

**University of Greenwich
Faculty of Education and Health**

**Learning on the Move: The potential impact of new mobile technologies
on students' learning**

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DECLARATION

“I certify that this work has not been accepted in substance for any degree, and is not concurrently being submitted for any degree other than that of Doctorate in Education (EdD) being studied at the University of Greenwich. I also declare that this work is the result of my own investigations except where otherwise identified by references and that I have not plagiarised the work of others.”

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Dedication:

In loving memory of my dear late mother (21.5.1945 - 20.8.2011)

~ Filiz alıřkan Ersoy ~



Canım Annemin hic bir zaman unutulmayacak hatıralarına...

Abstract

This study explores the potential use of mobile learning in higher education with a focus on student and academic staff requirements of a potential mobile application. The research examines the stakeholders' new technology acceptance behaviour within a post-1992 university and examines how new mobile technologies are able to contribute to enhancement of the learning experience of students and additionally the roles of educators in facilitating enhancement of the learning experience.

A post-positivistic paradigm has been used to explore a wider view of the stakeholders' (academic staff and students) understanding of the new technologies and the potential benefits of mobile applications. An electronic questionnaire was sent to over 900 undergraduates for their views on the use of new mobile technologies and in what ways these could be used to support their learning needs. This was followed by individual interviews and questionnaires to academic staff (n=44) to identify whether they would be interested in the use of mobile applications in their teaching and learning. The research explores the learning, concepts, theories and models which influence mobile device adoption and proposes a mobile application that has the potential to support teaching and learning. The data collected provides an invaluable insight into the potential use of a mobile learning platform at the University's Faculty of Business. The participants describe their uses of four distinct types of devices; potential frequency of specific use, and their views on the attraction and/or disadvantages of mobile use for learning. The research findings lead to the recommendation for a mobile learning trial within the Faculty with the potential for application to other academic subjects within the university.

Two elements have emerged from the research carried out and comprise an original contribution of the study, namely: an enhancement of the Technology Acceptance Model and development of the existing PESTEL model into a PESTEEL model by including Educational Factors and hence identifying a number of areas currently not addressed by the PESTEL model. The uniqueness of the study and the development of this work's original contribution to new knowledge was enhanced by approaching data collection and analysis within a Technology Acceptance Model and the PESTEEL model. This was also achieved by interpreting the gathered data within the broader concept of professionalism, sub-divided and conceptualised into examining the adherence of participants.

It is acknowledged that a limiting factor is that the study examined only one academic school within an institution, but it is anticipated that future research will include a comparison with other similar academic institutions.

Glossary of Terms

3G: Stands for “third generation” mobile technologies, which offer users a wider range of more advanced services than earlier mobile devices while achieving greater network capacity through improved radio spectrum efficiency.

ActionScript: A scripting language used by Adobe Flash. It has been improved from script syntax to one that supports object-oriented programming, and has a capability comparable to JavaScript.

ADSL (Asymmetric Digital Subscriber Line): The most widely deployed form of Digital Subscriber Line (DSL) technology.

Always-online: Solutions that give the user access to the Internet at all times.

Audiocast: Collection of audio files that is available for access via a cell phone.

Behaviourism: An approach to psychology that emphasises observable measurable behaviour.

Blended learning: The combination of multiple approaches to learning. Blended learning can be accomplished through the use of “blended” virtual and physical resources. A typical example of this would be a combination of technology-based delivery and face-to-face sessions used together to deliver instruction/training.

Blog: A reflective journal that is hosted online (short for weblog).

Bluetooth: Communication standard that allows devices to transfer data using short-range wireless. Bluetooth devices do not need to be in line-of-sight of each other to communicate.

Collaborative learning: The grouping and pairing of students for the purposes of achieving an academic goal.

Compact Flash (CF): A type of removable memory card for digital cameras and other portable electronic devices.

Data transfer rate: The bit rate at which one can download content from the Web or upload material to the web.

E-book: Electronic version of a book, designed to be read on a computer or similar device.

Encoding: A process in which a learner associates new, incoming information with knowledge or skills already stored in memory. Well-encoded information, in theory, should be easier to retrieve from memory when needed.

Flash: A multimedia authoring program from Adobe Systems. Flash is popular for creating animation, video and adding rich interactivity to web pages, and is available in most common web browsers.

Formative Evaluation: This is a type of evaluation that has the purpose of improving programs. It may also be referred to as developmental evaluation or implementation evaluation. It is used in instructional design to assess ongoing projects during their construction to implement improvements. Formative evaluation can use any of the techniques which are used in other types of evaluation, including surveys, interviews, data collection and experiments (where these are used to examine the outcomes of pilot projects).

GPRS (General Packet Radio Service): A wireless data service used by mobile phones to access the Internet.

GPS (Global Positioning System): Uses microwave signals broadcast by satellites orbiting the Earth to identify the geographical location of the GPS receiver. GPS devices can also record altitude, speed, direction and time.

ICT: Information and Communication Technology

Informal learning: Learning that is not organised and structured by an institution. It may take place in environments that already have some connections with learning, e.g. museums and art galleries, or anywhere the learner chooses, including at work.

Infrared (IR): Electromagnetic radiation of wavelengths longer than visible light. IR is typically used to transmit data through the air, for short distances, in a straight line.

Interaction: In instructional contexts, interaction can be seen as communication of any sort, e.g., two or more people talking to each other or communication among groups and organisations. Interaction in teaching and learning is typically thought of as a sustained, two-way communication among two or more persons for purposes of explaining and challenging perspectives. If done in a formal, educational environment, then, interaction is usually between a student(s) and an instructor, or among students.

Interactive Voice Response (IVR): IVR is a phone technology that allows a computer to detect voice and touch tones using a normal phone call.

Interface: The components of the computer program that allow the user to interact with the information.

IP (Internet Protocol) telephony: a technology that supports voice, data and video transmission via IP-based computer network.

iPAQ: A family of Pocket PC models from HP-Compaq.

JAVA: A programming language that provides a system for developing and deploying cross-platform applications.

Learning object: A self-contained learning resource that focuses on a single topic.

LMS (Learning Management System): An online system that manages the learning process and allows students to interact with the course, other students, and the instructor.

Location-based content: Text, images, audio files and video files that relate to the place where the user is at the time, for example within a museum or heritage site. The user needs a GPS-enabled mobile device in order to fully benefit from the location-based service.

Luddite: is a person who fears or loathes technology, especially new forms of technology that threaten existing jobs or interfere with personal privacy.

Macromedia Flash: A program to create multimedia for the Web.

Microsoft Reader: A program from Microsoft to read their e-book format.

M-learning: Mobile learning, using a mobile device to access and study learning materials and for communicating with the institution, tutors and fellow students.

mLMS (Mobile Learning Management System): A learning management system for mobile devices.

Mobile device: A device that can be used to access information and learning materials from anywhere and at any time. The device consists of an input mechanism, processing capability, a storage medium, and a display mechanism.

Moblog: Blog that can be updated by posting entries directly from a PDA, phone, smartphone or other portable device. Mobloggers are those who post their blogs in this way.

Moodle: A web-based system used in academic virtual learning environments

MP3: A digital audio encoding format. It's more accurate name is MPEG-1 Audio Layer 3. MP3 uses a compression algorithm to reduce the size of audio data. It is a popular audio format on many mobile devices.

MSN (Microsoft Network): An Internet chat service that allows text communication between people who have nominated each other as 'friends'.

M-teaching: Teaching with the support of mobile, handheld devices.

Multimedia: A combination of two or more media to present information to users.

Multimedia messaging service (MMS): A standard for telephony messaging systems that allows sending messages that include multimedia objects (images, audio, video, rich text).

News feed: Also known as web feed or RSS feed. The feed is a data format that delivers frequently updated content to computer or mobile devices.

Online Learning Environment (OLE): An Internet based learning environment accessible to a group of students, who can use a range of services to support their learning.

Open source: Any program whose source code is made available for use and/or modification as users or developers see fit.

PDA (Personal Digital Assistant): A handheld device that runs cut down or “pocket” versions of most office software including word-processing, spreadsheet management. Email and web browsing are enabled through wireless or GPRS connectivity. It often includes a camera and may have a pull-out mini-keyboard as well as an onscreen keyboard.

Pedagogy: The art or science of being a teacher. The term generally refers to strategies of instruction, or a style of instruction.

Personal Development Plan (PDP): A structured and supported process undertaken by an individual to reflect on their own learning, performance and/or achievement and to plan for their personal, educational and career development.

PNG (Portable Network Graphic): A bitmap image format that uses data compression to make file sizes smaller.

Pocket PC: A generic term for a handheld-sized computer that runs a specific version of the Windows CE operating system.

Podcast: Video or audio podcast files designed to be syndicated through feeds via the Internet and played back on mobile devices. New content is delivered automatically when it is available.

Portable keyboard: A keyboard that is possible to put in a coat pocket, by folding it or by other means to make it smaller.

RFID (Radio-frequency Identification): Use wireless technology to identify and manage people or objects. Data stored on a small, rugged tag is transmitted to a reader via electrical or electromagnetic waves.

Secure Digital (SD): A type of removable memory card for digital cameras and other portable electronic devices. See also Compact Flash (CF).

Short Message Service (SMS): A communications protocol allowing the interchange of short text messages between mobile telephony devices also known as “texting”.

Situated learning: Learning that draws on an understanding of the relevance of the learner’s context, in the way the learning activities and resources are designed.

Skype: Skype is a widely used peer-to-peer software program. Skype allows users to engage in text, audio and video conferencing over the Internet to other Skype users free of charge or to make telephone calls to landlines and cell phones for a fee.

Smart phone: A mobile phone with some advanced features, such as a web browser.

Speech synthesis: Computer-generated simulation of human speech.

Streaming: Starting the video or sound before it has downloaded to the client.

Subscriber Identity Module (SIM): Part of a removable smart card ICC (Integrated Circuit Card), also known as SIM Cards, for mobile cellular telephony devices such as mobile computers and mobile phones.

Syncing: A method used to synchronize the data held on PDAs and mobile phones or smartphones with the data held on a computer. ActiveSync is the application used to sync Windows Mobile and Pocket PC mobile devices. This allows the user to keep things like calendar and contacts list the same on both a desktop computer and a mobile device.

Text-to-speech (TTS): A type of speech synthesis application that is used to create a spoken sound version of text.

Transparency: The amount of time a user must focus on device usage compared with the amount of time that a user can focus on learning. A high degree of transparency suggests that a device is easy to use and that the user can concentrate on cognitive tasks rather than device manipulation.

Ubiquitous computing: Computing technology that is invisible to the user because of wireless connectivity and transparent user interface.

Ubiquitous: Existing or being everywhere at the same time, constantly encountered or widespread.

Universal accessibility: Available to anyone independent of physical handicaps.

URL: Uniform Resource Locator, a unique World Wide Web address.

Usability: Ease and efficiency in the use of a mobile device. In a learning situation, the device should not get in the way of the learning task. The design of the user interface is very important but contextual factors also have an impact on user experience.

User: An individual who interacts with a computer system to complete a task, learn specific knowledge or skills, or access information.

User Interface: The “bridge” through which a human interacts with a device. In mobile learning, it refers to the software and navigational features that permit a learner to complete learning tasks.

VLE (Virtual Learning Environment): A site that hosts online resources and activities to support students' learning.

VOIP (Voice Over Internet Protocol): A new form of telephony that allows voice to be transmitted over the Internet e.g. SKYPE.

WebCT: Web Course Tools, is an online or virtual learning management system (LMS) used to deliver courses over the Internet.

WiFi (Wireless Fidelity): A set of standards for facilitating wireless networks in a local area, enabling WiFi devices to connect to the Internet when in range of an access point.

Wireless Application Protocol (WAP): An open international standard for applications that use wireless communication. Its principal application is to enable access to the Internet from a mobile phone or PDA.

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Appendices

Chapter 1

1.1. Introduction

This study explores the potential use of mobile applications and the requirements identified by a Faculty of Business in a higher education institution. Developing advances in technology has increased the capability of mobile devices while simultaneously allowing them to be used on the move (Aberdeen Group, 2010). It was highlighted by ABI Research (2011) that broadband and Wi-Fi Internet access has increased mobile Internet usage which enables flexibility, rapid response' time management and communication. Currently mobile applications (apps) are used in many different sectors including gaming, entertainment, banking, finance, sports, music, travel' health and personal care. A majority of organisations are currently using mobile apps in their businesses to improve their organisation's standards and reach especially in a very competitive market place, ABI Research (2011).

Huang *et al.*, (2010) note the benefits of using mobile devices; portable, convenient to users giving flexibility 'anytime anywhere' in their daily life. Girardello and Michahelles (2010) emphasise that finding a suitable functional new mobile application is not an easy task and requires either knowing what to look for or going through an endless list of applications not knowing whether an appropriate app exists. From this, emerge opportunities for the development of custom made mobile applications which address users' specific needs and allow them to capture, share and update content (Nosseir *et al.*, 2012).

The software development lifecycle provides the basis for the research undertaken and is defined in detail within the study. The development steps or the activities may vary in each and every model but all the models will include planning, requirement, analysis, design, maintenance, etc. The waterfall model emphasises the step-by-step process, whilst the spiral model emphasis is on risk assessment and the prototyping model takes an incremental approach in each and every phase of the development process (Holzer and Ondrus, 2009).

This research will explore the first phase of the software development, the software requirements phase, where the ideas are collected and categorised. The main objective of this phase is to produce new ideas or improvements to the existing application.

The ideas can come from the customer or from developers (Jamwal, 2010) enabling potential ideas to be detailed, analysed and exploited. Rogers (2003) suggests that new technology adoption might not be a straightforward process. The user's decision whether to accept or reject the new technology is one of the most challenging issues in information systems (IS) research (Davis, 1989) and may be a consequence of severe usability errors such as failure or because the device functions are not sufficiently clear resulting in abandonment of applications (Euspring Organisation, 2011).

As an underpinning theoretical framework, the *theory of reasoned action* (TRA) which was developed by Fishbein in the 1970's and is used as an enabling explanation for human behaviour. Further, this model, with the adaptation by Davis (1989) and its evolution incorporating computer acceptance into the *technology acceptance model* (TAM), is used to explore the behavioural issues of users with regards to potential use of mobile devices. This study further discusses the diffusion of the potential use of mobile devices and the impact of the potential use of mobile learning used within organisational contexts. This is partly driven by economic crisis which has affected current funding regimes in higher education in the UK (Thompson and Bekhradnia, 2011) and has resulted in a reduction of Higher Education Funding Council for England (HEFCE) funding (HEFCE 2010) an aspect compounded by a reduction in the Treasury's expenditure by almost £1.17 billion in 2012-13. The consequence of this is that universities seek to re-coup lost tuition subsidies through charging higher tuition fees to counter the abolition of HEFCE (Brown, 2011).

The resultant changes will have an impact on universities requiring them to identify ways of offering more flexible and innovative delivery of teaching methods and cost-cutting, such as reduction in the use of paper and other physical materials. According to Coleman *et al.*, (2006) technology offers institutions a way forward by using fewer resources, the idea being that creating a reduced demand on paper reduces costs, improves efficiencies, makes better use of office space, making student information and institutions more accessible, and improving overall teaching services to students. However, these radical changes in the implementation of new technologies will require adaptation of new

technologies (Dodds, 2007). Coleman *et al.*, (2006) propose that the environmental changes for sustainability practices will encourage paperless services and provide learning content online, fostering the use of new technologies which will in turn contribute to university innovation and cost reductions.

1.2. Background and Ideology of the study

The researcher's role as an academic in a post 1992 university with responsibility for designing and delivering programmes and courses for both undergraduate and postgraduate students recognises that responsiveness to the evolving technological needs of students is the key to supporting learning. The constantly changing teaching demands in the higher education sector together with an understanding of using technology related to learning, including the design and delivery of programmes are crucial factors which are seen as central to quality provision.

Using emerging technologies that can enhance delivery and improve the end user experience in a way that maximises flexibility to meet the needs of students, especially in these rapidly changing and financially demanding times for higher education is an imperative. Furthermore, there needs to be a match established between the way in which education is provided through the use of technology and the expectations of the users of its education material – the students.

The chosen methods of delivery in teaching and learning should be seen by students as a new way of delivery to their future personal or professional lives to meet their demand for availability across all learning channels. Current teaching technology for programmes include a variety of tools, but the fundamental approach is the use of a 'blended' design to teaching through the use of a broad range of technologies, in particular, the prominent use of an organisational virtual learning environment - Moodle, which has evolved and developed over the life of recent undergraduate and postgraduate programmes. There are a variety of reasons for such a 'top-down' approach, but these are primarily driven by the existing technology infrastructure and systems without taking into account the practical needs of students, and their ability to have access to teaching materials online and in their own time, which would seem to be a key factor for any programmes successful delivery and adoption.

1.3. Originality of the research

An extensive review of the literature has revealed that there has been no previous survey conducted that links mobile learning and the creation of a paperless teaching environment.

The test case will be the Faculty of Business, in a post-1992 university. The practice of using mobile technology to support teaching and learning is not yet embedded in current practice, neither within the Faculty of Business nor the University, as was demonstrated during research for the Academic year 2013/14.

It is proposed that this study will explore a systems needs/requirements analysis for the potential development of an academic focused mobile application (App) for Business students' use. It is proposed that this will make an original contribution to understanding the views of academic staff and students on the use of innovative m-learning technologies.

1.4. Research Questions: Two questions frame the research within this study:

RQ1: How can new mobile technologies contribute to enhancement of the learning experience of students?

RQ2: What should the role of educators be in facilitating and enhancing the learning experience of students?

1.5. Outline of the Thesis

Review of Literature (chapters 2 and 3) has been divided into two sections. Chapter two addresses the identification and importance of each research question related to the impact of mobile technology in learning. Chapter three discusses the theoretical theme and framework related to the impact of using mobile technology in learning.

The Methodology (chapter 4) examines the research philosophy and methods used within the study to gather and analyse data from students and staff.

The Findings and Analysis (chapter 5 and 6) has been divided into two chapters that respectively focus on results related to the two research questions.

The '**Discussion Chapter**' (7) outlines insights from these results and discusses them within the context of existing literature.

Conclusions and Recommendations (chapter 8) present the main conclusions of the thesis and addresses the two research questions.

Chapter 2: Review of Literature / Use of Mobile Learning in Teaching and Learning

2.1. Structure of the Review of Literature:

The review of literature is divided into two sections and is presented as follows:

Chapter 2 addresses literature supporting the two research questions:

- *Q-1- How can new mobile technologies contribute to the enhancement in the learning experience of students? and*
- Q-2- What should the role of educators be in facilitating and enhancing the learning experience of students?*

Chapter 3 addresses the five theoretical frameworks that underpin the literature and includes the Industry Life Cycle, PESTLE, SDLC, TAM and Diffusion

2.2. Introduction: An examination of the literature supporting the research questions

Worldwide, the impact of small mobile devices (SMDs) in informal social settings of higher education has dramatically increased (Kennedy, 2014) and students are becoming more dependent on technology. Consequently there is expectation that universities will diffuse and disseminate information quickly through the use of new technologies (Elmas, 2013).

Additionally, the majority of schools in the UK are starting to appreciate how important the use of new technologies such as smart phones in learning has now become. Consequently they are encouraging their students to also use personal mobile devices rather than just using a PC. Universities are now using new technologies across their curriculum beyond the original use restricted to ICT lessons that was common in the previous decade. Over the next few years higher education will likely adopt a 1:1 tablet programme and more universities are now also embracing social media, again as a way of supporting teaching and learning (Britland, 2014).

Considerable time and effort have been spent over the last decade looking at the use of Mobile Devices and tablets for teaching and learning, with more recent work focusing on the advent of smart phones, tablets and phablets (mobile devices that are between a smart phone and a tablet computer in size, such as the iPad or iPad mini) (Hwang and Tsai, 2011).

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Historically, Attwell and Hughes, (2010) note that digitalized learning had its origins in the early 1980s with the development and use of personal computers and ICT learning processes in the classroom, prior to the internet era. Bates (2005) records that the first online teaching activity started in the same period as the introduction of specialised conferencing software developed by Murray Turoff in 1970.

Rossett (2002) states that daily activities such as receiving any information online e.g. receiving any information on mobile text message, or a chat room talk etc., integrated into the learning / teaching experience is e-learning. Also, the majority of researchers in this area of research view mobile learning as the immediate successor of e-learning (Laouris, 2005). The development of smart phones started in the 1990's - this was the "Dawn " period. 2000 to 2006 saw the emergence of the business smartphone - this was an expansion and development period, and eventually it became available to the majority of consumers. However, from 2007 onwards, the smart devices became 'mass market' in popularity (Richter, 2013). Smart devices have an advanced interface and importantly, advanced functionality. Smart devices have operating systems that directly link to 'app stores', whereby users can download thousands of applications. Devices are smaller and more convenient to carry and are flexible and available as long as they are powered and have network access (Gedik *et al.*, 2012). Zhou *et al.*, (2010) highlight that mobile devices for the use of the Internet and mobile terminals, enables the user to send and receive various forms (text, images, voice, form format, email) using a mobile phone directly connected to real-time information transmission to/from a computer.

