ 4□ 5□ 6□ □اكثر من 6	عدد المقررات التي يتم تدريسها خلال الفصل الدراسي:	**(7**
8.	The number of teaching hours in one semester:	□3 □4 □5 □6 □7 □8 □9 □10 □More than 10	3□ 4□ 5□ 6□ 7□ 8□ 9□ 10□ □اكثر من 10	عدد الساعات التدريسية خلال الفصل الدراسي:	**(8**
9.	The number of the assigned administrative tasks in one semester (Deanship of Faculty, Head of Department, Membership of the committee,…):	□0 □1 □2 □3 □4 □5 □6	0□ 1□ 2□ 3□ 4□ 5□ 6□	عدد المهام الإدارية المكلفة بها خلال الفصل الدراسي (عمادة, الكلية، رئاسة القسم ، عضوية اللجنة ، ...):	**(9**

Appendix I

القسم الثاني: برامج التطوير المهني المستمر

Section Two: The Continuing Professional Development Programs

	Questions	*Answers*	*الاجابة*	*السؤال*	
1.	(You can choose more than an option) The suitable time to attend the training session is:	□Early morning (9-11) □Late morning (11-1) □Early evening (3-5) □Late evening (5-7)	□الصباح الباكر (9-11) □الصباح المتأخر (11-1) □المساء الباكر (3-5) □ المساء المتأخر (5-7)	(يمكنك اختيار أكثر من خيار) الوقت المناسب لحضور التدريب هو:	**1)**
2.	(You can choose more than an option) The suitable place to attend the training session is:	□Traditional learning environment □Flipped learning environment □Mobile learning environment □Flipped mobile learning environment □Others……………..	□بيئة تعلم تقليدية □بيئة تعلم مقلوبة □بيئة تعلم نقاله □بيئة تعلم نقاله مقلوبة □أخرى	(يمكنك اختيار أكثر من خيار) البيئة المناسبة للتدريب:	**2)**
3.	(You can choose more than an option) Which type of training environment have you experienced before?	□Traditional learning □Flipped learning □Mobile learning □Flipped mobile learning □Others…………	□بيئة تعلم تقليدية □بيئة تعلم مقلوبة □بيئة تعلم نقاله □بيئة تعلم نقاله مقلوبة □أخرى	(يمكنك اختيار أكثر من خيار) بيئة التدريب التي تم حضورها من قبل:	**3)**
4.	The number of training courses or workshops you have attended during a semester:	□Non □1 □2 □3 □4 □5 □More than 5 workshops, please add ………	□لا يوجد □1 □2 □3 □4 □5 □أكثر من 5 دورات تدريبية, ...	عدد الدورات التدريبية التي تم حضورها خلال الفصل الدراسي:	**4)**
5.	The number of training courses or workshops you have attended during a semester is sufficient:	□No □I don't know □Yes	□لا □لا أعلم □نعم	عدد الدورات التدريبية التي تم حضورها خلال الفصل الدراسي كافي:	**5)**
6.	The number of training courses or workshops presented during a semester should be more:	□No □I don't know □Yes	□لا □لا أعلم □نعم	عدد الدورات التدريبية التي يتم تقديمها خلال الفصل الدراسي يجب ان تكون اكثر:	**6)**
7.	If you have answered 'yes' to the previous question, what are your preferable workshops/ training courses?	……………….	……………….	اذا كانت الاجابة 'نعم' في السؤال السابق, فماهي مواضيع الدورات التدريبية التي ترغب بها:	**7)**
8.	The number of training courses or workshops that you wanted to attend but you were unable to attend during a semester:	□Non □1 □2 □3 □4 □5 □More than 5 workshops	□لا يوجد □1 □2 □3 □4 □5 □أكثر من 5 دورات تدريبية	عدد الدورات التدريبية التي كانت لك الرغبة في حضورها لكن لم تحضريها خلال الفصل الدراسي:	**8)**
9.	(You can choose more than an option) The reason for not attending:	□ Due to a high number of teaching hours	□بسبب كثرة عدد ساعات التدريس □بسبب كثرة عدد المهام الادارية	(يمكنك اختيار أكثر من خيار) اسباب عدم الحضور:	**9)**

		□ Due to several numbers of administrative tasks □ Timing of implementation of training programs is not suitable □ The place of implementation of training programs is not suitable □ Due to traditional training methods used in training sessions □ Due to the lack of training programs that fit the needs of faculty members □ Due to the fact that training programs focus on theoretical aspects and neglect practical aspects □ Others …	□بسبب ان وقت تنفيذ التدريب غير مناسب □بسبب ان مكان تنفيذ التدريب غير مناسب □بسبب الطريقة التقليدية المتبعة في التدريب □بسبب قلة البرامج التدريبية التي تناسب احتياج عضوات هيئة التدريس □بسبب ان البرامج التدريبية تركز على الجانب النظري وتهمل الجانب العملي □اخرى		

القسم الثالث: بيئات التعلم

Section Three: The learning environments

	Questions	*Answers*	*الاجابة*	*السؤال*	
1.	Have you attended any training courses or workshops about mobile learning?	□No □I don't know □Yes	□لا □لا أعلم □نعم	هل سبق وان حضرت أي دورات تدريبية أو ورش عمل حول التعلم المحمول؟	**(1**
2.	Have you provided any educational activities via a mobile learning environment?	□No □I don't know □Yes	□لا □لا أعلم □نعم	هل سبق وان قدمت أي أنشطة تعليمية عبر بيئة تعليمية متنقلة؟	**(2**
3.	Have you attended any training courses or workshops about flipped learning?	□No □I don't know □Yes	□لا □لا أعلم □نعم	هل سبق وان حضرت أي دورات تدريبية أو ورش عمل حول التعلم المقلوب؟	**(3**
4.	Have you provided any educational activities via a flipped learning environment?	□No □I don't know □Yes	□لا □لا أعلم □نعم	هل سبق وان قدمت أي أنشطة تعليمية عبر بيئة تعليمية مقلوبة؟	**(4**
5.	Do you prefer to attend a training session via a flipped mobile learning environment?	□No □I don't know □Yes	□لا □لا أعلم □نعم	هل تفضل حضور دورة تدريبية عبر بيئة التعلم النقال المقلوبة ؟	**(5**
6.	Do you prefer to attend a training session about flipped mobile learning environment?	□No □I don't know □Yes	□لا □لا أعلم □نعم	هل تفضل حضور دورة تدريبية حول بيئة التعلم النقال المقلوبة؟	**(6**
7.	Have you ever presented an electronic lecture?	□No □I don't know □Yes	□لا □لا أعلم □نعم	هل سبق وان قدمت محاضرة الكترونيه؟	**(7**
8.	Have you attended any training courses or workshops about creating electronic lectures?	□No □I don't know □Yes	□لا □لا أعلم □نعم	هل سبق وان حضرت أي دورات تدريبية أو ورش عمل حول إنشاء المحاضرات الإلكترونية؟	**(8**

القسم الرابع: مفهوم المحاضرات الإلكترونية والمهارات المطلوبة لإنتاجها

Section Four: The Concept of Electronic Lectures and Skills Needed to Produce an Electronic Lecture

الجزء أ: المهارات المطلوبة لإنتاج محاضرة إلكترونية

يرجى اختيار الإجابة المناسبة التي تصف مستوى مهاراتك في الأسئلة من 1 إلى 14 .

Part A: Skills Needed to Produce an Electronic Lecture

Please choose the appropriate answer that describe the level of your skills in questions 1-14.

Statement		الاجابات Answers					العبارة	
		1 Least inadequate 5 الاكثر ملائمه	2 Inadequate 4 اكثر ملائمه	3 Adequate 3 كافيه	4 More adequate 2غير كافيه	5 Most adequate 1 اقل من غير كافيه		
To what extent you master the following skills:							إلى أي مدى تتقني المهارات التالية:	
First: The skills of designing and organising the structure of the presentation ***I have the ability to….***							**أولا: مهارات تصميم وتنظيم مخطط العرض** ***لدي القدرة على......***	
1)	Determine the purpose of the e-lecture						تحديد الغرض من المحاضرة الإلكترونية	.1
2)	Determine the content of the e-lecture						تحديد محتوى المحاضرة الإلكترونية	.2
3)	Design an e-lecture framework in proportion to the characteristics of the learners						تصميم الاطار العام للمحاضرة الإلكترونية بما يتناسب وخصائص المتعلمين	.3
4)	Give an introduction to gain learners' attention						تقديم مقدمة تشد انتباه المتعلمين	.4
5)	Give an explanation to clarify concepts and terms when presenting information						تقديم شرح يوضح المفاهيم والمصطلحات عند تقديم المعلومات	.5
6)	Give a summary emphasise the key points presented during an e-lecture						تقديم ملخص يؤكد على النقاط الرئيسية التي قدّمت خلال المحاضرة الإلكترونية	.6
7)	Design the activities in proportion to the content of a lecture						تصميم الأنشطة بما يتناسب وطبيعة المحتوى	.7
8)	Design the activities in proportion to the characteristics of the learners						تصميم الأنشطة بما يتناسب وخصائص المتعلمين	.8

Second: The skills of creating the content of electronic lecture ***I have the ability to….***							**ثانيا: مهارات بناء محتوى المحاضرة الالكترونية** ***لدي القدرة على......***	
9)	Use the audio and visual aids appropriate to the content (text, picture, video, …)						استخدام الوسائل السمعية والبصرية المناسبة للمحتوى (نص, صور, فيديو, رسوم بيانيه, صور فيديو, ...)	.9
10)	Determine the appropriate time to present the used audio and visual aids						اختيار الوقت المناسب لعرض الوسائل السمعية والبصرية المستخدمة	.10
11)	Deal with devices needed to create an e-lecture						التعامل مع الأجهزة المستخدمة لإنشاء محاضرة إلكترونية	.11
12)	Deal with several applications which are needed to create an e-lecture						التعامل مع العديد من التطبيقات مختلفة الاغراض لإنشاء محاضرة إلكترونية	.12
13)	Create a presentation						انشاء العرض التقديمي	.13
Third: The skills of presenting an e-lecture ***I have the ability to….***							**ثالثا: مهارات عرض المحاضرة الإلكترونية** ***لدي القدرة على......***	
14)	Make the e-lecture interactive (by ask questions, or give examples, or compare and contrast)						جعل المحاضرة تفاعليه (إما بطرح الاسئلة, او ضرب الامثلة, او اجراء المقارنة والتباين)	.14

الجزء ب: إنتاج محاضرة إلكترونية

اقدر لكم وقتكم الثمين وارجو التكرم بإنتاج محاضرة الكترونيه وارسالها خلال اسبوع على البريد الالكتروني dalllo-3@hotmail.com

Part B: Production an Electronic Lecture

I appreciate your time, but please create an e-lecture and email it to dalllo-3@hotmail.com

لقد أكملت الاستبيان ، نشكرك على مساهمتك ونقدر لك تعاونك معنا في الدراسة

You have completed the questionnaire. Thank you for your contribution to the study and appreciate your cooperation

Appendix J Arabic / English version of the post-training questionnaire

استبيان ما بعد التدريب

Post-training questionnaire

أثر استخدام بيئة تعلم متنقله مقلوبة في تطوير مهارات إنتاج محاضرة الكترونيه لدى عضوات هيئة التدريس بالمملكة العربية السعودية

The Impact of Using a Flipped Mobile Learning Environment on the Development of Skills for Creating Electronic Lectures among Female Faculty Members in the Kingdom of Saudi Arabia

Appendix J

يرجى الإجابة على الأسئلة بصدق. لا توجد اجابة صحيحه او اجابة خاطئة. إجاباتك سرية للغاية وسيتم استخدامها فقط للأغراض الأكاديمية.

Please answer questions honestly. There is no right or wrong answer. Your responses will be strictly confidential and will be used only for academic purposes.

القسم الاول: التأكد من بياناتك

Section One: Check your Information

Group Code:	□**Group A** □**Group B** □**Group C**	رمز المجموعة:
Participant ID:	....	رقم المنسوب:

القسم الثاني: مفهوم المحاضرات الإلكترونية والمهارات المطلوبة لإنتاجها

Section Two: The Concept of Electronic Lectures and Skills Needed to Produce an Electronic Lecture

الجزء أ: يدور حول المهارات المطلوبة لإنتاج محاضرة إلكترونية

يرجى اختيار الإجابة المناسبة التي تصف مستوى مهاراتك بعد حضورك التدريب في الأسئلة من 1 إلى 14.

Part A: Skills Needed to Produce an Electronic Lecture

Please choose the appropriate answer that describe the level of your skills after attending the training course in questions 1-14.

	Statement	***الاجابات/ Answers***					***العبارة***	
		1 Least inadequate **5** الاكثر ملائمه	**2** Inadequate **4** اكثر ملائمه	**3** Adequate **3** كافيه	**4** More adequate **2**غير كافيه	**5** Most adequate **1** اقل من غير كافيه		
	To what extent you master the following skills:						**إلى أي مدى تتقني المهارات التالية:**	
	First: The skills of designing and organising the structure of the presentation ***I have the ability to….***						**أولا: مهارات تصميم وتنظيم مخطط العرض** ***لدي القدرة على......***	
1.	Determine the purpose of the e-lecture						تحديد الغرض من المحاضرة الإلكترونية	.1
2.	Determine the content of the e-lecture						تحدي محتوى المحاضرة الإلكترونية	.2
3.	Design an e-lecture framework in proportion to the characteristics of the learners						تصميم الاطار العام للمحاضرة الإلكترونية بما يتناسب وخصائص المتعلمين	.3
4.	Give an introduction to gain learners' attention						تقديم مقدمة تشد انتباه المتعلمين	.4
5.	Give an explanation to clarify concepts and terms when presenting information						تقديم شرح يوضح المفاهيم والمصطلحات عند تقديم المعلومات	.5
6.	Give a summary emphasise the						تقديم ملخص يؤكد على النقاط الرئيسية التي	.6

	key points presented during an e-lecture						قدّمت خلال المحاضرة الإلكترونية	
7.	Design the activities in proportion to the content of a lecture						تصميم الأنشطة بما يتناسب وطبيعة المحتوى	.7
8.	Design the activities in proportion to the characteristics of the learners						تصميم الأنشطة بما يتناسب وخصائص المتعلمين	.8
Second: The skills of creating the content of electronic lecture ***I have the ability to….***							**ثانيا: مهارات بناء محتوى المحاضرة الالكترونية** ***لدي القدرة على......***	
9.	Use the audio and visual aids appropriate to the content (text, picture, video, …)						استخدام الوسائل السمعية والبصرية المناسبة للمحتوى (نص, صور, فيديو, رسوم بيانيه, صور فيديو, ...)	.9
10.	Determine the appropriate ti me to present the used audio and visual aids						اختيار الوقت المناسب لعرض الوسائل السمعية والبصرية المستخدمة	.10
11.	Deal with devices needed to create an e-lecture						التعامل مع الأجهزة المستخدمة لإنشاء محاضرة إلكترونية	.11
12.	Deal with several applications which are needed to create an e-lecture						التعامل مع العديد من التطبيقات مختلفة الاغراض لإنشاء محاضرة إلكترونية	.12
13.	Create a presentation						انشاء العرض التقديمي	.13

Third: The skills of presenting an e-lecture ***I have the ability to….***							**ثالثا: مهارات عرض المحاضرة الإلكترونية** ***لدي القدرة على......***	
14.	Make the e-lecture interactive (by ask questions, or give examples, or compare and contrast)						جعل المحاضرة تفاعليه (إما بطرح الاسئلة, او ضرب الامثلة, او اجراء المقارنة والتباين)	.14

الجزء ب: إنتاج محاضرة إلكترونية

اقدر لكم وقتكم الثمين وارجو التكرم بالتعديل على المحاضرة الكترونيه المنتجة سابقا وارسالها خلال اسبوع على البريد الالكتروني dalllo-3@hotmail.com

Part B: Production an Electronic Lecture

I appreciate your time, but please revise the produced e-lecture and email it to dalllo-3@hotmail.com

يرجى **الاجابه بنعم أو لا** للموافقه على إجراء مقابله .

Please **answer Yes or No** to giving your consent and allowing you to interview.

لقد أكملت الاستبيان ، نشكرك على مساهمتك ونقدر لك تعاونك معنا في الدراسة

You have completed the questionnaire. Thank you for your contribution in the study and we appreciate your cooperation

Appendix K Arabic / English version of the pre- and post- evaluation product card

بطاقة تقييم منتج تستخدم بواسطة الباحثة فقط

Evaluation Product Card used by the researcher only

أثر استخدام بيئة تعلم متنقله مقلوبة في تطوير مهارات إنتاج محاضرة الكترونيه لدى عضوات هيئة التدريس بالمملكة العربية السعودية

The Impact of Using a Flipped Mobile Learning Environment on the Development of Skills for Creating Electronic Lectures among Female Faculty Members in the Kingdom of Saudi Arabia

Group Code:	□**Group A** □**Group B** □**Group C**	**رمز المجموعة:**
Time Measurement of Skills:	□Before intervention □After intervention	**وقت قياس المهارة:**
Participant ID:	…………………………	**رقم المنسوب:**

سوف يتم التعرف على تأثير بيئة التعلم النقال المقلوبة على تنمية مهارات إنتاج محاضرة إلكترونية من خلال تقييم المحاضرات المنتجة قبل التدخل وبعده.

The effect of the flipped mobile learning environment on the development of production skills of electronic lecture will be identified through the evaluation of lectures produced before and after the intervention.

Statement	Answers الاجابات					العبارة
	1 To a very low degree **5** الى درجه كبيرة جدا	**2** To a low degree **4** الى درجه كبيرة	**3** To a medium degree **3** الى درجه متوسطة	**4** To a large degree **2** الى درجه قليله	**5** To a very large degree **1** الى درجه قليله جدا	
To what extent did the trainee master the following skills:						إلى أي مدى اتقنت المتدربة المهارات التالية:
First: The skills of designing and organising the structure of the presentation *The participant has the ability to….*						**أولا: مهارات تصميم وتنظيم مخطط العرض** *لدى المتدربة القدرة على......*
1) Determine the aims of the e-lecture						**.1** تحديد اهداف المحاضرة الإلكترونية
2) Determine the content of the e-lecture						**.2** تحديد محتوى المحاضرة الإلكترونية
3) Design an e-lecture framework in proportion to the characteristics of the learners						**.3** تصميم الاطار العام للمحاضرة الإلكترونية بما يتناسب وخصائص المتعلمين
4) Give an introduction to gain learners' attention						**.4** تقديم مقدمة تشد انتباه المتعلمين
5) Give an explanation to clarify concepts and terms when presenting information						**.5** تقديم شرح يوضح المفاهيم والمصطلحات عند تقديم المعلومات
6) Give a summary emphasise the key points presented during an e-lecture						**.6** تقديم ملخص يؤكد على النقاط الرئيسية التي قدّمت خلال المحاضرة الإلكترونية
7) Design the activities in proportion to the content of a lecture						**.7** تصميم الأنشطة بما يتناسب وطبيعة المحتوى
8) Design the activities in proportion to the characteristics of the learners						**.8** تصميم الأنشطة بما يتناسب وخصائص المتعلمين
Second: The skills of creating the content of electronic lecture *The participant has the ability to….*						**ثانيا: مهارات بناء محتوى المحاضرة الالكترونية** *لدى المتدربة القدرة على......*
9) Use the audio and visual aids appropriate to the content (text, picture, video, …)						**.9** استخدام الوسائل السمعية والبصرية المناسبة للمحتوى (نص, صور, فيديو , رسوم

							بيانيه, صور فيديو, ...)	
10)	Determine the appropriate time to present the used audio and visual aids						اختيار الوقت المناسب لعرض الوسائل السمعية والبصرية المستخدمة	**10**
11)	Deal with devices needed to create an e-lecture						التعامل مع الأجهزة المستخدمة لإنشاء محاضرة إلكترونية	**11**
12)	Deal with several applications which are needed to create an e-lecture						التعامل مع العديد من التطبيقات مختلفة الاغراض لإنشاء محاضرة إلكترونية	**12**
13)	Create a presentation						انشاء العرض التقديمي	**13**
<u>Third: The skills of presenting an e-lecture</u> *The participant has the ability to….*							**<u>ثالثا: مهارات عرض المحاضرة الإلكترونية</u>** ***لدى المتدربة القدرة على......***	
14)	Make the e-lecture interactive (by ask questions, or give examples, or compare and contrast)						جعل المحاضرة تفاعليه (إما بطرح الاسئلة, او ضرب الامثلة, او اجراء المقارنة والتباين)	**14**

Appendix L Arabic / English version of the interview

مقابلــه

Interview

أثر استخدام بيئة تعلم متنقله مقلوبة في تطوير مهارات إنتاج محاضرة الكترونيه لدى عضوات هيئة التدريس بالمملكة العربية السعودية

The Impact of Using a Flipped Mobile Learning Environment on the Development of Skills for Creating Electronic Lectures among Female Faculty Members in the Kingdom of Saudi Arabia

Group Code:	□**Group A** □**Group B** □**Group C**	رمز المجموعة:
Participant ID:	....	رقم المنسوب:

Number	Questions	السؤال	التسلسل
1.	How do you describe your relationship with technology?	كيف تصف علاقتك بالتكنولوجيا؟	.1
2.	Do you employ technology in the educational process? Or you only use it in everyday life situations? Why?	هل توظف التكنولوجيا في العملية التعليمية؟ ام هي مقتصرة فقط على الحياة العامة؟ لماذا؟	.2
3.	What types of mobile devices you have used in the experiment? ☐ Smart Phone ☐ Tablet ☐ Laptop ☐ Personal Media Players ☐ digital media players ☐ Personal Digital Assistant (PDA) ☐Others……………	ماهي الاجهزة النقالة التي استخدمتها في التجربة؟ ☐هاتف ذكي ☐جهاز لوحي ☐ ☐جهاز كمبيوتر محمول ☐مشغل الوسائط الشخصية ☐مشغل الوسائط الرقمية ☐ ☐جهاز المساعد الرقمي الشخصي ☐أخرى	.3
4.	What applications have you used in the experiment? What is the purpose from each one?	ماهي التطبيقات التي استخدمتها في التجربة؟ ماهو الغرض منها؟	.4
5.	What is your impression about the training method?	ماهو انطباعك عن طريقة التدريب؟	.5
6.	Did you like the training method? Why?	هل اعجبتك طريقة التدريب؟ لماذا؟	.6
7.	Could you please mention three benefits for using this training method whether in training or teaching?	هل يمكنك ذكر ثلاثة فوائد من طريقة التدريب المستخدمة؟	.7
8.	Could you please mention three difficulties you have encountered while using this training method? Or you may face by using this method?	هل يمكنك ذكر ثلاث صعوبات واجهتك من طريقة التدريب المستخدمة؟ او قد تواجهك أثناء استخدام هذه الطريقه؟	.8
9.	What suggestions can improve the continuing professional development programmes?	ما هي الاقتراحات التي يمكن ان تحسن برنامج التطوير المهني المستمر؟	.9
10.	What was the most interesting activity?	ما هو النشاط الذي كان الأكثر إثارة للاهتمام؟	.10