The key issues that arise from the literature related to mobile technology have been identified with three key themes. They are structured as (1st) *Overview*, (2nd) *Impact of new technology on student learning* and (3rd) *Use of digital technology for social and for academic purposes*.

2.3. Impact of new technology on student learning

Mobile devices, as well as supporting teaching and learning, also have a range of other applications including social communication (Lee, 2006). Gedik *et al.*, (2012) emphasises mobile learning development has been rapid due to the development of advanced software which enables and provides a more convenient way of learning.

Wireless devices which are used for learning and teaching are classified under mobile learning. Such devices include mobile phones, Smart devices, palmtops, and handheld computers. In addition, tablet PCs, laptops, and personal media players can normally fall within this scope (Kukulka-Hulme and Traxler, 2005). The current usage of social media technologies such as blogs, Twitter, YouTube or more broadly, social networking, have made mobile device content capture more dynamic and interactive and this will inevitably have a role in future mobile learning content delivery. Although, Pachler *et al.*, (2010) highlight that mobile learning is a new and changing context, it is not however just about technology. Mobile learning is not about understanding how to utilise it in everyday life-worlds as learning spaces. M-learning is about ubiquitous and social connectivity, instant information access, and enhancing how we view the world through digital growth (Cook, 2010).

Mobile learning has been described in many ways such as m-learning is e-learning but it uses mobile devices (Pinkwart *et al.*, 2003). It has been broadly described as any educational provision where the sole or dominant technologies are handheld or palmtop devices (Traxler, 2007). It has also been described as the point at which mobile computing and e-Learning intersect to produce an 'anytime, anyplace, anywhere' collaborative learning experience (Wurst *et al.*, 2008). Mobile learning has also been described as any activity which allows individuals to mediate through a portable device which is used daily and always-on connectivity and small enough for a pocket (Hart, 2008). Mobile learning and teaching enables users to interact with each other constantly which generate flexibility in learning and teaching (Gedik *et al.*, 2012).

Behera (2013) highlights that the advanced modern technologies make education no longer limited to the physical class room. E-learning comprises all forms of electronically supported learning and teaching. The term will still most likely be utilised to reference out-of-classroom and in-classroom educational experiences via technology, even as advances continue in regard to devices and curriculum. Mobile learning combines E-learning and mobile computing. Mobile learning is sometimes considered merely an extension of E-learning, but quality M-learning can only be delivered with an awareness of the special limitations and benefits of mobile devices (Traxler, 2007). Mobile learning has the benefits of mobility and its supporting platform. M-learning is a means to enhance the broader learning experience (Behera, 2013).

Peters (2007) also reports that new technology use has increased rapidly and has had a positive impact on teaching and life-long learning but that this change will require new course design and a review of academic activities which are more learner centred, interactive and flexible corresponding to students' needs.

The digital revolution is illustrated in Table: 2.1.

Table: 2.1 Functionality and mobility in a definition of mobile learning

Functionality		Mobility		
Computer	Laptop computers	PDA's handhelds palmtop	Smart phones	Mobile phone
E- Learning		M-Learning		

Source: Behera (2013)

Parsons and Ryu (2006) broadly defined mobile learning as being the delivery of learning which utilise mobile computing devices. On the other hand, and even more broadly, it is defined by Katz, (2011) that mobile learning arises in the course of person-to-person mobile communications. Motiwalla (2007) emphasizes that considering the great growth potential and popularity of mobile devices, mobile learning has still a long way to go until it's accepted and used. It has been estimated that the mobile learning market will rise from U.S. \$632.2 million in 2009 to U.S. \$1,464.8 billion by 2014 (GSMA embedded Mobile, 2011).

Kukulka-Hulme and Traxler (2005) emphasizes that wireless devices that are used for learning and teaching are classified under mobile learning. Such devices include mobile phones, smartphone devices, tablets and any handheld technology and any personal media players etc. The current usage of social media technologies such as blogs, Twitter, YouTube or more broadly, social networking have made mobile device content capture more dynamic and interactive and this will inevitably have a role in future mobile learning content delivery.

Mobile learning has been described as the point at which mobile computing and e-Learning intersect to produce an 'anytime, anyplace, anywhere' collaborative learning experience (Wurst *et al.*, 2008).

Mobile learning has also been described as any activity that allows individuals to be more productive when consuming content, interacting with, or creating information, mediated through a compact portable device that an individual carries with them on a daily basis, has a reliable 'always-on' connectivity and fits in a pocket or purse (Hart, 2008).

Mobile learning is also broadly defined as being the delivery of learning content to learners, utilising mobile computing devices (Parsons and Ryu, 2006). On the other hand, and even more broadly, it is defined by Katz, (2011) that mobile learning arises in the course of person-to-person mobile communications. Despite the discussions and definitions including the tremendous growth and potential of mobile devices and networks in recent decades, mobile e-learning or mobile learning (m-learning) is still in its infancy and at an embryonic stage according to Motiwalla (2007).

The mobile e-commerce has the unique advantage to traditional e-commerce integration, as it is available all the time; due to this fact mobile devices have become much more popular than PC's due to their flexibilities and accessibilities (Mafarlan *et al.*, 2008). The mobile devices have uniqueness, due to mobile phones in-built storage cards ability to store the user's information. In addition, electronic commerce and mobile e-commerce have different characteristics; mobile e-commerce is not able to completely replace the traditional electronic commerce. Hence, they are complementary and mutually reinforcing (Crossick, 2010).

2.4. Mobile applications

Mobile applications (apps) have been developed to be used by smart devices such as tablets, PC's, and other portable media players and are a "lighter version of computer applications" (Rishi, 2012). The current use of mobile application development has received a boost with two major developments. One development pertains to the availability of increased network bandwidth increasing from 2G to 3G and now 4G. The second significant development is on the mobile device side: larger screens, increased memory and high speed processing capability. Developers are motivated by these technological advances to create more innovative applications and services (Morris *et al.*, 2010).

Although, the initial use of mobile applications were only to be used for a calculator, calendar, alarm and currency converter functionalities (Gasminov *et al.*, 2010).

Morris *et al.*, (2010) classified the mobile applications as following categories: Social Networking such as Facebook, Twitter; Personal Productivity; own digital sketchbook; Leisure-based; GPS technology, road trip navigation; Transaction-Based; bill payments, mobile top-up and Content Dissemination-Based; traffic and weather alert apps.

According to Pasqua and Elkin, (2012) the growth in the market for Mobile applications is expected to accelerate to 74 percent by 2016.

Smart devices are becoming highly sophisticated and their popularity and use is rising rapidly in markets such as Japan, China, France, Malaysia, Singapore, US and India (Poitou, 2010). Since mobile devices are used in a range of ways including as a mobile computer, music player, navigation device, a notepad and a search tool, a variety of consumer based, as well as business based mobile applications are being developed. Technology giants, including Google, Yahoo, Apple and Microsoft have been quick in responding to this environment and have introduced various mobile applications that let the users search for relevant information through newer modalities (Kenney *et al.*, 2011). Such applications are supported by various algorithms that the company (offering the mobile application) creates so that ambient systems or pervasive computing can facilitate the weaving together of computing with communication (Schmitt *et al.*, 2008). However, success of these mobile applications is based on the relevance of the information that they offer to the users or in other words, the ability of the application to decipher the context of a users' search and offer results, information or solutions in tandem with the user's situation, so that the end result is more personalised, relevant and user friendly (Schmitt *et al.*, 2008). Hence, the simple concept of an algorithm, being a sequence of activities aimed at achieving a computing task, appears as altered to an algorithm being a series of steps, directed by a computing task, leading towards a specific output, which fits in a finite range of output specifications. In other words, it aims at getting the best results using limited resources (Satyanarayanan and Narayanan, 2001). Mobile application developers, especially in India have been very successful in producing customer-engaging mobile applications for businesses (Fling, 2009). Fling (2009) also highlights that since the mobile application market is rising globally, it open doors for mobile application developers to create applications to address users' needs in specific target groups.

2.5. Use of digital technology for social and for academic purposes

The research carried out by Wang *et al.* (2012) show students can easily communicate and interact with their peers through Facebook and other social networking platforms. Along with Facebook, text or instant messaging such as WhatsApp allows messages to be sent and received free of charge by individuals or groups of students, where previously mobile devices had been limited to only calls and text messaging functions. The research outcome demonstrates that mobile devices and smartphones in particular, are already being used informally as support tools in the learning process by students due to the flexibility that they offer to the students (Echenique *et al.*, 2015). According to Echenique *et al.* (2015), Moodle, the virtual learning environment, is less popular as it offers limited integration with social media platforms such as Facebook which have a very high student penetration. Brady *et al.*, (2010), suggest that Moodle should be seen only as a means of communicating between students and teachers as Moodle tends to be highly focused on academic work and lacks the capacity for interaction that social media platforms offer. Smith (2009) and Brady *et al.* (2010) suggest that social networks can actively promote the construction of online communities and extend learning beyond the confines of the classroom, providing a forum where users can create their own discussions and their own groups. However, in the Moodle environment these capabilities are either not available or dependant on being activated by the lecturer.

Table 2.2. Social media & messaging platforms used for academic activities by students

Technology	Social purposes	Academic purposes
Computer	Entertainment, listening to music, for example, or watching films on your computer, or chatting with friends sometimes – doing all kinds of things like that ... for fun ... [Woman, Early Childhood Education, 29 years old]	... academically, the entire computer ... I mean Word, both in Office and Open Office ... search engines ... [Man, Social Education, 22 years old] The computer to find information for my studies ... [Man, Social Education, 25 years old]
Mobile	The mobile for social networks, social networks to stay informed, because I also sometimes read the newspaper on the mobile ... [Man, Social Education, 25 years old] ... the mobile to communicate with friends and family. [Woman, Pedagogy, 26 years old]	I use the smartphone to get in touch with my classmates academically, because you can look at work, check it over, and make a minor correction and resend it whenever you need to. [Man, Social Education, 24 years old]
WhatsApp	WhatsApp is ... well, a revolution, isn't it! ... I use it a lot ... to talk to my family, friends ... [Woman, Pedagogy, 26 years old]	I have WhatsApp. We have special groups for academic purposes, groups for professional profiles. We're a group and we use it to communicate with each other to meet, to share information ... [Man, Social Education, 22 years old]
Internet	... it's much easier to make a reservation ... on the Internet ... and I think it's great that you don't have to go to a ticket office to buy a ticket at the last minute. ... [Woman, Pedagogy, 58 years old]	... I use Explorer, the Internet, and especially the Google search engine for anything I need to check ... [Woman, Pedagogy, 26 years old]
Social networks	... I use social networks ... well, for social contacts, to get in touch with my colleagues ... [Man, Social Education, 24 years old]	... social networks to share work more than anything else ... [Woman, Pedagogy, 26 years old]
Facebook	For social purposes, if I've arranged to meet friends and someone's late, to call them or let them know with a message or on Facebook, creating events if we arrange to meet up somewhere. [Woman, Social Education, 19 years old]	... I use Facebook to do group tasks ... All the members who have something new to say or something – we put it there and we upload it, correct it, talk about it, even the appointments that we sometimes have, "Ah, Wednesday at such and such a time!" [Woman, Pedagogy, 26 years old]
Tablet	... I use it for social purposes like connecting to Facebook, to Twitter, watching news on the Internet ... sports pages, everything related to the world of the Internet. [Man, Pedagogy, 22 years old]	... well, I use Word to take notes, to study as well, for looking at the presentations that we're going to do, I have them on my tablet. I use them as a support in our presentations. [Man, Pedagogy, 22 years old]
Moodle	... to communicate ... with you through the Moodle, don't I? With lecturers and all that. [Woman, Pedagogy, 24 years old]	And the university's intranet ... where you get all the functions of the courses and stuff. Academically, for that I suppose, to search for information and ... to upload the information you're working on as well. [Woman, Early Childhood Education, 29 years old]

Source: Echenique *et al.*, 2015; Wang *et al.*, 2012

2.6. The roles of educators in enhancing the learning experience of students

College and university educators in general have a unique set of personal values, motivations, organisational politics and alliances that influence their decisions around new technology adoption for learning. Given the nature of their chosen field, most educators place value on creativity and learning but are generally risk averse. They also have limited scope for experimentation as they must function within the framework of their institution's philosophies, organizational, social, resource and political framework (Gillard *et al.*, 2008). Deerajviset (n.d.) also contends that there is a significant change happening in teaching and learning in universities across the world in the second generation of ICT. This new way of learning has the potential to offer innovative ways of teaching and learning and to increase the ability of students to acquire new skills (Deerajviset, n.d.; Sife *et al.*, 2007). A large number of universities now offer classes that use e-learning in some form as an enhancement to face-to-face teaching and as a means of delivering course content interactively (Fallows & Bhanot, 2005).

Baylor and Ritchie (2002) claimed that some factors have had an impact on educators use, including in promoting the technology use in the academic environment, including planning new curriculum alignment, professional development, teacher openness to change, and teacher non-school computer use. The educators' skills, such as the level of teacher competency, technology integration, and not least, the educators' morale must not be forgotten as variables that may affect the impact and increase the complexity of teaching through new technology.

It was highlighted by Backhouse (2003) that educators need time to plan and prepare materials for the classroom, for their own professional learning, record keeping, assessment and reporting, to collaborate with their peers, to develop interdisciplinary and differentiated instruction. On top of this is the time teachers spend doing what they do best, teaching (Backhouse, 2003:5).

The time demands of these activities should not be minimised. However, Acikalin (2015) suggests that for educators to be able disseminate new technologies for students they need to be familiar with the technology themselves first. Hence, if the educator is not familiar with the new technology they will not be able to disseminate or use it to full effect in their lesson due to lack of familiarity.

Teachers' knowledge, skills, beliefs and attitudes can be barriers for making instructional decisions (Acikalin, 2015; Hew and Brush, 2007). Kochan and Pascarelli, (2012), also agree that an educator's attitude to promoting the use of mobile technologies for their students relies strongly on their own skill, knowledge and understanding of these technologies. Therefore it is advisable to promote the use of technologies through a peer mentoring programme between academics to support colleagues since they have teaching expertise and experience working with a set of student participants to facilitate knowledge transfer for m-learning (Kochan and Pascarelli, 2012).

2.7. A Pedagogical view of Mobile Learning

The use of emerging new technology in education changes the structures of learning and consequently this opens potential new instructional delivery methods. When designing new instructional delivery for students, transactional distance between the students and the academics includes not only instructor and the learners but also the learners' communications with their peers (Benson and Samarawickrema, 2009).

Cochrane and Bateman (2010) demonstrated the smart device use in various projects (see Table: 2.3). These projects are inclusive of the built-in media recording capabilities and communications tools. The built-in microphone that many smart devices have can be used to record audio for later podcasts when uploaded online.

Podcasting is a popular way for students to record themselves reflecting or reporting on their progress in an assignment or project, or they could record an interview with an expert in the field. For example the *Audiobook* site is designed specifically for recording, uploading and sharing audio recordings from the *iPhone*.

Table: 2.3 Pedagogical uses of Mobile Devices

Activity	Overview	Examples	Pedagogy
Video Streaming	Record and share live events	Flixwagon, Qik http://www.qik.com	Real-time event, data and resource capturing and collaboration.
Geo tagging	Geo-tag original photos, geolocate events on Google Maps	Flickr, Twitter, Google Maps http://tinyurl.com/5a85yh	Enable rich data sharing.
Micro-blogging	Post short updates and collaborate using micro-blogging services	Twitter http://tinyurl.com/2j5sz3	Asynchronous communication, collaboration and support.
Txt notifications	Course notices and support	Txttools plugin for Moodle and Blackboard txt and twitter polls: http://www.polleverywhere.com http://twitter.poll daddy.com http://twtpoll.com	Scaffolding, learning and administrative support
Direct image and video blogging	Capture and upload images and video of ideas and events	Flickr, YouTube, Vox	Student journals, ePortfolios, presentations, peer and lecturer critique.
Mobile Codes	2D Codes scanned by cameraphone to reveal URL, text etc...	QR Codes, Datamatrix 2D Codes http://tinyurl.com/af2u6d	Situated Learning – providing context linking
Enhanced Student PODcasts	Remote recording of audio, tagged with GPS and images etc...	AudioBoo	Situated and collaborative Learning – providing context linking
Social Networking	Collaborate in groups using social networking tools	Vox groups, Ning, peer and lecturer comments on Blog and media posts http://tinyurl.com/4uz6j	Formative peer and lecturer feedback

Source: Cochrane and Bateman (2011)

The main features of the pedagogical view of mobile learning according to Uden (2007) are that new technology use as part of the teaching and learning environment requires changes in pedagogy and integration into teaching and learning. Cochrane and Bateman (2011) emphasises the requirements of significant time to gain the skills required to maximise the potential of new and emerging technologies for both instructors and for the learners. The use of new technologies in education are a pedagogically challenging experience for the students, and consequently instructors have a significant role in structured implementation to be more effective in teaching to support student learning (Cochrane and Bateman 2011).

On the other hand Butchart (2011) emphasises that use of new mobile devices' applications are very user friendly and easy to use so that anyone with a compatible Smartphone can easily operate applications without any significant problems. Cochrane (2010) emphasises that, social software such as Blogs, wikis and podcasting are easy to operate and also they provide opportunities and learning environments focusing on student-centred learning and end-user content creation and sharing.

2.8. Summary of the chapter

This chapter addresses the two research questions:

- *Q-1- How can new mobile technologies contribute to the enhancement in the learning experience of students? and*
- Q-2- : What should the role of educators be in facilitating and enhancing the learning experience of students?*

Mobile technology when used for educational activities provides users greater mobility by giving access to their study content “anytime, anywhere” in contrast to a static computing experience where the user is required to go to a physical site to interact with the learning service.

The impact of mobile devices through informal learning use in higher education has dramatically increased over the last decade. Institutions are becoming or are already aware of such trends and are starting to formally plan for introduction, but often individual tutors are leading through informally delivering learning content to allow connectivity via a student’s mobile device. Separately there is an increasing expectation from students that universities will increase and enhance the use of mobile enabled teaching content to disseminate learning information as quickly as possible within institutions.

Currently, a majority of UK higher institutions use Moodle software for learning and student management within their institutions. However, Moodle, while being the preferred platform for e-learning, tends to remain focused on academic work and management with limited capacity for interaction with social networks which is the preferred communication platform for this current generation of students who are wholly dependent on the lecturer having the requisite skills to deploy such functionality.

It has been suggested that social networks can actively promote the construction of formal and informal online student learning communities to help extend learning beyond the confines of the campus, by providing a neutral forum where users can create their own discussions and form their own study groups.

University educators in general have a unique set of personal values, motivations, organisational politics and alliances that will significantly influence the impact, content decisions, delivery timeframes and adoption of m-learning technology.

Some of these factors will have both negative and positive impacts on educators learning to use and promote the use of m-learning technology in their academic environments.

These can be listed as: planning new digital curriculum alignment with traditional content channels, professional development in terms of the individual educator's openness to change, skills - their level of technology competency, developing an institutional acceptance for an m-learning theory of change and integration or blending with existing methods of student learning delivery. It must not be forgotten that these variables may affect the complexity of delivery, timeframes and uptake by educators across any given institution, particularly where training programmes are not introduced well in advance of any move to a student digital learning platform. Most importantly, mobile channels for learning require educators to have the time to plan and prepare existing materials for delivery through new digital formats, as well as gain time for self-learning, or group-based training through institution approved peer-led mentoring programmes.

Chapter 3- Theoretical Framework

This chapter addresses the study's key theoretical frameworks, comprising: Industry Life Cycle, PESTLE, SDLC, TAM and Diffusion.

3.1. Introduction

A detailed analysis of literature identified the key themes which informed a most suitable structure for the literature review to encompass **Industry Life Cycle** in relation to the use of mobile device use and its rate of change in the market, **PESTLE** to look at the background of mobile devices use, **Software Development Life Cycle** to explore the needs of user groups for development of key functionality for delivery to mobile learning channels, **Technology Acceptance Model** to examine user groups acceptance of mobile technologies and **Diffusion** to examine how quickly they adopt new technologies.

3.2. Industry Life Cycle Analysis for Smart Devices

The concept of the Industry Life Cycle is one of the most frequently used models to analyse the characteristics of an industry at a particular stage and was presented in 1980 by Michael Porter. This model emphasises the industry as the key aspect of the environment of a business. An analysis of the characteristics helps identify the competitiveness and structure of the competition and helps determine the appropriate strategy for survival and development (Sabol, *et al.*, 2013).

Johnson *et al.*, (2008) propose that industries start small in their development stage and then go through a period of rapid growth resulting in a period of shake out. The stage that follows is a stage of slow or zero growth which is referred to as maturity and then the final stage which is decline. Each of these stages has specific characteristics and structures.

There is some evidence of an increase in smart device ownership. Smart devices are quickly becoming ubiquitous in the UK market and it is estimated by 2015, more than half the population will use a smart device (SmartMyWebsite.com, 2013)

Table 3.1: Number of UK smart device users and usage level: 2010-2016

Year	Smart Device Users	% of Population
-2010:	10.2 million	(16.4%)
-2011:	15.5 million	(24.7%)
-2012:	19.2 million	(30.5%)
-2013:	24.0 million	(37.8%)
-2014:	29.2 million	(45.9%)
-2015:	35.2 million	(55.0%)
-2016:	41.9 million	(65.1%)

(Source: SmartMyWebsite.com, 2013)

eMarketer predicts that by 2014, two out-of-three mobile phone users and 45.9% of the UK general population will use a smart device. By the end of the forecasted period, 41.9 million smart device users will account for nearly 65.1% of mobile phone users in the UK. The vast majority of mobile phone users are between the ages of 12 and 54. Between 2011 and 2017, 18 to 24-year-olds will have the highest percentage of smart device penetration among mobile phone users, while beginning in 2014 and lasting for the remainder of the forecast period, teens ages 12 to 17 will have the second-highest penetration out of all mobile users. Smart device users ages 25 to 34 will be close behind in terms of penetration rates. By 2017, smart device user penetration among mobile phone users ages 12 to 44 will be between 94% and 98% (Cloudspotting, 2014). According to Crossick (2010) distance learning will be a part of the solution though any major expansion of that will need to accommodate the very distinctive and marketable qualities of the UK graduate.

West (2011) emphasises that smart devices were initially perceived as a luxury item, however, it is now very much perceived as a necessity and almost everyone is using them.

The first smart devices were heavy and bulky but have evolved to highly focused communication and entertainment devices from initially quite basic phones. They have the ability to help users make decisions through the cutting-edge technology embedded within them (Darrell, 2013). The use of smart devices is very much connected with the development of the internet and users can use other internet-enabled functions on a device in addition to calling and texting functions. The pocket computers personal computers (PC) were introduced in 2000 by Psion. After the popularity of these computers many others such as Nokia, Blackberry, Google and Apple have developed (Hu *et al.*, 2008).

The most influential OS vendors at the grow phase of smart devices industry were Nokia and Blackberry (RIM). At this phase, consumers started to accept this product category, thus creating gradually increasing sales for the company (Lin and Ye, 2009). However, Google (Android) and Apple have taken the place of Microsoft to become the most important players at this stage. Since customers gradually realized the benefits of using smart devices, potential profitability has seduced other companies into this market. For instance, the case study material shows that the Symbian OS had a 63.5% market share in 2007 while BBOS had a 19.9 market share in 2009. Smart devices occupied the share of 11% of the mobile phone industry in 2008. Their share rose sharply to 44% in 2012 and it is estimated that smart devices will represent almost the entire industry by 2017 (Darrell, 2013). The innovation of Android OS as an open source platform which can be licenced by any hardware vendor offers potential for high levels of adoption by different group of consumers. Android OS devices have been developed quickly with more features, including high-resolution displays and performance processors, gaming features, camera, etc., to the point where ownership of a smart device has become a de-facto necessity for many consumers. According to International Data Corporation, the smart devices market was expected to grow by 7.3% in 2013, with increasing levels of demand.

According to the PLC theory, as the market matures and an increasing number of customers purchase a product, the maturity stage comes when standardization and scale effect determine total revenue and profit (Chang *et al.*, 2009; Lin and Ye, 2009). West (2011) pointed out that with the development of smart devices, more companies would launch new models with higher levels of innovation and features to attract more consumers, therefore, attracting more rivals, leading to higher levels of competition.

The decline stage of the “first generation” of smart devices came when Apple launched iOS and shortly afterwards, Google launched Android OS. While the products from Nokia and Microsoft were not automatically made obsolete; they had been driven by a long existing concept of interaction between human beings and mobile phones for a long time. For mobile devices, man-machine interaction, also known as HCI (human-computer Interaction), highly concentrated on interaction between a user and his or her device and friendly screen display (Chang *et al.*, 2009; Lin and Ye, 2009). This concept redefined mobile devices and helped devices installed with Android or iOS to quickly capture market share.

The smartphone industry is experiencing high levels of competition and the financial investments companies in the market need to invest in research and technological innovation to be successful are significant (Forsell *et al.*, 2013). Hence, the barrier to entry to the volume smartphone industry is exceptionally high. However, according to Johnson *et al.*, (2013) these are signs of the industry slowly reaching its maturity stage.

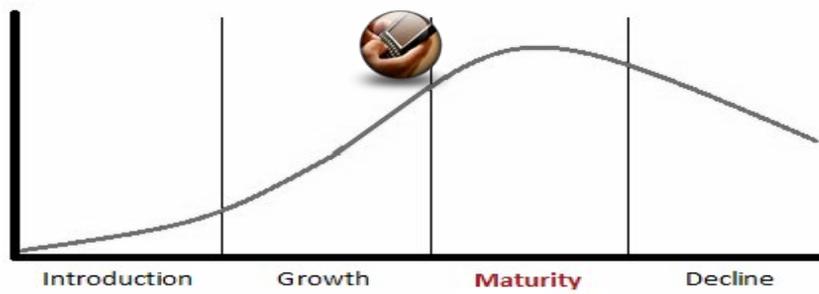


Figure 3.1.: Life Cycle (Adapted from: Johnson *et al.*, (2013)

3.3. The Context of Mobile Technology Use in Higher Education

This section explores the complexity of the current higher education context. The smart devices used in learning and teaching for external effects have been identified under the PESTEL framework. The PESTEL framework has been considered as an appropriate analytic vehicle (McGee *et al.*, 2005). According to Johnson *et al.*, (2008) a 'PESTEL' is a useful tool to identify the Political, Economic, Social, Technological, Legal and Environmental context impacting on a sector.

Rae (2010) highlights that the global economic crisis in 2008 had a significant effect on many industries including the education sector. The USA and UK have been significantly affected by the 'credit crunch' and government funding for public finance sector has been reduced (Cable, 2010).

The UK higher education together with other sectors is experiencing a paradigm shift and no one is sure about the long term impact on universities. The president of Universities UK: Professor Eric Thomas states that: "In a sector built around people, it is clear that human resource managers will be pivotal in helping universities to thrive in a fast-changing environment. Their role in making sure we have the right people, with a clear and shared understanding of what the university is trying to achieve, should not be underestimated" (Knight, 2012). The current economic crisis both nationally and globally have driven changes in university funding and policy, and have placed greater demands on the university sector resulting in the introduction of higher tuition fees. This has raised a number of key issues. One of particular concern is the potential negative impact on accessibility of specific groups to higher education (Johnstone and Marcucci, 2010).

A useful device for analysing the complexity of the current higher education context is the use of the PESTEL analysis. PESTEL analysis has been considered as an appropriate analytic vehicle (McGee *et al.*, 2005). According to Johnson *et al.*, (2008) a 'PESTEL' is a useful tool to identify and possibly develop new strategies based on the Political, Economic, Social, Technological, Legal and Environmental context impacting on an organization or sector.

McGee *et al.*, (2005) highlights that the use of PESTEL analysis helps identify contextual factors of the particular market. These contextual factors include governments, external competitors, new technological innovations and the change in social behaviour. Among the key conclusions of the PESTEL analysis are the following: Funding of higher education such as the introduction of “top-up” fees in UK higher education is a critical issue across the world (Chowdry *et al.*, 2013), the consequences of continued under-funding of universities resulting in the increasing use of part-time faculty and the relative unattractiveness of academic careers and mounting evidence of financial failure (Chowdry *et al.*, 2013).

The aim of the review is to recognise the environmental factors in use of new technologies in higher education. Over the years, mobile devices have enabled users to have access to content at any time; this factor has become a megatrend socially. Use of mobile devices have *their* technology phenomenon and according to research carried out by Alcatel-Lucent (2011) this megatrend occurred due to availability of high speed internet, demonstrating governmental support for ICT funding and its vision for UK adoption of new technologies. Therefore the review explores some aspects of the contextual issues in and around mobile learning utilising political, sociological, technological, legal and environmental perspective.

3.3.1. Political: Budget Crisis Hits Universities

This section discusses the higher education institutions current financial circumstances caused by the government's earlier introduction of a policy on funding around new tuition fees for home students and new visa restrictions on overseas students studying in the UK.

New funding regimes in the UK may result in the true cost of learning increasing by up to six times more than is projected by any Government savings (Thompson and Bekhradnia, 2011). Due to the annual deficit generated by the economic crisis the government funding HEFCE budget for 2010-2011 has been reduced to universities. The Treasury is set to reduce its expenditure further - by almost £1.17 billion following the budget changes in 2012-13, which will mean universities will need to re-coup lost tuition subsidies through charging higher tuition fees to counter the abolition of the Higher Education Funding Council for England (HEFCE) (Brown, 2011). Tuition fees were increased to £9,000 per year by the coalition government in 2012 (Dearden *et al.*, 2011). Lunt (2008) agrees that the reduction of the government's funding for HE has put universities in a financially difficult situation in terms of a decrease in student numbers. Vedrickas (2010) highlighted that the recent tuition fee arrangements in the UK have encouraged potential UK students to consider studying outside the UK as some countries such as the Scandinavian countries have lower tuition fees for their HE education. Thus, the universities need to be more flexible in teaching and learning. Säljö (1999) emphasises that flexible learning is a promising alternative to traditional classroom learning and offers more flexible and lower cost access than traditional learning. McLaughlin and Faulkner, (2012) emphasises that students learning is impacted by the availability of facilities and their learning design. Currently university students prefer less time on campus and would like to blend their learning with virtualbased advanced technology to interact with their tutors and peers. Hajhashemi *et al.*, (2014) highlighted that the use of new technologies have provided opportunities and flexibility for education in recent years.

3.3.2. Economic

The effects and benefits of mobile learning and teaching in the wider economy and in particular the potentially higher impact in developing nations both as a cost-effective delivery channel.

Consumer demand for the latest smart devices and also, their rapid technological advancement shortens the life span of a mobile device. Due to this users renew their devices around every two to three years (Schaefer *et al.*, 2012). This fact is a multiplier for the quantity of smartphones in use. This is confirmed by most smartphone market data which indicated that revenues for the global smartphone market have increased even during the global financial crisis (Lin and Ye, 2009). Kozma, (2005) emphasizes the importance of learning and teaching to the economy where they highlighted that education is the driving force for any country, especially for emerging nations. Higher education drives the competitiveness and employment generation in emerging countries and this is especially true for the use of mobile devices in education. These devices are a perfect launch vehicle for new kinds of out-of-school learning, which can occur at places and times that are more convenient than school. These factors create an extraordinary opportunity for complementing the formal educational system towards enhancing skills which helps and enables students with employment opportunities that in turn helps the economy (Kozma, 2005). Alcatel-Lucent (2011) also highlighted that governmental investment in new technologies in academia is an important economic growth factor. This is especially important in developing countries where schools are not located or easy to access for rural communities. This allows nations to improve and control their own education distribution through the use of mobile devices leading to better jobs and income (Alcatel-Lucent, 2011). The adaptation of new technologies and any development in innovation activities are crucial for any country's development both socially and economically. Thus, diffusion of new technologies plays a key role in the sustainable development of any country. Mobile learning will have a massive impact on the market reaching from \$632.2 million in 2009 to \$1,464.8 million by 2014 in the USA (Alcatel-Lucent, 2011). Aker *et al.*, (2010). emphasize that mobile device use has a massive impact on many different areas including the creation of effective opportunities for local economic development, particularly important in the developing countries where mobile devices are also growing fastest.

3.3.3. Social Changes in UK Universities and Their Impact on Learning

The social changes through the use of mobile devices in learning and teaching. It examines the evaluation in traditional learning and teaching with digital education.

Wider social changes have a direct impact on the way in which learning is delivered in higher education and in this case specifically related to changes in technology. Since technology cannot be isolated from society, the further development and implementation of mobile technology can only be understood as the outcome of strategies of various actors. Specific to the UK, the economic and political factors around the current economic downturn have negatively impacted on UK universities' ability to attract students, mainly through the enforced increase in tuition fees which in 2012 were raised to a standardised cap of £9,000 per year (Barr, 2012). Thus, it is imperative that universities offer flexibility in how teaching and learning will be delivered. James (2012) highlights mobile learning on the increase due to mobility, flexibility, accessibility and high levels of personal convenience that is beyond the capabilities of existing learning systems. The way teaching is delivered has already changed and has been driven to a large extent by technological innovations. Learning is no longer restricted to a classroom environment but can take place anywhere facilitated through technology giving the student independence and autonomy. According to Wang *et al.*, (2003) using electronic devices for academic activities such as delivering curricula through the use of electronic media have been the major contribution of the developments in the information systems industry.

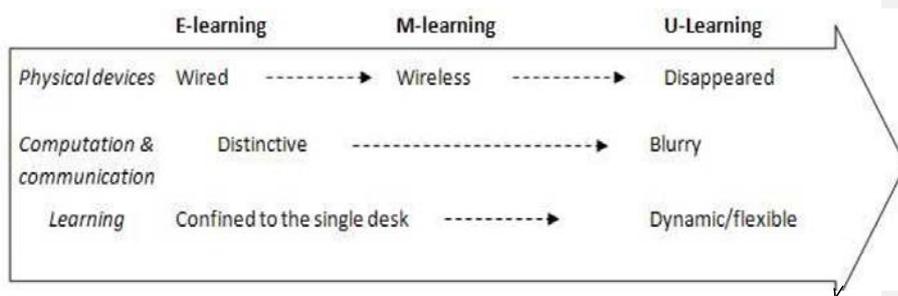


Figure: 3.2. Digital Learning Revolution (Behera, 2013)

3.3.4. Technological / University Contexts: The use of Digital Technology

The audience that can access and understand the technology is far larger than traditional teaching delivery methods. In the early 90's, the desktop computer was still the primary new technology being used for educational activities (Tak-Wai *et al.*, 2006). However, more than a decade on, technology dissemination has undergone two great leaps forward; uptake of a consumer-focused Internet boom and shortly after, the fast growth of wireless technologies and mobile technologies in late 90's. The current use of new advanced network technologies have enabled flexible, portable teaching and learning in the higher education sector in recent years (Hajhashemi, *et al.*, (2014).

The information systems (IS) curricula are driven to change by the almost continuous innovations in information technology (IT). Hence, the higher education institutions must adapt the new innovations and technologies into the classroom to provide a knowledge base for the discipline (Choi, 2009).

Pea and Maldonado (2006) identify that there are many benefits of using mobile technologies in teaching and learning, specifically that mobile devices are faster, start instantly and have a broad range of applications which makes them appropriate for academic use. Peters (2007) proposes that the most important attributes of mobile technologies are that they enable ubiquitous learning which consequently changes the way of teaching and learning. Kukulska-Hulme and Traxler, (2005) highlights that mobile learning is a flexible, on the move, mode of learning and all smart phones and tablets, laptops are typical tools in use of mobile learning. Peters (2007) emphasizes that the current advanced technologies such as blogs, twitter, Facebook etc. have made dynamic and easy to use by many user groups which are a potential for pedagogical use. Use of mobile devices enables users to stay available at all times which has become a megatrend socially. The social change of being available at all times is due to the advanced high-speed internet protocols and pervasive networks. These factors have been affected by governmental support for ICT funding and the government's positive vision for the adoption of new technologies (Alcatel-Lucent, 2011).

3.3.5. Environmental/ Going paperless

According to Krumbein *et al.*, (2010), going paperless would reduce administrative costs and improve efficiencies, make better use of office space, make student information and institutional records more accessible, and improve services to students, faculty and academic and administrative offices. Technology enables institutions to do more with fewer resources such as reduction in printing, mailing, and filing and storage costs and these are a definite benefit (Coleman *et al.*, 2006). Although new technology adoption and consequently going paperless might not be an easy task, the benefit of using technology needs to be emphasised to the potential user groups (Coleman *et al.*, 2006). Dodds (2007), agrees that information technology contributes innovation to the higher education sector such as redesigning core university processes and improves the way things get done while driving innovation. Carlson (2001) stated that when considering the creation of paperless campuses, administrators need to consider issues such as the digital divide, access, and security. Schools need to look at the cost of the new technology versus the effectiveness and make sure it fits the school (Carlson, 2001). Technology offers opportunities to replace current paper processes with innovative methods (Coleman *et al.*, 2006). Farrell (2008), even though most students apply online, there are still supplemental materials such as teacher recommendations, transcripts, resumes, test scores, etc. that are received in the mail. Electronic transmissions are also more reliable and accurate than the mail. However, it might be frustrating if technology doesn't work properly (Briceno-Perriott *et al.*, 2005). According to Ferneding, (2003) the purpose of using advanced technology is to reduce the information flow time, eliminate duplication of information, create interfaces between the database and the World Wide Web, real-time updating, specialized rankings, and electronic forms. Accuracy in processing applications has increased with fewer errors than the paper process and saved hundreds of person-hours and documented significant cost reductions in paper and photocopying expenditures (Dalgarno, 2007). There are many advantages of going paperless with the use of digital communication; encouraging students to use less paper or going paperless will encourage the faster uptake of new technologies. This will consequently reduce procurement activities such as buying papers, toners and importantly will save storage space (Kupetz, 2008).

3.3.6. Legal

Government regulations and policies play a big role on the impact of any adaptation of new technologies. Thus, many regulatory bodies will need to be more aware of the changes and be positive on innovation projects in applying legal changes (Alcatel-Lucent, 2011). According to Gianluca and Misuraca (2009) it is important for governments to ensure and protect public/user groups' privacy and security in the explosion of smart devices, cloud services and social networks which might have a significant level of problems. Hewson *et al.*, (2003) raise ethical concerns such as anonymity and confidentiality, participant risks are issues around mobile learning. Wishart, (2009) also agreed that confidentiality and data protection legislation are an important aspect of mobile device use in learning and teaching. Campbell (2011) emphasises that the mobile device security and safety are the core of mobile technology problems, which solving the problems of mobile electronic commerce security combined with 3G-technology application is a complicated system engineering, because of the need to establish a complete security policy framework system. Dubendorf (2003) points out that the wireless channel is an open channel which enables the user free and flexible communication and consequently this brings many safety factors, including the identity of the communication content as the content may easily be tampered with. Alcatel-Lucent (2011) observes that internet privacy and data stored in many applications and shared via mobile devices increases the concern of the consumers. The growing concerns regarding security and privacy issues have slowed down the adoption of new technologies (GSMA Association Mobile and Privacy, 2011). Thus, Governments started working to address data privacy and ensure that trust is sustainable in the consumers' perception of new technologies to avoid potentially losing billions through litigation Wishart, (2009). Hence, to promote data privacy and gaining consumers' trust, the EU data protection regulation and the U.S. President proposed new regulations in regards to safeguarding via the of Consumer Privacy Bill of Rights. Governments and the European Union have also discussed how to apply their privacy safeguards and guidelines in their own applications as well as large organisations. Microsoft, have signed an agreement offering privacy and disclosure to consumers when downloading mobile apps (Alcatel-Lucent, 2011).

3.8. Software Development Life Cycle (SDLC) Process

Information systems development methodologies (ISDM) have been used to develop many IT projects by many organisations (Vickers, 1999). Traditionally defined, an ISDM is the structured set of methods that are used for developing systems – also known as the waterfall model – explicitly identified and follow a linear sequence of life cycle steps and thus became associated with the definition of SDLC. The typical project development stages and activities, such a structured approach was introduced in the 1960's by the UK National Computing Centre (Management Outline, 1998).

A software development life cycle model is a conceptual framework describing all phases in a process of the software development project. These phases range from planning/understanding of the users requirements to maintenance/testing. In addition to project development activities, the life cycle continues with the *post hoc* problem identification of new business needs, which begins the cycle again (Gustafson, 2002).