11.	What was the most uninteresting activity?	ما هو النشاط الذي كان الأكثر مللا؟	**.11**

For group C only: 12. Did you attend any session via mobile? 13. Did you give any session via mobile? 14. Did you attend any session using flipped method? 15. Did you give any session using flipped method? 16. Do you think flipped mobile learning method will be an effective method for teaching students? 17. Do you think there are any limitations to employing this method at universities?	***بالنسبة للمجموعة C فقط:*** **.12** هل حضرت مسبقا جلسة عن طريق الاجهزة النقالة؟ **.13** هل قدمت جلسة عن طريق الاجهزة النقالة؟ **.14** هل حضرت مسبقا جلسة بالطريقة المقلوبة؟ **.15** هل قدمت جلسة بالطريقة المقلوبة؟ **.16** هل تعتقد ان طريقة التعلم المتنقله المقلوبة ستكون فعاله مع الطلاب؟ **.17** هل تعتقد ان هناك أي عوائق تحول من تطبيق هذه الطريقة في الجامعات؟
For group A and B only: If you have the opportunity to attend training provided by the trainer through the use of flipped mobile learning (FML). The flipped mobile learning is defined as the training given by the trainer through any application on a mobile device (e.g. Acadox application or any other application that is used as an educational platform) to trainees prior to attending the training session. The trainees will watch a recorded video before the class, whereas class time will be used to solve complex concepts and answer questions. Could you please think about this environment and answer some questions? **12.** Can you please mention three benefits you may obtain by using this method in training/ teaching? **13.** Can you please mention three difficulties you may encounter by using this method in training/ teaching? **14.** What do you think about the possibility of using FML to teach students?	***بالنسبة للمجموعتين A و B فقط:*** إذا كان لديك فرصة لحضور تدريب من خلال استخدام بيئة تعلم متنقلة مقلوبه. يتم تعريف بيئة تعلم متنقلة مقلوبه على أنها التدريب من قبل المدرب من خلال أي تطبيق في الجهاز النقال (على سبيل المثال تطبيق أكادوكس أو أي تطبيق آخر يستخدم كمنصة تعليمية) للمتدربين قبل حضور دورة التدريب. سوف يشاهد المتدربون الفيديو المسجل قبل الصف، في حين سيتم استخدام وقت الصف لحل المفاهيم المعقدة، والإجابة على الأسئلة. من فضلك, هل يمكنك التفكير في هذه البيئة والإجابة على بعض الأسئلة: **.12** هل يمكنك ذكر ثلاثة فوائد يمكنك الحصول عليها باستخدام هذه الطريقة في التدريب/ التدريس؟ **.13** هل يمكنك ذكر ثلاث صعوبات قد تواجهيها باستخدام هذه الطريقة في التدريب/ التدريس ؟ **.14** ما رأيك في إمكانية استخدام بيئة تعلم متنقلة مقلوبه في تدريس الطلاب؟

15. Do you think there are any limitations to applying this environment at universities?	15. هل تعتقد ان هناك أي عوائق تحول من تطبيق هذه البيئة في الجامعات؟

لقد أجبت على الأسئلة، نشكرك على مساهمتك ونقدر لك تعاونك معنا في الدراسة

You have answered the questions. Thank you for your contribution and we appreciate your cooperation with us

Appendix M Ethics Application Form

This version updated November 2018

ETHICS APPLICATION FORM

Faculty of Social Sciences

Please note:

- ***<u>You must not begin data collection for your study until ethical approval has been obtained</u>.***
- ***It is your responsibility to follow the University of Southampton's Ethics Policy (https://www.southampton.ac.uk/about/governance/policies/ethics.page) and any relevant academic or professional guidelines in the conduct of your study. This includes providing appropriate information sheets and consent forms, and ensuring confidentiality in the storage and use of data.***
- ***You are advised to read the Advice on Applying guidance document, downloadable from the ERGO II website, before you submit your application.***

Important notice on Risk Assessment:

Health and Safety-type risk assessment is no longer part of the ethics review process. Questions pertaining to ethical and reputational risks have been moved from the old 'Risk Assessment Form for Assessing Ethical and Research Risks' to this form. Please do NOT upload a separate Risk Assessment Form to your ethics application.

However, it is your responsibility to undertake a Risk Assessment for your research study. Depending on whether your study is office based, involves off-site data collection and/or international travel, there are different risk assessment forms you can use. Please use this link to access the forms:

https://groupsite.soton.ac.uk/Administration/FSHS-Health-and-Safety/Documents/Forms/AllItems.aspx?RootFolder=%2FAdministration%2FFSHS%2DHealth%2Dand%2DSafety%2FDocuments%2FRisk%20assessments%20and%20risk%20register%2FERGO%20interim%20documents&FolderCTID=0x012000BE79A4A3B3DC1143ABB38DFA6B580A8C&View={A5E79215-986A-4471-8CF9-B11F85214687}

If you need guidance or are unsure about which form to use, please contact your Discipline Health and Safety Rep in the first instance, and the Faculty Health and Safety Officer, Aloma Hack (A.J.Hack@soton.ac.uk), if you have further questions. Supervisors and Line Managers are responsible for ensuring risk assessments are completed for all research studies.

1. **Name(s):** Dalya Osama Seraj Khayat

2. **Current Position** PhD candidate (full-time)

3. **Contact Details:**

Division/School Education School in Faculty of Social Sciences at the University of Southampton

Email d.o.s.khayat@soton.ac.uk

Phone 00447427732239 - 00966504776510

4. Is your study being conducted as part of an education qualification?

Yes ☒ **No** ☐

5. If Yes, please give the name of your supervisor

Dr Christian Bokhove

Dr John Woollard

6. Title of your project:

The Impact of Using a Flipped Mobile Learning Environment on the Development of Skills for Creating Electronic Lectures among Female Faculty Members in the Kingdom of Saudi Arabia

7. Briefly describe the rationale, study aims and the relevant research questions of your study

The purpose of the research is to gain a better understanding of the perceived and actual effects of flipped learning (FL), mobile learning (ML), and flipped mobile learning (FML) CPD on university teachers e-lecture skills in a leading university in Saudi Arabia. Additionally, the study seeks to provide a better understanding of the use of FML in continuing professional development, including the removal of space and time limits, to increase the use of e-lectures in supporting teaching in higher educational institutions. This research also seeks to explore university teachers' opinion (concerns, challenges, and affordances) of using FML.

This dissertation seeks to answer three main research questions.

RQ 1. What are the perceived outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers e-lecture skills?

RQ 2. What are the actual outcomes of flipped learning, mobile learning, and flipped mobile learning CPD on university teachers e-lecture skills?

RQ 3. What are the university teachers' opinions regarding the concerns, challenges, and affordances of flipped mobile learning CPD?

This research could potentially present several significant contributions to the researcher's current knowledge of mobile learning and flipped learning in higher education. Firstly, this research could assist university teachers in creating accessible e-lectures, which could, in turn, enhance student learning and student quality as well. Secondly, this thesis attempts to cover the conceptual gap, where the intervention (i.e. flipped mobile learning "FML") has been designed to improve teacher effectiveness with low cost, in an easy manner, and via an available device. Thirdly, this intervention could also contribute to other teaching tools available via mobile device applications. Fourthly, this thesis proposes a teachers' training environment characteristic efficiently and cost-effectively by efficiently using resources and minimising financial waste. Finally, the findings could make a significant contribution in making recommendations that can be brought to the attention of policymakers in higher education.

8. Describe the design of your study

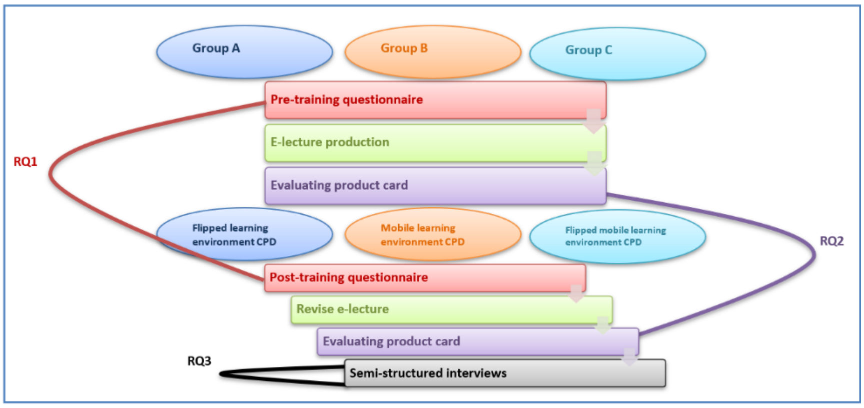
This thesis follows a pragmatic paradigm and uses a quasi-experimental, mixed methods approach. A pre- and post-test design will also be used. The study will be conducted in the form of pre- and post-training questionnaires, evaluation product cards, and semi-structured interviews. The experiment will be comprised of four weekly sessions and each session around 30 minutes. The experiment will be carried out via presenting CPD by three different methods of training (FL, ML, and FML). The participants will be divided into three groups.;

1) **The first control group (Group A):** The participants will be trained via a flipped learning environment. In this study context, a flipped learning environment is defined as the learning prior to attending the training session. The trainees watch a recorded video before the training session, while the training session time used to solve the

complex concepts and questions arising from the video. The training sessions conduct in a real designated training room at UQU.

2) **The second control group (Group B):** The participants will be trained via a mobile learning environment. In this study context, a mobile learning environment is defined as the training provided from the trainer to trainees through Acadox application via their mobile devices.

3) **The experimental group (Group C):** The participants will be trained via flipped mobile learning environment (FML). In this study context, the training via flipped mobile learning environment is defined as the learning prior to attending the training session. The trainees watch a recorded video in Acadox application through the mobile device before the training session, while the training session time used to solve the complex concepts and questions arising from the video. The training sessions conduct also in Acadox application.



The before-and-after design for RQs

9. Who are the research participants?

The participants are female university teachers (the academic staff) of Umm Al-Qura University. The sample will be various scientific degrees and various disciplines. Each group includes 30 participants as a maximum.

10. If you are going to analyse secondary data, from where are you obtaining it?

Please note that if you are analysing individual-level secondary data (e.g. survey data), you must also fill in and upload the Ethics Application Form for SECONDARY DATA ANALYSIS.

I am not going to analyse secondary data.

11. If you are collecting primary data, how will you identify and approach the participants to recruit them to your study?

Please upload a copy of your information sheet. This must be based on the GDPR-compliant template that can be downloaded from the ERGO II website. Note that there is a separate template for UG/PGT applicants. If you are not using an information sheet, please explain why. If you are using posters, fliers or emails for recruitment, these must be uploaded, too. Please note that recruitment by mass emailing to @soton.ac.uk email addresses is not allowed.

The researcher will follow specific criteria for selection a sample, which are as follows:

1. Only university teachers from UQU;
2. Only female tutors;
3. All university teachers, regardless of their level of academic position (teaching assistant: a university teacher who holds a bachelor's degree as the highest qualification; lecturer: a university teacher who holds a master's degree as the highest qualification; assistant professor, associate professor, and professor: a university teacher who holds a doctoral degree as the highest qualification);
4. Only Saudi university teachers;
5. All university teachers, regardless of their majors;

6. Only academic staff (i.e., only university teachers);
7. Only those who have accepted the use of technology; and
8. Only those who have a technological background.

Therefore, the researcher will contact the Curriculums Department of Umm Al-Qura University (UQU) to request them about contact with female university teachers in UQU (the academic staff). They will send thankfully an information sheet and consent form (Arabic version) via email to all female teachers to ask them about their consent to contribute to this research study. If they agree to participate in this research, they will forward the email to me and sign on the consent form. However, the Saudi Embassy request that I should have a supervisor in Saudi Arabia. So, Dr Faiza Maghrabi will be my supervisor in my journey of data collection. Please find attached a copy of the English version of the information sheet and consent form (the English version will be translated into Arabic to use with participants after getting the ethics approval to collect data).

12. Will you be collecting Special Category data as defined by UK data protection legislation? Will you be collecting Criminal Offence data? If so, please give details.

Special Category data are sensitive personal data that require greater protection. They include data on an individual's religion; race; ethnicity; health; sex life and sexual orientation; politics; trade union membership; genetics; biometrics. For further information, see: https://ico.org.uk/for-organisations/guide-to-the-general-data-protection-regulation-gdpr/lawful-basis-for-processing/special-category-data/

Criminal Offence data are personal data relating to criminal convictions and offences, or related security measures. For further information, see https://ico.org.uk/for-organisations/guide-to-the-general-data-protection-regulation-gdpr/lawful-basis-for-processing/criminal-offence-data/

I am not going to collect Special Category data.

13. Where will your data collection take place?

The data will be collected from Umm Al-Qura University at Makkah in Kingdom of Saudi Arabia from 30th April to 8th July 2019.

14. Will participants be taking part in your study without their knowledge and consent at the time (e.g. covert observation of people)? If yes, please explain why this is necessary.

No.

15. If you answered 'no' to question 13, how will you obtain the consent of participants?

Please upload a copy of your consent form. A template consent form can be downloaded from the ERGO II site. Note that there is a separate template for UG/PGT applicants. If you are not using a consent form, please explain why.

The researcher will receive the all Arabic version of consent forms from the participants. Where the researcher will contact the Curriculums Department of UQU to request them about contact with female university teachers.

The sent-out email's content is to ask all university teachers about their consent to contribute to this research study. Also, it includes the researcher contact details to allow participants to contact the researcher directly. As well, the email tells the university teachers if they accept to contribute to the research, they should forward that email to the researcher and sign on the consent form. The Arabic version of an information sheet and consent form will be attached with that email.

16. Is there any reason to believe participants may not be able to give full informed consent? If yes, what steps do you propose to take to safeguard their interests?

No.

17. If participants are under the responsibility or care of others (such as parents/carers, teachers or medical staff), what permission do you have to approach the participants to take part in the study?

Please upload evidence of approval from gatekeepers (e.g. Head Teacher, if conducting research in a school).

The study can only be completed by adult. They will be female university teachers (the academic staff) of Umm Al-Qura University.

18. Describe what participation in your study will involve for study participants.

Specify in meaningful detail the experience of participation from the point of view of the participant. You MUST attach copies of any questionnaires and/or interview schedules and/or observation topic lists to be used.

1) The participant will be asked to complete **an online pre-training questionnaire**. The link to the questionnaire will be sent to their contact number (the link will be expired during a week). The questions related to the extent of their experience and skills in producing electronic lecture and use of technology. The participants in each group will be given their codes' group (A, B, or C). It is estimated that the participants will take about 10-15 minutes to complete the questionnaire. Please find attached a copy of the pre-training questionnaire.
2) The participant will be asked to **attend four weekly sessions** and each session around 30 minutes. The participant will be trained and asked to produce electronic lecture by using recorded video lecture or combination of pictures, PowerPoint slides, text, audio records, and video records. The video produced does not include the image of the participants their selves or their personality; but general images, texts, and sounds.
3) The participant will be asked to complete **an online post-training questionnaire**. The link to the questionnaire will be sent to their contact number (the link will be expired during a week). It is estimated that the participants will take about 10-15 minutes to complete the questionnaire. Please find attached a copy of the post-training questionnaire.
4) The researcher will use **the evaluation product card** which is a list of e-lectures production skills. It is created and used by the researcher for all groups to evaluate the lectures produced during the experiment and verify whether the participants had mastered the skills or not. The researcher (as well an independent assessor) will mark the evaluation cards to measure the effect of flipped mobile learning environment on the development of e-lectures production skills. Please find attached a copy of the evaluation product card.
5) The participant will be approached to participate in **the interview**. Three participants at least from each group will be interviewed. The interview time will be arranged according to the researcher's agreement with the participants. The interview will be conducted at a secured designated training classroom at Umm Al-Qura University. It is possible to conduct the interview at comfortable place for both of us. The researcher will record the interview, which will be used only for the scientific purposes. The researcher only who has the right to listen to the participant voice. Please find attached a copy of the interview.

19. How will you make it clear to participants that they may withdraw consent to participate at any point during the research without penalty?

If there is a point after which it is not practicable to eliminate someone's data (e.g. after submission of dissertation), then please state this clearly here and on the Information Sheet. Please note that in fully anonymous online or paper questionnaires, it is not possible to withdraw data after submitting / handing in the questionnaire.

A note will be put at the beginning of the questionnaire saying that the participants can quit at any time.

20. Detail any possible distress, discomfort, inconvenience, harm or other adverse effects the participants may experience, including after the study, and how you will deal with this.

Give consideration to aspects such as emotional distress, anxiety, unmet expectations, unintentional disclosure of participants' identity, and assess the likelihood and severity of risks. Specify what precautions you will take or suggest to your participants to minimise any risks of harm (e.g. providing information about support services).

This will not be an issue for this project.

21. Specify any possible distress or harm to YOU arising from your proposed research, and the precautions you will take to minimise these.

Give consideration to the possibility that you may be adversely affected by something your participants share with you. This may include information of a distressing, sensitive or illegal nature.

This research does not lead to any potential distress or harm to me. The research has not the possibility that I may be adversely affected by something that my participants share with me.

22. Does your planned research pose any additional risks as a result of the sensitivity of the research and/or the nature of the population(s) or location(s) being studied?

Give considerations to aspects such as impact on the reputation of your discipline or institution; impact on relations between researchers and participants, or between population sub-groups; social, religious, ethnic, political or other sensitivities; potential misuse of findings for illegal, discriminatory or harmful purposes; potential harm to the environment; impacts on culture or cultural heritage.

This research does not pose any additional risks as a result of the sensitivity of the research or the nature of the population or location being studied. On the contrary, this research could potentially assist university teachers in creating accessible e-lectures, which in turn could enhance the student learning process. This intervention could also contribute to other teaching tools available via mobile device applications. In addition, this research could contribute not only to the training of university lecturers in Saudi Arabia but also to other places around the world. This intervention not only could benefit university teachers but also could potentially enhance the quality of learners. Where is there a relationship between teacher training to student quality, demonstrating that achieving good training influences achieving an excellent learner.

This research will contribute to the entire domain of educational technology by identifying positive and negative trends in flipped mobile learning use among university teachers in relation to their knowledge and skills toward the production of e-lectures. Second, this research could contribute to improving teaching methods and moving from the traditional learning environment to the flipped mobile learning environment. Awareness may be rising among university teachers about the need for and the importance of using flipped mobile learning with today's digitally-aware students because of its ease of use and widespread availability. The findings make an important contribution to decision makers in HE, educators, university teachers, and workers in the field of educational technologies. The outcomes of this project may work on changing the minds of educators who absolutely refuse technology.

In addition, it will contribute new data to the growing body of research on the effects of flipped mobile learning on individual performance. The implications of this research may lead to improvements in the technological abilities of university teachers. Furthermore, it will assist all workers in the field of educational technologies by promoting the use of flipped mobile learning to improve educational performance. In addition, this research will encourage university teachers not only in Saudi Arabia but also globally. The further results will contribute to extending the body of knowledge in the field of flipped mobile learning.

23. How will you maintain participant anonymity and confidentiality in collecting, analysing and writing up your data?

To maintain participant anonymity and confidentiality in this study, it will not ask their names on their e-lectures produced; and other necessary steps will be used to disguise the identity of the participants. In addition, their responses will be anonymous because their real names and their own details will not be asked in the pre- and post-training questionnaires. Therefore, the data that will be collected will be only used for academic purposes and it will be kept electronically, and password protected in my personal laptop. So, these participant individuals cannot be identified in the study.

24. How will you store your data securely during and after the study?

The University of Southampton has a Research Data Management Policy, including for data retention. The Policy can be consulted at http://www.calendar.soton.ac.uk/sectionIV/research-data-management.html

Please note that for UGs and PGTs, it is NOT correct that the University will store data for 10 years or longer. Instead, UG and PGT dissertation study data should be destroyed securely after conferment of the degree, unless strong justifications are made to retain the data for longer.

The Data Protection Act 1998, BERA and University of Southampton policy will be taken in the study account whether in searched, data collected, or data stored. It will be kept by me in specific folder in my laptop which is protected by password and no one allow using it. Also, all documents will be stored in a file in hard disc; each document will be protected by password. All paper documents will be kept in safe place until finish the study. After that, only electronic documents of personal data will be stored securely as above.

25. Describe any plans you have for feeding back the findings of the study to participants.

If the finding of the study useful for them, it will be sending a summary of the findings via email to Curriculums Department which will send that summary to them.

26. What are the main ethical issues raised by your research and how do you intend to manage these?

The main ethical issue of this study is concern of anonymity and confidentiality of the participants. To manage these, we have already mentioned all procedure that we will take in our account to manage these issues above. Participants will be informed that we are respecting all participants and their data. So, all documents will be kept by me in specific folder in my laptop which is protected by password and no one allow using it. It will be kept in safe place until finish the study. After that, only electronic documents of personal data will be stored securely as above.

27. Please outline any other information you feel may be relevant to this submission.

For example, if you have professional qualifications or experience relevant to your study, you may wish to state this here.

None.

Appendix N Arabic version of the participant information sheets for each group

<u>استمارة معلومات مشارك (للمجموعة A)</u>

<u>عنوان الدراسة:</u> أثر استخدام بيئة تعليمية متنقلة مقلوبة في تطوير مهارات انتاج محاضرة إلكترونية لدى عضوات هيئة التدريس بالمملكة العربية السعودية

<u>الرقم المرجعي:</u> 48268 **<u>اسم الباحثة:</u>** داليا اسامه خياط

عزيزتي .أنتِ مدعوه للمشاركة في الدراسة البحثية المذكورة أعلاه .لمساعدتك في تحديد ما إذا كنت ترغبِ في المشاركة أم لا، من المهم أن تفهمِ سبب إجراء البحث وما الذي سيتضمنه .يرجى قراءة المعلومات أدناه وطرح الأسئلة إذا كان هناك شيء غير واضح أو لك الرغبة في الحصول على المزيد من المعلومات قبل أن تقرر المشاركة في هذا البحث .إذا كنتِ سعيدة بالمشاركة، فيرجى الرد على رسالتنا بالموافقة.

 # ماهو موضوع البحث؟

هذا البحث الخاص بس لمرحلة الدكتوراه وهو تحت إشراف جامعة ساوثهامبتون بالمملكة المتحدة.
الغرض من البحث هو فهم أفضل للآثار المدركة والفعلية للتعلم المقلوب (FL)، والتعلم المتنقل (ML)، والتعلم المتنقل المقلوب (FML)على مهارات المحاضرات الإلكترونية في برامج التطوير المهني لأعضاء هيئة التدريس بالجامعات .بالإضافة إلى ذلك ، تسعى الدراسة إلى توفير فهم أفضل لاستخدام FML في التطوير المهني المستمر، بما في ذلك إزالة حدود المكان والزمان، لزيادة استخدام المحاضرات الإلكترونية في دعم التعليم في مؤسسات التعليم العالي .يسعى هذا البحث أيضًا إلى استكشاف رأي الأساتذة الجامعيين (المخاوف والتحديات في استخدام FML).

 # لماذا يُطلب مني المشاركة في البحث؟

لقد تم اختيارك للمشاركة في هذه الدراسة لأننا نرغب في الاستفادة من خبرتك القيمة في جودة التدريب المقدم لأعضاء هيئة التدريس بجامعة أم القرى.
سوف يساعد رأيك في تطوير جودة التدريب، تحديد المواضيع وفقًا لاحتياجات الأعضاء، وتحديد أفضل طريقة للتدريب تحت مظلة المهام المتعددة التي يقوم بها أعضاء هيئة التدريس في الجامعات السعودية .لقد تم اختيارك للمشاركة في هذه الدراسة لأنك عضوة هيئة تدريس بجامعة أم القرى بغض النظر عن مستواك الوظيفي الأكاديمي وبغض النظر عن تخصصك. أيضا، لأنك تمتلكِ إما هاتفًا ذكيًا أو جهازًا لوحيًا أو كمبيوتر محمولا. كذلك، لقد تم اختيارك لأنك تقبل التكنولوجيا ولديك خلفية جيدة عن التكنولوجيا. بخلاف هذه المعايير، يؤسفني القول أنه لا يمكنك المشاركة في هذا المشروع البحثي وسيتم حذف بياناتك.

 # ماذا سيُطلب مني اذا شاركت في البحث؟

عندما توافقِ على المشاركة، سيتم تدريبك عبر بيئة تعليمية مقلوبه (FL). رمز المجموعة التي تنتمي إليها هو A.

عزيزتي ..أقدر وقتك ، لكن سيُطلب منك:

1. اكمال استبيان الكتروني خلال أسبوع. تستغرق الإجابة على الاستبيان حوالي 15 دقيقة .سيُطلب منك انتاج محاضرة الكترونيه حسب معرفتك او الرد بلا اعرف.
2. حضور تدريب مدته حوالي 40 دقيقة عن انتاج المحاضرات الإلكترونية.
3. اكمال استبيان الكتروني خلال أسبوع. تستغرق الإجابة على الاستبيان حوالي 10 دقائق. سيُطلب منك التعديل على المحاضرة الكترونيه المنتجه مسبقا.
4. إجراء مقابلة عبر الهاتف او أي برنامج اتصال مناسب لك .سيتم تحديد الوقت المناسب لكِ عزيزتي لإجراء المقابلة.

*في سياق هذه الدراسة، يتم تعريف التدريب عبر بيئة تعليمية مقلوبة على أنه التعلم الذي يحدث قبل حضور التدريب .حيث يشاهد المتدرب مقطع فيديو مسجل عن المحتوى العلمي بينما يُستخدم وقت التدريب للنقاش والإجابة على الأسئلة .تقدم الدورة التدريبية في قاعة تدريبيه في جامعة ام القرى.
*كما يتم تعريف التدريب عبر بيئة تعليمية متنقله على أنه التدريب المُقدم من المدرب للمتدربين من خلال تطبيق تعليمي)مثل تطبيق اكادوكس (موجود في الجهاز النقال)مثل الهاتف الذكي، اللاب توب، الاي باد، ...وغيرها.(
*كما يتم تعريف التدريب عبر بيئة تعليمية متنقله مقلوبة على أنه التعلم الذي يحدث قبل حضور التدريب .حيث يشاهد المتدرب مقطع

فيديو مسجل في تطبيق اكادوكس قبل التدريب بينما يستخدم وقت التدريب للنقاش والإجابة على الأسئلة .تقدم الدورة التدريبية أيضًا في تطبيق اكادوكس.

هل هناك أي فوائد من مشاركتي في البحث؟

سوف تتعلمِ مهارات جديدة .كما سوف تتعرفين على فوائد بعض التطبيقات التعليمية .ايضا سوف تتعاملين مع بعض البيئات التعليمية والتي لم تستخدميها من قبل .في حال رغبتك بالحصول على معلومات اضافيه، سيتم إرسال نسخه عن البحث بالتفصيل.

هل هناك أي مخاطر تتضمنها الدراسة؟

لا توجد أي مخاطر من مشاركتك في الدراسة.

ماهي طبيعة البيانات التي سوف يتم جمعها؟

سوف يتم جمع البيانات من أعضاء هيئة التدريس بالجامعات والتي هي عباره عن معرفة الآثار المدركة والفعلية للتعلم المقلوب (FL)، والتعلم المتنقل (ML)، والتعلم المتنقل المقلوب (FML)على مهارات المحاضرات الإلكترونية في برامج التطوير المهني لأعضاء هيئة التدريس بالجامعات .بالإضافة إلى ذلك، الحصول على معلومات حول طبيعة برامج التطوير في الجامعات السعودية. يسعى هذا البحث أيضًا إلى استكشاف رأي الأساتذة الجامعيين (المخاوف والتحديات) في استخدام FML. كافة البيانات سوف يتم جمعها بواسطة الباحث.

عندما توافقين على المشاركة في هذه الدراسة البحثية، سوف يستخدم الباحث أي بيانات شخصية لأغراض إجراء هذا البحث وسيتم التعامل معها وفقًا لسياسة جامعة ساوثهامبتون بما يتماشى مع قانون حماية البيانات. لن يتم استخدام أي بيانات شخصية يتم جمعها لأغراض البحث لأي غرض آخر. سيتم تخزين المعلومات الخاصة بك في ملف موجود في Dropbox وهو موجود في كمبيوتر محمول الوصول المحمي بكلمة مرور. في محاولة لتخطي أي خطأ قد يحدث أثناء حفظ البيانات, ستكون هناك نسخة احتياطيه من هذا الملف على الكمبيوتر المحمول. بمجرد العودة إلى ساوثهامبتون، سيتم نقل البيانات من الكمبيوتر المحمول إلى الحاسوب الشخصي في مكتبي بمبنى 32. سيتم استخدام جميع المعلومات على نظام آمن وسيتم استخدامها لهذا الغرض من البحث فقط. ردودكم تطوعية وستكون سرية. لن يتم تحديد الردود الفردية. سيتم تجميع جميع الردود معًا وتحليلها كمجموعة. الباحثة هي الشخص الوحيد الذي له أذن للوصول إلى البيانات. سيتم الاحتفاظ بالبيانات الشخصية واستمارات الموافقة في خزانات قابلة للقفل في جامعة ساوثهامبتون. ومع ذلك، سوف يحتفظ الباحث بيانات الاتصال الخاصة بك لمدة الدراسة. اما بعد الانتهاء من الدراسة، سيقوم الباحث بتدمير بياناتك.

هل ستكون مشاركتي سرية؟

نعم ، لن يتم سؤالك عن اسمك الحقيقي ، لكن الباحث سوف يعرف هويتك فقط. هذا فقط من أجل تسهيل المقارنات لنفس المشارك قبل وبعد التدريب أثناء تحليل البيانات. ستظل مشاركتك والمعلومات التي جمعتها عنك خلال البحث سرية للغاية. سيتم تخزين معلوماتك في ملف موجود في الوصول المحمي بكلمة مرور. سيتم استخدام جميع المعلومات على الأنظمة الآمنة وسيتم استخدامها لهذا الغرض من البحث فقط. ستبقى جميع البيانات سرية حيث سيتم حفظها بتنسيق PDF مع وصول محمي بكلمة مرور. سوف يسجل الباحث صوت المشاركين فقط في المقابلات (من أجل احترام الشريعة الإسلامية والتقاليد السعودية). ومع ذلك, سوف يتم اتلاف جميع البيانات الخاصة بك بعد الانتهاء من الدراسة. لا يُسمح للباحث والمشرفين والأعضاء المسؤولين بجامعة ساوثهامبتون إلا بالوصول إلى البيانات الخاصة بك لأغراض المراقبة أو لإجراء مراجعة للدراسة لضمان امتثال البحث للوائح المعمول بها. كل هؤلاء الأشخاص عليهم واجب الحفاظ على سرية معلوماتك بصفتك مشاركًا في البحث.

هل يجب علي المشاركة؟

لا ، الأمر متروك لك تمامًا لتقرري ما إذا كنتِ ستشاركِ في البحث أم لا. إذا رغبتِ في المشاركة ، فسوف احتاج إلى توقيع "نموذج موافقة" لإظهار موافقتك على المشاركة في هذه الدراسة البحثية.

ماذا يحدث إذا قمت بتغيير رأيي؟

لديك الحق في الانسحاب في أي وقت وفي أي مرحلة من مراحل التجربة. لا تحتاج إلى إعطاء أي أسباب للانسحاب وحقوقك القانونية لن تتأثر. سيتم تدمير البيانات الخاصة بك التي تم جمعها حتى هذه النقطة مباشرة عند اتخاذ قرار الانسحاب.

ماذا سيحدث لنتائج البحث؟

هذا البحث هو أطروحة الدكتوراه المقدمة إلى كلية التربية في كلية العلوم الاجتماعية في جامعة ساوثهامبتون. لذلك سيتم تضمين النتائج ضمن أطروحة. يمكنك الاتصال بي إذا كنت ترغب في الحصول على نسخة من النتائج. يتم تخزين البيانات البحثية 10 سنوات كحد أدنى وفقا لسياسة جامعة ساوثهامبتون، ولكن يمكن أن تكون أطول إذا اقتضى الأمر من قبل الممول أو الالتزام القانوني.

أين يمكنني الحصول على مزيد من المعلومات؟

يمكنك التواصل معي من خلال أيا من التالي:

جوال: 00966504776510 (السعودية)

جوال: 00447427732239 (المملكة المتحدة)

البريد الالكتروني: dosk1e14@soton.ac.uk

وبالإضافة إلى ذلك، يمكنك الاتصال المشرف الرئيسي (الدكتور كريستيان بوخوف) باستخدام أي مما يلي:

هاتف: 00442380592415

البريد الإلكتروني: C.Bokhove@soton.ac.uk

 # ماذا يحدث إذا حصل خطأ ما؟

يمكنك الاتصال برئيس إدارة الأبحاث في جامعة ساوثهامبتون من خلال:

هاتف: 00442380595058

بريد الكتروني: rgoinfo@soton.ac.uk

أشكركم على اعطائنا جزء من وقتكم الثمين لقراءة ورقة المعلومات والنظر في المشاركة في البحث.

استمارة معلومات مشارك (للمجموعة B)

عنوان الدراسة: أثر استخدام بيئة تعليمية متنقلة مقلوبة في تطوير مهارات انتاج محاضرة إلكترونية لدى عضوات هيئة التدريس بالمملكة العربية السعودية

الرقم المرجعي: 48268 **اسم الباحثة:** داليا اسامه خياط

عزيزتي .أنتِ مدعوه للمشاركة في الدراسة البحثية المذكورة أعلاه .لمساعدتك في تحديد ما إذا كنت ترغبِ في المشاركة أم لا، من المهم أن تفهمِ سبب إجراء البحث وما الذي سيتضمنه .يرجى قراءة المعلومات أدناه وطرح الأسئلة إذا كان هناك شيء غير واضح أو لك الرغبة في الحصول على المزيد من المعلومات قبل أن تقرر المشاركة في هذا البحث .إذا كنتِ سعيدة بالمشاركة، فيرجى الرد على رسالتنا بالموافقة.

 # ماهو موضوع البحث؟

هذا البحث الخاص بس لمرحلة الدكتوراه وهو تحت إشراف جامعة ساوثهامبتون بالمملكة المتحدة.
الغرض من البحث هو فهم أفضل للآثار المدركة والفعلية للتعلم المقلوب (FL)، والتعلم المتنقل (ML)، والتعلم المتنقل المقلوب (FML)على مهارات المحاضرات الإلكترونية في برامج التطوير المهني لأعضاء هيئة التدريس بالجامعات .بالإضافة إلى ذلك ، تسعى الدراسة إلى توفير فهم أفضل لاستخدام FML في التطوير المهني المستمر، بما في ذلك إزالة حدود المكان والزمان، لزيادة استخدام المحاضرات الإلكترونية في دعم التعليم في مؤسسات التعليم العالي .يسعى هذا البحث أيضًا إلى استكشاف رأي الأساتذة الجامعيين (المخاوف والتحديات في استخدام (FML).

 # لماذا يُطلب مني المشاركة في البحث؟

لقد تم اختيارك للمشاركة في هذه الدراسة لأننا نرغب في الاستفادة من خبرتك القيمة في جودة التدريب المقدم لأعضاء هيئة التدريس بجامعة أم القرى.
سوف يساعد رأيك في تطوير جودة التدريب، تحديد المواضيع وفقًا لاحتياجات الأعضاء، وتحديد أفضل طريقة للتدريب تحت مظلة المهام المتعددة التي يقوم بها أعضاء هيئة التدريس في الجامعات السعودية .لقد تم اختيارك للمشاركة في هذه الدراسة لأنك عضوة هيئة تدريس بجامعة أم القرى بغض النظر عن مستواك الوظيفي الأكاديمي وبغض النظر عن تخصصك. أيضا، لأنك تمتلكِ إما هاتفًا ذكيًا أو جهازًا لوحيًا أو كمبيوتر محمولا. كذلك، لقد تم اختيارك لأنك تقبل التكنولوجيا ولديك خلفية جيدة عن التكنولوجيا. بخلاف هذه المعايير، يؤسفني القول أنه لا يمكنك المشاركة في هذا المشروع البحثي وسيتم حذف بياناتك.

 # ماذا سيُطلب مني اذا شاركت في البحث؟

عندما توافقِ على المشاركة، سيتم تدريبك عبربيئة تعليميه متنقلة (ML). رمز المجموعة التي تنتمي إليها هوِ B.

عزيزتي ..أقدر وقتك ، لكن سيُطلب منك:

1. اكمال استبيان الكتروني خلال أسبوع. تستغرق الإجابة على الاستبيان حوالي 15 دقيقة .سيُطلب منك انتاج محاضرة الكترونيه حسب معرفتك او الرد بلا اعرف.
2. حضور تدريب مدته حوالي 40 دقيقة عن انتاج المحاضرات الإلكترونية.
3. اكمال استبيان الكتروني خلال أسبوع. تستغرق الإجابة على الاستبيان حوالي 10 دقائق. سيُطلب منك التعديل على المحاضرة الكترونيه المنتجه مسبقا.
4. إجراء مقابلة عبر الهاتف او أي برنامج اتصال مناسب لك .سيتم تحديد الوقت المناسب لكِ عزيزتي لإجراء المقابلة.

*في سياق هذه الدراسة، يتم تعريف التدريب عبر بيئة تعليمية مقلوبة على أنه التعلم الذي يحدث قبل حضور التدريب .حيث يشاهد المتدرب مقطع فيديو مسجل عن المحتوى العلمي بينما يُستخدم وقت التدريب للنقاش والإجابة على الأسئلة .تقدم الدورة التدريبية في قاعة تدريبيه في جامعة ام القرى.
*كما يتم تعريف التدريب عبر بيئة تعليمية متنقله على أنه التدريب المُقدم من المدرب للمتدربين من خلال تطبيق تعليمي)مثل تطبيق اكادوكس (موجود في الجهاز النقال)مثل الهاتف الذكي، اللاب توب، الاي باد، ...وغيرها.(
*كما يتم تعريف التدريب عبر بيئة تعليمية متنقله مقلوبة على أنه التعلم الذي يحدث قبل حضور التدريب .حيث يشاهد المتدرب مقطع فيديو مسجل في تطبيق اكادوكس قبل التدريب بينما يستخدم وقت التدريب للنقاش والإجابة على الأسئلة .تقدم الدورة التدريبية أيضًا في تطبيق اكادوكس.

 # هل هناك أي فوائد من مشاركتي في البحث؟

سوف تتعلمِ مهارات جديدة .كما سوف تتعرفين على فوائد بعض التطبيقات التعليمية .ايضا سوف تتعاملين مع بعض البيئات التعليمية والتي لم تستخدميها من قبل .في حال رغبتك بالحصول على معلومات اضافيه، سيتم إرسال نسخه عن البحث بالتفصيل.

 # هل هناك أي مخاطر تتضمنها الدراسة؟

لا توجد أي مخاطر من مشاركتك في الدراسة.

 # ماهي طبيعة البيانات التي سوف يتم جمعها؟

سوف يتم جمع البيانات من أعضاء هيئة التدريس بالجامعات والتي هي عباره عن معرفة الآثار المدركة والفعلية للتعلم المقلوب (FL)، والتعلم المتنقل (ML)، والتعلم المتنقل المقلوب (FML)على مهارات المحاضرات الإلكترونية في برامج التطوير المهني لأعضاء هيئة التدريس بالجامعات .بالإضافة إلى ذلك، الحصول على معلومات حول طبيعة برامج التطوير في الجامعات السعودية. يسعى هذا البحث أيضًا إلى استكشاف رأي الأساتذة الجامعيين (المخاوف والتحديات) في استخدام FML. كافة البيانات سوف يتم جمعها بواسطة الباحث.

عندما توافقين على المشاركة في هذه الدراسة البحثية، سوف يستخدم الباحث أي بيانات شخصية لأغراض إجراء هذا البحث وسيتم التعامل معها وفقًا لسياسة جامعة ساوثهامبتون بما يتماشى مع قانون حماية البيانات. لن يتم استخدام أي بيانات شخصية يتم جمعها لأغراض البحث لأي غرض آخر. سيتم تخزين المعلومات الخاصة بك في ملف موجود في Dropbox وهو موجود في كمبيوتر محمول الوصول المحمي بكلمة مرور. في محاولة لتخطي أي خطأ قد يحدث أثناء حفظ البيانات, ستكون هناك نسخة احتياطيه من هذا الملف على الكمبيوتر المحمول. بمجرد العودة إلى ساوثهامبتون، سيتم نقل البيانات من الكمبيوتر المحمول إلى الحاسوب الشخصي في مكتبي بمبنى 32. سيتم استخدام جميع المعلومات على نظام آمن وسيتم استخدامها لهذا الغرض من البحث فقط. ردودكم تطوعية وستكون سرية. لن يتم تحديد الردود الفردية. سيتم تجميع جميع الردود معًا وتحليلها كمجموعة. الباحثة هي الشخص الوحيد الذي له أذن للوصول إلى البيانات. سيتم الاحتفاظ بالبيانات الشخصية واستمارات الموافقة في خزانات قابلة للقفل في جامعة ساوثهامبتون. ومع ذلك، سوف يحتفظ الباحث بيانات الاتصال الخاصة بك لمدة الدراسة. اما بعد الانتهاء من الدراسة، سيقوم الباحث بتدمير بياناتك.

 # هل ستكون مشاركتي سرية؟

نعم ، لن يتم سؤالك عن اسمك الحقيقي ، لكن الباحث سوف يعرف هويتك فقط. هذا فقط من أجل تسهيل المقارنات لنفس المشارك قبل وبعد التدريب أثناء تحليل البيانات. ستظل مشاركتك والمعلومات التي جمعتها عنك خلال البحث سرية للغاية. سيتم تخزين معلوماتك في ملف موجود في الوصول المحمي بكلمة مرور. سيتم استخدام جميع المعلومات على الأنظمة الآمنة وسيتم استخدامها لهذا الغرض من البحث فقط. ستبقى جميع البيانات سرية حيث سيتم حفظها بتنسيق PDF مع وصول محمي بكلمة مرور. سوف يسجل الباحث صوت المشاركين فقط في المقابلات (من أجل احترام الشريعة الإسلامية والتقاليد السعودية). ومع ذلك, سوف يتم اتلاف جميع البيانات الخاصة بك بعد الانتهاء من الدراسة. لا يُسمح للباحث والمشرفين والأعضاء المسؤولين بجامعة ساوثهامبتون إلا بالوصول إلى البيانات الخاصة بك لأغراض المراقبة أو لإجراء مراجعة للدراسة لضمان امتثال البحث للوائح المعمول بها. كل هؤلاء الأشخاص عليهم واجب الحفاظ على سرية معلوماتك بصفتك مشاركًا في البحث.

 # هل يجب علي المشاركة؟

لا ، الأمر متروك لك تمامًا لتقرري ما إذا كنتِ ستشاركِ في البحث أم لا. إذا رغبتِ في المشاركة ، فسوف احتاج إلى توقيع "نموذج موافقة" لإظهار موافقتك على المشاركة في هذه الدراسة البحثية.

 # ماذا يحدث إذا قمت بتغيير رأيي؟

لديك الحق في الانسحاب في أي وقت وفي أي مرحلة من مراحل التجربة. لا تحتاج إلى إعطاء أي أسباب للانسحاب وحقوقك القانونية لن تتأثر. سيتم تدمير البيانات الخاصة بك التي تم جمعها حتى هذه النقطة مباشرة عند اتخاذ قرار الانسحاب.

 # ماذا سيحدث لنتائج البحث؟

هذا البحث هو أطروحة الدكتوراه المقدمة إلى كلية التربية في كلية العلوم الاجتماعية في جامعة ساوثهامبتون. لذلك سيتم تضمين النتائج ضمن أطروحة. يمكنك الاتصال بي إذا كنت ترغب في الحصول على نسخة من النتائج. يتم تخزين البيانات البحثية 10 سنوات كحد أدنى وفقا لسياسة جامعة ساوثهامبتون، ولكن يمكن أن تكون أطول إذا اقتضى الأمر من قبل الممول أو الالتزام القانوني.

 # أين يمكنني الحصول على مزيد من المعلومات؟

يمكنك التواصل معي من خلال أيا من التالي:

جوال: 00966504776510 (السعودية)

جوال: 00447427732239 (المملكة المتحدة)

البريد الالكتروني: **dosk1e14@soton.ac.uk**

وبالإضافة إلى ذلك، يمكنك الاتصال المشرف الرئيسي (الدكتور كريستيان بوخوف) باستخدام أي مما يلي:

هاتف: 00442380592415

البريد الإلكتروني: **C.Bokhove@soton.ac.uk**

 # ماذا يحدث إذا حصل خطأ ما؟

يمكنك الاتصال برئيس إدارة الأبحاث في جامعة ساوثهامبتون من خلال:

هاتف: 00442380595058

بريد الكتروني: **rgoinfo@soton.ac.uk**

أشكركم على اعطائنا جزء من وقتكم الثمين لقراءة ورقة المعلومات والنظر في المشاركة في البحث.

استمارة معلومات مشارك (للمجموعة C)

عنوان الدراسة: أثر استخدام بيئة تعليمية متنقلة مقلوبة في تطوير مهارات انتاج محاضرة إلكترونية لدى عضوات هيئة التدريس بالمملكة العربية السعودية

الرقم المرجعي: 48268 **اسم الباحثة:** داليا اسامه خياط

عزيزتي .أنتِ مدعوه للمشاركة في الدراسة البحثية المذكورة أعلاه لمساعدتك في تحديد ما إذا كنت ترغبِ في المشاركة أم لا، من المهم أن تفهمِ سبب إجراء البحث وما الذي سيتضمنه .يرجى قراءة المعلومات أدناه وطرح الأسئلة إذا كان هناك شيء غير واضح أو لك الرغبة في الحصول على المزيد من المعلومات قبل أن تقرر المشاركة في هذا البحث .إذا كنتِ سعيدة بالمشاركة، فيرجى الرد على رسالتنا بالموافقة.

ماهو موضوع البحث؟

هذا البحث الخاص بس لمرحلة الدكتوراه وهو تحت إشراف جامعة ساوثهامبتون بالمملكة المتحدة.
الغرض من البحث هو فهم أفضل للآثار المدركة والفعلية للتعلم المقلوب (FL)، والتعلم المتنقل (ML)، والتعلم المتنقل المقلوب (FML)على مهارات المحاضرات الإلكترونية في برامج التطوير المهني لأعضاء هيئة التدريس بالجامعات .بالإضافة إلى ذلك ، تسعى الدراسة إلى توفير فهم أفضل لاستخدام FML في التطوير المهني المستمر، بما في ذلك إزالة حدود المكان والزمان، لزيادة استخدام المحاضرات الإلكترونية في دعم التعليم في مؤسسات التعليم العالي .يسعى هذا البحث أيضًا إلى استكشاف رأي الأساتذة الجامعيين (المخاوف والتحديات في استخدام FML).

لماذا يُطلب مني المشاركة في البحث؟

لقد تم اختيارك للمشاركة في هذه الدراسة لأننا نرغب في الاستفادة من خبرتك القيمة في جودة التدريب المقدم لأعضاء هيئة التدريس بجامعة أم القرى.
سوف يساعد رأيك في تطوير جودة التدريب، تحديد المواضيع وفقًا لاحتياجات الأعضاء، وتحديد أفضل طريقة للتدريب تحت مظلة المهام المتعددة التي يقوم بها أعضاء هيئة التدريس في الجامعات السعودية .لقد تم اختيارك للمشاركة في هذه الدراسة لأنك عضوة هيئة تدريس بجامعة أم القرى بغض النظر عن مستواك الوظيفي الأكاديمي وبغض النظر عن تخصصك. أيضا، لأنك تمتلكِ إما هاتفًا ذكيًا أو جهازًا لوحيًا أو كمبيوتر محمولا. كذلك، لقد تم اختيارك لأنك تقبل التكنولوجيا ولديك خلفية جيدة عن التكنولوجيا. بخلاف هذه المعايير، يؤسفني القول أنه لا يمكنك المشاركة في هذا المشروع البحثي وسيتم حذف بياناتك.