There are a range of frameworks available for the software development lifecycle including the waterfall, spiral and iterative prototyping model. Each model is characterised by a sequence of activities. The development steps or the activities may vary according to the model but all the models will include planning, requirement, analysis, design. The classic waterfall Software Development Life Cycle (SDLC) firstly defines all the requirements then, creates all the design. The model places more emphasis on the step-by step process; the spiral model on risk assessment while the iterative prototyping model takes an incremental approach in each and every phase of the development process (Jamwal, 2010).

Waterfall model, Spiral model, Iterative model and Prototyping models are software development lifecycle models used widely in the industry, although according to Ruparelia (2010) the Waterfall model is the one that has had a profound effect on software development. Additionally this model has influenced many SDLC models still in use today.

There is a need to have a distinct mobile application development lifecycle model (see Figure: 3.3). Mobile application development involves various complex functionality and services like telephony services, location based services and different connectivity modes (Vithani and Kumar, 2014).

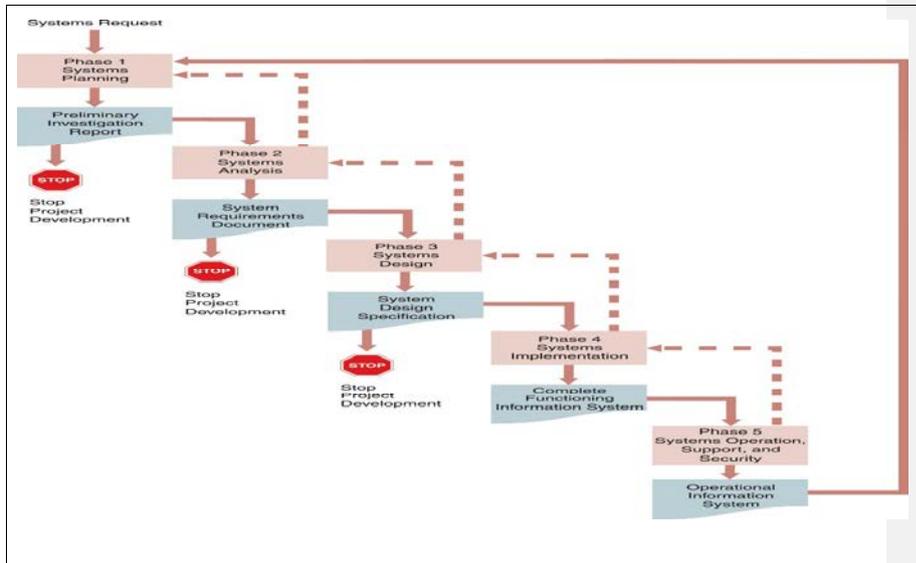


Figure: 3.3. System Development Lifecycle Model, (Source: Ruparelia, 2010)

The development of any desktop application involves similar phases of any Software Development Life Cycle (SDLC) (Vithani and Kumar, 2014) irrespective of technology being used. The output of each and every phase in SDLC feeds into the next phase. For instance, the requirements gathered during the planning phase are analysed in the next phase. These refined requirements are then designed in the *Design Phase*. The design is then implemented in the *Implementation Phase*. The code generated during the implementation phase is verified and tested. Customer support is provided for the designed and deployed application.

3.9. Mobile Application Development Process

This section discusses the system development life cycle for mobile technology frameworks.

The recent advances in mobile technology have created a gap for specialised software development frameworks for these devices and the interest of enterprises to embed the development of their mobile apps into their business cycle increases the need to have a specialised software development process. These needs are identified as context, connectivity, size and data entry methods that impact on the apps' usability (Nosseir *et al.*, 2010). This has resulted in many software companies focusing on new mobile application development frameworks. In the recent years application development lifecycle have been developed by many companies and some of them such as 'IT Intel' and 'Slalom Consulting' have developed mobile applications frameworks (Vithani and Kumar, 2014). 'Slalom Consulting' has defined the mobile application development lifecycle as an 'Enterprise Mobile Application Lifecycle' described as end-to-end mobile application development. They have defined the lifecycle in the following four different phases:

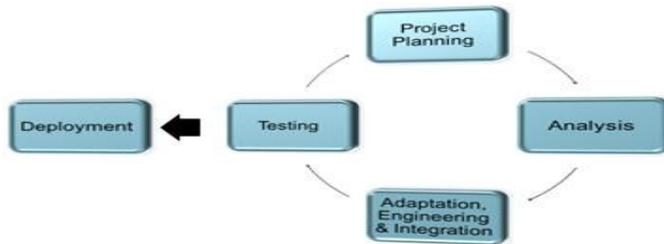


Figure 3.4: The Proposed New Component-Based Development Process Model (Source: Barnawi *et al.*, 2012).

Vithani and Kumar (2014) have developed a Mobile Application Development Lifecycle model (MADLC) which includes a systematic approach in development, arguing that this newly developed model will aid the mobile application developers in developing high-end apps. This lifecycle includes the following phases: Identification, Design, Development, Prototyping, Testing and Maintenance. The different tasks and activities in the various phases of the process address some of the distinguishing characteristics of mobile applications like life span, complex functionalities, fewer physical interfaces, a greater number of screens for interaction, battery and memory usage, cross platform development and maintenance.

Preliminary testing of the MADLC indicates that this lifecycle will enable developers and project managers to efficiently execute projects and deliver solutions on time.

i. Identification Phase /Project Planning Phase: In this phase ideas are collected and categorised. The main objective of this phase is to produce a new idea or improvements to the existing application. According to Tetlay and John (2009) there is a potential for a high risk of failure if there is a lack of clear understanding of the users' requirements. Hence it is important the system requirements should be clear and unambiguous at the beginning of the process. This consequently minimises the potential problems at the end of the process. Early communication is the key for the establishment of the basic requirements of the system (Vithani and Kumar, 2014).

The existing applications on any of the standards platforms are searched to establish the novelty of the idea. If a similar application exists in the market, the popularity of the application and the features supported are studied and compared. If no similar application exists on any mobile platform, then the idea with its core functionality should be documented. The other important task in this phase is to define the time required to develop the application. The work developed by the mobile application idea team should then be documented and forwarded to the design team (see Figure: 3.5).

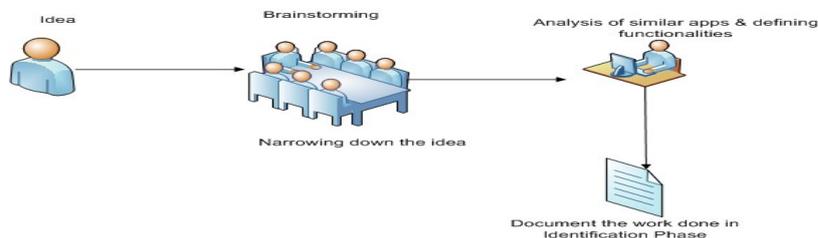


Figure: 3.5. Software Identification Phase (Vithani and Kumar, 2014)

ii. Design Phase: This phase focuses on planning the next direction of the development including how the project will develop through the rest of each phase within the software development process (Pohl, 2010). The idea from the mobile application team is developed into an initial design of the application. The feasibility of developing the application on all mobile platforms is determined. Alternatively, the specific target mobile platform is identified. The application functionality is broken down into modules and into prototypes i.e., combination of modules which are to be released in the prototype fashion.

The functional requirements are defined and the software architecture of the application is created (Vithani and Kumar, 2014). A very important part of the design phase is to create the storyboard which describes the flow of the application. The design team's work is documented and forwarded to the development team for coding.

iii. Development Phase: The developers generate the code for the system. The coding for different modules of the same prototype can proceed in parallels (Hatley and Pirbhai, 2013). The development process can be in two stages: Coding for Functional Requirement and Coding for requirements. The code is developed first for the core functionalities. Parallel development can be done for modules of the same prototype that are independent of each other. Subsequently, these modules can be integrated. In the second stage, user interface is designed so that it can be supported on as many mobile operating system platforms as possible; it is not good practice to have a different look and feel for the same application on different platforms. Finally, the documentation of the development phase is then forwarded to the prototyping phase.

iv. Prototyping Phase: This focuses on developing the software and tests it in a real environment. The prototypes are sent to the client for feedback (Bakker *et al.*, 2012). After feedback is received from the client, the required changes are implemented through the development phase. When the second prototype is ready, it is integrated with the first prototype, tested and then sent to the client. The development, prototyping and testing phases are repeated until the final prototype is ready. The final prototype is sent to the client for final feedback. The work done in this prototyping phase is documented and then forwarded to the testing phase.

v. Testing Phase: This is one of the most important phases of any development lifecycle model. During the testing phase every aspect of the system is tested (Tawileh *et al.*, n.d.). The important element of the testing phase is to make sure that the system delivers all the end-user requirements outlined at the beginning of the process. This phase is to see if the new system addresses the quality standards of the client and their user groups (Hatley and Pirbhai, 2013).

vi. Deployment Phase: This is when the users receive the new system as an update or a brand new system. Once the rollout starts, after the testing is completed and the final feedback is obtained from the client, the application is ready for the deployment (Hatley and Pirbhai, 2013). The application is uploaded to the appropriate application store/market for user consumption. Before the application is deployed, organisations must obey the rules and regulations of the application store for the deployment of an application.

vii. Maintenance Phase: This is the final phase of the model but maintenance is a continuous process. Feedback is collected from users and required changes are made in the form of bug fixes or functionality improvements. Appropriate security patches, performances improvements, additional functionality and new user interfaces should be provided at regular intervals in the form of updates to the application. The maintenance phase also includes the marketing of the application, advertising and highlighting its unique features.

Following the final phase of the maintenance phase, the developed product must be accepted by the user group. Where the product is not accepted and has a negative perception in terms of usefulness of the new system, then it is likely that the product might be a failure. Therefore, the next section will explore the Technology Acceptance Model (TAM) which is a theory that demonstrates how users initially come into acceptance and use of a new technology (Venkatesh, 2012).

This model explains that when a new technology is introduced to an individual, a number of aspects and factors can influence their decision notably, perceived usefulness and perceived ease of use. Perceived usefulness (PU) is related with the users' beliefs that using a particular system would enhance their performance on their job (Davis, 1989). Perceived ease of use or PEOU, can be defined as "the degree to which a person believes that using a particular system would be free from effort" (Davis, 1989).

3.10. Adoption of A New Technology

The adopter of every new technology innovation differs in terms of their characteristics and the acceptance of the innovation will depend on the context, society and time of the innovation. Some innovations may be considered as a failure even given the obvious advantages so that innovation does not automatically ensure acceptance of the technology by users (Grübler, 1998).

Students' learning expectations currently lie in an age of 'immediacy' where social networking and daily 'embedded' mobile use is the norm and where future students are likely to be more comfortable in receiving new program developments through a mobile learning channel. With the increase of home and international students, universities are being 'encouraged' (pulled) by student habits to offer flexibility in the way future programmes will be delivered, including incorporating the development of virtual and mobile learning platforms into the learning environment, particularly through the use of new mobile technologies for education. The mobile device has now become the fastest-growing communication technology of all time, with subscriptions are likely to reach 5.13 billion users globally by 2017 (Srivastava, 2014).

Pachler *et al.*, (2010) observe that mobile devices have functionality that are suitable for educational activities and importantly offer a low-cost of ownership; multimedia convergence and 'always-on' connectivity. Kukulska-Hulme (2010) also agree that Mobile learning is suitable for educational activities and they also highlight that it has been an interesting research topic for many researchers to identify suitable learning platforms.

There is an acknowledgement that traditional ways of teaching delivery are undergoing a radical change, no longer being solely restricted to classrooms (Wang *et al.*, 2007). The current generation of students has grown up with access to various types of new technology. However, educational institutions are not built around technology and are embedded in the traditions of classroom-led learning delivery where the main focus is on providing information through personal teaching and physical books and journals.

Mobile technology has also been described as an emergent paradigm which is developing rapidly (Traxler, 2007). Whether labelling it as a paradigm is adequate or not, previous research has revealed high potential for mobile devices to realise the long-held dream of one-to-one computing (one device for every student) in and beyond the classroom (Pea and Maldonado, 2006).

The obvious difference between mobile learning and other methods of learning is that learners can be continually on the move (Gedik *et al.*, 2012). The use of technologies in education is important for the pedagogical perspective and the benefits of using them should be emphasis to students (Kirkwood and Price, 2005).

3.10.1. The Background of Technology Acceptance:

Davis (1989) emphasises that acceptance or decline of information technology related innovation is a challenging task. The user's attitudes and behaviour towards use of new technologies is therefore of particular interest. Fishbein and Ajzen (1975) argue that the user behaviour can be explained with some application of models from social psychology. The TRA (The Theory of Reasoned Action) model (see Figure: 3.6) has been used and proven as a successful model to explain user group behaviour in adoption of new technologies.

The TRA model is designed and developed to examine human behaviour (Davis, 1989) and has been developed and adopted by Davis to explain information system usage behaviour. It has developed a model specifically focused on the Technology Acceptance Model (TAM). Following the development of TAM which evolved from TRA, a further model namely the **Unified Theory of Acceptance and Use of Technology (UTAUT)** evolved. This model is a combination of several technology acceptance theories and focuses on explaining user intentions to use an information system and subsequent usage behaviour. It has three developed determinants of intention to use: performance expectancy; effort expectancy, and social influence.

This model was further developed to include two additional direct determinants of usage behaviour: intention and facilitating conditions. Gender, age, experience and voluntary use are assumed to mediate the impact of the determinants on usage intention and behaviour (Venkatesh *et al.*, 2003).

3.10.2. Technology Acceptance Models

The Technology acceptance model is a general model which examines user group's actions as determinants of consciously intended behaviours (Davis, 1989). It examines the following human aspects which determine a specific behaviour: Behavioural Intention (BI), Attitude (A) and Subjective Norm (SN). Behavioural Intention corresponds to the intention to perform a certain behaviour, which is determined by the Attitude and the Subjective Norm ($BI = A + SN$) (Davis, 1989). The BI looks at the strength of an intention to perform behaviour. A signifies feelings of the user's (either positive or negative) towards performing a behaviour. Lastly, SN corresponds to the perception of an individual as to whether the user thinks about performing, or not, a certain behaviour (Davis, 1989).

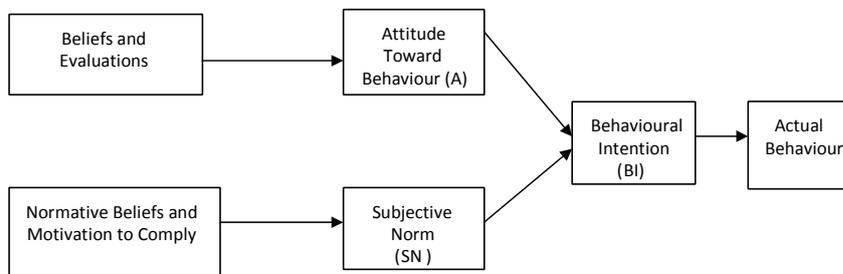


Figure: 3.6. Theory of Reasoned Action (Source: Davis *et al.*, 1989)

TAM was developed and adapted from TRA by Davis (1986) (see Figure: 3.7). TAM has two factors which influence technology acceptance behaviour: Perceived Usefulness (U) and Perceived Ease of Use (PEOU) (see Figure: 2.6). Davis states that the use of a specific application system may increase the users' performance and empowers the user within an organisational context.

The use of technology can be predicted reasonably well from people's behaviour and intentions in relation to how they perceive usefulness and ease of use:

- Perceived U is an important factor in people's intentions to use technologies.
- Perceived EOU is an important secondary determinant of people's intentions to use technologies.

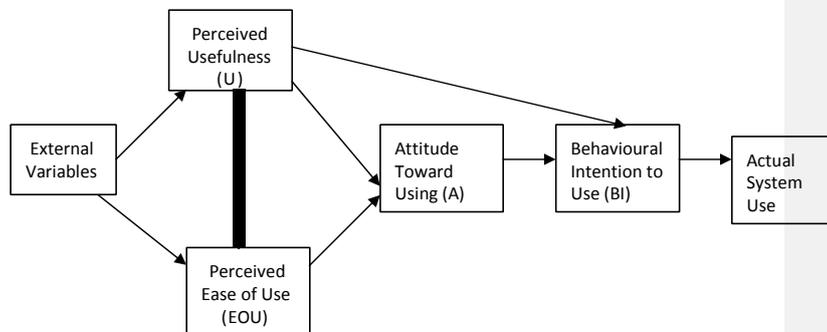


Figure: 3.7. Technology Acceptance Model (Source: Davis *et al.*, 1989)

Bagozzi *et al.*, (1992) emphasise that both models, TRA and TAM, examine a user's intention for using new technology. However, intention of use of technologies may be related to a range of factors including a lack of ability, time restrictions, environmental limits and habits. The differences between TAM and TRA are that TAM introduces PEOU (perceived ease of use) and PU (perceived usefulness) to explain attitude. TAM does not consider subjective norm as in TRA which Davis *et al.*, (1989) argue is not required as it is context-driven. Although, subjective norms may be important in some settings, in the empirical work validating TAM, but in predicting of intentions, Davis *et al.*, propose that this has been demonstrated as not important. Davis *et al.*, (1989) highlighted that, because the technology studied was of a personal and individual nature (i.e., use of the technology was not dependent on others' use of the same technology), system usage was not likely driven by social influences.

An important difference between TRA and TAM is that TAM proposes a direct path from perceived usefulness to intention, violating TRA which shows attitude completely mediating the relationship between beliefs and intention. According to Davies *et al.*, (1989) in the work environment, intentions to use IT may be based on its anticipated impact on job performance, regardless of the individual's overall attitude toward that system. In other words, even though an employee may dislike a system, that employee may still use the system if it is perceived to increase job performance (thus, it has high perceived usefulness).

Another difference between TAM and TRA is the 'EOU (Ease of Use) on Use' meaning that usefulness is related with the ease of use. If a user finds the system easier to use then they believe it to be useful. Davis (1989) stated that where a user becomes more productive through ease-of-use enhancements they should become more productive overall. The converse (that U influences EOU) does not hold, however. Thus, from a theoretical perspective, perceived ease of use influences perceived usefulness, but not vice versa.

Overall in comparison between TAM and TRA, according to Davis (1989) TAM was a better predictor and extremely robust in comparison to TRA (Adams *et al.*, 1992).

3.11. Diffusion and Technology Acceptance Models

The diffusion is a type of communication in which the content of the exchange message is related to an innovation over time among people in the community. Rogers (2003) defines an innovation as any new idea, practice, or object perceived as a new emergence. The TAM on the other hand explores the determinants of new technology acceptance in general, capable of explaining user behaviour and to provide some explanation of the impact of external factors on internal beliefs, attitudes, and intentions (Davis *et al.*, 1989). The following section explains in more depth the technology acceptance model (TAM). Every new technology innovation of adopters is different; the acceptance of the innovation will depend on society and the timing of the innovation. In some cases innovations may be considered as a failure considering the obvious advantages of an innovation, as it does not guarantee and it does not give full acceptance of the technology (Grübler, 1998).

Students' learning is framed by expectations of 'immediacy' (Vrielink, 2007) where social networking and daily 'embedded' mobile use is the norm. The World mobile device market sales grew to 250 million in 2013 and it is further expected to increase to 1.75 billion users in 2014 (Srivastava, 2014). In the future students are likely to be more comfortable in receiving new programmed developments through a mobile learning channel. However, educational institutions are not built around technology and are embedded in the traditions of classroom-led learning delivery where the main focus is on providing information through personal teaching and physical books and journals. With the increase of home and international students, universities are being 'encouraged' (pulled) by student habits to offer flexibility in the way future programs will be delivered, including incorporating the development of virtual and mobile learning platforms into the learning environment, particularly through the use of new mobile technologies for education.

Mobile learning has been an interesting research topic for many researchers to identify suitable learning platforms (Kukulka-Hulme, 2010). Mobile technology has also been described as an emergent paradigm which is developing rapidly (Traxler, 2007). Whether labelling it as a paradigm is adequate or not, previous research has revealed high potential for mobile devices to realise the long-held dream of one-to-one computing (one device for every student) in and beyond the classroom (Pea and Maldonado, 2006) The obvious difference between mobile learning and other methods of learning is that learners can be continually on the move (Gedik *et al.*, 2012).

By choosing mobility of learning as the object of analysis we may understand better how improved knowledge and skills can be transferred across different location contexts, such as the home, work and school environments, and how learning can be managed across life transitions, and where and how new technologies can be aligned to support a mobile-centric delivery. According to Kirkwood and Price (2005) the use of technologies in education pedagogic aspects are more important for students to know the benefits and understanding of why it is beneficial for them to use technology along with how technology works and how it is applied to businesses.

3.11.1. Diffusion of Technological Innovations

Diffusion of Innovation (DOI) Theory, developed by E.M. Rogers in 1962, is one of the oldest social science theories. It originated in communication to explain how, over time, an idea or product gains momentum and diffuses (or spreads) through a specific population or social system. The end result of this diffusion is that people, as part of a social system, adopt a new idea, behaviour, or product. The key to adoption is that the person must perceive the idea, behaviour, or product as new or innovative. It is through this that diffusion is possible.

Diffusion research centres on the conditions which increase or decrease the likelihood that a new idea, product, or practice will be adopted by members of a given culture. Diffusion of innovation theory predicts that media as well as interpersonal contacts provide information and influence opinion and judgment. Studying how innovation occurs, Rogers (1995) argued that it consists of four stages: invention, diffusion (or communication) through the social system, time and consequences.

Researchers have found that people who adopt an innovation early have different characteristics than people who adopt an innovation later. When promoting an innovation to a target population, it is important to understand the characteristics of the target population that will help or hinder adoption of the innovation. There are **five established adopter categories**, and while the majority of the general population tends to fall in the middle categories, it is still necessary to understand the characteristics of the target population. When promoting an innovation, there are different strategies used to appeal to the different adopter categories.

Innovation diffusion is a framework where the social impact of a new technology acceptance can be modelled. It also explores the characteristics of those groups who may adopt a technology at different stages. Although, diffusion theory does not predict how many users will receive a new technology (Rogers, 2003). The prediction can be provided by the use of TAM (Technology Acceptance Model) (Davis, 1989).

According to Rogers (2003) diffusion is a process in which an innovation is communicated through channels over a certain period of *time* among the members of a *social system*. Rogers (2003) argues that making a decision in regards to adopting a new technology will not be immediate; the process will require time, plan and actions. Further Rogers (2003) describes the *innovation-decision process* as the process where an individual making the decision passes from understanding the primary knowledge of an innovation and implementation process, to then making a decision whether to reject or adopt the innovation.

Grübler (2003) emphasizes that implementing and adopting a new technology is a difficult process due to uncertainty and unknown factors by the stakeholders; adoption process of a new technology will depend on society's perception and time of the innovation. Rogers (2003) highlights that considering the very obvious advantages of a new innovation may not be successful in adoption and further explains that this failure may be dependent on many different factors such as lack of interests of manufacturers, sales outlets, stakeholders etc. *Mobile computing*, used for education activities refers to technologies to provide user mobility and allow access to data "anytime, anywhere" in contrast to static computing where the user is required to go to a physical site to receive the service (Lyytinen and Yoo, 2002).

So far the literature review for this research considers mobile devices use for educational activities to be an example of an innovation as defined by Rogers (2003), whereas innovation is an idea, practice, or object that is perceived as a newly introduced idea by an individual or other unit of adoption.

The adoption of a new technology will be affected by the perception of the society and time of the innovation, according to Grübler (1998). In some cases the technology may offer very clear advantages, however, it may fail or it may be limited with a very small number of users.

This innovation in some cases shows obvious advantages, but may not be successful due to not being adopted; the reasons for such failures may be dependent on the interests of the stakeholders etc. Rogers (2003), in sticking to the old way, may not be open to new ideas etc.

Rogers (2003) suggests that with regards to acceptance of new technology, there are two approaches or attitudes:

- i) The *deterministic* examines the adoption of new technologies as an inevitable event. This view proposes that every innovated new technology is more advanced than the previous technology and due to this it believes that the technology must be adopted; the deterministic approach is also divided into two approaches: the *utopian* approach (technology will be leading the user groups to progress and deliverance), and the *dystopian* approach (is against use of technology and it supports the idea that technologies are harmful) (Rogers, 2003).
- ii) On the other hand *instrumental* proposes that new technology developments are not unavoidable and they are effected with the social, cultural, political and legal factors which determine the diffusion of innovation (Cantoni, 2006; Winston, 1998). It is opposite to *deterministic* that not all new technology is adopted due to the fact that they are more advanced or better than the previous technology.

According to Fidler (1997) inventions and innovation adaptations are not dependent on how beneficial the technology innovations are. Hence, the benefits of innovations are not constrained to adaptation but have built within them the potential for future applications which may have an impact on new technologies.

Keegan (2002) states that the rapid expansion of e-learning started with the development of the Internet and the first actual online teaching activity started in the early 1980's. Bates (2005) highlights that in the USA in 2002 over 1.6 million college students took part in at least one online course and also in China in 2003 almost 1.4 million university students took part in the online academic activity (Bates, 2005).

According to a survey carried out by the Centre for the Development of Vocational Training (CEDEFOP) on students from universities and colleges, private training companies and public organisations, results illustrate an increase of over 20% of eLearning courses between 1999 to 2001 (McCullough and Bainbridge, 2001). A similar study was carried out in Northern European countries which focused on adopting eLearning solutions at higher rates than the rest of the EU (Ranganathan *et al.*, 2007).

3.11.2. New Technology Adopters

Cantoni *et al.*, (2007) states that diffusion theories comprise five different types of adopters (see Figure: 3.8). Below are the categorized adopters:

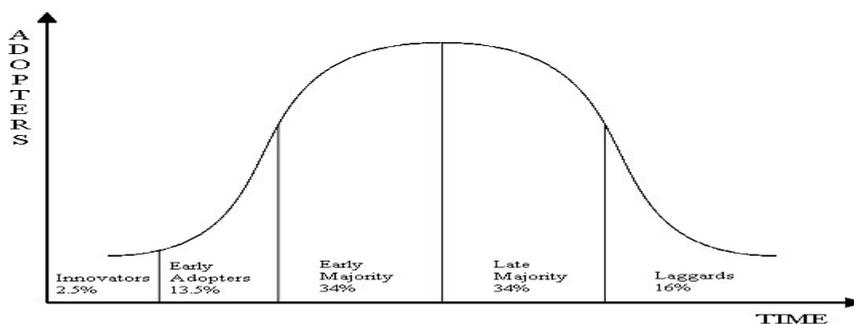


Figure: 3.8 Categorization of the adopters (Source: Rogers, 2003)

- i) **Innovators** can be described as the opinion leaders they will be interested in the new technology because they can afford it and believe that the new innovation will be positive for the stakeholders to adopt. They represent about 2.5% of the population. According to Rogers (2003) this group, 'innovators' are willing to experience new ideas and they can cope and also prepare for, unprofitable, unsuccessful or even uncertainty in relation to innovations. The innovators are promoters of the innovation they are also known for their highly complex technical knowledge. They may not be welcomed by other members of the social system because of their enthusiasm and close relationships outside the social system.

- ii) **Early adopters**, according to Rogers (2003), are the pushers of the diffusion of an innovation. They are strong in interpersonal, leadership and they are influential people. They represent about 13.5 % of the population. Compared to innovators, early adopters are more limited with the boundaries of the social system. Rogers (2003) argued that since early adopters are more likely to hold leadership roles in the social system, other members come to them to get advice or information about the innovation.

Early adopters play a central role in almost every aspect of the innovation process including initiation to implementation and carrying innovation forward (Light, 1998). The early adopters' attitudes toward innovations are more important, they are strong in interpersonal skills and their promotion of innovation reach almost every member of the social system through their good networking skills. Early adopters' leadership in adopting the innovation decreases uncertainty about the innovation in the diffusion process. Finally, this group has a very strong influence on approval of the innovation (Rogers, 2003).

iii) **Early majority**, represent about 34% of the population and they are much faster than Adopters in adapting new ideas. They prefer not to be the first or the last adaptors (Rogers, 2003).

Rogers (2003) also highlighted that early majority have a good interaction with other members of the social system although they don't take the leadership role like the early adopters. Their interpersonal skills are very important in the innovation-diffusion process. The early majority adopts the innovation just before the other half of their peers adopts it. They are deliberate in adopting an innovation and they are neither the first nor the last to adopt it. Thus, their innovation decision usually takes more time than it takes innovators and early adopters Rogers (2003).

iv) **Late majority** represent 34% of the population. These are sceptical people who will use the new technology once the majority have accepted it. These users are the most unconvinced people and are very doubtful about the use of new technology. They will only use and trust the new technology once it has been tried and tested by others. This group are similar to the early majority group. Although they are sceptical about the innovation and its outcomes, economic necessity and peer pressure may lead them to the adoption of the innovation. To reduce the uncertainty of the innovation, interpersonal networks of close peers should persuade the late majority to adopt it. This group believe the innovation and feel that it is safe to adopt (Rogers, 2003).

v) **Laggards** are more traditional and very critical about new technology and new ideas so they will adopt the new technology when it is almost outdated and a new one introduced on the market. They represent 16% of the population. This group have a traditional view and they are more sceptical about innovations and change agents than the late majority. As the most localised group of the social system, their interpersonal networks mainly consist of other members of the social system from the same category. This group would like to see if the innovation works before they adopt it. Therefore, the laggards' innovation-decision period is relatively long as they like to see if the innovation is successful.

In addition to these five categories of adopters, Rogers (2003) further described his five categories of adopters in two main groups: earlier adopters and later adopters. Earlier adopters consist of innovators, early adopters, and early majority, while late majority and laggards comprise later adopters.

Rogers (2003) identifies the differences between these two groups in terms of socioeconomic status, personality variables, and communication behaviours, which usually are positively related to innovativeness. For instance, “the individuals or other units in a system who most need the benefits of a new idea (the less educated, less wealthy, and the like) are generally the last to adopt an innovation” (Rogers, 2003). Rogers (2003) also believed that it is possible to notice that the adoption speeds up when the diffusion is around 10-25% of its market share, and the early adopters are the necessary channel to take off.

3.8. Summary of the Chapter

The literature review introduced the Life-Cycle Model and discussed the current life cycle of the mobile device industry. The background of the Higher Education Institution is framed through the use of a PESTEL analysis to focus on external factors. The analysis explored contextual issues from political, sociological, technological, legal and environmental perspectives. Further, the Systems Development Life Cycle explored and identified the needs of user groups in relation to use of mobile devices/applications.

The review continued with an overview of Diffusion theory and the rationale behind and adaptation of the “TAM” (Technology Acceptance Model) model which examined the human variables as well as the perceived ease of use and the perceived usefulness combined with their intention to use new information technology and supporting learning material through mobile technologies. The review continued with an exploration of the **diffusion of technological innovations** and discussed general diffusion theories. Diffusion is a type of communication in which the content of the exchange message is related to an innovation over time among people in the community which explains how radical new technologies such as smart devices are used and adopted.

Chapter 4: Methodology

4.1. Introduction

This chapter examines the paradigm within which the research is located, details of the research design and method of data analysis in addition to emergent issues and ethical approval. The term “paradigm” has been described as logical assumptions (Bogdan and Biklen, 1998). Creswell (2003) defines it as the interpretive framework in terms of ‘knowledge claims’. In this study, based on the nature of the research and understanding of the topic, a post-positivist approach has been selected as the most suitable research paradigm. This Chapter will explore the paradigm and further justification will be given for the methods applied.

The research undertaken examines how the Faculty of Business, staff and students perceive new technology in teaching and learning. This led to the development of the argument underlying the Technology Acceptance Model (TAM). With this model in mind it is possible to explore the staff and students’ perceptions with regard to the ease and potential usefulness of new technologies.

4.2. The Research Paradigm

According to Gilman, (1992) a paradigm is a collection of beliefs or a set of agreements shared by scientists about how problems are to be understood. A paradigm can be viewed as the lens through which you see the world and the lens built from all that has been experienced, learnt, read, heard and sensed. Kuhn (1962) claims that scientific fields undergo periodic “paradigm shifts” which is a radical change rather than solely progressing in a continuous way. Hence, the radical change explores new approaches to understanding what scientists would never have considered valid before. The view of scientific truth, at any given moment, cannot be established solely by objective criteria but is defined by a compromise of a scientific community. Thus, the knowledge of science can never rely on full objectivity as subjective conditioning worldview view also must be considered (Kuhn, 1962). Becker (1989) emphasises that choosing a paradigm involves assessing which paradigms best fit with the researchers’ assumptions and methodological preferences. It is important to find the right paradigm where conceptual framework, research questions, and method development should be compatible with the general paradigmatic sequence of the study (Becker, 1989).

A post-positivistic approach is used that synthesises data drawn from a range of complementary viewpoints obtained from staff and students. The following section will explore the post-positivist view in more depth.

4.3. Post-positivist (and Positivist) Paradigm

Positivism is an approach; it is a way of thinking which focuses on facts, statistics, numbers, and looks for causality and fundamental laws. A Positivistic approach can also be referred to as a quantitative method which is interested in an objectivist, scientific, numerical, experimentalist and traditionalist approach (Hussey and Hussey 1997). The key approach of the scientific method is the experiment, the attempt to discern natural laws through direct manipulation and observation (Popper, 1959). However, positivism gradually became less prominent after World War II (Mertens, 2005) in social science research and has been superseded by post-positivism as the dominant paradigm. Thomas Kuhn introduced the notion of 'paradigm shift' denoting a radical change (Gilman, 1992). Gilman, (1992) argued that the scientific advancement is not evolutionary but rather a series of peaceful interludes punctuated by intellectually violent revolutions. Often scientists working on the list of criteria may reach different conclusions; this is because they reach their conclusion based on their worldly life experience (Kuhn, 1977). Rosenau, (1991) observes that the Thomas Kuhn revolution of paradigm shift of post-positivist approach has been extensively used in many areas of research and especially in social science such as arts and humanities. Cook and Campbell (1979) argue that post-positivists work from the assumption that any piece of research is influenced by a number of well-developed theories apart from, and as well as, the one which is being tested.

The post-positivism paradigm, which aligns in some sense with the constructivist paradigm in the Social Sciences, claims that post - positivists see the world as ambiguous, variable and multiple in its realities. It also emphasises that truth and belief might be a truth for one but might not be a truth for another (O'Leary, 2007). O'Leary (2004) suggests that the post-positivism paradigm is intuitive and holistic, inductive and exploratory with findings that are qualitative in nature. However, Mackenzie and Knipe (2006) argue that the more widely used definition provides that positivists and post-positivist research is most commonly aligned with quantitative methods of data collection and analysis.

4.3. The Research Methods

Johnson *et al.*, (2007) propose that both qualitative and quantitative research can be used on a project to complement and support each other. They represent importantly two viewpoints of human communication; the qualitative method represents in words and the quantitative method represents in numbers. For example, quantitative research methods are usually linked to a positivist approach, because of the way in which objectivity is perceived and acclaimed, and the phenomenological approach is usually linked to post-positivist thinking while widely applying qualitative research instruments and techniques. However, it should be kept in mind that when using a particular paradigm, it is important to understand its characteristics, and ensure that there are no contradictions or deficiencies in the methodology (Collis and Hussey, 2003). Each of the research techniques are examined in turn.

Quantitative research methods emphasise numerical data such as counting and measuring to check an hypothesis, but qualitative research is more concerned with understanding why people behave as they do by identifying their knowledge, attitudes, beliefs, fears, etc. (Peninsula Research and Development Support Unit, 2005). By using qualitative research, it is possible to generate and manage more in-depth information compared to that gathered by quantitative research. However, according to Cohen *et al.*, (2007) a large sample size more usually used in quantitative methods, may provide greater reliability and confidence in the results. Both of the research approaches have their strengths and weaknesses, and advantages and disadvantages; they are not superior from one another (Sandelowski, (2000).

Qualitative research methods according to McMillan and Schumacher (2001) enable a detailed explanation and analysis of gathered data. The qualitative research uses inductive reasoning applied to evidence gained from sources (McMillan and Schumacher, 2001). Focus groups and interviews would be concerned with a small number of people who are selected and are asked about their attitude to a product, service, concept, advertisement, idea or packing (Lindlof and Taylor, 2002). This method enables flexibility for the moderator to control the questioning during the interview. However, this method may not be suitable for large volumes of responses that would need to be used to understand groups' views Creswell (1994).

The mixed method uses a combination of various qualitative and quantitative approaches. This method has been used to link the in-depth, contextualized, to advance the research by comparing quantitative versus qualitative arguments (Tashakkori and Teddlie, 2003). It has also been perceived as the third paradigm, with quantitative and qualitative methods representing the first and second paradigms respectively (Venkatesh *et al.*, 2013)

Giddings *et al.*, (2011) agrees that the advantage of mixing qualitative and quantitative methods within one study offers 'the best of both worlds'.

The reasons for using the mixed methods approach for this project, was to strengthen and minimize limitations of the methods (Johnson *et al.*, 2007). Although, in some cases the nature of questions may only allow the research questions to be addressed by either quantitative or qualitative research methods (Onwuegbuzie and Leech, 2005). However, for this research study, responses to research questions required methods that utilise both quantitative and qualitative methodological frameworks. Hence, the qualitative and quantitative approaches were the most suitable approaches for this research project where the outcome of the surveys provided the best opportunities for answering research questions and objectives (Tashakkori Teddlie and, 2003).

Onwuegbuzie and Leech (2005) emphasise that the mixed methods may not always be the most suitable choice for all research types. Johnson and Onwuegbuzie (2004) emphasise that, mixed methods approaches might be challenging for a researcher as the researcher needs to be competent and familiar in using both of the methods to be able to know how to combine both of the approaches appropriately for a successful empirical project. Greene *et al.*, (1989) emphasises that as well as developing a robust study by using mixed methods at the same time the method requires the researcher to be flexible to be able to deal with the problem being studied. If the study is done correctly, it must be planned carefully, and it must have a clear rationale that is defensible, which is part of the time-consuming aspect of this methodology (Greene *et al.*, 1989).

4.4.1. Research Design

Data was gathered from both students and staff within the Faculty of Business. Figure: 4.1 details the research design.

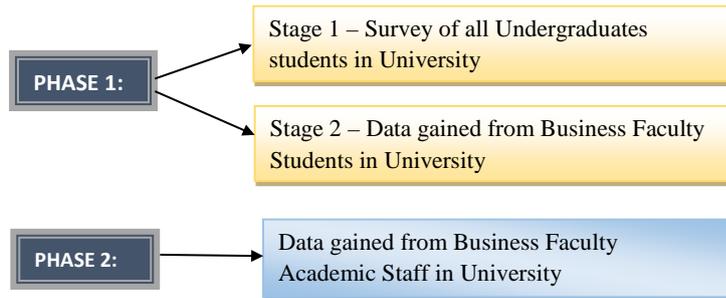


Figure: 4.1. Details of the research design

For students: Table (4.1) sets out the methods of data collection and sample details used to gather data from students within the Faculty of Business.

A questionnaire was developed with an online based survey and ‘Google Docs’ to reach the students. The questionnaire was purely designed for the students as they are very familiar with the current use of online learning tools and mobile communication devices. The final question on the questionnaire was open-ended enabling an interpretive approach. This allowed for further comments and suggestions. In a research perspective this could be problematic as responses could be subjective and potentially not necessarily reflective of the research area.

Table: 4.1. The research methods and participants, students’ details

Phase 1: Students	Research Method	Research sample size
Stage 1:	Survey: Questionnaire (closed format)	All Undergraduate students including other schools within the University over 900 students responded.
Stage 2:	Survey details:	Faculty of Business Students
i.	Focus Group meeting with 1st Year students	6 mixed gender students
ii.	Focus Group meeting with 2nd Year students	6 mixed gender students
iii.	Focus Group meeting with 3rd Year students	6 mixed gender students
iv.	Questionnaire (closed format)	Masters students n=68
v.	Questionnaire (closed format)	Undergraduates students n=83

For staff: Table: 4.2 sets out the methods and sample details used to gather data from Faculty staff.

The email interview; sent to pre-selected academic staff by their age group. The data was then analysed with the use of coding. Training session; the researcher presented power point slides on potential use of mobile learning use in HE. The purpose of the training session was to inform staff with the current use of online learning tools and mobile communication devices. The follow up meeting; the purpose of this session was to see if the academic staff would use such devices in learning and teaching. The discussion also included that if such devices were to be implemented what would the academics feel they would need in regards to using the devices. The questionnaire; was developed with an online based survey and ‘Google Docs’ to reach the academic staff.

The questionnaire was designed for academic staff as they are very familiar with the current use of online learning tools and mobile communication devices. The final question on the questionnaire was open ended enabling an interpretive approach. This allowed for further comments and suggestions.

Table: 4.2. The research methods and the participants (Academic staff) details

Phase 2: Academics	Research Method	Research sample size
i.	Email Interview	Total 8 academic staff: With different age groups: N=2x 23-38 years; N=2x 39-49 years; N=2x 50-60 years; N=2x 61+ years
ii.	Training Session	N= 6 members from the Faculty of Business academics
iii.	Training - Follow up meeting 5th December 2012	N= 6 members from the Faculty of Business academics
iv.	Questionnaire (Closed format)	N=30 respondents Male 20 67% Female 10 33%

4.4.2. The Research Frameworks

The Research questions are empirically explored in this study to identify the user group needs of a mobile learning application. This phase is the requirements stage which is the first phase of the Software Development Life Cycle of the model presented in Figure: 4.2. The research also included the exploration of the user groups (Faculty of Business academics and students') attitudes, behaviours and their intentions for the potential use of mobile devices for educational activities.

i) Software Development Life Cycle (SDLC)

The research focused on analysing and identifying the user group needs of a mobile learning application and focuses on the requirements stage of the model presented in Figure: 4.2.