ماذا سيُطلب مني اذا شاركت في البحث؟

عندما توافقِ على المشاركة، سيتم تدريبك عبربيئة تعليمية متنقلة مقلوبة (FML). رمز المجموعة التي تنتمي إليها هِو C.

عزيزتي ..أقدر وقتك ، لكن سيُطلب منك:

1. اكمال استبيان الكتروني خلال أسبوع. تستغرق الإجابة على الاستبيان حوالي 15 دقيقة .سيُطلب منك انتاج محاضرة الكترونيه حسب معرفتك او الرد بلا اعرف.
2. حضور تدريب مدته حوالي 40 دقيقة عن انتاج المحاضرات الإلكترونية.
3. اكمال استبيان الكتروني خلال أسبوع. تستغرق الإجابة على الاستبيان حوالي 10 دقائق. سيُطلب منك التعديل على المحاضرة الكترونيه المنتجه مسبقا.
4. إجراء مقابلة عبر الهاتف او أي برنامج اتصال مناسب لك .سيتم تحديد الوقت المناسب لكِ عزيزتي لإجراء المقابلة.

*في سياق هذه الدراسة، يتم تعريف التدريب عبر بيئة تعليمية مقلوبة على أنه التعلم الذي يحدث قبل حضور التدريب .حيث يشاهد المتدرب مقطع فيديو مسجل عن المحتوى العلمي بينما يُستخدم وقت التدريب للنقاش والإجابة على الأسئلة .تقدم الدورة التدريبية في قاعة تدريبيه في جامعة ام القرى.
*كما يتم تعريف التدريب عبر بيئة تعليمية متنقله على أنه التدريب المُقدم من المدرب للمتدربين من خلال تطبيق تعليمي)مثل تطبيق اكادوكس (موجود في الجهاز النقال)مثل الهاتف الذكي، اللاب توب، الاي باد، ...وغيرها.(
*كما يتم تعريف التدريب عبر بيئة تعليمية متنقله مقلوبة على أنه التعلم الذي يحدث قبل حضور التدريب .حيث يشاهد المتدرب مقطع فيديو مسجل في تطبيق اكادوكس قبل التدريب بينما يستخدم وقت التدريب للنقاش والإجابة على الأسئلة .تقدم الدورة التدريبية أيضًا في تطبيق اكادوكس.

هل هناك أي فوائد من مشاركتي في البحث؟

سوف تتعلمِ مهارات جديدة .كما سوف تتعرفين على فوائد بعض التطبيقات التعليمية .ايضا سوف تتعاملين مع بعض البيئات التعليمية والتي لم تستخدميها من قبل .في حال رغبتك بالحصول على معلومات اضافيه، سيتم إرسال نسخه عن البحث بالتفصيل.

 # هل هناك أي مخاطر تتضمنها الدراسة؟

لا توجد أي مخاطر من مشاركتك في الدراسة.

 # ماهي طبيعة البيانات التي سوف يتم جمعها؟

سوف يتم جمع البيانات من أعضاء هيئة التدريس بالجامعات والتي هي عباره عن معرفة الآثار المدركة والفعلية للتعلم المقلوب (FL)، والتعلم المتنقل (ML)، والتعلم المتنقل المقلوب (FML)على مهارات المحاضرات الإلكترونية في برامج التطوير المهني لأعضاء هيئة التدريس بالجامعات .بالإضافة إلى ذلك، الحصول على معلومات حول طبيعة برامج التطوير في الجامعات السعودية. يسعى هذا البحث أيضًا إلى استكشاف رأي الأساتذة الجامعيين (المخاوف والتحديات) في استخدام FML. كافة البيانات سوف يتم جمعها بواسطة الباحث.

عندما توافقين على المشاركة في هذه الدراسة البحثية، سوف يستخدم الباحث أي بيانات شخصية لأغراض إجراء هذا البحث وسيتم التعامل معها وفقًا لسياسة جامعة ساوثهامبتون بما يتماشى مع قانون حماية البيانات. لن يتم استخدام أي بيانات شخصية يتم جمعها لأغراض البحث لأي غرض آخر. سيتم تخزين المعلومات الخاصة بك في ملف موجود في Dropbox وهو موجود في كمبيوتر محمول الوصول المحمي بكلمة مرور. في محاولة لتخطي أي خطأ قد يحدث أثناء حفظ البيانات, ستكون هناك نسخة احتياطيه من هذا الملف على الكمبيوتر المحمول. بمجرد العودة إلى ساوثهامبتون، سيتم نقل البيانات من الكمبيوتر المحمول إلى الحاسوب الشخصي في مكتبي بمبنى 32. سيتم استخدام جميع المعلومات على نظام آمن وسيتم استخدامها لهذا الغرض من البحث فقط. ردودكم تطوعية وستكون سرية. لن يتم تحديد الردود الفردية. سيتم تجميع جميع الردود معًا وتحليلها كمجموعة. الباحثة هي الشخص الوحيد الذي له أذن للوصول إلى البيانات. سيتم الاحتفاظ بالبيانات الشخصية واستمارات الموافقة في خزانات قابلة للقفل في جامعة ساوثهامبتون. ومع ذلك، سوف يحتفظ الباحث بيانات الاتصال الخاصة بك لمدة الدراسة. اما بعد الانتهاء من الدراسة، سيقوم الباحث بتدمير بياناتك.

 # هل ستكون مشاركتي سرية؟

نعم ، لن يتم سؤالك عن اسمك الحقيقي ، لكن الباحث سوف يعرف هويتك فقط. هذا فقط من أجل تسهيل المقارنات لنفس المشارك قبل وبعد التدريب أثناء تحليل البيانات. ستظل مشاركتك والمعلومات التي جمعتها عنك خلال البحث سرية للغاية. سيتم تخزين معلوماتك في ملف موجود في الوصول المحمي بكلمة مرور. سيتم استخدام جميع المعلومات على الأنظمة الآمنة وسيتم استخدامها لهذا الغرض من البحث فقط. ستبقى جميع البيانات سرية حيث سيتم حفظها بتنسيق PDF مع وصول محمي بكلمة مرور. سوف يسجل الباحث صوت المشاركين فقط في المقابلات (من أجل احترام الشريعة الإسلامية والتقاليد السعودية). ومع ذلك, سوف يتم اتلاف جميع البيانات الخاصة بك بعد الانتهاء من الدراسة. لا يُسمح للباحث والمشرفين والأعضاء المسؤولين بجامعة ساوثهامبتون إلا بالوصول إلى البيانات الخاصة بك لأغراض المراقبة أو لإجراء مراجعة للدراسة لضمان امتثال البحث للوائح المعمول بها. كل هؤلاء الأشخاص عليهم واجب الحفاظ على سرية معلوماتك بصفتك مشاركًا في البحث.

 # هل يجب علي المشاركة؟

لا ، الأمر متروك لك تمامًا لتقرري ما إذا كنتِ ستشاركِ في البحث أم لا. إذا رغبتِ في المشاركة ، فسوف احتاج إلى توقيع "نموذج موافقة" لإظهار موافقتك على المشاركة في هذه الدراسة البحثية.

 # ماذا يحدث إذا قمت بتغيير رأيي؟

لديك الحق في الانسحاب في أي وقت وفي أي مرحلة من مراحل التجربة. لا تحتاج إلى إعطاء أي أسباب للانسحاب وحقوقك القانونية لن تتأثر. سيتم تدمير البيانات الخاصة بك التي تم جمعها حتى هذه النقطة مباشرة عند اتخاذ قرار الانسحاب.

ماذا سيحدث لنتائج البحث؟

هذا البحث هو أطروحة الدكتوراه المقدمة إلى كلية التربية في كلية العلوم الاجتماعية في جامعة ساوثهامبتون. لذلك سيتم تضمين النتائج ضمن أطروحة. يمكنك الاتصال بي إذا كنت ترغب في الحصول على نسخة من النتائج. يتم تخزين البيانات البحثية 10 سنوات كحد أدنى وفقا لسياسة جامعة ساوثهامبتون، ولكن يمكن أن تكون أطول إذا اقتضى الأمر من قبل الممول أو الالتزام القانوني.

 # أين يمكنني الحصول على مزيد من المعلومات؟

يمكنك التواصل معي من خلال أيا من التالي:

جوال: 00966504776510 (السعودية)

جوال: 00447427732239 (المملكة المتحدة)

البريد الالكتروني: **dosk1e14@soton.ac.uk**

وبالإضافة إلى ذلك، يمكنك الاتصال المشرف الرئيسي (الدكتور كريستيان بوخوف) باستخدام أي مما يلي:

هاتف: 00442380592415

البريد الإلكتروني: **C.Bokhove@soton.ac.uk**

 # ماذا يحدث إذا حصل خطأ ما؟

يمكنك الاتصال برئيس إدارة الأبحاث في جامعة ساوثهامبتون من خلال:

هاتف: 00442380595058

بريد الكتروني: **rgoinfo@soton.ac.uk**

أشكركم على اعطائنا جزء من وقتكم الثمين لقراءة ورقة المعلومات والنظر في المشاركة في البحث.

Appendix O English version of the participant information sheets for each group

Participant Information Sheet (Group A)

Study Title: The Impact of Using a Flipped Mobile Learning Environment on the Development of Skills for Creating Electronic Lectures among Female Faculty Members in the Kingdom of Saudi Arabia

Researcher: Dalya Osama Khayat **ERGO number:** 48268

You are being invited to take part in the above research study. To help you decide whether you would like to take part or not, it is important that you understand why the research is being done and what it will involve. Please read the information below carefully and ask questions if anything is not clear or you would like more information before you decide to take part in this research. You may like to discuss it with others but it is up to you to decide whether or not to take part. If you are happy to participate you will be asked to sign a consent form.

What is the research about?

This research is under direction of the School of Education, University of Southampton, UK. This research conducted by me as the main researcher where is I am a PhD candidate. This research is under funding of the Royal Embassy of Saudi Arabia Cultural Bureau in London.

The purpose of the research is to gain a better understanding of the perceived and actual effects of flipped learning (FL), mobile learning (ML), and flipped mobile learning (FML) CPD on university teachers e-lecture skills in a leading university in Saudi Arabia. Additionally, the study seeks to provide a better understanding of the use of FML in continuing professional development, including the removal of space and time limits, to increase the use of e-lectures in supporting teaching in higher educational institutions. This research also seeks to explore university teachers' opinion (concerns, challenges, and affordances) of using FML.

Why have I been asked to participate?

You have been chosen to participate in this study because we wish to benefit from your valuable experience in the quality of training offered to female faculty members at Umm Al-Qura University, which are within the continuing professional development program. Your opinion will help in developing the quality of training, determining themes according to the members' needs, and identify the best way for training under the umbrella of over multi-tasks that required from the faculty members in the Saudi universities. You have been chosen to participate in this study because you are a female faculty member at Umm Al-Qura University regardless of your level of academic position and regardless of your majors. Also, because you own either a smartphone, a tablet, or a laptop. As well, you have been chosen because you accept technology and you have a good background about technology. Otherwise of these criteria, I am sorry to say you cannot participate in this research project and your data will be deleted.

What will happen to me if I take part?

When you agree to participate, you will be trained via a flipped learning environment (FL). In this study context, the training via a flipped learning environment is defined as the learning prior to attending the training session. The trainees watch a recorded video before the training session, while the training session time used to solve the complex concepts and questions arising from the video. The training sessions conduct in a real designated training room at UQU. I appreciate your time, but you will be asked to:

1. Complete an online pre-training questionnaire. The link to the questionnaire will be sent to your contact number (the link will be expired during a week). The questions related to the extent of your experience and skills in producing electronic lecture and use of technology (electronic lecture means the use of video technology for the purpose of interactive communication between learners and tutors). You should choose the code A in the group code section. You will take approximately 15-20 minutes to complete the questionnaire. You need to tick a box to giving your consent and allowing you to start the questionnaire. You will also be asked to provide some basic demographic information about yourself (e.g. age, scientific of degree, etc.) at the beginning of the questionnaire. You are required to provide accurate responses before submitting the questionnaire.
2. You will be required then to attend four weekly sessions that are provided through a flipped learning environment. Each weekly session comprised of 30 minutes. You will be required to watch a recorded video which will be sent to your contact number before the training session. The training sessions will be conducted in a real designated training room at UQU. You will be required to produce an electronic lecture by using recorded video lecture or combination of pictures, PowerPoint slides, text, audio records, and video records. The video produced does not include the image of the participants their selves or their personality; but general images, texts, and sounds.
3. Complete an online post-training questionnaire. The link to the questionnaire will be sent to your contact number (the link will be expired during a week). The questionnaire contains questions about training (as well learning) environment to develop teachers' e-lecture production skills. It is estimated that you will take about 10-15 minutes to complete the questionnaire. You should choose the code A in the group code section. You must answer all the questions in questionnaire accurately, and then submit.
4. In case you agree to do an interview, you will be required to answer the interview questions. The interview will be conducted at an assigned training classroom at Umm Al-Qura University, which will be informed prior to the interview session. The research team will be responsible for the venue arrangement. You may also request for the interview to conducted at any place convenient to you. The researcher will record the interview and your answer. The interview will be used only for scientific purposes. Your answers will be recorded and filed in a secured PC where only the researcher has the right to the access.

Are there any benefits in my taking part?

You will obtain more benefits from taking part in terms of learning new skills, knowing the benefits of some educational application, dealing with some learning environments you may have not used before. However, your feedback; your answers will help me gather educationalist opinions on the development efforts.

Are there any risks involved?

There are no risks from taking part in this research.

What data will be collected?

The data will be collected from the university teachers; these data are the perceived and actual skills of the e-lecture before and after the CPD through three different environments [flipped learning (FL), mobile learning (ML), and flipped mobile learning (FML)]. As well, knowing information about CPD in Saudi universities. Finally, exploring the university teachers' opinion (concerns, challenges, and affordances) of using FML as a new training environment. These data will be collected by the researcher.

When you agree to take part in this research study, the researcher will use any personal data for the purposes of carrying out this research and will be handled according to the University of Southampton policy in line with data protection law. Any personal data collected for research will not be used for any other purpose.

Your information will be stored in a file located in the Dropbox which is in the password-protected access laptop. A copy of this file will be on the laptop in an attempt to skip any wrong that may happen during save data. Once back in Soton, I will transfer the data from the laptop to my personal computer in my office at building 32. All information will be used on secure systems and will be used for this research purpose only. Your responses are voluntary and will be confidential. Individual responses will not be identified. All responses will be compiled together and analysed as a group. The researcher who only has authorised to access the data. The hard data (i.e. personal data and consent forms) will be kept in lockable cabinets in the University of Southampton. However, the researcher will save your contact details for the duration of the study. After finishing the study, the researcher will destruct your data.

Will my participation be confidential?

Yes, you will not be asked about your real name, but the researcher will just know your ID. This only in order to facilitate the comparisons for the same participant before and after intervention during the analysis of the data. Your participation and the information I collect about you during the course of the research will be kept strictly confidential. Your information will be stored in a file located in the password-protected access. All information will be used on secure systems and will be used for this research purpose only. All data will be kept confidential where will be saved in PDF format with the password-protected access. The researcher will record only the participants' voice in the interviews (in order to respect Islamic law and the Saudi traditions). However, the researcher will destruct all your data after finishing the study.

Only the researcher, supervisors, and responsible members of the University of Southampton may be given access to data about you for monitoring purposes or to carry out an audit of the study to ensure that the research is complying with applicable regulations. All of these people have a duty to keep your information, as a research participant, strictly confidential.

Do I have to take part?

No, it is entirely up to you to decide whether or not to take part. If you decide you want to take part, you will need to sign a "Consent Form" to show you have agreed to take part in this research study.

What happens if I change my mind?

You have the right to withdraw at any time, at any stage of the experiment. You do not need to give any reasons to withdraw and your legal rights will not be affected. Your data collected up to this point will be destroyed directly when you take a decision to withdraw. However, you can withdraw from the study after a month of data collection has finished.

What will happen to the results of the research?

This research is a doctoral thesis submitted to the Education School in Faculty of Social, Human and Mathematical Sciences at the University of Southampton. Therefore, the findings will be included within the thesis. Your personal details will remain strictly confidential. Research findings made available in any reports or publications will not include information that can directly identify you without your specific consent. You can contact me if you like to have a copy of the results. The research data be stored a minimum of 10 years as per University of Southampton policy, but can be longer if required by the funder or statutory obligation.

Where can I get more information?

You can contact me (Mrs Dalya Khayat) using any of the following:

Mobile: 00966504776510 (KSA)

Mobile: 00447427732239 (UK)

Email: dosk1e14@soton.ac.uk

In addition, you can contact the main supervisor (Dr Christian Bokhove) using any of the following:

Telephone: (004423) 8059 2415

Email: C.Bokhove@soton.ac.uk

What happens if there is a problem?

If you remain unhappy or have a complaint about any aspect of this study, please contact the University of Southampton Research Integrity and Governance Manager;

Telephone: 00442380 595058

E-mail: rgoinfo@soton.ac.uk

Thank you for taking the time to read the information sheet and considering taking part in the research.

Participant Information Sheet (Group B)

Study Title: The Impact of Using a Flipped Mobile Learning Environment on the Development of Skills for Creating Electronic Lectures among Female Faculty Members in the Kingdom of Saudi Arabia

Researcher: Dalya Osama Khayat **ERGO number:** 48268

You are being invited to take part in the above research study. To help you decide whether you would like to take part or not, it is important that you understand why the research is being done and what it will involve. Please read the information below carefully and ask questions if anything is not clear or you would like more information before you decide to take part in this research. You may like to discuss it with others but it is up to you to decide whether or not to take part. If you are happy to participate you will be asked to sign a consent form.

What is the research about?

This research is under direction of the School of Education, University of Southampton, UK. This research conducted by me as the main researcher where is I am a PhD candidate. This research is under funding of the Royal Embassy of Saudi Arabia Cultural Bureau in London.

The purpose of the research is to gain a better understanding of the perceived and actual effects of flipped learning (FL), mobile learning (ML), and flipped mobile learning (FML) CPD on university teachers e-lecture skills in a leading university in Saudi Arabia. Additionally, the study seeks to provide a better understanding of the use of FML in continuing professional development, including the removal of space and time limits, to increase the use of e-lectures in supporting teaching in higher educational institutions. This research also seeks to explore university teachers' opinion (concerns, challenges, and affordances) of using FML.

Why have I been asked to participate?

You have been chosen to participate in this study because we wish to benefit from your valuable experience in the quality of training offered to female faculty members at Umm Al-Qura University, which are within the continuing professional development program. Your opinion will help in developing the quality of training, determining themes according to the members' needs, and identify the best way for training under the umbrella of over multi-tasks that required from the faculty members in the Saudi universities. You have been chosen to participate in this study because you are a female faculty member at Umm Al-Qura University regardless of your level of academic position and regardless of your majors. Also, because you own either a smartphone, a tablet, or a laptop. As well, you have been chosen because you accept technology and you have a good background about technology. Otherwise of these criteria, I am sorry to say you cannot participate in this research project and your data will be deleted.

What will happen to me if I take part?

When you agree to participate, you will be trained via mobile learning environment (ML). In this study context, the training via mobile learning environment is defined as the training provided from the trainer to trainees through Acadox application via their mobile devices. I appreciate your time, but you will be asked to:

1. Complete an online pre-training questionnaire. The link to the questionnaire will be sent to your contact number (the link will be expired during a week). The questions related to the extent of your experience and skills in producing electronic lecture and use of technology (electronic lecture means the use of video technology for the purpose of interactive communication between learners and tutors). You should choose the code B in the group code section. You will take approximately 15-20 minutes to complete the questionnaire. You need to tick a box to giving your consent and allowing you to start the questionnaire. You will also be asked to provide some basic demographic information about yourself (e.g. age, scientific of degree, etc.) at the beginning of the questionnaire. You are required to provide accurate responses before submitting the questionnaire.
2. You will be required then to attend four weekly sessions that are provided through Acadox application. Each weekly session comprised of 30 minutes. You will be required to produce an electronic lecture by using recorded video lecture or combination of pictures, PowerPoint slides, text, audio records, and video records. The video produced does not include the image of the participants their selves or their personality; but general images, texts, and sounds.
3. Complete an online post-training questionnaire. The link to the questionnaire will be sent to your contact number (the link will be expired during a week). The questionnaire contains questions about training (as well learning) environment to develop teachers' e-lecture production skills. It is estimated that you will take about 10-15 minutes to complete the questionnaire. You should choose the code B in the group code section. You must answer all the questions in questionnaire accurately, and then submit.
4. In case you agree to do an interview, you will be required to answer the interview questions. The interview will be conducted at an assigned training classroom at Umm Al-Qura University, which will be informed prior to the interview session. The research team will be responsible for the venue arrangement. You may also request for the interview to conducted at any place convenient to you. The researcher will record the interview and your answer. The interview will be used only for scientific purposes. Your answers will be recorded and filed in a secured PC where only the researcher has the right to the access.

Are there any benefits in my taking part?

You will obtain more benefits from taking part in terms of learning new skills, knowing the benefits of some educational application, dealing with some learning environments you may have not used before. However, your feedback; your answers will help me gather educationalist opinions on the development efforts.

Are there any risks involved?

There are no risks from taking part in this research.

What data will be collected?

The data will be collected from the university teachers; these data are the perceived and actual skills of the e-lecture before and after the CPD through three different environments [flipped learning (FL), mobile learning (ML), and flipped mobile learning (FML)]. As well, knowing information about CPD in Saudi universities. Finally, exploring the university teachers' opinion (concerns, challenges, and affordances) of using FML as a new training environment. These data will be collected by the researcher.

When you agree to take part in this research study, the researcher will use any personal data for the purposes of carrying out this research and will be handled according to the University of Southampton policy in line with data protection law. Any personal data collected for research will not be used for any other purpose.

Your information will be stored in a file located in the Dropbox which is in the password-protected access laptop. A copy of this file will be on the laptop in an attempt to skip any wrong that may happen during save data. Once back in Soton, I will transfer the data from the laptop to my personal computer in my office at building 32. All information will be used on secure systems and will be used for this research purpose only. Your responses are voluntary and will be confidential. Individual responses will not be identified. All responses will be compiled together and analysed as a group. The researcher who only has authorised to access the data. The hard data (i.e. personal data and consent forms) will be kept in lockable cabinets in the University of Southampton. However, the researcher will save your contact details for the duration of the study. After finishing the study, the researcher will destruct your data.

Will my participation be confidential?

Yes, you will not be asked about your real name, but the researcher will just know your ID. This only in order to facilitate the comparisons for the same participant before and after intervention during the analysis of the data. Your participation and the information I collect about you during the course of the research will be kept strictly confidential. Your information will be stored in a file located in the password-protected access. All information will be used on secure systems and will be used for this research purpose only. All data will be kept confidential where will be saved in PDF format with the password-protected access. The researcher will record only the participants' voice in the interviews (in order to respect Islamic law and the Saudi traditions). However, the researcher will destruct all your data after finishing the study.

Only the researcher, supervisors, and responsible members of the University of Southampton may be given access to data about you for monitoring purposes or to carry out an audit of the study to ensure that the research is complying with applicable regulations. All of these people have a duty to keep your information, as a research participant, strictly confidential.