During this phase ideas are collected and categorised. The main objective of this phase is to produce a new idea or improvements to the existing application that exists. According to Tetlay and John (2009) there may be a high risk of a failure if there is a lack of clear understanding of the users' requirements and their needs. Hence it is important the system requirements should be clear and unambiguous at the beginning of the process. This consequently minimises the potential problems at the end of the process. Early communication is the key for the establishment of the basic requirements of the system (Vithani and Kumar, 2014). This methodology is a logical description of the phases taken in the development of information systems (Ruparelia, 2010).

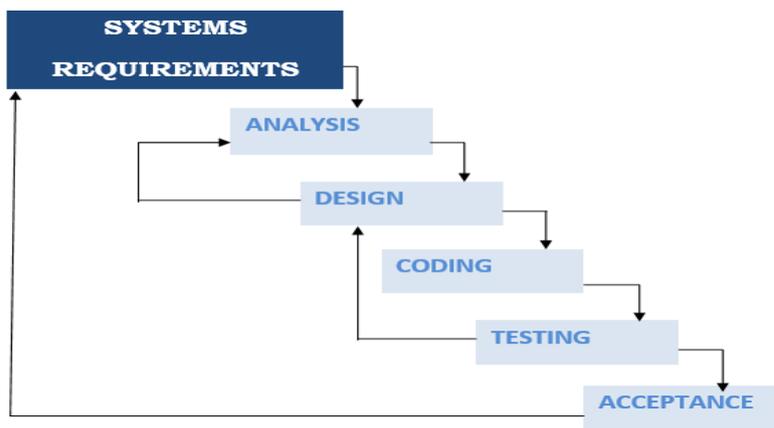


Figure 4.2.: The waterfall model (Systems Development Life Cycle) Source: Ruparelia, 2010

ii) Technology Acceptance Models (TAM)

The research framework also included the exploration of the user groups (Faculty of Business academics and students') attitudes, behaviours and their intentions for the potential use of mobile devices for educational activities. Thus, in planning the development of the use of mobile technologies, the data is gathered and analysed based on the understanding of the staff and students' experience and their willingness to use new technologies within their learning. Acceptance is something that is very hard to predict due to the variable factors that the human element brings to the equation (Ajzen, 1991). According to Dillon and Morris (1996) there are many theories of acceptance especially in the area of information systems and funding for new information systems can cost considerable amounts of money hence, it is important to understand how new technology will be received and utilised.

Two models have been examined in the literature review chapter, namely- TRA (Theory of Reasoned Action) and TAM (Technology Acceptance Models). However, it was decided to use TAM as it is more developed and a better predictor in terms of users' intentions of using the systems and it is significantly more robust than TRA (Adams *et al.*, 1992).

Davis (1986) believes the TAM is a very influential framework in use of any acceptance and adoption related project in new technologies. The TAM model (Figure: 4.3), examines the users' acceptance of the new technology explored by analysing their attitude toward the potential use and intention to use mobile devices in educational related activities. At this stage, investigation of the intentions of users would enhance the predictive power of the model.

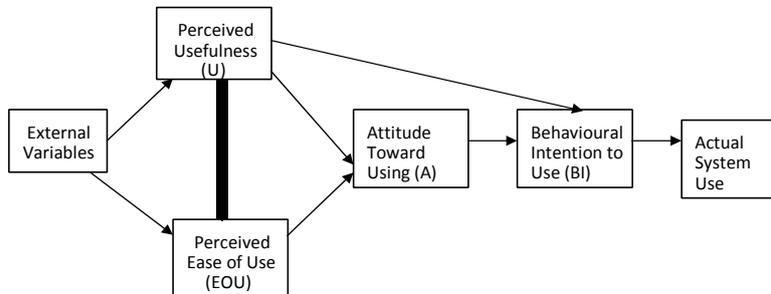


Figure: 4.3. Technology Acceptance Model (Davis *et al.*, 1989)

The following two tables 4.3 and 4.4 present the adopted post-positivistic approach using multiple sources of evidence from students. The student research methods are inclusive of questionnaire (closed format) including two undergraduate students and one Master’s questionnaire and focus group meetings to undergraduate students including 1st, 2nd and 3rd year students.

The academic staff research methods comprise: email interviews to 8 academics age range between 30 to 70; training sessions to 6 academic members of staff and the training session carried on with a follow up/focus group interviews; a closed format questionnaire emailed to all Business academic staff.

Table: 4.3. The Adopted Post-positivistic Approach Using Multiple Sources of Evidence on Students

The Adopted Post-positivistic Approach Using Multiple Sources of Evidence on Students					
PHASE 1:	Research Method	Goals of this phase	Who are the participants	Research sample size	How was it conducted
PHASE 1: STUDENTS	Questionnaire (closed format)	Phase to understand current and future use of students mobile devices	Undergraduate students	All Undergraduate students including other Faculties within the University over 900 students responded.	Online by the use of Google Docs online tool
	Focus Group meetings with 1stYear students	Deeper understanding of students views	Undergraduate students	6 mixed gender students	Face to face /50-60 min.
	Focus Group meetings with 2ndYear students	Deeper understanding of students views	Undergraduate students	6 mixed gender students	Face to face /50-60 min.
	Focus Group meetings with 3rd Year students	Deeper understanding of students views	Undergraduate students	6 mixed gender students	Face to face /50-60 min.
	Questionnaire (closed format)	To understand overseas student levels of mobile device use and compare that with UK resident undergraduates	Post Graduate Students	The surveys were conducted during their lecture (68 participants)	Hard copy survey circulated during the lecture
	Questionnaire (closed format)	To understand undergraduate students views on mobile learning and its potential	Undergraduate Students	Only circulated to the Faculty of Business Students (83 participants)	Online by the use of Google Docs online tool

Table: 4.4. The Adopted Post-positivistic Approach Using Multiple Sources of Evidence on Staff

The Adopted Post-positivistic Approach Using Multiple Sources of Evidence on Staff					
Academic Staff	Research Method	Goals of this research	Who were the participants	Research sample size	How and where was it conducted
PHASE 2: STAFF	Email Interviews Dates: 4 th , 7 th June 2012 & 30 th November '12	The preliminary study to understand staff views on their willingness and experience in delivering mobile learning in HE education	Faculty of Business academic staff	Total 8 academic staff: With different age groups: 2x 61+ years; 2x 50-60 years; 2x 39-49 years; 2x 23-38 years	Questions were sent by email then discussed the answers
	Training Session with the use of power point slides Date: 21 st Nov. '12	Make them aware of the wider use of mobile devices	Staff divided into two groups; A- Good with mobile apps, B- Little experienced with mobile apps	6 members from the Faculty of Business academics	By invitation, QA216 at the University Campus
	Training - Follow up meeting Date: 5 th Dec. '12	Staff to discuss their view on how mobile devices enhance learning experience	The same staff who attended the training session	The same participants who attended the training session	By invitation, QA216 at the University Campus
	Questionnaire (closed format) Date: 24 th Jan. '13	The awareness of their knowledge and their view on mobile device use	Faculty of Business academics	Faculty of Business academics	Google Docs, Online survey emailed to all Business Faculty academics

4.5. The Initial study

Based on the advice of De Vaus (1993), it is best to conduct pilot research to pre-test, rather than taking any project risk. Based on this understanding, a pilot study survey was conducted in May 2010 to pre-test the view of staff and students. Thus, the purpose of this study was to 'try out' the research instrument (Baker, 1994), that further explains that one of the advantages of conducting a pilot study is that it might indicate whether the research study would result in success or failure.

The online pilot questionnaire (see Appendix 3) was developed and emailed to all students including all Faculties of the University. The response was very good so this study was expanded into a much wider initial survey and eventually the number of respondents reached over 900 participants. The majority of the questions on the questionnaire were based on multiple-choice answers.

4.5.1. The Sample / Participants

The sample consisted of academic staff and students of the Business Faculty of the University. The inclusion requirements for participants were according to the following criteria, adapted from Rea and Parker (2012) that all participants should be:-

From the University, more specifically the Faculty of Business, include both academics and current students, including undergraduates and postgraduates and, importantly, they needed to be willing to participate in the study. The students for the focus groups were selected from the author's tutorial groups on a volunteer basis. The students were selected from different levels of their academic stages; including levels 1, 2 and 3. The final student questionnaire was sent to all Faculty of Business students. The participants for the academic staff interviews (email based) and the focus group were selected based on their age groups. Selecting the participants for their age was guess work. They were selected as e.g. 30+, 40+, 50+, 60+ etc. The questionnaire was sent to every member of academic staff from the Faculty of Business. The project was undertaken during the period September 2009 to September 2014 at the University.

4.5.2. Questionnaires as a data gathering technique

The survey questionnaire was designed using an online survey tool embedded within the 'Google Docs' suite of services. This was chosen as it is relatively straightforward to use both to create a questionnaire for respondents as well as to complete them and also offers automated collation of results as charts. Generally, the tool is very user friendly, and it automatically generates tables and charts to illustrate results clearly. Google Docs Survey was complemented in the study by using SPSS (Statistical Package for Social Scientists) for data analysis; Chi-square tests were also carried out to explore categorical variables in relations. Beebe *et al.*, (1997) posit that online based surveys may attract a higher response rate as they are superior to email-based surveys in terms of functionality and ease-of-use. It was also mentioned that online surveys are much more user friendly and their layout is well structured (Brennan *et al.*, 1999). According to Mann and Stewart (2000), online-based surveys reach a very large audience; hence it is much less likely that they will have issues with narrow geographic distribution.

4.5.3. Distribution of the online Questionnaire (Google Docs')

The online questionnaires were circulated to staff and students via the university's email system using a web link enabling them to access the survey. The respondents were postgraduate and undergraduate business school students. It was decided to use an online survey via a web link to ensure anonymity and because it was more relevant to the subject and, more importantly, it would be quick and already in electronic format for easier analysis i.e. data could be directly linked to a database as the use of new and emerging technologies is central to this thesis.

Whilst the questionnaire (see Appendix 3) was not divided into sections, there was a logical order to the questions that have been designed to sequentially cover separate areas of technology usage.

The first line of the questionnaire briefly introduces the research study and includes details relating to questions and comments. During designing of the questionnaire, the author was particularly specific about the layout, presentation, font size and colour etc., following the advice given by Fanning (2005) in that a well formatted survey makes it easier for the respondent to read and complete and has a direct impact on the response rate.

4.5.4. Focus groups interview analysis

The student focus group interviews (Table 4.5) were digitally recorded and transcribed (see Appendices between 6 and 8A). Krueger, and Casey (2009) highlight that focus group interviews are generally made of four to twelve of people with a similar interest or a similar background and the participants discuss a given topic area. McLafferty, (2004), emphasises that conducting focus group interviews are relatively cheap to run also providing a fast outcome of the research. Krueger, and Casey (2009) state that the moderator must ensure that participants feel free to discuss any matter without any concern and without criticism. The interviews must be clear and open-ended (Cohen *et al.*, 2000). The focus group interview outcomes were then analysed inductively through a process of coding (Dowling and Brown, 2010).

The collected data analysis of the focus group interviews with the undergraduates and the interview analysis of the academic staff, involved categorising the ideas conveyed with the flow of the interviews. The first step during the data analysis process was coding without which it would not be possible to interpret data (Table: 4.6). The coding helped to define categories to create structural analysis (Charmaz, 2000).

Table: 4.5. Details of the focus group interviews with the undergraduates' students

Research Method	Who are the participants?	How was it conducted?
Focus Group meetings with 1stYear students	6 mixed gender students	Face to face /50-60 min.
Focus Group meetings with 2ndYear students	6 mixed gender students	Face to face /50-60 min.
Focus Group meetings with 3rd Year students	6 mixed gender students	Face to face /50-60 min.

Table: 4.6. Sample view of one of the focus group analysis with first year students

Theme	Responses (Supporting Data)	Open coding	Axial Coding
Mobile functions to support academic studies	(P 1) A lot of things – specifically, download lecture notes	Download	
	(P 2) Making or capturing course lecture notes on a device, alarm reminder for hand-in dates/ group work sessions, using the mobile device to view lecture podcasts, using the mobile device for self-testing and revision. I also believe with a phone we can do a lot, we can use the phone to view lectures, facebook, email, call and other, also for reminder of hand in dates. P3, P4, P5, P6	Alarm reminder Project management Podcast Exam revision	Podcast
	(P 3) Having an on-device course scheduler and tracking tool, alarm reminders for hand-in dates/ group work sessions, using your mobile device to view lecture podcasts, using your mobile device for self-testing and revision. Even though a mobile device could be pretty useful recording lectures. I still take my own notes by hand and do the heavy study at home by reading books.	Alarm reminder Podcast Diary Recording lectures	Recording lectures
	(P 4) Capturing lecture notes, reminder for hand-in dates/ group work sessions, listening to lecture podcasts, exam revision. I think having these functions would benefit us, as students always have their mobile phone on them and sometimes forget other materials i.e. pen and paper, they would then be able to use their mobiles whilst at university to help them with learning etc.	Recording lectures Alarm reminder Podcast Project management	Alarm reminder
	(P 5) Alarm reminder for coursework hand-in dates, it would be useful for exam revision, coursework preparations, etc. It is useful to have a device that will remind you of upcoming deadlines, test knowledge.	Alarm reminder Exam revision	Project Management
	(P 6) Exam revision, alarm on coursework hand-in deadlines. Just like in project management, test quiz, simulation games again subject-related	Alarm reminder Project management Exam revision Simulation games	Revision

4.5.5. Email Interview Surveys and Analysis

The academic staff were categorised by age group and also a number of structured interview questions emailed to each of the participants. The participants were assured that their data would be kept confidential and their details would be kept anonymous. The participants were provided with additional ethics letters to inform them as to data protection (see Appendix 1 for students and Appendix 9 for staff letters of consent).

The major benefits of the emailed interviews were that they saved time and transcripts were automatically created. This was the first method used to understand the academic staff’s initial thoughts on the future use of new technologies for academic purposes. After participants sent back their completed transcripts, again using the coding system (see above Table 3.6), the data was organised and analysed according to the language of Bernstein’s theoretical framework (Dowling and Brown, 2010). The first stage of the analysis attempted to identify the ideological conceptions of teaching held by each participant.

4.6. Strengths of the Research

The first strength of the research was applying the mixed method to conduct this research. According to Tashakkori and Teddlie (2003) the mixed methods research provides stronger suggestions than a single method. Especially on any ICT related research this method employs rich insights on various information systems phenomena with the use of quantitative and qualitative methods (Greene and Caracelli, 1989). According to Molina-Azorín (2007) the mixed methods may complement strengths and non-overlapping weaknesses of qualitative and quantitative methods. The combinations of these methods offer greater insights on a phenomenon that each of these methods individually cannot offer (Johnson and Turner, 2003). Patton (1990) emphasises the use of mixed methods keeps the researcher open-minded on various research outcomes and analysis. Furthermore, Patton (1990) highlighted that the finding and collecting of relevant information is a more important methodological approach. The qualitative data collection approach; would help the researcher to understand the deep insights from the surveys and a quantitative data collection approach, may help researchers gather data about different aspects of a phenomenon from many participants. Hence, by using this method for this research, the researcher was able to collect two data approaches to make better and more accurate inferences as results.

Secondly, a pilot study was conducted to pre-test or 'try out' the research instrument. Baker (1994) highlights that one of the advantages of conducting a pilot study is that it gives some indication as to whether the project is on the right track or could fail. Additionally, a pilot study gives an early warning on the appropriateness of the proposed research methods which could save time and money.

4.7. Research Limitations

There were potential issues that the researcher identified while doing research which created concern in attracting sufficient numbers of participants to complete the online survey. In order to overcome this issue the researcher offered an incentive (light snacks) for students taking part in the pilot study.

Furthermore, similar incentives were offered for the staff to encourage more staff to take part in the survey.

In addition, at the staff and student focus group meetings participants were required to meet with the researcher at an arranged location which proved time-consuming for the participants. In order to facilitate this, the meetings were planned well in advance and light refreshments were organised for the participants. To ensure data was not lost through technical breakdown of digital recording instruments, a backup digital recorder was brought to the interview sessions, and the data gathered was itself immediately backed up and given a unique code number.

4.8. Ethical Considerations

The issue of power and influence was considered and addressed in the University Research Ethics Committee (UREC) submission (Refer to Appendix 15 A and B for the UREC principles and letter of approval). By conducting the survey at the researcher's own university it was considered that some staff and students may have felt obliged to be involved in the survey as the author works there as a lecturer. Therefore, the following issues concerning anonymity and confidentiality were explored further and addressed.

- It was stressed to the academic staff and students who were involved with the interviews and the focus group meetings that they could only take part in the survey if they wished to. Hence, if they did not wish to take part, there would be no consequences for refusal to do so.
- The questionnaires were sent online to all Business Faculty students and academic staff via a web link to ensure anonymity. It was clearly stated that it was an option to take part in the survey, only if they wished. It was also stated that no personal data would be stored after conducting the questionnaires.
- Anonymity was guaranteed throughout the process as all personal data would be removed once the data was coded. All participants were informed of how they were protected with regards to the data.
- The researcher ensured that participants could choose to terminate their involvement at any stage of the research survey.

The focus groups interviews were assigned a code; to staff by age group and student by academic stage.

4.8.1. Informed consent

Individual consent forms for participants (staff and students) for the focus group meetings and staff interviews were distributed before the surveys. Refer to Appendix 1 for students and Appendix 9 for staff for the consent letters.

The retention and safeguard of accurately recorded and retrievable results is essential for ethical research. The collected data from the various surveys and the audio recordings will be kept until the viva, as a form of evidence of this research. However, after the viva it will be filed in accordance with the Data Protection Act (1998).

4.9. Validity and Reliability

The stakeholders who took part in the study comprised of academic staff and students – with academic staff being potentially the creators and editors of mobile learning content, and students, primarily being consumers of content. Both groups, therefore, had both indirect and direct interest in how mobile learning content was being designed, delivered and disseminated, with its quality, usability and accessibility deemed as being essential for the successful completion, implementation and delivery of any m-learning project.

The notion of validity is of particular importance. Validity was determined through the inclusion of both stakeholder groups in qualitative interviews through focus groups and e-mail interviews that examined different user-groups and potential outcomes across staff-creator/student-consumer viewpoints with often very different technology acceptance and input/output perspectives.

4.9.1. Use of a Case Study: Justification of the use of the Faculty

A case study approach was used to examine a specific example of a faculty within the university which had the following important characteristics: there was no introduction of mobile technology by teaching staff for m-learning; Faculty is the biggest single grouping within university staff; and the researcher is a member of faculty and as such had access to both staff and students. The Faculty in the surveyed institution employed traditional methods of teaching but was seriously considering the use of alternative methods of digital delivery through m-learning and as such was interested in the potential outcome of the research questions for the "how" and/or "why" for the m-learning argument.

4.9.2. The use of mixed methods

The use of mixed methods has contributed significantly to this research study, in gathering data both for students and staff.

The use of a focus group enables researchers to interact with selected participants, pose follow-up questions, or raise questions that can probe more deeply than quantitative based research e.g. questionnaire type methods (Stewart and Shamdasani, 2014).

An additional benefit of using face-to-face focus groups was that the researcher could identify non-verbal responses through facial expressions or body language. Similarly, face-to-face interviews allowed the researcher to keep the discussion under control and maintain the key areas of interest. Free and open discussion among the respondents resulted in generation of new ideas which were very useful for the analysis (Wilkinson, 1998)

The use of quantitative research methods, such as used in the survey, allowed the researcher to identify a large quantity of information collected from a number of participant groups in a short timeframe and in a very cost-effective manner (Creswell and Clark, 2007). The approach allowed the researcher to analyse data more objectively than other research methods.

4.10. Summary of the Chapter

This chapter has discussed the research philosophy, theory, strategy and methodology which framed this study. The research supports the post-positivism paradigm which is an amendment to the positivism paradigm.

The reformation of positivism through a re-appraisal of the basic assumptions of positivism: ontological realism, the possibility and desirability of objective truth, and the use of experimental methodology. The research undertaken has utilised both positivist and the interpretive elements within the research design to include mixed methods including; emailed interviews, focus groups and two questionnaires to provide a wider understanding of the research question.

The two interpretive methods have been applied to achieve the research objectives. This includes a substantial literature review, the enhancement of earlier research models and the development of an instrument. The choice of the post-positivist paradigm enables a broader range of methods. Furthermore, an attempt is made to further develop an instrument to assess users' perceptions and acceptance of new technologies.

Chapter 5 - Data analysis of Research Question One

5.1 Structure of the data analysis chapters:

The empirical data analysis is divided into two chapters and is presented as follows:-

(Chapter 5) addresses research question one:

- Q-1- How can new mobile technologies contribute to the enhancement of the learning experience of students? and

(Chapter 6) addresses research question two:

- Q-2- What should the role of educators be in facilitating and enhancing the learning experience of students?

5.2 Introduction:

This chapter presents the research question the findings from the analysis of quantitative and qualitative data comprising student-focused data sets (Phase 1) and staff-focused data sets (Phase 2) set out in Figure: 5.1. This data has been collated in order to answer the following research questions:-

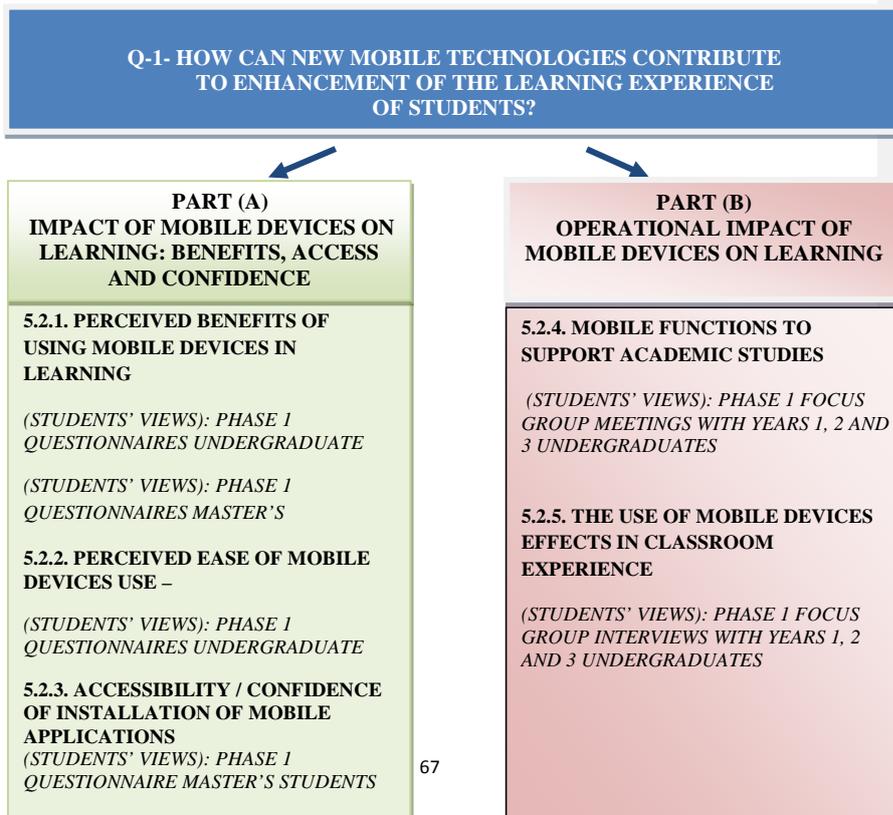


Figure: 5.1. Analysis of the research question one

PART (A)
IMPACT OF MOBILE DEVICES ON LEARNING:
BENEFITS, ACCESS AND CONFIDENCE

5.2.1 PERCEIVED BENEFITS OF USING MOBILE DEVICES IN LEARNING

Data sets: Phase 1 stage 1: Questionnaire (Undergraduate)

Phase 1 stage 2: Questionnaire (Masters)

5.2.1.1 Undergraduate Students view on the use of mobile devices as a supporting tool

Figure: 5.2. Identifies students' views on mobile devices as a supporting tool in academic studies. It can be seen clearly in Figure 5.2 that students were interested in using mobile devices as a course scheduler and as a tracking tool – using a mobile device to get reminders for upcoming coursework hand-in dates and/or for group work sessions

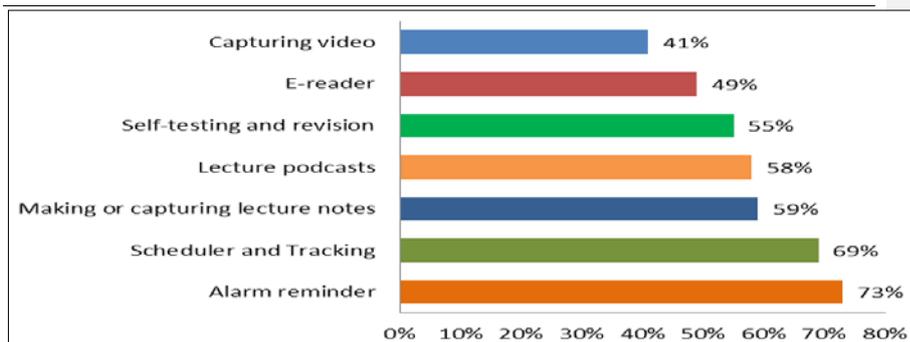


Figure: 5.2. Students view on mobile devices as a supporting tool (Q-9)
N=960 (561 Male, 399 Female undergraduates from years 1, 2 and 3)

5.2.1.2 Undergraduate Students view on university-wide SMS notifications

Students were asked how they would use mobile messaging services like SMS notification services (Figure: 5.3.). The purpose of this question was to ascertain whether students were interested in interactive messaging as a notifications service for their future academic studies. Again, a large number said they would prefer to be notified by a messaging service in case of a room/lecture changes, change in lecture timetabling and course work hand-in dates etc.

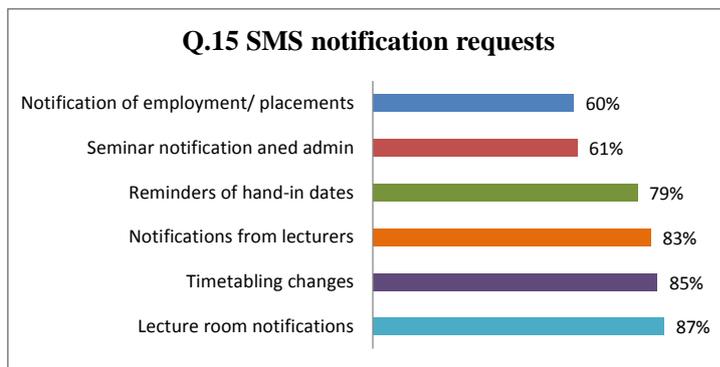


Figure: 5.3. Students view on university-wide SMS notifications (Q-15)
N=960 (561 Male, 399 Female undergraduates from years 1, 2 and 3)

5.2.1.3. Undergraduate Students view on mobile payment services University-wide

Figure: 5.4 indicated that students were already aware of mobile payments potential (May, 2011) and were even then interested in using mobile devices for purchasing small, low-value items within the university campus e.g. in Student Union shops, canteens, vending machines and to pay for travel between campuses. This question, although not directly relevant to the actual research question, was seen as having potential for future study/publication in a broader research area.

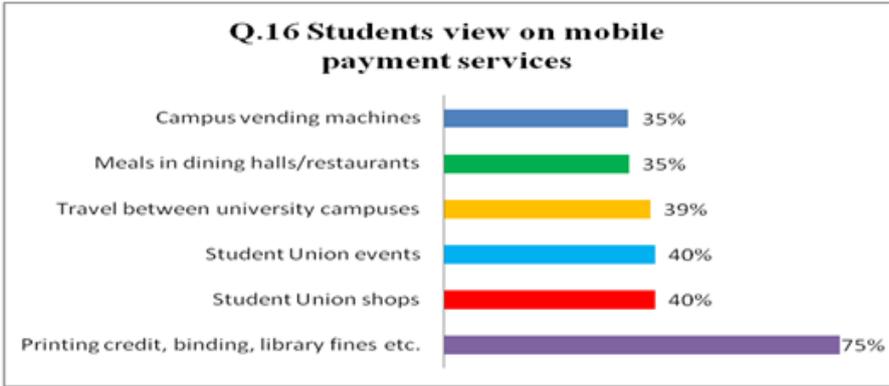


Figure: 5.4. Students view on mobile payment services University-wide
N=960 (561 Male, 399 Female undergraduates from years 1, 2 and 3)

5.2.1.4. Undergraduate students views on benefits of using mobile learning (Q-12)

This section presents the findings from the undergraduate students' questionnaire (Q-12 only) component of the study.

The key findings that emerged from the analysis are set out in Figure 5.5 and identify 4 key elements:-

The ease of completion of tasks such as; accessing journal articles from electronic databases and more generally from the University online library, Google Scholar, supporting the engagement in group/ peer discussions in university enabled platforms; and the downloading and accessing blogs, were the benefits perceived by students.

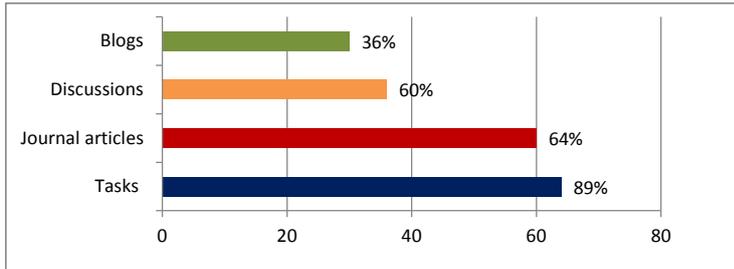


Figure: 5.5. The Undergraduate Students view on benefits of the mobile devices use
N=83 (25 Male, 58 Female undergraduates from years 1, 2 and 3)

5.2.1.5. The Masters students views on benefits of the mobile devices (Q-7)

The key findings that emerged from the analysis are set out in Figure 5.6 and present the masters students' view on benefits of mobile device use.

The benefits of the mobile devices have been identified under 4 key elements; accessing journal articles from electronic databases and more generally from the University online library, Google Scholar, supporting the engagement in group-peer discussions in university enabled platforms and the downloading and accessing of blogs are seen as perceived benefits by students.

These findings show that the outcome was not much different than undergraduate's outcomes. The only minor difference was that 68% of masters' students would use mobile devices for journal article research via electronic databases and would be very beneficial, compared with 64% of undergraduates, as can be seen in figure 5.5 above.

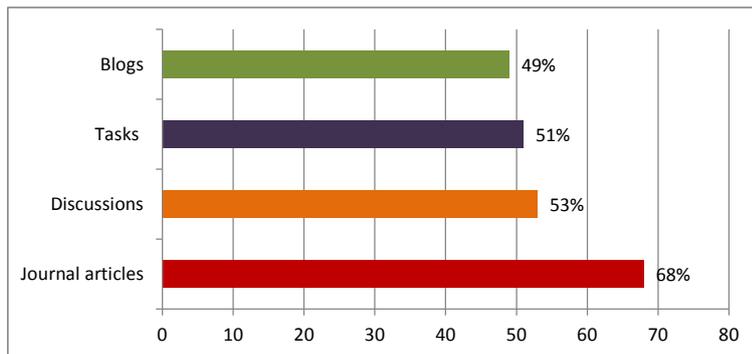


Figure: 5.6. The Masters Students view on benefits of the mobile devices use (Q-7) N= 68 (33 Male, 35 Female masters students)

Further data analysis to identify the views of Masters level students on the use of mobile technologies was conducted using Chi-square (SPSS) tests (Pls see Appendix 5-C) to explore categorical variables in relation to the Masters students questionnaire (Pls see Appendix 5-A). The outcomes demonstrated that there is no significant difference between the way men and women (Q-13) answered their views on usefulness of mobile apps as part of their learning (Q-5). There was also no significant difference in age groups (Q-12) in relation to usefulness of mobile apps as part of their learning.

5.2.1.6 The undergraduate and postgraduate students' views on the perceived benefits/ of mobile learning

The questionnaire findings from undergraduate (Figures 5.5 and 5.6) and Master's students do not significantly differ. Both groups see the future use of mobile devices and are positive in both their impact and perceived usefulness and uniformly see the potential benefits of using the technology in their learning.

The findings of the empirical data indicate that potential adoption by Faculty of Business students of mobile learning is determined by perceived usefulness. Perceived usefulness (PU) in the TAM model was originally defined as the extent to which a person believes that using a system would enhance his or her job performance and effectiveness (Davis, 1989). The next section examines the students view.

PART (A) (cont'd)
IMPACT OF MOBILE DEVICES ON LEARNING:
BENEFITS, ACCESS AND CONFIDENCE

5.2.2 Perceived Ease of Mobile Device Use

Data sets: Phase 1-Stage 2: Questionnaires Undergraduate

A closed format questionnaire was used to analyse the ease of mobile learning use on students at Faculty of Business of the University.

Perceived ease of use (PEOU) refers to the extent to which a person believes that using a system would be free of mental effort (Davis, 1989). This is another major determinant of attitude toward system use in the TAM model.

The survey outcome (Stage 2, Figure: 5.7) has indicated that student respondents clearly accepted that if the mobile learning platform was to be perceived to be easy to use, it would, in all likelihood, have a higher acceptance and usage among their fellow students. Only 30% of respondents were somewhat comfortable with their attitude towards such a level of ease of use, while another 34 % felt comfortable that such a perception of ease of use could lead directly to their own positive attitude toward a mobile learning platform. 78% of students were comfortable or somewhat comfortable that after training they would use the platform –indicating a high level of perceived usefulness.

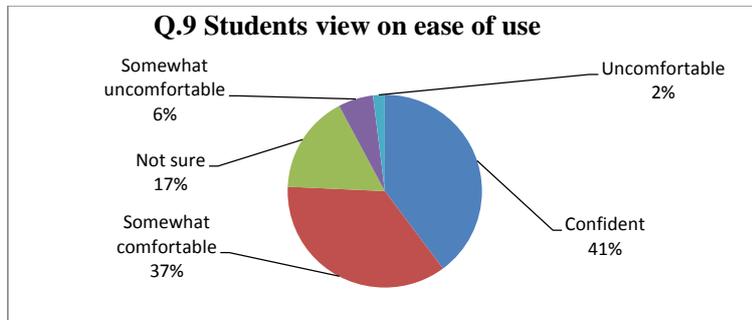


Figure: 5.7. Students view on ease of use

N=83 (25 Male, 58 Female undergraduates from years 1, 2 and 3)

Table 5.1: Students view on ease of Mobile device use

Ease of use (students)	Number of respondents	%
Confident	34	41
Somewhat comfortable	30	37
Not sure	14	17
Somewhat uncomfortable	5	6
Uncomfortable	2	2

PART (A) (cont'd)
IMPACT OF MOBILE DEVICES ON LEARNING: BENEFITS, ACCESS AND CONFIDENCE

5.2.3. ACCESSIBILITY / CONFIDENCE OF INSTALLATION OF MOBILE APPLICATIONS

Data sets: Phase 1- Stage 2: Master's Students' view in confidence of installation of mobile applications

75% of the respondents felt comfortable (i.e. confident) in installing mobile applications on their smart devices, Figure: 5.8. The prediction here was that if students felt comfortable in installing and manipulating mobile applications, they would have the skill set to use these to access learning materials, update information, and use interactive communication and remote access to lectures and tutorials.

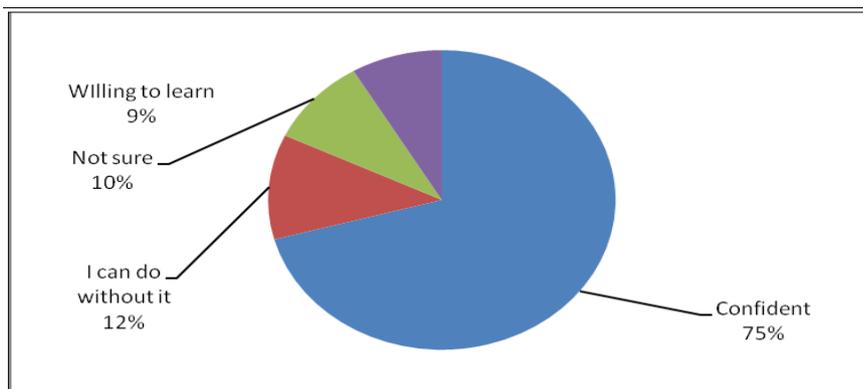


Figure: 5.8. Masters Students' confidence in installation of mobile applications (Q-4)
N=68 (33 Male, 35 Female masters students)

PART (B)
OPERATIONAL IMPACT OF MOBILE DEVICES ON LEARNING

5.2.4. MOBILE FUNCTIONS TO SUPPORT ACADEMIC STUDIES

Data sets: Phase 1, Stage 2: Focus Group Interviews with Years 1, 2 and 3 Undergraduates

A series of focus group interviews were carried out comprising groups representative of all three years of an undergraduate programme. Three self-selected focus groups were used to explore the perceptions of students in relation to their use of mobile devices in supporting personal learning situations. Table 5.2 below sets out the focus group interviews. During the interviews, the researcher acted in the role of moderator and led all the group sessions, while another member of staff recorded the interviews using a smart device. After these meetings the researcher transcribed the smart device recordings prior to carrying out a thematic analysis. A full written summary of the interviews are presented in Appendices 6 - 8A.

Table: 5.2. The details of the participants' of the focus group interviews.

Date	Research Method	Who were the participants	Research sample size	How was it conducted
15 th Nov.'12	Focus Group interview	Undergraduates 1 st Year students	6 mixed gender students	Face-to-face /50-60 min.
22 nd Nov.'12	Focus Group interview	Undergraduates 2 nd year students	6 mixed gender students	Face-to-face /50-60 min.
3 rd Oct. '12	Focus Group interview	Undergraduates 3 rd year students	6 mixed gender students	Face-to-face /50-60 min.

Table: 5.3. The 1st Year students view on Mobile functions to support academic studies

Theme	Responses (<i>Supporting Data</i>)	Open coding	Axial Coding	
Mobile functions to support academic studies	(P 1) A lot of things – specifically, download lecture notes	Download		
	(P 2) Making or capturing course lecture notes on a device, alarm reminder for hand-in dates/ group work sessions, using the mobile device to view lecture podcasts, using the mobile device for self-testing and revision. I also believe with a phone we can do a lot, we can use the phone to view lectures, Facebook, email, call and other, also for reminder of hand in dates. P3, P4, P5, P6	Alarm reminder Project management Podcast Exam revision		Podcast
	(P 3) Having an on-device course scheduler and tracking tool, alarm reminders for hand-in dates/group work sessions, using your mobile device to view lecture podcasts, using your mobile device for self-testing and revision. Even though a mobile device could be pretty useful recording lectures. I still take my own notes by hand and do the heavy study at home by reading books.	Alarm reminder Podcast Diary Recording lectures		Recording lectures
	(P 4) Capturing lecture notes, reminder for hand-in dates/ group work sessions, listening to lecture podcasts, exam revision. I think having these functions would benefit us, as students always have their mobile phone on them and sometimes forget other materials i.e. pen and paper, they would then be able to use their mobiles whilst at university to help them with learning etc.	Recording lectures Alarm reminder Podcast Project management		Alarm reminder
	(P 5) Alarm reminder for coursework hand-in dates, it would be useful for exam revision, coursework preparations, etc. It is useful to have a device that will remind you of upcoming deadlines, test knowledge.	Alarm reminder Exam revision		Project Management
	(P 6) Exam revision, alarm on coursework hand-in deadlines. Just like in project management, test quiz, simulation games again subject-related	Alarm reminder Project management Exam revision Simulation games		Revision

5.2.4.1 Outcomes of the Focus group interviews with the 1st Year students on use of Mobile functions to support academic studies

The summary of the interviews with the 1st year students (Refer to table 5.3) indicated that many students were keen on the use of mobile devices for enhancing their learning experience for example through downloading lecture notes and podcasts/ or as a notepad diary. Offering functionality that allowed a project manager to be viewed by students enabling them to track course completion and to inform students through notifications of upcoming deadlines for their coursework and/or group work is identified as a beneficial application.

The outcome of the survey (Table: 5.4) clearly identifies that students could see a future for mobile learning and believes mobile devices could be beneficial for their learning experience.