Do I have to take part?

No, it is entirely up to you to decide whether or not to take part. If you decide you want to take part, you will need to sign a "Consent Form" to show you have agreed to take part in this research study.

What happens if I change my mind?

You have the right to withdraw at any time, at any stage of the experiment. You do not need to give any reasons to withdraw and your legal rights will not be affected. Your data collected up to this point will be destroyed directly when you take a decision to withdraw. However, you can withdraw from the study after a month of data collection has finished.

What will happen to the results of the research?

This research is a doctoral thesis submitted to the Education School in Faculty of Social, Human and Mathematical Sciences at the University of Southampton. Therefore, the findings will be included within the thesis. Your personal details will remain strictly confidential. Research findings made available in any reports or publications will not include information that can directly identify you without your specific consent. You can contact me if you like to have a copy of the results. The research data be stored a minimum of 10 years as per University of Southampton policy, but can be longer if required by the funder or statutory obligation.

Where can I get more information?

You can contact me (Mrs Dalya Khayat) using any of the following:

Mobile: 00966504776510 (KSA)

Mobile: 00447427732239 (UK)

Email: dosk1e14@soton.ac.uk

In addition, you can contact the main supervisor (Dr Christian Bokhove) using any of the following:

Telephone: (004423) 8059 2415

Email: C.Bokhove@soton.ac.uk

What happens if there is a problem?

If you remain unhappy or have a complaint about any aspect of this study, please contact the University of Southampton Research Integrity and Governance Manager;

Telephone: 00442380 595058

E-mail: rgoinfo@soton.ac.uk

Thank you for taking the time to read the information sheet and considering taking part in the research.

Participant Information Sheet (Group C)

Study Title: The Impact of Using a Flipped Mobile Learning Environment on the Development of Skills for Creating Electronic Lectures among Female Faculty Members in the Kingdom of Saudi Arabia

Researcher: Dalya Osama Khayat **ERGO number:** 48268

You are being invited to take part in the above research study. To help you decide whether you would like to take part or not, it is important that you understand why the research is being done and what it will involve. Please read the information below carefully and ask questions if anything is not clear or you would like more information before you decide to take part in this research. You may like to discuss it with others but it is up to you to decide whether or not to take part. If you are happy to participate you will be asked to sign a consent form.

What is the research about?

This research is under direction of the School of Education, University of Southampton, UK. This research conducted by me as the main researcher where is I am a PhD candidate. This research is under funding of the Royal Embassy of Saudi Arabia Cultural Bureau in London.

The purpose of the research is to gain a better understanding of the perceived and actual effects of flipped learning (FL), mobile learning (ML), and flipped mobile learning (FML) CPD on university teachers e-lecture skills in a leading university in Saudi Arabia. Additionally, the study seeks to provide a better understanding of the use of FML in continuing professional development, including the removal of space and time limits, to increase the use of e-lectures in supporting teaching in higher educational institutions. This research also seeks to explore university teachers' opinion (concerns, challenges, and affordances) of using FML.

Why have I been asked to participate?

You have been chosen to participate in this study because we wish to benefit from your valuable experience in the quality of training offered to female faculty members at Umm Al-Qura University, which are within the continuing professional development program. Your opinion will help in developing the quality of training, determining themes according to the members' needs, and identify the best way for training under the umbrella of over multi-tasks that required from the faculty members in the Saudi universities. You have been chosen to participate in this study because you are a female faculty member at Umm Al-Qura University regardless of your level of academic position and regardless of your majors. Also, because you own either a smartphone, a tablet, or a laptop. As well, you have been chosen because you accept technology and you have a good background about technology. Otherwise of these criteria, I am sorry to say you cannot participate in this research project and your data will be deleted.

What will happen to me if I take part?

When you agree to participate, you will be trained via flipped mobile learning environment (FML). In this study context, the training via flipped mobile learning environment is defined as the learning prior to attending the training session. The trainees watch a recorded video in Acadox application through the mobile device before the training session, while the training session time used to solve the complex concepts and questions arising from the video. The training sessions conduct also in Acadox application. I appreciate your time, but you will be asked to:

1. Complete an online pre-training questionnaire. The link to the questionnaire will be sent to your contact number (the link will be expired during a week). The questions related to the extent of your experience and skills in producing electronic lecture and use of technology (electronic lecture means the use of video technology for the purpose of interactive communication between learners and tutors). You should choose the code C in the group code section. You will take approximately 15-20 minutes to complete the questionnaire. You need to tick a box to giving your consent and allowing you to start the questionnaire. You will also be asked to provide some basic demographic information about yourself (e.g. age, scientific of degree, etc.) at the beginning of the questionnaire. You are required to provide accurate responses before submitting the questionnaire.
2. You will be required then to attend four weekly sessions that are provided through Acadox application. Each weekly session comprised of 30 minutes. You will be required to watch a recorded video which will be in Acadox application before the training session. The training sessions conduct also in Acadox application. You will be required to produce an electronic lecture by using recorded video lecture or combination of pictures, PowerPoint slides, text, audio records, and video records. The video produced does not include the image of the participants their selves or their personality; but general images, texts, and sounds.
3. Complete an online post-training questionnaire. The link to the questionnaire will be sent to your contact number (the link will be expired during a week). The questionnaire contains questions about training (as well learning) environment to develop teachers' e-lecture production skills. It is estimated that you will take about 10-15 minutes to complete the questionnaire. You should choose the code C in the group code section. You must answer all the questions in questionnaire accurately, and then submit.
4. In case you agree to do an interview, you will be required to answer the interview questions. The interview will be conducted at an assigned training classroom at Umm Al-Qura University, which will be informed prior to the interview session. The research team will be responsible for the venue arrangement. You may also request for the interview to conducted at any place convenient to you. The researcher will record the interview and your answer. The interview will be used only for scientific purposes. Your answers will be recorded and filed in a secured PC where only the researcher has the right to the access.

Are there any benefits in my taking part?

You will obtain more benefits from taking part in terms of learning new skills, knowing the benefits of some educational application, dealing with some learning environments you may have not used before. However, your feedback; your answers will help me gather educationalist opinions on the development efforts.

Are there any risks involved?

There are no risks from taking part in this research.

What data will be collected?

The data will be collected from the university teachers; these data are the perceived and actual skills of the e-lecture before and after the CPD through three different environments [flipped learning (FL), mobile learning (ML), and flipped mobile learning (FML)]. As well, knowing information about CPD in Saudi universities. Finally, exploring the university teachers' opinion (concerns, challenges, and affordances) of using FML as a new training environment. These data will be collected by the researcher.

When you agree to take part in this research study, the researcher will use any personal data for the purposes of carrying out this research and will be handled according to the University of Southampton policy in line with data protection law. Any personal data collected for research will not be used for any other purpose.

Your information will be stored in a file located in the Dropbox which is in the password-protected access laptop. A copy of this file will be on the laptop in an attempt to skip any wrong that may happen during save data. Once back in Soton, I will transfer the data from the laptop to my personal computer in my office at building 32. All information will be used on secure systems and will be used for this research purpose only. Your responses are voluntary and will be confidential. Individual responses will not be identified. All responses will be compiled together and analysed as a group. The researcher who only has authorised to access the data. The hard data (i.e. personal data and consent forms) will be kept in lockable cabinets in the University of Southampton. However, the researcher will save your contact details for the duration of the study. After finishing the study, the researcher will destruct your data.

Will my participation be confidential?

Yes, you will not be asked about your real name, but the researcher will just know your ID. This only in order to facilitate the comparisons for the same participant before and after intervention during the analysis of the data. Your participation and the information I collect about you during the course of the research will be kept strictly confidential. Your information will be stored in a file located in the password-protected access. All information will be used on secure systems and will be used for this research purpose only. All data will be kept confidential where will be saved in PDF format with the password-protected access. The researcher will record only the participants' voice in the interviews (in order to respect Islamic law and the Saudi traditions). However, the researcher will destruct all your data after finishing the study.

Only the researcher, supervisors, and responsible members of the University of Southampton may be given access to data about you for monitoring purposes or to carry out an audit of the study to ensure that the research is complying with applicable regulations. All of these people have a duty to keep your information, as a research participant, strictly confidential.

Do I have to take part?

No, it is entirely up to you to decide whether or not to take part. If you decide you want to take part, you will need to sign a "Consent Form" to show you have agreed to take part in this research study.

What happens if I change my mind?

You have the right to withdraw at any time, at any stage of the experiment. You do not need to give any reasons to withdraw and your legal rights will not be affected. Your data collected up to this point will be destroyed directly when you take a decision to withdraw. However, you can withdraw from the study after a month of data collection has finished.

What will happen to the results of the research?

This research is a doctoral thesis submitted to the Education School in Faculty of Social, Human and Mathematical Sciences at the University of Southampton. Therefore, the findings will be included within the thesis. Your personal details will remain strictly confidential. Research findings made available in any reports or publications will not include information that can directly identify you without your specific consent. You can contact me if you like to have a copy of the results. The research data be stored a minimum of 10 years as per University of Southampton policy, but can be longer if required by the funder or statutory obligation.

Where can I get more information?

You can contact me (Mrs Dalya Khayat) using any of the following:

Mobile: 00966504776510 (KSA)

Mobile: 00447427732239 (UK)

Email: dosk1e14@soton.ac.uk

In addition, you can contact the main supervisor (Dr Christian Bokhove) using any of the following:

Telephone: (004423) 8059 2415

Email: C.Bokhove@soton.ac.uk

What happens if there is a problem?

If you remain unhappy or have a complaint about any aspect of this study, please contact the University of Southampton Research Integrity and Governance Manager;

Telephone: 00442380 595058

E-mail: rgoinfo@soton.ac.uk

Thank you for taking the time to read the information sheet and considering taking part in the research.

Appendix P Arabic version of the consent forms for each group

استمارة موافقة (الاصدار رقم 1)

عنوان الدراسة: أثر استخدام بيئة تعليمية متنقلة مقلوبة في تطوير مهارات انتاج محاضرة إلكترونية لدى عضوات هيئة التدريس بالمملكة العربية السعودية

اسم الباحثة: داليا اسامه خياط

الرقم المرجعي: 48268

رقم المنسوب: ....

يرجى مبدئيا وضع اشاره إذا كنت تتفق مع البيانات ادناه

لقد قرأت وفهمت ورقة المعلومات (2019/3/30 الإصدار رقم 1) وأتيحت لي الفرصة لطرح أسئلة حول الدراسة.	
أوافق على المشاركة في هذا المشروع البحثي والموافقة على استخدام بياناتي لأغراض هذه الدراسة.	
أفهم أن مشاركتي تطوعية، ويمكنني أن أنسحب (في أي وقت) لأي سبب من الأسباب دون أن تتأثر حقوقي.	
أوافق على المشاركة في هذا المشروع البحثي من خلال حضور الدورات التدريبية في جامعة أم القرى (4 دورات)، والإجابة على الاستبيان القبلي والبعدي، وإنتاج محاضرة إلكترونية قصيرة.	
أوافق على إجراء مقابلة معي.	
أدرك أن المقابلة سوف يتم تسجيلها.	
أفهم أنه قد يتم نقل اجاباتي الى تقارير البحث دون ان يستخدم اسمي.	
أفهم أن المعلومات التي تم جمعها عني قد تكون مجهولة المصدر واستخدامها في الدراسات البحثية المعتمدة أخلاقيا في المستقبل.	

اسم المُشاركة..

توقيع المُشاركة..

التاريخ ....

اسم الباحثه..

توقيع الباحثه..

التاريخ ....

[الرقم المرجعي 48268] [الاصدار رقم 1] [2019/3/30]

استمارة موافقة (الاصدار رقم 2)

عنوان الدراسة: أثر استخدام بيئة تعليمية متنقلة مقلوبة في تطوير مهارات انتاج محاضرة إلكترونية لدى عضوات هيئة التدريس بالمملكة العربية السعودية

اسم الباحثة: داليا اسامه خياط

الرقم المرجعي: 48268

رقم المنسوب: ....

يرجى مبدئيا وضع اشاره إذا كنت تتفق مع البيانات ادناه

لقد قرأت وفهمت ورقة المعلومات (2019/3/30 الإصدار رقم 2) وأتيحت لي الفرصة لطرح أسئلة حول الدراسة.	
أوافق على المشاركة في هذا المشروع البحثي والموافقة على استخدام بياناتي لأغراض هذه الدراسة.	
أفهم أن مشاركتي تطوعية، ويمكنني أن أنسحب (في أي وقت) لأي سبب من الأسباب دون أن تتأثر حقوقي.	
أوافق على المشاركة في هذا المشروع البحثي من خلال حضور الدورات التدريبية عبر تطبيق Acadox (4 دورات)، والإجابة على الاستبيان القبلي والبعدي، وإنتاج محاضرة إلكترونية قصيرة.	
أوافق على إجراء مقابلة معي.	
أدرك أن المقابلة سوف يتم تسجيلها.	
أفهم أنه قد يتم نقل اجاباتي الى تقارير البحث دون ان يستخدم اسمي.	
أفهم أن المعلومات التي تم جمعها عني قد تكون مجهولة المصدر واستخدامها في الدراسات البحثية المعتمدة أخلاقيا في المستقبل.	

اسم المُشاركة...

توقيع المُشاركة..

التاريخ ....

اسم الباحثه...

توقيع الباحثه...

التاريخ ....

استمارة موافقة (الاصدار رقم 3)

عنوان الدراسة: أثر استخدام بيئة تعليمية متنقلة مقلوبة في تطوير مهارات انتاج محاضرة إلكترونية لدى عضوات هيئة التدريس بالمملكة العربية السعودية

اسم الباحثة: داليا اسامه خياط

الرقم المرجعي: 48268

رقم المنسوب: ....

يرجى مبدئيا وضع اشاره إذا كنت تتفق مع البيانات ادناه

لقد قرأت وفهمت ورقة المعلومات (2019/3/30 الإصدار رقم 3) وأتيحت لي الفرصة لطرح أسئلة حول الدراسة.	
أوافق على المشاركة في هذا المشروع البحثي والموافقة على استخدام بياناتي لأغراض هذه الدراسة.	
أفهم أن مشاركتي تطوعية، ويمكنني أن أنسحب (في أي وقت) لأي سبب من الأسباب دون أن تتأثر حقوقي.	
أوافق على المشاركة في هذا المشروع البحثي من خلال حضور الدورات التدريبية عبر تطبيق Acadox (4 دورات)، والإجابة على الاستبيان القبلي والبعدي، وإنتاج محاضرة إلكترونية قصيرة.	
أوافق على إجراء مقابلة معي.	
أدرك أن المقابلة سوف يتم تسجيلها.	
أفهم أنه قد يتم نقل اجاباتي الى تقارير البحث دون ان يستخدم اسمي.	
أفهم أن المعلومات التي تم جمعها عني قد تكون مجهولة المصدر واستخدامها في الدراسات البحثية المعتمدة أخلاقيا في المستقبل.	

اسم المُشاركة...

توقيع المُشاركة..

التاريخ ....

اسم الباحثه...

توقيع الباحثه..

التاريخ ....

Appendix Q English version of the consent forms for each group

CONSENT FORM (Version number 1)

Study title: The Impact of Using a Flipped Mobile Learning Environment on the Development of Skills for Creating Electronic Lectures among Female Faculty Members in the Kingdom of Saudi Arabia

Researcher name: Dalya Osama Khayat **ERGO number:** 48268

Participant Identification Number: …………..

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet (30/3/2019 /version number 1) and have had the opportunity to ask questions about the study	
I agree to take part in this research project and agree for my data to be used for the purpose of this study	
I understand my participation is voluntary and I may withdraw (at any time) for any reason without my rights being affected	
I agree to participate in this research project by attending the training sessions at Umm Al-Qura University (4 sessions), answering on pre- and post-training questionnaires, and produce a short electronic lecture	
I agree with doing an interview with me	
I understand that my interview will be audio recorded	
I understand that I may be quoted directly in reports of the research but that my name will not be used	
I understand that the information collected about me may be anonymised and used in future ethically approved research studies	

Name of participant (print name)……………………………………………………………………

Signature of participant…………………………………………………………………………….

Date………………………………………………………………………………..………………….

Name of researcher (print name)……………………………………………………………………

Signature of researcher ……………………………………………………………………………

Date…………………………………………………………………………………………………..

[30/3/2019] [Version number 1] [Ethics/IRAS number 48268]

Appendix Q

CONSENT FORM (Version number 2)

Study title: The Impact of Using a Flipped Mobile Learning Environment on the Development of Skills for Creating Electronic Lectures among Female Faculty Members in the Kingdom of Saudi Arabia

Researcher name: Dalya Osama Khayat

ERGO number: 48268

Participant Identification Number: …………..

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet (30/3/2019 /version number 2) and have had the opportunity to ask questions about the study	
I agree to take part in this research project and agree for my data to be used for the purpose of this study	
I understand my participation is voluntary and I may withdraw (at any time) for any reason without my rights being affected	
I agree to participate in this research project by attending the training sessions through Acadox application (4 sessions), answering on pre- and post-training questionnaires, and produce a short electronic lecture	
I agree with doing an interview with me	
I understand that my interview will be audio recorded	
I understand that I may be quoted directly in reports of the research but that my name will not be used	
I understand that the information collected about me may be anonymised and used in future ethically approved research studies	

Name of participant (print name)……………………………………………………………………

Signature of participant…………………………………………………………………………….

Date…………………………………………………………………………….……….

Name of researcher (print name)……………………………………………………………………

Signature of researcher ……………………………………………………………………………

Date……………………………………………………………………………………………..

CONSENT FORM (Version number 3)

Study title: The Impact of Using a Flipped Mobile Learning Environment on the Development of Skills for Creating Electronic Lectures among Female Faculty Members in the Kingdom of Saudi Arabia

Researcher name: Dalya Osama Khayat

ERGO number: 48268

Participant Identification Number: ………….

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet (30/3/2019 /version number 3) and have had the opportunity to ask questions about the study	
I agree to take part in this research project and agree for my data to be used for the purpose of this study	
I understand my participation is voluntary and I may withdraw (at any time) for any reason without my rights being affected	
I agree to participate in this research project by attending the training sessions through Acadox application (4 sessions), answering on pre- and post-questionnaires, and produce a short electronic lecture	
I agree with doing an interview with me	
I understand that my interview will be audio recorded	
I understand that I may be quoted directly in reports of the research but that my name will not be used	
I understand that the information collected about me may be anonymised and used in future ethically approved research studies	

Name of participant (print name)………………………………………………………………………

Signature of participant………………………………………………………………………………

Date…………………………………………………………………………………….. ………………

Name of researcher (print name)………………………………………………………………………

Signature of researcher ………………………………………………………………………………

Date……………………………………………………………………………………………………..

[30/3/2019] [Version number 3] [Ethics/IRAS number 48268]

Appendix R Data distribution for perceived skills for all groups before and after the intervention

Tests of Normality				
The Perceived Skills of Creating E-Lectures	Training Environment	Shapiro-Wilk		
		Statistic	df	Sig.
Before the intervention	A	.945	26	.180
	B	.902	22	.103
	C	.937	22	.174
After the intervention	A	.894	26	.102
	B	.938	22	.178
	C	.926	22	.101
Total (for perceived skills of creating e-lectures)	All groups		70	.140

Table 31. Data distribution for perceived skills for all groups before and after the intervention

Appendix S Data distribution for actual skills for all groups before and after the intervention

Tests of Normality				
The Actual Skills of Creating E-Lectures	TrainingEenvironment	Shapiro-Wilk		
		Statistic	df	Sig.
Before the intervention	A	.794	26	.101
	B	.769	22	.101
	C	.624	22	.101
After the intervention	A	.847	26	.101
	B	.897	22	.126
	C	.729	22	.101
Total (for actual skills of creating e-lectures)	All groups		70	.105

Table 32. Data distribution for actual skills for all groups before and after the intervention

Appendix T The group that showed significant improvement of both perceived and actual e-lecture skills

Dependent Variable		Significant Improvement for the Perceived E-Lecture Skills in the Group	Significant Improvement for the Actual E-Lecture Skills in the Group
The skills of creating e-lectures in general	All 14 sub-skills combined	C The perceived e-lecture skills in general were significantly improved via the flipped mobile learning environment (FML)	C The the actual e-lecture skills in general were significantly improved via the flipped mobile learning environment (FML)
The three main skills	1. The skills of designing and organising the structure of the presentation	C The perceived skills of designing and organising the structure of the presentation were significantly improved via FML	B The actual skills of designing and organising the structure of the presentation were significantly improved via mobile learning environment (ML)
	2. The skills of creating the content of an e-lecture	C The perceived skills of creating the content of an e-lecture were significantly improved via FML	C The actual skills of creating the content of an e-lecture were significantly improved via FML
	3. The skills of presenting an e-lecture	C The perceived skills of presenting an e-lecture were significantly improved via FML	C The actual skills of presenting an e-lecture were significantly improved via FML

The fourteen sub-skills	1.1. The ability to determine the purpose of the e-lecture	B The perceived skill of the ability to determine the purpose of the e-lecture was significantly improved via ML	A The actual skill of the ability to determine the purpose of the e-lecture was significantly improved via flipped learning environment (FL)
	1.2. The ability to determine the content of the e-lecture	C The perceived skill of the ability to determine the content of the e-lecture was significantly improved via FML	C The actual skill of the ability to determine the content of the e-lecture was significantly improved via FML
	1.3. The ability to design an e-lecture framework in proportion to the characteristics of the learners	C The perceived skill of the ability to design an e-lecture framework in proportion to the characteristics of the learners was significantly improved via FML	C The actual skill of the ability to design an e-lecture framework in proportion to the characteristics of the learners was significantly improved via FML
	1.4. The ability to give an introduction to gain learners' attention	A The perceived skill of the ability to give an introduction to gain learners' attention was significantly improved via FL	A & B The actual skill of the ability to give an introduction to gain learners' attention was significantly improved via FL and ML
	1.5. The ability to give an explanation to clarify concepts and terms when presenting information	B & C The perceived skill of the ability to give an explanation to clarify concepts and terms when presenting information was significantly improved via ML and FML	B The actual skill of the ability to give an explanation to clarify concepts and terms when presenting information was significantly improved via ML
	1.6. The ability to give a summary to emphasise the key points presented during an e-lecture	A The perceived skill of the ability to give a summary to emphasise the key points presented during an e-lecture was improved significantly via FL	A The actual skill of the ability to give a summary to emphasise the key points presented during an e-lecture was significantly improved via FL

	1.7. The ability to design the activities in proportion to the content of the e-lecture	C The perceived skill of the ability to design the activities in proportion to the content of the e-lecture was significantly improved via FML	C The actual skill of the ability to design the activities in proportion to the content of the e-lecture was significantly improved via FML
	1.8. The ability to design the activities in proportion to the characteristics of the learners	C The perceived skill of the ability to design the activities in proportion to the characteristics of the learners was significantly improved via FML	C The actual skill of the ability to design the activities in proportion to the characteristics of the learners was significantly improved via FML
	2.1. The ability to use audio and visual aids appropriate to the content	C The perceived skill of the ability to use audio and visual aids appropriate to the content was significantly improved via FML.	B & C The actual skill of the ability to use audio and visual aids appropriate to the content was significantly improved via FML
	2.2. The ability to determine the appropriate time to present audio and visual aids	C The perceived skill of the ability to determine the appropriate time to present audio and visual aids was significantly improved via FML	C The actual skill of the ability to determine the appropriate time to present audio and visual aids was significantly improved via FML
	2.3. The ability to deal with devices needed to create an e-lecture	C The perceived skill of the ability to deal with devices needed to create an e-lecture was significantly improved via FML	B The actual skill of the ability to deal with devices needed to create an e-lecture was significantly improved via ML
	2.4. The ability to deal with several applications needed to create an e-lecture	C The perceived skill of the ability to deal with several applications needed to create an e-lecture was significantly improved via FML	B & C The actual skill of the ability to deal with several applications needed to create an e-lecture was significantly improved via ML and FML

	2.5. The ability to create a presentation	C The perceived skill of the ability to create a presentation was significantly improved via FML	C The actual skill of the ability to create a presentation was significantly improved via FML
	3.1. The ability to make the e-lecture interactive	C The perceived skill of the ability to make the e-lecture interactive was significantly improved via FML	C The actual skill of the ability to make the e-lecture interactive was significantly improved via FML

Table 33. The group that showed significant improvement of both perceived and actual e-lecture skills

Appendix U List of participant ID for each group

Group …………… via …………. learning

Deserving to be certificated	Note (Completed all tasks,or withdrew, or did not compelete tasks)	Want to be interviewed	Producing e-lecture		Questionnair		University email	ID number	The sequence
			Post-	Pre-	Post-	Pre-			
									.1
									.2
									.3
									.4
									.5
									.6
									.7
									.8
									.9
									.10
									.11
									.12
									.13
									.14
									.15
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									.26
									.27
									.28
									.29
									.30

Table 34. List of participant ID for each group

Appendix V Thematic analysis (manual)

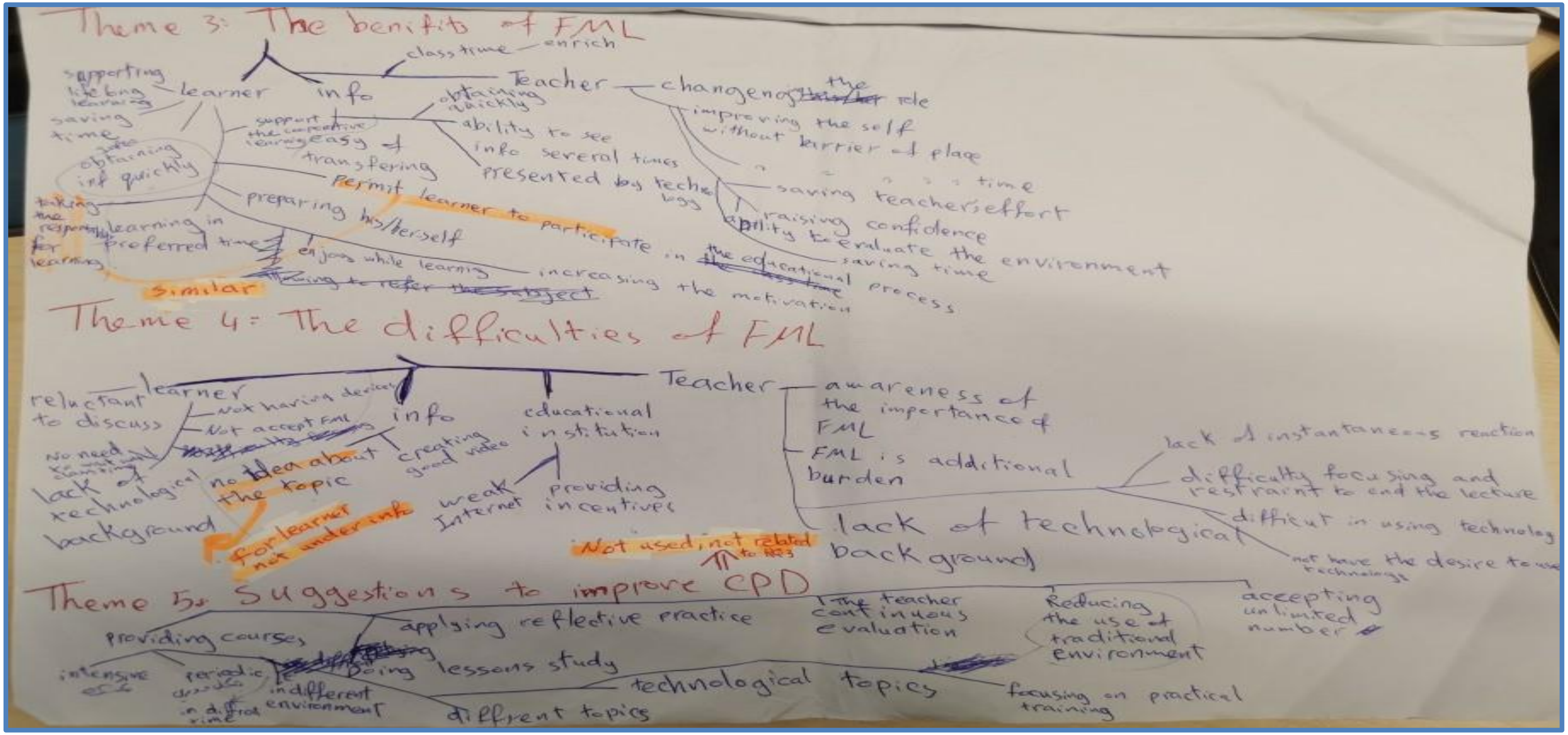

Figure 36. Thematic analysis (manual)

Appendix W Interview transcript for all groups

This appendix demonstrates the direct quotations from participants and indirect questions which have been asked from the interviewer. However, Table 35 transcribes the interviewees' opinions with regard to the FML CPD. Table 36 transcribes the interviewees' opinions from Group C through questions only asked for this group, while Table 37 transcribes the interviewees' opinions from Groups A and B through questions only asked for these groups. The codes in all tables have been specified in *Italics and underline*, while themes have been specified in ***Italics and Bold.***

Questions	Answers from the three groups		
	Participants from Group A (Flipped learning environment): 1- F1; 2- F2; and 3- F3	Participants from Group B (Mobile learning environment): 4- M4; 5- M5; 6- M6; and 7- M7	Participants from Group C (Flipped mobile learning environment): 8- FM8; 9- FM9; 10- FM10; 11- FM11; and 12- FM12
1. How do you describe your relationship with technology?	**F1:** A good relationship. I see that technology helps me a lot whether in my personal life or in my career life at the uni. It helps me as a mum, and as a teacher. It helps people to get a piece of quick information without any barrier of time **F2:** I love technology so much **F3:** My relationship with technology is a love-hate relationship because of the constant need for it in particular at the present time during the doctoral study. Although I don't imagine living without technology, my day relies heavily on it. Even to pay through points of sale, I use my digital watch. At some moments, I feel that I need to get away from technology for a short time and then come back again	**M4:** It is a good relationship. I use technology so much **M5:** My relationship with technology is normal **M6:** My relationship is very good to excellent **M7:** I love using technology and I love to learn about it.	**FM8:** Excellent **FM9:** My relationship with technology is good. I have a passion for learning all that is new and useful in the world of technology **FM10:** I have massive experience in technology since my major is a bachelor's degree in computer science. And I also attempt to know the most modern technological ways in educational practice and the newest programs **FM11:** My relationship with technology is very good. I support using technology and I use it so much whether in my life or in teaching, learning, my researches. Technology penetrates our lives **FM12:** From my perspective, technology has become essential to our life. Technology has been used for everything whether for me or for my family. I can

			obtain the answer for any question by using technology
2. Do you employ technology in the educational process? Or do you only use it in everyday life situations? Why?	**F1:** I use technology for both. I need it in the educational process to get some information, to obtain some pictures, and to transfer information to my students. And I also need technology to exchange information with other academics around the world. Of course, using technology in daily life is considered as a list of uses. This is why I can say because it simply saves our time and effort. There is no consideration of time and place when using technology **F2:** Yes, I use technology in the teaching process. I think technology is an enjoyable way for learners in the 21st century. Also, technology facilitates information for learners **F3:** No not only in my everyday life. In my everyday life, I sacred of technology is as long as it is summarised distances, effort, and time. On the contrary, technology could be a burden, it takes time to learn, and sometimes extensive use of technology keeps us away from the content of the message to be delivered. The technology could be employed positively in the educational process, but	**M4:** I employ technology in the educational process and in everyday life situations because it makes life easier **M5:** I used technology in everyday life situations only. There are a few attempts to use it in the educational process, this backfires due to the lack of knowledge about technology and the educational programs **M6:** I employ technology in all aspects of life **M7:** I use technology simply, whether in an educational process or in everyday life situations. I think the problem is in my major, which is Statistics. It is easy to write symbols on a traditional board. It is difficult to use any technological devices to create a presentation, video, or e-lecture with these symbols. And academics face the problem of having a lot of administrative tasks	**FM8:** Yes. I use technology in my classes but with medical students, technology is crucial as I need to play videos, show pictures and definitions of terminology. One minor reason for using technology is that I try to minimize printing papers. I prefer to rely on technology instead of printing **FM9:** I love using technology in life in general because it saves a lot of time and effort. It also provides fun for the student and helps communicate information easily at the level of the educational process **FM10:** Yes, I employ technology in both. This because of several reasons: firstly, we are in the technological era and the students enjoy using technology in the classroom. And using technology in the classroom is considered a type of change in education. Technology motivates a student to learn. Secondly, we work to produce a technologically empowered generation. Thirdly, using technology could support teaching methods by saving time and effort. Finally, using technology could improve educational activities **FM11:** Yes, I employ technology in both. Technology is not only used in everyday life situations. We can use it in educational processes in order to explain concepts, train students, search for information. Through technology, a learning environment has

	my point of view is that, as much as education improves, technology cannot replace the personal teacher's presence, voice, and instantaneous interaction. These elements are important to me. However, this perspective may differ from person to person, especially for the next generation		been provided for students allowing them to share information, add comments, participate in a discussion each of them in a different place **FM12:** I use technology in everyday life only, not in the educational process. Because I don't have enough experience with employing technology in education; and the university does not support us or provide training around the use of technology in education, especially for those who got a job in the university recently
3. What types of mobile devices you have used in the experiment? Smartphone / Tablet / Laptop / Personal Media Players / Digital media players / Personal Digital Assistant (PDAs) / Others……………	**F1:** Smartphone + laptop+ Personal Digital Assistant **F2:** Smartphone **F3:** Smartphone + laptop	**M4:** Smartphone + laptop **M5:** Smartphone + laptop **M6:** laptop + Personal Digital Assistant **M7:** laptop	**FM8:** Smartphone + laptop **FM9:** Smartphone + laptop + Personal Digital Assistant **FM10:** laptop + Personal Digital Assistant **FM11:** laptop **FM12:** Laptop

4. What applications have you used in this experiment? What is the purpose of each one?	**F1:** PowerPoint to create slides + KMPlayer to create video + Xmind to create mind map **F2:** Video maker to create video **F3:** PowerPoint to create slides	**M4:** PowerPoint to create slides + Video maker to create video **M5:** PowerPoint to create slides **M6:** PowerPoint to create slides **M7:** PowerPoint to creat slides	**FM8:** 1. Power point to make slides of difficult vocabulary 2. Quizlet to make a list of vocabulary associated with pictures for medical students 3. YouTube to watch videos that demonstrate specific units for medical students and I have used some videos with EGP to improve pronunciation **FM9:** PowerPoint to create slides **FM10:** PowerPoint to create slides + Camtasia to screenshot and montage **FM11:** PowerPoint to create slides and then add photos and video **FM12:** PowerPoint to create video by adding photos, audios, text, animations by one app + Video maker
5. What is your impression about the training method? ***Theme No. 1: The impression about FML CPD***	**F1:** It was good. The experiment opened the door to several educational environments. It provided a new concept, the e-lecture and its importance in the educational process **F2:** Normal. I liked the content because I had not heard about e-lectures before. It was new to me **F3:** Very beautiful, but it would be better if the content was deeper and more interactive	**M4:** Excellent **M5:** The training course was beautiful and unique. It enhanced some educational abilities **M6:** It was useful and rich **M7:** I like this method and the Acadox application. My major does not allow me to use this environment with students. Perhaps I will use it with the theoretical parts of the curriculum and the traditional	**FM8:** This method was *successful* and I would *definitely use it*. I am a big fan of making learning as *fun* as possible by playing games online and using useful websites. So my number one tool in teaching would always be *integrating technology in my classrooms* and in the future, I plan to use blackboard, that the university has recently launched **FM9:** It was *useful and rich* **FM10:** The training method was *beautiful*. The video helped me to understand how to create e-lectures. Using the mobile app as a training environment made it *easier to attend the session* and *see the discussion when I want*. I meant the questions that

	Interviewer: What do you mean deeper and more interactive? **F3:** I meant that the video I watched includes a few information, I did not know about the e-lecture **Interviewer:** You are correct but because the flipped learning method is based on providing the basic information via a video prior the class time, while the class time is used for discussion and asking about concepts that weren't understood. Therefore, those videos that were presented did not include a lot of information. I would like to ask you several questions and inquires to enrich the discussion	environment with these statistical symbols. Of course, students will like the new environment and the diversity in environments to have knowledge instead of just the classroom	are sent after the training time in the discussion panel **FM11:** *Good*. This method *showed us one of the benefits of technology in the educational process*, as it can be used to train members of the academic staff also. I think using this technological environment in training, *teachers' integration into the technology will be increased*; and then, this environment will be employed with their students. My opinion is that *using technology in the educational process in a good manner makes the topic attractive and interesting*. Overall, I found myself *more excited to see the video* and write down my questions about the content. I was also *excited to attend* the training via the application on my mobile phone. It is true that I produced an electronic lecture and I think it was not good enough, but I was *sincerely eager to amend it and show* it well in the end **FM12:** *I like it*, honestly. *The Acadox app was easy*, and that information was presented in the *video in a nice manner*. I can *pause the video to understand and re-read the text*
6. Did you like the training method? Why?	**F1:** Yes, I like it. I was interested in this new method **Interviewer:** The flipped learning is not a new method but it is an innovative and effective instructional approach and it has recently gained prominence. Had you heard about flipped learning before?	**M4:** Yes. Because I learned new knowledge via a new environment. So, I can utilize this environment with the students **M5:** The method is practical but I prefer the direct method because	**FM8:** Yes, *I liked it*. It was *easy to follow* **FM9:** *Yes*, because it was *rich, useful, and practical* **FM10:** As I said previously, *I like* the training method. *I enjoyed watching* the video, and I can *watch it again. I was able to manage my time*, so, I can improve myself from anywhere if I have free time. In contrast, with the traditional method, which obliges

Theme No. 2: The reasons to like FML for CPD	**F1:** Realy? I had not heard about it before **F2:** It was a regular environment. I used it to attend workshops via the traditional classroom. To be honest, I attended two workshops through the Rawaq application, it was interesting, more than the regular training. Sorry this is my opinion **F3:** No, I don't like it. There is no specific reason but I felt it was like any other training course	it is easier for assimilation and for asking inquiries. **Interviewer:** Do you mean the direct method? Is it the face-to-face method? Or as we call it the traditional method? **M5:** Yes, that what I meant **Interviewer:** But through this method you can also ask your inquiries easily by tapping on the discussion panel? **M5:** Really, I did not know this **M6:** Yes, because it allowed me to know about a new type of educational environment **M7:** Yes, because I attended a training course online last month and now I am attending this training session via Acadox app. Both of them were the best training. I attended while I was at home. And I watched the content several times and can download it whenever and wherever I want	the trainee to attend the training session. And the duration of that training session could be more than two hours **FM11:** *Yes, I like it*. I had previously heard about flipped learning, but *I had no opportunity* to try it or attend a training course on it. Now, I am aware of flipped learning as well as inverted learning combined with mobile learning **FM12:** As I said *I like* the Acadox app. The reasons that I totally agree with this method are: 1. The Acadox app was *easy*, and that information has been presented in the video in a *nice manner*. I can *pause the video to understand and re-read the text, or if I am not in a good mood to continue* 2. I think this method will encourage academics *to attend several training courses without any barrier of time, place, or having my children with me*. I will be the first one to use this if this environment is applied 3. I believe if the Higher Education institutions offer opportunities for academics to have training about this method and how to use it with students, this will *reflect on students, their motivations, and their responsibility towards learning*
7. Could you please mention three benefits	**F1:** I cannot really recall any	**M4:** 1. Enjoying learning when using technology	**FM8:** I cannot really recall any **FM9:** 1. *Saving the learner's time* 2. *Obtaining information quickly*

for using this training method whether in training or teaching? ***Theme No. 3: The benefits of using FML whether in training or teaching***	**F2:** In my view, the direct interaction between teachers and their students is the only benefit of this method **F3:** Obtaining the interaction with the trainer at the same time	2. Allowing the learner to learn in the preferred time and in the preferred place **M5:** 1. Flexible 2. Respect everyone's circumstances to learn in their preferred time and place 3. Easy **M6:** 1. Because the training was from my mobile, so obtaining it was quick 2. I think training via mobile is an effective way to benefit from training **M7:** Allowing the learner to learn in their preferred time and place	*3. The ease of information transfer for the learner* **FM10:** *1. Allowing the learner to learn in their preferred time* 2. *Obtaining the information or the inquires* which could arise after the training session *quickly* (from the discussion panel) *3. The ability to see the content several times* **FM11:** *1. Preparing the learner to learn* *2. Supporting the lifelong learning concept* 3. *Changing the teacher's role* in the educational process, where his role will be more than a provider of information. The teacher uses technology to help a learner to learn by him/herself. Meanwhile, the teacher will use that time to improve himself or to focus more on another student who needs more support **FM12:** *1. Encouraging the learner to take responsibility for learning* *2. Encouraging the teacher to improve themselves without any barrier of place or time* 3. *Raising the teacher's confidence*
8. Could you please mention three difficulties you have encountered	**F1:** I cannot really recall any **F2:** This method, of course, as any workshop or training course suffers from the limited number of participants **F3:**	**M4:** The difficulty was in the beginning, toaccess the training session **M5:** 1. Not absorbing some points	**FM8:** There were not any difficulties **FM9:** There were not any difficulties **FM10:** There were no difficulties but I have a question. It is too strange that *the teachers did not participate in the discussion*. The e-lecture concept is not famous among university teachers as you know, so when you asked us to write our questions or our

while using this training method? Or you may face by using this method? ***Theme No. 4: The difficulties of using FML***	1. I could not understand the content of the research topic at first sight because I don't know some technological words 2. There was no indication to me during the lecture whether my understanding was right or wrong __Interviewer:__ Why you did not ask in the discussion? I meant during training time? **F3:** I felt a little bit shy	2. Inability to link information to my major __Interviewer:__ What is your major? **M5:**Biology **M6:** There were not any difficulties **M7:** There were not any difficulties	inquiries around the video content, just a few teachers asked. So, do all the other teachers know about e-lectures, programs to create e-lectures, ….. etc??? I believe they don't know but I don't have an idea about why they did not participate **FM11:** The difficulties appeared when you asked us to produce e-lectures when *__I don't know about the element__* of it **FM12:** I think the difficulty is *__lack of awareness of the importance of FML__* as well as the awareness of the importance of other technological concepts. It should encourage teachers to use FML. However, I found some limitations, which are: *1.* *__Some teachers will see this method as an additional burden__* 2. I think if FML is applied, *__the educational institution may need to provide incentives__* for those who use it. So, they will have the motivation to employ it 3. The issue of *__access to the Internet__* 4. *__The lack of technological background__* especially those teachers who don't like technology
9. What suggestions can improve the continuing professional development programmes?	**F1:** May I ask you a question? __Interviewer:__ Yes, of course **F1:** What do you mean by the continuing professional development programs? __Interviewer:__ It means the training courses, or workshops, or training sessions that the higher education institutes provide for university teachers in order to improve their skills and acquire new knowledge	**M4:** Increasing the use of technology in these programme **M5:** 1. Providing intensive and periodic courses for faculty members 2. The courses should take into account our time and our academic schedule	**FM8:** 1. Applying the reflective practice for teachers and learning circle 2. Offering weekly or monthly workshops 3. Doing lessons study for teachers **FM9:** I don't have any suggestions **FM10:** Employing an effective training environment by using technology, It is enough to provide the training traditionally

	about a specific concept, a strategy, or method. So, what are your suggestions? **F1:** Ok. I got it. So, maybe provide the training via the flipped method. In other words, change the usual method used in training **Interviewer:** Do you mean changing the traditional method in training, which is attending the class and the trainer provides the information? **F1:** Yes, that what I meant. I suggest also focusing on the subjects related to how to create a presentation, how to motivate learners **F2:** 1. Emphasising the need to train university teachers about technological topics. So, as long as there is a limited number of participants, the uni has to repeat that course several times in different times to be sure that the university teachers take their opportunity to attend training 2. Presenting the workshop via a variety of environments **F3:** I believe that getting an educational opportunity is a right for everyone. Even after receiving the doctorate, everyone needs development and training to keep up with what happens around us.	**M6:** Continuous evaluation of teachers in order to follow them; and reveal their strengths and weaknesses **M7:** Providing the training course via several types of environments (online, via mobile or traditional classroom). When I attended online workshop, the presenter mentioned the virtual classroom, it is a smart idea to use this type of classes to train academics who have several curriculums and several administrative tasks	**FM11:** Accepting a big number of participants. Several CPDs have rejected my attendance because there was a limit to the number of participants **Interviewer:** There was no limit to the number of participantswhen I used the FML environment to provide training. So, do you recommend employing this environment in the UQU? **FM11:** Wow. Yes, I strongly recommend it. That is exactly what we need. We need training to be provided to all faculty members without there being any problem with the number of participants. We need training about technology and its variety of uses whether in teaching students or training teachers **FM12:** 1. I think using this environment in order to trainteachers is a good idea. It will be effective in CPD 2. Focusing on practical training to improve skills. It's enough to provide theoretical courses which is like a lecture. We need to improve our skills as well

	Therefore, everything that can improve the development process is desirable. Based on this I suggest: 1. Establishing a specialized committee in universities concerned with developing academics 2. Presenting financial stimuli and moral rewards for the distinguished 3. Creating the infrastructure in universities in accordance with the desired technological dimension		
10. What was the most interesting activity?	**F1:** The discussion with you **F2:** The discussion **F3:** None because I don't like the training method nor the content	**M4:** How to create the e-lecture **M5:** How to create the e-lecture **M6:** I enjoyed with whole experiment **M7:** The whole experiament	**FM8:** The whole experiament **FM9:** The whole experiament **FM10:** The task of creating the e-lecture because it provided an opportunity to apply what I learned. I was very interested in this task, I feel like as a student while waiting for the teacher's evaluation for her homework or research **FM11:** All activities. Once an activity ends, I look forward to the next activity **FM12:** I liked all activities
11. What was the most uninteresting activity?	**F1:** None **F2:** None **F3:** I cannot recall	**M4:** None **M5:** How to record the lecture and insert it in the video **M6:** None **M7:** None	**FM8:** None **FM9:** None **FM10:** None but the training time which was used for the discussion and asking questions was boring. Some teachers appear on the screen but are not actually there. No question, no enquiry. I felt they sat in front of the screen and they might be cooking or playing games

			FM11: None. The training was good **FM12:** In the beginning, I thought it would be difficult and complex. After watching the video, it became easy and wonderful

Table 35. The interviews for the three groups

For Group C only:	
12. Did you attend any session via mobile?	**FM8:** Yes. Webinars, online courses and discussions during my studies **FM9:** No **FM10:** Yes **FM11:** Yes. I attended sessions via Cisco and WebEx **FM12:** No
13. Did you give any session via mobile?	**FM8:** No **FM9:** No **FM10:** No **FM11:** Yes. Just once. It was under the supervision of experts in technology. My role was only to create the content and present it to the audience. All the technical procedures and how to link from my laptop to the audience devices, I don't know anything about it **FM12:** No

14. Did you attend any session using flipped method?	**FM8:** No **FM9:** No **FM10:** Yes **FM11:** Never **FM12:** No
15. Did you give any session using flipped method?	**FM8:** No **FM9:** No **FM10:** Yes **FM11:** Never **FM12:** No
16. Do you think the flipped mobile learning method will be an effective method for teaching students? ***Theme No. 5: To what extent will the FML method be effective in teaching students***	**FM8:** _Yes_, but with _some specific rules such as number of students, levels, and streams (medical, technology, commerce.. etc)_ **FM9:** _Yes_, if it is _applied correctly with a clear plan_ **FM10:** _Yes_. Because it will _allow students to achieve the biggest opportunity of participating_. It may _support cooperative learning_. The most important point is _allowing the students to learn anytime and anywhere_ **FM11:** _Yes_, of course **FM12:** _Yes_, I think so. It will be effective with students

17. Do you think there are any limitations to employing this method at universities? ***Theme No. 6: The limitations to employing FML at* universities**	**FM8:** *I think that it is feasible* to implement this strategy at our university. *We have qualified teachers who are open to change, have the tools and creativity to make it happen* **FM9:** *I think so*, but I am concerned *about students accepting this method and their commitment to watching the video before they attend* the virtual classroom. I am also *afraid about some students who do not have a smartphone or laptop* **FM10:** The *slow Internet* inside uni could affect negatively in case students or teachers would like to attend a session inside the university **FM11:** *No*, I don't think so. To employ this environment, we *need Internet + teachers' awareness regarding the importance of technology + training around technology.* By looking at each element separately in our university; we can say that *Internet is slow*, but the other two elements are lacking. So, *what we need is to increase teachers' awareness regarding employing technology in the educational process and to raise the number of training courses around technology and its benefits*, its variety of uses **FM12:** As I mentioned, *some teachers will see FML as an additional burden. Some teachers will not accept the new environment because they are familiar with the traditional environment or maybe the traditional does not require much effort in preparation. FML requires preparing themselves and creating a video. As you know some teachers don't accept using technology or they don't have enough experience to use technology* in the educational process like me

Table 36. The interview questions only asked for Group C

For Group A and B only: **If you have the opportunity to attend training provided by trainers through the use of flipped mobile learning (FML). The flipped mobile learning is defined as the training given by the trainer through any application on a mobile device (e.g. Acadox application or any other application that is used as an educational platform) to trainees prior to attending the training session. The trainees will watch a recorded video before the class, whereas class time will be used to solve complex concepts and answer questions.** **Could you please think about this environment and answer some questions?**		
12. Can you please mention three benefits you may obtain by using this method in training/ teaching? ***It follows theme No. 3: The benefits of using FML***	**Participants from Group A (Flipped learning environment)**	**Participants from Group B (Mobile learning environment)**
	F1: Sorry, I can't really think of any **F2:** *1.* The learner in general whether teacher or student will *enjoy learning from their devices and from a new environment* *2.* The learner will also *prepare themselves before class* 3. By applying FML, the *teacher can evaluate that environment and be able to ask students questions when necessary* **F3:** *1. Saving the teacher's effort* *2. Allowing a student to refer to the educational subject at any time and any place* 3. *Attracting the new generation who is interested in technology*	**M4:** *1. Saving the teacher's time* *2. Saving the teacher's effort* *3. Investing in technology* **M5:** *1. Preparing the learner* *2. Building the basic information for specific knowledge by the learner* *3. Asking questions about information that was not understood* **M6:** *1. Giving the learner an initial idea about the scientific subject to be presented* *2. Involving the learner in the educational process* *3. Motivating learners to keep an eye on the additional information that they will get later, which will help them to have solutions and clarifications for their inquiries* **M7:**

		1. *Enrich class time* by questioning the learners' ability 2. The *learners will learn by self-study*, this method as you know *helps learners store information they acquire for a longer period*
13. Can you please mention three difficulties you may encounter by using this method in training/ teaching? **It *follows theme No. 4: The difficulties of using FML***	**F1:** Sorry, I can't really think of any **F2:** 1. As long *as it is new*, it will face several difficulties. *Some learners will not accept that environment* 2. As you know, the *Internet is not reliable* **F3:** Because I am one of the people who prefer the verbal and face to face interaction, I can list these difficulties: 1. The *lack of an instantaneous reaction* 2. *Difficulty to focus and restraint to end the lecture at a certain time compared to the traditional lectures* 3. The *difficulty of understanding the exact meaning* of the question, because I cannot communicate and ask at the moment **Interviewer:** This method is based on watching a video that exists on the application (i.e. the Acadox platform) before the class time. Then, the learner will attend the class, which is in that app. The class time is used to ask your inquiries and anything you did not understand. Therefore, you can ask in the class time, which is used basically for the discussion. Or simply, if you cannot wait, you can easily write in the discussion panel	**M4:** 1. The university teacher might find *using technology difficult* 2. The university teacher *might not have the desire to use technology* **M5:** The *weak technical knowledge*, whether for the teacher or the students **M6:** The difficulty maybe just *to start working with something new*, never used before. But after providing the clarifications and descriptions, this environment will be easy **M7:** 1. In this method, as you said, the learners will first watch a video. Then, they will have to wait until the training is over. According to me, *I do not need to wait* and can search for the information I need 2. *The time to create a good video* may challenge me if I use FML with my students. I must choose an effective activity to attract students. Of course, I need to learn about several programs that help me to deal with FML and create e-lectures 3. *Accessing the Internet*

		4. Accessing the devices, *<u>especially since some students don't have a laptop or smartphone</u>*, as you know the situation in some families
14. What do you think about the possibility of using FML to teach students? ***It follows theme No. 5: To what extent will the FML method be effective in teaching students***	**F1:** I think *<u>yes</u>*, it will be effective but *<u>not for all majors</u>* **F2:** *<u>Yes</u>*, I think it is possible. But it is important that *<u>academics are aware of the benefits of FML</u>*, then it will be *<u>possible to use it</u>* **F3:** *<u>Yes</u>*, it is possible. It is a very beautiful idea, but it needs *<u>to be fully developed compared to the traditional environment</u>*	**M4:** Using FML is *<u>possible</u>* especially in higher education, as well as, *<u>in some majors</u>*. In these two points, there is no need for continuous communication between learners and teacher **M5:** I think *<u>it is a good idea</u>* but to achieve its goals, it is important *<u>to train the university teachers well about this environment.</u>* This will *<u>help teachers to describe the new environment and the instructions for students</u>* **M6:** I see *<u>it as an excellent method</u>* for pre-learning, for *<u>preparing the learner for new knowledge.</u>* I see this method as *<u>enriching the learner</u>* **M7:** *<u>Yes</u>*, it is possible but it's very important to *<u>providing staff with computer technology to help teachers in case they face any challenges</u>*
15. Do you think there are any limitations to applying this environment at universities? ***It follows theme No. 6: The limitations to employing FML at* universities**	**F1:** I think the limitation is only in *<u>preparing the teachers and training them about this environment</u>*. After getting your degree and going back to KSA, you can provide a training course like this one and introduce a lot of information about this environment **F2:** No, I think there are not. Through *<u>workshops that have to be provided to the teacher prior to using FML</u>*, the teachers will learn about FML, its benefits,	**M4:** I think yes, where there is *<u>no specific learning area for the learners</u>* who already attended the university. As you know, those the computer labs are not authorised to the learners accessing without the teachers, so, they cannot benefit. I would like to present a suggestion to the university officials to allow learners to enter these labs by providing instructions for them to keep the labs and hardware during their using

	its importance, the programs or the application. *Then they can employ this environment easy* **F3:** *Infrastructure, Internet speed, and lack of secure electrical outlets in offices are a temporary hindrance* in case that teacher or student are at the uni	**M5:** I think the limitation is only in *providing computer labs or increasing the number of computers in the library*; in order to *help students look to the lectures especially since some students don't have smartphone or laptop* **M6:** I don't think so **M7:** I think if there are any limitations, they will be related to *academics that teach several different curriculums, deal with several administrative tasks, and the huge number of students*

Table 37. The interview questions only asked for Groups A & B

Appendix X Participant certificate of attendance

Figure 37. Participant certificate of attendance

Appendix Y Letter from UQU regarding the completion of collecting data

المملكة العربية السعودية
وزارة التعليم
جامعة أم القرى
(٠٣١)

VISION 2030
KINGDOM OF SAUDI ARABIA

إلى من يهمه الأمر...

يفيد قسم المناهج وطرق التدريس بكلية التربية في جامعة أم القرى بأن المبتعثه / داليا اسامه سراج خياط - والمبتعثه الى جامعة ساوثهامبتون بالمملكة المتحدة لإكمال دراستها العليا- قد أتمت جمع بيانات دراستها لمرحلة الدكتوراه والتي كانت بعنوان: ***أثر استخدام بيئة تعلم متنقله مقلوبة في تطوير مهارات إنتاج محاضرة الكترونيه لدى عضوات هيئة التدريس بالمملكة العربية السعودية*** ".

للتكرم بإستلامه وإجراء اللازم...ودمتم بحفظ الله ورعايته،،،

رئيس قسم المناهج وطرق التدريس

٢٥/١١/١٤٤٠

أ.د. عوض بن صالح المالكي

الرقم : .... التاريخ : .... المشفوعات : ....

Figure 38. Letter from UQU regarding the completion of collecting data

Appendix Z The researcher’s PhD plan

Dalya’s PhD Plan

The research plan will be flexible but taking into our account the priority to catch up with the workflows plan.

In each month, there are varieties of actions, which I attempt to do. In my view, it is necessary to cover five basic actions, which as follow:

1. Attending PEGasus meeting;
2. Preparing for two supervisory meetings;
3. Improving myself (by attending workshops, training course, seminar, and conference);
4. Reading and writing; and
5. Learning something new.

In addition, there is a report should be submitted every three months.

Our plan includes what have mentioned above, in addition to some specific actions that conduct after passing particular months since beginning the studying.

Note:

Any action with empty space = I have not finished this work yet

Appendix Z

Months	*Actions*	*Outcomes (What I already achieved)*	*Reflections*
During the First Year (From 29th September 2016 to 28th September 2017):			
29th September to 28th October (1)	Studying three modules	✓Studying Philosophy of Social Science Research module (RESM6101) ✓Studying Qualitative Methods I (RESM 6103)	➢ Dalya, you are in the first milestone in PhD journey. So, manage your time to get good outcomes ➢ READ, READ, READ, and READ ➢ Write directly in the document; do not write on the hard copy ➢ Use Mendeley software instead of EndNote is my colleague's recommendation
	Attending PEGasus meeting	✓In 5/10/2016, I have learned about the benefits of research profile. Based on that, I have filled the form and sent it to Anna ✓Knowing how to design the questionnaire	
	Preparing for two supervisory meetings	✓The first meeting with Dr Christian Bokhove in 3/10/2016 ✓The second meeting with Dr Christian Bokhove in 19/10/2016	
	Filling PGR Tracker forms	Submitting all forms by the end of 15/11/2016	
	Improving myself	✓Attending a "Researching For Impact, FSHMS Impact Series" seminar in 12/10/2016 ✓Attending an e-training workshop, titled "Electronic Questionnaires" in 12/10/2016 ✓Attending a "Promoting Your Work: Exploring Open Access Publication" workshop in 25/10/2016 ✓Attending a "Doctoral College Welcome Session" workshop in 26/10/2016	
	Reading and writing	Reading some articles and take notes on the hard copy	
	Learning something new	Viewing the references management software and using EndNote software	
29th October to 30th November (2)	Studying two modules	Studying Quantitative Methods I (EDUC- RESM 6204)	➢ Be moderate. No, a lot of working that lead you to be under pressure, angry, and cannot continue. In contrast, do not relax for long time that lead you to laziness ➢ READ, READ, READ, and READ ➢ Write directly in the document; do not write on the hard copy
	Attending PEGasus meeting	✓In 7/11/2016, I have learned how should be presenting the research for audience ✓Knowing how choose the sample size	
	Preparing for two supervisory meetings	✓The first meeting with Dr Christian Bokhove & Dr John Woollard in 7/11/2016 ✓The second meeting with Dr Christian Bokhove in 22/11/2016	
	Improving myself	Attending a "Managing Your Supervisors" workshop in 22/11/2016	
	Reading and writing	Writing around 1279 words for Introduction Chapter	
	Learning something new	Viewing the websites for correction English Language. Currently, I used Grammarly	

29th November to 28th December (3)	Submitting the 3-months report	Submitting the 3rd months report in 12/12/2016	➢ Remember, you have three years; you will not learn and do everything in the current time ➢ Refresh yourself and enjoying with Christmas break ➢ READ, READ, READ, and READ ➢ Write directly in the document; do not write on the hard copy
	Attending PEGasus meeting	In 13/12/2016, I have an experience about Nashwa's thesis, which was in e-learning. Moreover, in this meeting I have enriched my knowledge about pilot study	
	Preparing for two supervisory meetings	The first meeting with Dr Christian Bokhove & Dr John Woollard in 20/12/2016	
	Improving myself	Attending a training session to work for University of Southampton as examination invigilators in 9/12/2016	
	The PhD project should be clear	✓Yes, it is clear now. It has changed from: "Using Mobile Learning to Increase the Use of Information and Communication Technology by University Teachers at Kingdom of Saudi Arabia" to be: "The Impact of Using a Mobile Learning Environment in Developing Skills of Creating Electronic Lectures Among Faculty in the Kingdom of Saudi Arabia". Based on that I have to change what I have written in Introduction Chapter	
	Taking a rest in Christmas Break	Staying for five days at London	
29th December to 30th January (4)	Attending PEGasus meeting	✓31/1/2017, I have gained information about computational thinking ✓Some information got it about the use of technology to promote inclusion	➢ Keep going Dalya ➢ READ, READ, READ, and READ ➢ Write directly in the document; do not write on the hard copy
	Preparing for two supervisory meetings	✓The first meeting with Dr John Woollard in 3/1/2017 ✓The second meeting with Dr Christian Bokhove in 17/1/2017	
	Improving myself	✓Attending a WSI Conversation Space, titled "What is the role of the teacher in the digital age?" in 13/1/2017 ✓Attending a workshop, titled "Research Data Management: A Briefing" in 17/1/2017 ✓Working for my University of Southampton as examination invigilator from 19/1/2017 ✓Attending a workshop, titled "Critical Thinking – Bitesize Workshop" in 27/1/2017	
	Reading and writing	✓Writing the majority of overview of KSA and send it to supervisors. I have written around 3719 words. ✓Unfortunately, due to the keyboard break down in a day and the mouse stop working in other day	
	Learning something new	Using Mendeley software and learned quickly	

Appendix Z

<table>
<tr><td rowspan="5">29th January to 28th February (5)</td><td>Creating a poster for the 9th Manchester Metropolitan University Postgraduate Research Conference</td><td>Finishing the poster in four days due to the keyboard break down in the first day. In the fourth day, the PC stop working. I got several comments from supervisors and my colleagues to improve the poster</td><td rowspan="5">➢ Do not panic. It will be interesting journey. So, interest as much as you can
➢ READ, READ, READ, and READ
➢ Write directly in the document; do not write on the hard copy</td></tr>
<tr><td>Attending PEGasus meeting</td><td>In 28/2/2017, I have gained information about some students' module</td></tr>
<tr><td>Preparing for two supervisory meetings</td><td>✓The first meeting with Dr John Woollard in6/2/2017
✓The second meeting with Dr Christian Bokhove in 9/2/2017</td></tr>
<tr><td>Improving myself</td><td>✓Attending a workshop, titled "Research Questions & Using them to Structure your Doctoral Work" in 8/2/2017
✓Attending a workshop, titled "Academic Writing" in 12/2/2017
✓Participating in the 9th Manchester Metropolitan University Postgraduate Research Conference in 22/2/2017 via presenting a poster titled:
"The Effect of Mobile Learning on the Development of Educational Video Production Skills and on the Enhancement of Self-Efficacy of Postgraduate Female Students at Umm Al-Qura University ". I achieved 18 of 20</td></tr>
<tr><td>Learning something new</td><td>Presentation skills have improved after present the poster at conference</td></tr>
<tr><td rowspan="6">29th February to 30th March (6)</td><td>Attending PEGasus meeting</td><td>✓In 15/3/2017, I have learned the benefits of interview and challenges could face a researcher when doing interview
✓I have learned about CPD and its advantages with e-learning Furthermore, TPD term equal of CPD</td><td rowspan="6">➢ Well done Dalya. You are now in the sixth month of the interesting journey
➢ READ, READ, READ, and READ
➢ Write directly in the document; do not write on the hard copy</td></tr>
<tr><td>Preparing for two supervisory meetings</td><td>✓The first meeting with Dr John Woollard in 31/03/2017
✓The second meeting with Dr Christian Bokhove in 8/3/2017</td></tr>
<tr><td>Submitting the 7-months report</td><td>Submitting the 7th months report in 20/3/2017</td></tr>
<tr><td>Improving myself</td><td>✓Attending "3 Minute Thesis Competition- FSHMS Heat" in 1/3/2017
✓Attending the ECaT evening workshop "Early Communication Skills, Language and Early Literacy Skills" in 1/3/2017
✓Attending a workshop, titled "Everything you Always Wanted to Know about E-Theses but were too Afraid to Ask" in 3/3/2017
✓Attending a workshop, titled "Online and Offline Approaches to Fostering Public Engagement in Research Findings" in 7/3/2017
✓Attending a workshop, titled "EAP Academic Writing Skills" in 13/3/2017
✓Attending a workshop, titled "PhD Journey and Principles of the Scientific Research" in 29-3-2017</td></tr>
<tr><td>Reading and writing</td><td>Writing nearly to 2483 words of literature review. The technical problem still existing, I faced a huge one when the PC does not work. I contacted with IT and waiting from nine to three. After that, a member of IT came and solved the problem. In addition, the mouse does not work. I lost my day until got the alternative mouse from IT member</td></tr>
<tr><td>Learning something new</td><td>Be patient as much as I can</td></tr>
</table>

29th March to 28th April (7)	Submitting the First Progression Review report (From April to 29th June)	Submitting the report in 28th June 2017	➢ Remember, you have three years; you will not learn and do everything in the current time ➢ READ, READ, READ, and READ ➢ Write directly in the document; do not write on the hard copy
	Attending PEGasus meeting	In 26/4/2017, I have learned how to choose the appropriate theory for the topic. Also, how can I combined between theories to obtain new model (this is an original contribution)	
	Preparing for two supervisory meetings	✓The first meeting with Dr Christian Bokhove in 5/4/2017 ✓The second meeting with Dr Christian Bokhove in 26/4/2017	
	Improving myself	✓Attending a workshop, titled "First Progression Review" in 4/4/2017 ✓Attending a meeting with Dr Chris Downey about further PGR Peer-Support groups in 4/4/2017 ✓Attending the 1st Progression and Upgrade Milestones Q & A Drop-in workshop in 26-4-2017	
	Reading and writing	The completion of Introduction chapter. I have finished it in 4th May. It written around 3349 words	
	Learning something new	Saving documents in Dropbox and another copy in One Drive	
	Taking a rest in Easter Break	Staying for five days at Paris between 15 and 20 April 2017	
29th April to 30th May (8)	Preparing for the First Progression Review milestone (From May to July)	The First Progression Review discussion held in building 32 room 2035 on Monday 24th July 2017 from 2 to 4 p.m. with an assessor: Dr Chris Downey	➢ This is a lovely month because of it is my birth month but... ➢ I will try to overcome the psychological pain after the death of my aunt and especially that I miss her so much ➢ I pray to God that our health be good and that we are not affected by the fall of the tube (which carrying the curtain in the bathroom) on my head ➢ My child fell from the swing to the ground and injured his feet. Subsequently, he could not walk or jump. This led us to get several an appointment to checking his feet, conducting an X-ray and conducting some physical exercises to him
	Attending PEGasus meeting	In 22/5/2017, I have learned the advantages and challenges in using online document	
	Preparing for two supervisory meetings	✓The first meeting with Dr Christian Bokhove in 10/5/2017 ✓The second meeting with Dr John Woollard in 12/5/2017 ✓The third meeting with Dr John Woollard in 18/5/2017 ✓The fourth meeting with Dr John Woollard in 22/5/2017 ✓The fifth meeting with Dr Christian Bokhove in 26/5/2017	
	Improving myself	Registering in three workshops and a seminar but I have cancelled to focus on my studying	
	Reading and writing	✓Reading and writing about CPD around 1341 words by the end of 20th May 2017 ✓Reading and writing about e-lecturing near to 700 words by the end of 10th June ✓Discussing about research questions, CPD and aims with some of PhD students	
	Taking student annual leave	From 28th May to 5th July	

29th May to 28th June (9)	Reading and writing	Writing the first progression review	➢ Try to work hard as much as you can
29th June to 28th July (10)	Reading and writing	Writing a paper	➢ don't panic, everything will be well
29th July to 28th August (11)	Preparing for two supervisory meetings	The first meeting with Dr John Woollard in 1/8/2017	➢ Try overcoming the pain which is caused by a traffic accident
	Reading and writing	✓Continuing reading and writing in the literature reviews chapter ✓Creating a presentation to present it at 2017 BERA Conference ✓The technical problem still existing, I faced a huge one when the PC does not work for a week. I contacted with IT several times. The PC worked for a few minutes and then stopped suddenly	
29th August to 28th September (12)	Presenting the first paper at BERA Conference	My presentation was good, and it was in 7th September 2017	➢ Well done Dalya, you are about to complete the first year ➢ Keep going Dalya, you have achieved a part of your dreams
	Preparing for two supervisory meetings	The first meeting with Dr Christian Bokhove in 29/9/2017	
	Improving myself	✓Attending several sessions at 2017 BERA Conference whether in Educational Technologies or in other field of Education. It was in the period 5-7/9/2017 at University of Sussex ✓Attending a conference, titled "What Works in Assessment and Feedback: Simply Better". It held on 14/9/2017 at University of Southampton ✓Attending a workshop, titled "Education PGR Early Stages Induction" in 28/9/2017	
	Reading and writing	Continuing reading and writing in the literature reviews chapter	
	Submitting 12-month report	Submitting the report in 14/9/2017	
	The completion of the first three chapters by the end of this year	I have finished but I need to review my writing with an up dated reference	
By the End of the First Year (From 29th September 2016 to 28th September 2017): ✓ **I have studied 3 modules** ✓ **I have attended 8 PEGasus meetings**			

- ✓ **I have met my supervisors 20 times**
- ✓ **I have attended 18 workshops, a training course, 2 seminars, and 3 Conferences**
- ✓ **I have written17000 words**
- ✓ **I have submitted 4 reports**

Months	*Actions*	*Outcomes (What I already achieved)*	*Reflections*
During the Second Year (From 29th September 2017 to 28th September 2018):			
29th September to 28th October (13)	Designing the research tools	Creating the research instruments for the piloting phase in 8/2/2018	➢ Dalya, congratulation. you have finished the first year in PhD journey ➢ Trying to overcome the psychological pain after the death of my father in law and travelling to home
	Improving myself	✓Attending a training course for English language support. The course including 9 sessions, session per a month. It conducted between 14 and 15:30 p.m. The first session was in 24/10/2017 ✓Attending a workshop, titled "What is NVivo? How might it help me in my PhD?" in 30/10/2017	
29th October to 28th November (14)	Applying the ethical forms (for piloting study)	✓Creating the application in ERGO in 28/11/2017 ✓Submitting the application for piloting study only in 20/2/2018 ✓Receiving the e-mail approval in 21/3/2018	➢ Dalya, you can compensate delay in October month by doubling efforts as much as possible without any affecting on the family
	Attending PEGasus meeting	In 6/11/2017, I have extended the knowledge about ERGO, the ethics considerations, and the ethics considerations when use technology or e-learning	
	Preparing for two supervisory meetings	The first meeting with Dr Christian Bokhove in 23/11/2017	
	Improving myself	Attending the second session of a training course for English language support. It conducted between 14 and 15:30 p.m. and was in 14/11/2017	
	Reading and writing	Reading and writing about methodology	
29th November to 28th December (15)	Conducting the pilot study	I have conducted the pilot study from 22/3/2018 to 21/4/2018	➢ READ, RED, READ, and READ ➢ Write directly in the document; do not write on the hard copy
	Preparing for two supervisory meetings	✓The first meeting with Dr John Woollard in 5/12/2017 ✓The second meeting with Dr Christian Bokhove in 13/12/2017	
	Improving myself	Due to the changing in the session date (it was in 5/12/2017 and changed to be on 12/12/2017), the third session of a training course for English language support did not attend	
	Reading and writing	Reading and writing about methodology	
	Submitting 15-month report	Submitting the report in 21/12/2017	
29th December to	Preparing for two supervisory meetings	✓The first meeting with Dr John Woollard in 18/1/2018 ✓The second meeting with Dr Christian Bokhove in 25/1/2018	

28th January (16)	Improving myself	✓Attending the fourth session of a training course for English language support. It conducted between 14 and 15:30 p.m. and was in 16/1/2018 ✓Attending a workshop, titled "Experimental research; design, implementation and analysis". It held on Wednesday 24-1-2018 at 32/2097 from 1 to 5 p.m.	➢ You can do it Dalya. Read and write as much as you can
	Reading and writing	Reading and writing about methodology but unfortunately the document gone	
29th January to 28th February (17)	Submitting the Confirmation document (From February to May)	Because applying for two extensions, it has been delayed until December 2018	➢ Keep going Dalya. You can submit the confirmation document in the time ➢ Study as you can before have a baby and you will not need extension
	Preparing for two supervisory meetings	✓The first meeting with Dr John Woollard in 14/2/2018 ✓The second meeting with Dr Christian Bokhove in 21/2/2018	
	Improving myself	✓Due to a sickness, the fifth session of a training course for English language support which was in 13/2/2018 did not attend ✓Attending a workshop, titled "Preparing for your Viva" on Monday 5-2-2018 in building 32 room 2097 between 10:30 a.m. and 13:00 p.m.	
	Reading and writing	Rewriting nearly to 1320 words of the methodology chapter	
29th February to 28th March (18)	Preparing for the Confirmation milestone (From March to June)	Because applying for two extensions, it has been delayed until January 2019	➢ READ, READ, READ, and READ ➢ Write directly in the document; do not write on the hard copy
	Preparing for two supervisory meetings	The first meeting with Dr Christian Bokhove & Dr John Woollard in 20/3/2018	
	Improving myself	The sixth session of a training course for English language support which was in 6/3/2018 has been cancelled by the tutor	
	Submitting the first extension (for the confirmation for three months)	Submitting the form for Grad School in 21/3/2018	
	Reading and writing	Writing around to 4028 words of the methodology chapter	
	Submitting 18-month report	Submitting the report in 23/3/2018	
29th March to 28th April (19)	Last weeks of pregnancy trip	DING NOTHING	➢ Prepare yourself Dalya to have a new baby ➢ Prepare your stuff Dalya to move into a new home

29th April to 28th May (20)	Have a little baby	DING NOTHING	➢ Enjoy Dalya with Loren and her childhood ➢ Enjoy Dalya with your family in your new sweet home
29th May to 28th June (21)	Submitting 21-month report	Submitting the report in 16/7/2018	➢ Take care for yourself, your family ➢ Enjoy with your annual leave
29th June to 28th July (22)	A lot of work for my children, my husband, and for new home	DING NOTHING	➢ Take care for yourself, your daughter ➢ Don't forget, you had an operation ➢ Don't forget, you felt of the stairs ➢ Don't do a lot of work, you need a rest
	Submitting the second extension (for the confirmation for four months)	Submitting the form for Grad School in 19/7/2018	
29th July to 28th August (23)	Reading and writing	Continue reading and writing in all thesis to be ready for the confirmation	➢ Hurry up, you must work and tie your thesis ➢ Reread your writing and critic it
	Preparing for two supervisory meetings	The first meeting with Dr John Woollard in 15/8/2018	
29th August to 28th September (24)	Submitting 24-month report	Submitting the report in 2/10/2018	➢ Dalya, you did well. Keep going ➢ Read critically
	Reading and writing	Continue reading and writing in the methodology chapter and the theoretical framework	
	The completion of the two chapters by the end of the second year (Methodology + Findings + Do corrections)	I have finished but I need to review my writing with an up dated reference	

By the End of the Second Year (From 29th September 2017 to 28th September 2018):

- ✓ **I have attended 1 PEGasus meeting**
- ✓ **I have met my supervisors 9 times**
- ✓ **I have attended 3 workshops and 1 training course**
- ✓ **I have written around 50000 words**
- ✓ **I have submitted 4 reports**

Months	***Actions***	***Outcomes (What I already achieved)***	***Reflections***
During the Third Year (From 29th September 2018 to 28th September 2019):			
29th September to 28th October (25)	Preparing for two supervisory meetings	✓The first meeting with Dr Christian Bokhove in 5/10/2018 ✓The second meeting with Dr John Woollard in 11/10/2018	➢ Hurry up, you must work and tie your thesis ➢ Reread your writing and critic it
	Improving myself	Attending the first session of the training course, titled ‘PhD writing workshops for 2nd – 4th years PGRs’, in 23/10/2018	
	Reading and writing	Continuing reading and writing in the methodology chapter and the theoretical framework	
29th October to 28th November (26)	Preparing for two supervisory meetings	The first meeting with Dr Christian Bokhove in 21/11/2018	➢ You can do it Dalya ➢ Remember; you are more than your thesis
	Improving myself	Attending a second session of the training course, titled ‘PhD writing workshops for 2nd – 4th years PGRs’, in 13/11/2018	
	Reading and writing	Tie the whole thesis and reduce the amount number of words from 62000 to be 35000 word	
29th November to 28th December (27)	Submitting 27-month report	Submitting the report in 18/12/2018	➢ Good work Dalya, you almost submit your document ➢ Address the feedback quickly ➢ Don’t forget you exercises, your health important
	Preparing for two supervisory meetings	✓The first meeting with Dr John Woollard in 18/12/2018 ✓The second meeting with Dr Christian Bokhove and Dr John Woollard in 18/12/2018	
	Submitting the Confirmation document	Submitting the document in 28/12/2018	
29th December to 28th January (28)	Attending PEGasus meeting	In 19/1/2019, I have extended the knowledge about the systematic review and the differences between the electronic interview and face to face interview	➢ Congratulation Dalya
	Preparing for the Confirmation milestone	The Confirmation discussion held inbuilding 32 room 2103 on 24th January 2019 from 1:30 to 4 p.m. with two assessors: Dr Chris Downey and Dr Gary Kinchin	
	Preparing for two supervisory meetings	✓The first meeting with Dr John Woollard in 19/1/2019 ✓The second meeting with Dr Christian Bokhove in 21/1/2019	
	Applying the ethical forms (for data collection)	✓Creating the application in ERGO in 13/3/2019 ✓Submitting the application for data collection in 13/3/2019 ✓Receiving the e-mail approval in 8/5/2019	
29th January to 28th February (29)	Applying for data collection trip through the embassy	✓Submitting the application in 18/2/2019 ✓Receiving the approval in 13/3/2019	➢ Take rest but do not forget the important work for data collection
	Improving myself	Attending a training course, titled ‘Issues and practice in mixed research design (EDUC6459)’, in 5/2/2019	

Appendix Z

29th February to 28th March (30)	Preparing for two supervisory meetings	The first meeting with Dr Christian Bokhove in 12/3/2019	➢ Make balance between your study, your health, and your family ➢ Dalya help yourself to recovery quickly after the surgery
	Preparing to have the medical operation	The medical operation in 16/3/2019 and have 14 days away from the studies	
	Improving myself	✓Participating with some PhD students to present a group seminar, titled 'The upgrade milestone' in 1/3/2019 ✓Attending a training course, titled 'The scientific publishing in journals', in 5/3/2019	
29th March to 28th April (31)	Submitting 30-month report	Submitting the report in 29/3/2019	➢ Dalya, do not forget the important work for data collection
	Collecting data from KSA (From 7th April to 8th July)	The data has been collected from 7th April to 8th July	
29th April to 28th May (32)	Collecting data from KSA	The data has been collected from 7th April to 8th July	➢ Dalya, try to follow the plan as much as you can
29th May to 28th June (33)	Collecting data from KSA	The data has been collected from 7th April to 8th July	➢ Dalya, you almost gathering data. Well done
29th June to 28th July (34)	Submitting 33-month report	Submitting the report in 25/7/2019	➢ Welcome back Dalya, a lot of work should be finished
	Preparing for two supervisory meetings	✓The first meeting with Dr Christian Bokhove in 11/7/2019 ✓The second meeting with Dr John Woollard in 15/7/2019	
	Preparing for the Third Progression Review milestone	The third progression review discussion held inbuilding 32 room 2103 on 23rd July 2019 at 12:30 p.m. with Dr Christian Bokhove & Dr John Woollard	
	Reading and writing	Writing up the data collection procedures	
29th July to 28th August (35)	Submitting the Third Progression Review report	Submitting the report in 1/8/2019	➢ Dalya, you will achieve your dream of coming soon
	Preparing for two supervisory meetings	The first meeting with Dr John Woollard in 27/8/2019	
	Reading and writing	Writing up the parts of methodology chapter	
29th August to 28th September (36)	Participating in mLearn 2019 conference in the Netherlands	Unfortunately, the visa has been rejected	➢ Try to manage your time Dalya, you have a lot of missions to do
	Participating in FSS Conference 2019 in the University of Southampton	Unfortunately, it has been cancelled because my husband operation	
	Improving myself	✓Attending a training course, titled 'Academic writing for PhD', in 5/9/2019 ✓Attending a training course, titled 'Effective communication skills', in 19-9-2019	
	Reading and writing	Writing up the parts of methodology chapter	
	Preparing for two supervisory meetings	✓The first meeting with Dr Christian Bokhove in 6/9/2019 ✓The second meeting with Dr John Woollard in 9/9/2019	
By the End of the Third Year (From 29th September 2018 to 28th September 2019):			

- ✓ **I have studied a module**
- ✓ **I have attended a PEGasus meeting**
- ✓ **I have met my supervisors 13 time**
- ✓ **I have attended 3 workshops, a training course, and a seminar**
- ✓ **I have written 39398 word**
- ✓ **I have submitted 5 report**

Months	Actions	Outcomes (What I already achieved)	Reflections
During the Fourth Year (From 29th September 2019 to 28th September 2020):			
29th September to 28th October (37)	Preparing for two supervisory meetings	The first meeting with Dr Christian Bokhove in 28/10/2019	➢ Hurry up, you must work and tie your thesis ➢ Reread your writing and critic it
	Improving myself	Attending a seminar, titled 'Discovery through writing', in 22/10/2019	
	Submitting 37-month report	Submitting the report in 3/11/2019	
	Reading and writing	Writing up the findings chapter	
29th October to 28th November (38)	Preparing for two supervisory meetings	The first meeting with Dr Christian Bokhove in 20/11/2019	➢ You can do it Dalya ➢ Remember; you are more than your thesis
	Improving myself	✓Attending a workshop, titled 'The A-Z of a PhD Viva: I wish I had known', in 14/11/2019 ✓Attending a seminar, titled 'Five decades of theory in education research', in 19/11/2019 ✓Attending the first virtual meeting for the faculty members of Umm Al-Qura University who are scholarships for the United Kingdom in 24/11/2019 ✓Attending an online workshop, titled 'The research products and dissertations: differences, designs, and uses', in 27/11/2019	
	Attending PEGasus meeting	In 12/11/2019, I have extended the knowledge about the differences between affordances and functionality of applications and e-learning	
	Reading and writing	Writing up the findings chapter	
29th November to 28th December (39)	Preparing for two supervisory meetings	The first meeting with Dr John Woollard in 10/12/2019	➢ Good work Dalya, you almost finish the findings chapter ➢ Address the feedback quickly ➢ Don't forget you exercises, your health important
	Improving myself	Attending a training course, titled 'Literature searching using the Systematic Review methodology', in 10/12/2019	
	Taking student annual leave	From 22nd December to 7th January	
	Reading and writing	Writing up the findings chapter	
29th December to 28th January (40)	Preparing for two supervisory meetings	The first meeting with Dr Christian Bokhove in 28/01/2020	➢ Welcome back Dalya ➢ Take rest but do not forget the important work for the interviews ➢ All the best in the Symposium
	Improving myself	Participating in the eLearning 2020 Symposium and provide a poster about the current research titled: 'The Impact of Flipped Mobile Learning on the Development of E-Lectures Skills among University Teachers'. The Symposium held on Friday 24/01/2020 at the University of Southampton	
	Submitting 40-month report	Submitting the report in 28/01/2020	
	Reading and writing	Writing up the findings chapter	
29th January to 28th	Preparing for two supervisory meetings	The first meeting with Dr John Woollard in 14/2/2020	➢ Address the feedback quickly

February (41)	Improving myself	✓Attending a second session of the training course, titled 'PhD writing workshops for 2nd – 4th years PGRs', in 5/2/2020 ✓Attending a workshop, titled 'Tips on delivering a great presentation', in 7/2/2020	➢ Don't forget your exercises, your health important ➢ You are a student and mother, so you have a lot of effort towards your family
	Reading and writing	✓Writing up the findings chapter ✓Writing up the discussion chapter ✓Responding to the Confirmation milestone feedback	
29th February to 28th March (42)	Preparing for two supervisory meetings	The first meeting with Dr John Woollard in 6/3/2020	➢ Your husband will recover quickly after cold and flue ➢ Your children will become better after chickenpox, don't worry ➢ Reread your writing and critic it
	Improving myself	Attending an event, titled 'Leadership and diversity', in 5/3/2020	
	Reading and writing	✓Writing up the discussion chapter ✓Responding to the Confirmation milestone feedback	
29th March to 28th April (43)	Submitting 43-month report	Submitting the report in 14/5/2020	➢ Good work Dalya, as you could not have the ability to focus on your writing, but you try improving yourself and ignoring the bad news ➢ Remember, you almost finish your thesis ➢ Address the feedback quickly
	Improving myself	✓Attending a webinar, titled 'Students interaction and their participation to improve the quality of distance learning', in 5/4/2020 ✓Attending a webinar, titled 'Digital transformation', in 5/4/2020 ✓Attending a webinar, titled 'IT Governance', in 6/4/2020 ✓Attending a webinar, titled 'Technical Service Management', in 7/4/2020 ✓Attending a webinar, titled 'Foundations to consider when using virtual classroom techniques', in 8/4/2020 ✓Attending a webinar, titled 'Primary Psychological first aid', in 11/4/2020 ✓Attending an online training course, titled 'Let's Break the Chain of COVID-19 Infection', in 13/4/2020 ✓Attending a webinar, titled 'The role of the teacher in e-learning and distance learning', in 14/4/2020 ✓Attending a webinar, titled 'Flipped classrooms and applied in education', in 15/4/2020 ✓Attending a webinar, titled 'The methodology for making correct decisions in crises and disasters', in 15/4/2020 ✓Attending a webinar, titled 'Corona: a paradigm shift or a passing moment', in 17/4/2020 ✓Attending a webinar, titled 'How to break up with your phone', in 17/4/2020 ✓Attending a webinar, titled 'Steganography', in 18/4/2020 ✓Attending a webinar, titled 'Cybersecurity from the fundamentals to the clouds', in 18/4/2020 ✓Attending a webinar, titled 'The future of e-learning after Corona', in 19/4/2020 ✓Attending a webinar, titled 'Designing a stimulating learning environment using educational materials', in 21/4/2020 ✓Attending a webinar, titled 'Effective leadership in crisis', in 21/4/2020	

		✓Attending a webinar, titled 'Design thinking in crisis management', in 22/4/2020 ✓Attending a webinar, titled 'The mechanism for discussing doctoral theses using remote communication platforms', in 26/4/2020	
	Reading and writing	Writing up the conclusion chapter	
29th April to 28th May (44)	Preparing for two supervisory meetings	The first meeting (via mobile calling) with Dr John Woollard in 12/5/2020	➢ Taking a short rest ➢ Enjoying while training, have a nice course
29th May to 28th June (45)	Back to KSA through governmental evacuation trips	The researcher back home in 24/5/2020	➢ You still have some job; don't worry you can finish it quickly
	Improving myself	Attending a webinar, titled 'Academic poster', in 2/6/2020.	
29th June to 28th July (46)	Improving myself	✓Attending an online workshop, titled 'The professional montage skills', which was for two days (Tuesday and Wednesday) in 7-8/7/2020 ✓Attending a webinar, titled 'Distinctive educational digital video production skills', in 9/7/2020 ✓Attending an online symposium, titled 'Innovation in e-learning', in 11/7/2020 ✓Attending an online conference, titled 'Remote: The connected faculty summit', in 13-14/7/2020 ✓Attending an online symposium, titled 'Innovation and quality in e-learning', in14/7/2020 ✓Attending (get-together), in 15/7/2020. It is an online gathering between PhD students and leaders in the University of Southampton	➢ Hurry up, you must work and tie your thesis
	Submitting 46-month report	Submitting the report in 18/7/2020	
29th July to 28th August (47)	Responding to the examiners' report	Done	➢ It is hard to fix all issues that you faced, but you can Dalya
29th August to 28th September (48)	Improving myself	✓Attending a webinar, titled 'Five Principles for Meaningful Online Learning', in 27/9/2020 ✓Attending a webinar, titled 'Using Technology to support Meaningful Online Instructional Strategies', in 29/9/2020	➢ Almost done Dalya
	Translation the training content to English		

By the End of the Fourth Year (From 29th September 2019 to 28th September 2020):

- ✓ **I have attended a PEGasus meeting**
- ✓ **I have met my supervisors 7 times**
- ✓ **I have attended 4 workshops, 3 training course, 3 seminars, a conference, 3 symposium, and 24 webinars**
- ✓ **I have finished my writing**
- ✓ **I have submitted 4 reports**

Months	*Actions*	*Outcomes (What I already achieved)*	*Reflections*
During the Fifth Year (From 29th September 2020 to 28th September 2021):			
29th September to 28th October (49)	Improving myself	✓Attending a webinar, titled 'Developing Online Assessments', in 1/10/2020 ✓Attending a webinar, titled 'Blend but Don't Break', in 5/10/2020 ✓Attending an online seminar, titled 'Using Research to Promote Equity within Education Systems', in 6/10/2020 ✓Attending an online seminar, titled 'Engaging Teachers, Education Practitioners and Students with Health and Health research', in 20/10/2020 ✓Attending an online workshop, titled 'R Workshop', in 27/10/2020	➢ Good luck
	Asking the CAS	Done	
	Reading and writing	Finishing the writing up of the conclusion chapter	
29th October to 28th November (50)	Submitting 49-month report	Submitting the report in 29/10/2020	➢ Well done ➢ Congratulation for sending the first draft
	Improving myself	✓Attending a webinar, titled 'Publishing Workshop', in 10/11/2020 ✓Attending an online workshop, titled 'Manage and index references using Mendeley software', in 11/11/2020 ✓Attending an online workshop, titled 'Creating knowledge trips using the Zunal software', in 11/11/2020 ✓Attending an online seminar, titled 'Digital transitions: learning from lockdown for the future', in 13/11/2020 ✓Attending an online seminar, titled 'The Networked School Leader: How to Improve Teaching and Student Outcomes using Learning Networks', in 17/11/2020 ✓Attending an online forum, titled 'Educational Forum for Applications of Artificial Intelligence in Education (Future shaping and pioneering applications)', between 21-23/11/2020 ✓Attending a webinar, titled 'Adapting Research Methods for the Covid Era', in 24/11/2020	
	Attending PEGasus meeting	In 24/11/2020, I have extended the knowledge about some apps that used to educate students another language	
	Completing the visa renewal procedures	Done	
	Submitting the first draft of the thesis to the supervisors	Submitting the first draft to Dr Christian Bokhove and Dr Martin Dyke in 29/10/2020	
	Publishing the paper		
29th November to 28th December (51)	Responding to the supervisors' feedback	✓Receiving the feedback on the first draft of thesis from Dr Christian Bokhove on Thursday 3/12/2020 ✓Receiving the feedback on the first draft of thesis from Dr Martin Dyke on Tuesday 22/12/2020	➢ Almost done Dalya, all difficult times will pass
	Preparing for two supervisory meetings	The first meeting with Dr Christian Bokhove in 8/12/2020	

	Training about the car driving	I couldn't have the training previously in the UK due to the COVED-19 pandemic and there was a lockdown, but my turn to have the training in the KSA from 20/12/2020 to 8/1/2021	
29th December to 28th January (52)	Responding to the supervisors' feedback on the first draft of the thesis	Done	➢ All the best Dalya, you can do it
	Doing the proofreading	Done	
29th January to 28th February (53)	Submitting 52-month report	Submitting the report in 1/2/2021	➢ Take a rest Dalya and then back with your full energy
	Improving myself	Attending an online symposium, titled 'Chat about Education Technologies', in 10/2/2021	
29th February to 28th March (54)	Submitting the second draft of the thesis to the supervisors	Sending the second draft of the PhD thesis to Dr Christian Bokhove and Dr Martin Dyke on Monday 1/3/2021	➢ Good work Dalya, you almost finish your degree and your scholarship
	Responding to the supervisors' feedback on the second draft of the thesis	Receiving the feedback on the first draft of thesis from Dr Christian Bokhove on Wednesday 24/3/2021	
	Improving myself	✓ Attending an online workshop, titled 'Preparing for your Viva', in 10/3/2021 ✓ Attending an online workshop, titled 'Managing the entities' websites and personal websites for faculty members at Umm Al-Qura University', in 24/2/2021 ✓ Attending an online workshop, titled 'Designing digital educational content', in 24/2/2021 ✓ Attending a webinar, titled 'The teacher and the skills of employing technology and dealing with talented students', in 25/2/2021	
29th March to 28th April (55)	Procedures of submit the thesis	✓ Filling the intention to submit form in 27/3/2021 ✓ The researcher requested transfer to nominal registration in 30/3/2021	➢ Congratulation, prepare yourself Dalya
	Submitting 55-month report	Submitting the report in 27/4/2021	
	Submitting the thesis for Viva	Submitting the PhD thesis in 27/4/2021	
29th April to 28th May (56)	Preparing for the Viva milestone	Preparing several times and having moce-viva	➢ Pprepare yourself Dalya
29th May to 28th June (57)	The Viva	The Viva will be held on 1/6/2021	➢ Congratulation for passing your Viva
29th June to 28th July (58)	Responding to the examiners' report		➢ It was amazing journey Dalya, having your children and PhD from the UK
By the End of the Fifth Year (From 29th September 2020 to 28th September 2021): ✓ **I have met my supervisors one time** ✓ **I have attended 7 workshops, 1 training course, 4 seminars, 1 symposium, and 5 webinars** ✓ **I have submitted 2 reports**			

Table 38. The researcher's PhD plan

In summary, from the first year of PhD until submit the thesis, the researcher done the following:

1. Studying 4 modules;
2. Attending 11 PEGasus meetings;
3. Meeting the supervisors 50 times;
4. Submitting 19 reports; and
5. Attending 35 workshops, 7 training course, 10 seminars, 4 Conferences, 4 symposiums, and 29 webinars