Table: 5.4 The 1st year student responses to mobile services provision

Mobile service	Respondents
Alarm reminder	5
Project management	3
Exam revision	3
Recording lectures	2
Diary	1
Simulation games	1
Podcasting	3
Journal article look-up	0
Language support	0
Library services	0

Table: 5.5. The 2nd Year students view on Mobile functions to support academic studies

Theme	Responses (<i>Supporting Data</i>)	Open coding	Axial Coding
Mobile functions to support academic studies	(P1) I would not use it personally, but it could be useful for others. Podcasting lectures etc.	Podcast	Podcast
	(P2) There is an app for overseas English language students.	Language Support	
	(P3) For finding an academic journals/article should be a bit easier (P8)	Library services	Library services
	(P4) Lectures - if there is a function to make short notes of lectures (P7)	Podcast	
	(P5) Project management style function would be useful. Start of the project and finishing the project.	Project Management	
	(P6) Exam revision should be good to have use of a mobile app. (P7)	Exam revision	Exam revision
	(P7) Podcasting would be good when I want to revise I could go back and revise it over again.	Podcast Exam revision	
	(P8) Library	Library services	

5.2.4.2. Outcome of the Focus group interviews with the 2nd Year students on Mobile functions to support academic studies

The focus group interview outcome (Table: 5.5) clearly indicates that many students were keen on the use of mobile devices to enhance their learning experience including the downloading of lecture notes and podcasts/ into a notepad diary. Mobile functionality could be offered as a project manager to keep them informed of forthcoming deadlines for their coursework and/or group work. Second year students also thought that there could be a future in mobile learning and believe mobile devices could be beneficial for their learning experience.

Table: 5.6. The 2nd year student responses to mobile services provision

Mobile service	Respondents
Alarm reminder	0
Project management	2
Exam revision	3
Recording lectures	1
Diary	0
Simulation Games	0
Podcasting	2
Journal article look-up	2
Library services	1
Language support	1

Table: 5.7. The 3rd Year students view on Mobile functions to support academic studies

Theme	Responses (<i>Supporting Data</i>)	Open coding	Axial Coding
Mobile functions to support academic studies	<i>(P 1)</i> I would use any helpful tool which makes my daily life easier to organise my academic work. Alarm reminder would be good to keep up with the upcoming coursework deadlines etc. P2, P3, P4, P5, P6	Alarm reminder Notifications	
	<i>(P 2)</i> Notifications from lecturers: timetabling changes, lecture room change notifications etc.	Notifications	
	<i>(P 3)</i> I could use timetable apps to use on my mobile device. Capturing videos could be helpful if the quality good.	Notifications	
	<i>(P 4)</i> If done well mobile apps could be very useful to aid revision and exam preparation. videos could also be very successful. Alarm reminder about coursework would be good to have as a functions one of the mobile apps. using mobile device to view lecture podcasts.	Podcasting Alarm reminder Revision	
	<i>(P 5)</i> A function with a reminder on the upcoming coursework deadlines and exam revisions.	Alarm reminder	
	<i>(P 6)</i> Exam revision, alarm on coursework hand-in deadlines. I can use the mobile device for self-testing with small straight forward questions.	Diary Alarm reminder Revision	

5.2.4.3. Outcome of the Focus group interviews with the 3rd Year students on Mobile functions to support academic studies

The participants were positive with regard to including mobile devices in their learning experiences (Table: 5.7). They could see the benefits of using, for example, to support their exam revision, using the apps for the purpose of project management in terms of reminding them about their forthcoming exam and coursework deadlines. They also thought that capturing the lecture notes could benefit them (Table: 5.8).

Table: 5.8. The 3rd year student responses to mobile services provision

Mobile service	Respondents
Alarm reminder	4
Project management	0
Exam revision	3
Recording lectures	1
Diary	2
Simulation games	0
Podcasting	1
Journal article look-up	0
Language support	0
Library services	0

5.2.4.4. Overall view of the focus group interviews on Mobile service preferences

(Students' preferences for mobile services in support of academic studies)

The survey outcome (Phase 1-Stage 2, Table: 5.9) indicated student preferences in regards to functionality of mobile applications that could be useful: an alarm reminder for students coursework submission, exam revision notes; availability of notes online, or a quiz in regards to revision sessions for an exam or cv preparedness. Project management access: this functionality came up as one of the top three in importance of functionality; it was hoped it would help students to manage a combination of both alarm reminders and exam revision notes. The fourth in importance was the recording of lectures through podcasting.

Table: 5.9. Summary for all students (1st, 2nd and 3rd year) - mobile service preferences rankings

Summary for mobile services – themes	1 st year	2 nd year	3 rd year	Overall ranking
Alarm reminders	5	0	4	9
Exam revision notes	3	3	3	9
Project management access	3	2	0	5
Recording lectures facility	2	1	1	4
Diary management	1	0	2	3
Podcasting	0	2	1	3
Journal article look-up	0	2	0	2
Library	0	1	0	1
Language support	0	1	0	1
Simulation games	1	0	0	1

PART (B) (cont'd)
OPERATIONAL IMPACT OF MOBILE DEVICES ON LEARNING

5.2.5. The Use of Mobile Devices Effects in Classroom Experience (Q-5)

Data Sets: Phase 1, Stage 2: Focus Group Interviews With Years 1, 2 And 3 Undergraduates.

Three focus group interviews were conducted with undergraduate students (Refer to Table: 5.10 below for a summary of focus group interviews). The interviews were moderated by the researcher while another member of staff recorded the interviews (*audio available on request*). The interviews were recorded using a smart device. After these meetings the author transcribed recordings prior to thematic analysis. A full written summary of the meetings is presented in Appendix x.

Table: 5.10. The participants' details of the focus group interviews

Date	Research Method	Who were the participants	Research sample size	How was it conducted
15 th Nov. '12	Focus Group interview	Undergraduates 1 st Year students	6 mixed gender students	Face-to-face /50-60 min.
22 nd Nov. '12	Focus Group interview	Undergraduates 2 nd year students	6 mixed gender students	Face-to-face /50-60 min.
3 rd Oct. '12	Focus Group interview	Undergraduates 3 rd year students	6 mixed gender students	Face-to-face /50-60 min.

Table: 5.11. The Focus Group interviews with the 1st year students' / use of Mobile devices effects on classroom experience (Q-5)

Theme	Responses (<i>Supporting Data</i>)	Open coding	Axial Coding
Effects on classroom experience	(P 1) Alarm reminder for coursework hand-in dates, and also it may be used for exam revision. Project management apps would be useful. (P2)	Functionality	Functionality
	(P 2) With the use of mobile technologies the classroom activities could be more dynamic. However, not sure how they could be used.	Functionality	
	(P 3) In certain areas i.e. updates on materials needed for lectures and tutorials due dates and online tasks. But, not everyone has smart phones, so some students might be disadvantaged. Perhaps the university could offer some subsidies, so all can have smart phones. (P4, P7)	Accessibility Training Subsidise	Accessibility
	(P 4) Maybe for simple tasks but if it is too complicated then people will not want to use it. The most popular apps are the clever ones that are incredibly simple to use.	Accessibility Training	
	(P 5) It can be used as social networking site and it can also be used for virtual learning but, perhaps for only certain situations such as quizzes and games rather than complex theories.	Quizzes to self-test	Training
	(P 6) Perhaps podcasts could be used.	Podcast	
	(P 7) Some students may feel inadequate using some of the technologies due to lack of understanding so the university needs to provide training.	Training	

5.2.5.1. Outcomes of the Focus group interviews with the 1st Year students on the use of Mobile devices Effects on classroom experience (Q-5)

Participants were generally positive to this question (Table:5.11 and 5.12). However, some had reservations about mobile connection costs and the variety of devices students used, as well as the fact that mobile use among students was not ubiquitous.

Table: 5.12. Outcomes of the Focus Group interviews with the 1st year students, Q-5

Mobile service	Respondents
Functionality	2
Accessibility	2
Training	3
Subsidise	1
Quizzes to self-test	1
Podcast	1

Table: 5.13 The Focus Group interviews with the 2nd year students' / use of Mobile devices effects on classroom experience (Q-5)

Themes	Responses (<i>Supporting Data</i>)	Open Coding	Axial Coding
Effects on classroom experience	(P 4) It would be mean to have to ask the tutor for the recording of the lecture notes. Body language can indicate to the tutor if the student is interested in the subject. If online, the tutor can not see student reaction.	Interaction	Interaction 
	(P 1) You would come to university because you pay for the tuition fees. If people want to study online they would sign up to online course. P2, P3 and P4	Enhance not replace	
	(P 2) Online courses should enhance the physical learning experience but not replacing the traditional teaching aspects of university courses	Enhance not replace	Enhance 
	(P 3) Traditional learning should not be replaced but be enhanced by mobile.	Enhance not replace	
	(P 4) It is important for interpersonal skills and personal communications to attend a physical campus.	Enhance not replace	
	(P 2) It's like shopping, the majority shops have an online presence but even so, people still use high street shops for shopping.	Interaction	

5.2.5.2. Outcome of the Focus Group Interviews With the 2nd Year Students / Use of Mobile Devices Effects on Classroom Experience (Q-5)

The discussion below (Table 5:14) indicates a broad appreciation of the traditional physical interaction between tutor and student but that mobile can possibly enhance the experience but certainly not replace it. It was noted that the personal interaction between a student, his tutor and fellow students was a big part of the university experience (Table: 5.13).

Table: 5.14. Findings of the Focus Group interviews with the 2nd year students, Q-5

Mobile service	Respondents
Interaction	2
Enhance not replace	4

Table: 5.15. Outcomes of the Focus Group interviews with the 3rd year students' / use of Mobile devices effects on classroom

Theme	Responses (<i>Supporting Data</i>)	Open coding	Axial Coding
Effects on classroom experience	(P 1) Some students would definitely would need training due to a lack of understanding so, I think the university would need to provide training.	Training	
	(P 2) Should not replace classroom interaction. especially one-to-one discussions with a tutor should not be replaced. however, additional materials such as a podcast should be provided to enhance the learning activities. P4, P5, P6	Enhance not replace Podcast	
	(P 3) The apps must be adaptable to our devices technical specifications. Data, speed and cost should be considered.	Compatibility	
	(P 4) As an additional learning resource notification service but in no way should it replace tutorials. Podcasts may be a suitable alternative to lectures. However, tutorials should very much stay as they are because we need the interaction with our peers and tutors.	Enhance not replace Alarm services	
	(P 5) During the tutorials perhaps we could use our mobile to take part in subject related quizzes and perhaps some interesting games could be included in the tutorials but not replace tutors.	Quiz and simulation games Enhance not replace	
	(P 6) Podcast should be good but not replaced the tutorials.	Podcast	

**5.2.5.3. Outcomes of the Focus Group Interviews with the 3rd Year Students /
Use of Mobile Devices Effects on Classroom Experience (Q-5)**

The following section (Table 5.16) presents the 3rd year students' views on the outcome of the focus group interviews on use of Mobile devices' effects on classroom experience (Q-5). The outcome clearly indicated that students' interactions during tutorials were important to keep communications open between the tutor and their fellow students. Hence, they preferred the traditional teaching methods (Table: 5.17).

Table: 5.16. The Outcomes of the Focus Group interview with the 3rd year students (Q-5)

Impacts on classroom experience	Respondents
Training	2
Enhance not replace tutorials	4
Podcasting	2
Device compatibility	1
Notifications services	1
Quizzes & simulation games	1

5.2.5.4. Overall outcomes of the focus group interviews with the undergraduate students: Students' preferences for mobile services in support of academic studies

Table: 5.17. Undergraduates view on use of Mobile devices effects on classroom experience (Q-5).

Summary for mobile services – themes	1st year	2nd year	3rd year	Overall ranking
Enhance not replace	0	4	4	8
Training	3	0	2	5
Podcast	1	0	2	3
Accessibility	2	0	0	2
Functionality	2	0	0	2
Quiz & self-test	1	0	1	2
Alarm reminders	1	0	0	1
Compatibility	0	0	1	1
Subsidise	1	0	0	1

The majority of the focus group participants stated that they were very strongly against any major changes to the traditional classroom experience (Refer to table 5.17). They thought that interactions during tutorials were important to keep communications open between the tutor and their fellow students. However, they also thought the tutorials could benefit from additional activities using mobile devices, such as quizzes, podcasts and simulation related games etc.

Chapter 6- Data analysis of Research Question Two

6.1 Introduction

This section presents the findings from empirical data analysis components of the study to address the above second research question. The research question analysis was derived through data sets captured from empirical data using both qualitative and quantitative methods.

The Research Model- the Research Question two is addressed in the following mind map sequence in the next page, Figure: 6.1.

Q-2- WHAT SHOULD THE ROLE OF EDUCATORS BE IN FACILITATING AND ENHANCING THE LEARNING EXPERIENCE OF STUDENTS?

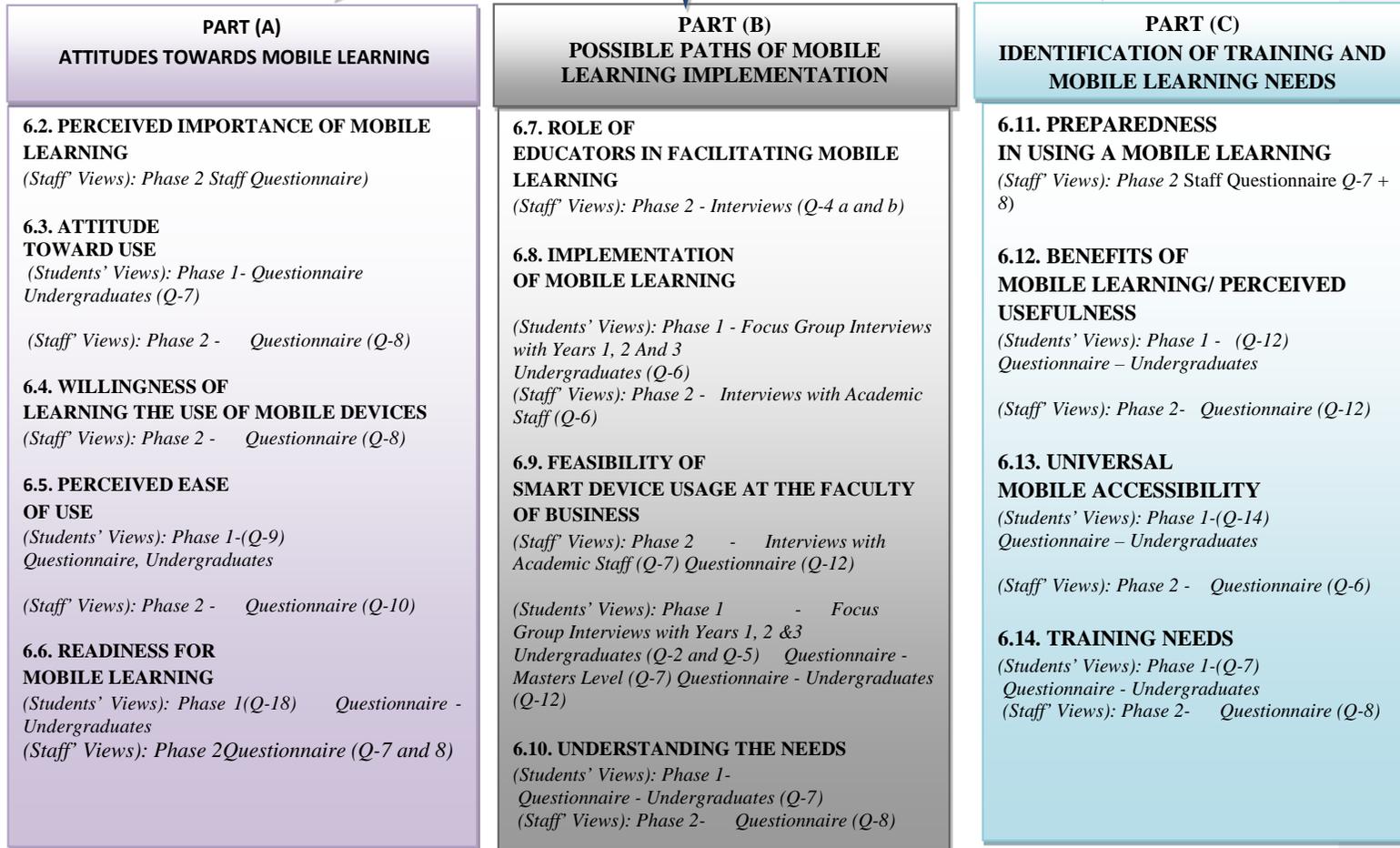


Figure: 6.1. The analysis of the research Q-2

PART (A)
ATTITUDES TOWARDS MOBILE LEARNING

6.2. Perceived Importance of Mobile learning

(The importance placed on mobile technology by Faculty of Business academics)

The following data sets from the staff questionnaire (*Refer to Figure: 6.2.*) illustrates the outcomes of the findings. The staff questionnaire component of the study allowed the author to compare whether staff and students perceptions and expectations were different from each other. 30 academic staff took part in the survey prior to interviews and workshops (Appendix 14 A). The details of the questionnaire is summarised in table 6.1.

Table: 6.1. Details of academic staff questionnaire

Date	Research Method	Participants	Sample size	How was it conducted
24 Jan.'13	Questionnaire (closed format)	Academic staff	n=30 respondents Male 20 67% Female 10 33%	Online, Google Docs.

Figure: 6.2 below shows that 77% of academic staff felt that the use of mobile apps was a positive thing for them as educators. This infers a high level of acceptance with a positive attitude towards mobile technologies in general, which supports the expectations of students shown in Figure 6.10.

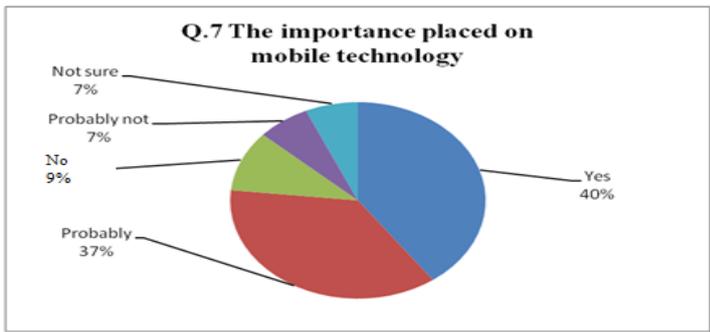


Figure: 6.2. The importance placed on mobile technology by Faculty of Business academics, N=30 respondents (Male 20, 67% and Female 10, 33%)

PART (A) (cont'd)

ATTITUDES TOWARDS MOBILE LEARNING

6.3 ATTITUDE TOWARDS USE

The following data sets explores the stakeholders attitude towards mobile learning on intentions to use mobile devices at the Faculty of Business at the University

Data sets: Phase 1, Stage 2 - Questionnaire - Undergraduates (Q-7) and
Phase 2 - Questionnaire - Academic staff (Q-8)

Attitude has long been identified as a cause of intention. Adapting this general principle, attitude toward use in the TAM model is defined as a mediating affective response between usefulness and ease of use beliefs and intentions to use a target system. Therefore, the investigation of attitude toward potential use of mobile functions and identification of its relationship with intention to use is valuable for predicting usage behaviour (Figure: 6.3).

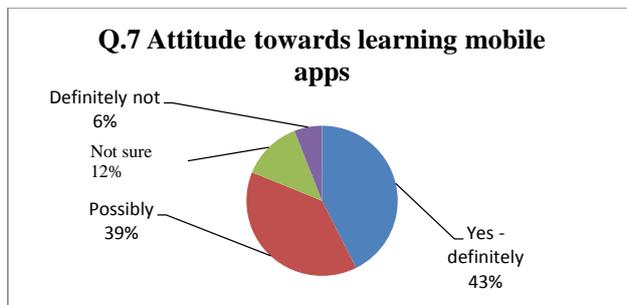


Figure: 6.3 Students view on Attitude toward use of mobile devices
N=83 (25 Male, 58 Female)

Table: 6.2. Students view on Attitude toward use of mobile devices

Attitude towards use	Number of respondents	%	Age					
			17-19	20-24	25-29	30-34	35-39	50-54
Yes – definitely	35	43	7	21	3	2	4	0
Possibly	32	39	5	25	3	1	0	1
Not sure	10	12	2	7	1	1	0	0
Definitely not	5	6	0	4	1	0	0	0

The above Table: 6.2 clearly indicates that the 20 to 24 year old age group, being the largest group of respondents, has the most positive attitude towards the use of mobile devices.

Further, Chi-square tests were conducted to explore categorical variables in relation to students' views on the use of mobile apps for academic activities using age and gender. The outcomes of the tests demonstrated that there was no significant difference between ages and the way men and women answered whether they would use mobile apps for academic activities (*Pls see Appendix 4- A, for the Q-6 on the students' questionnaire and Appendix 4- C for the Chi-square test outcomes*).

Staff attitudes towards use of mobile devices for delivering learning:

The table below (6.3.) indicates that there is a high level of potential adoption by staff to support the delivery of learning content through a mobile technology platform.

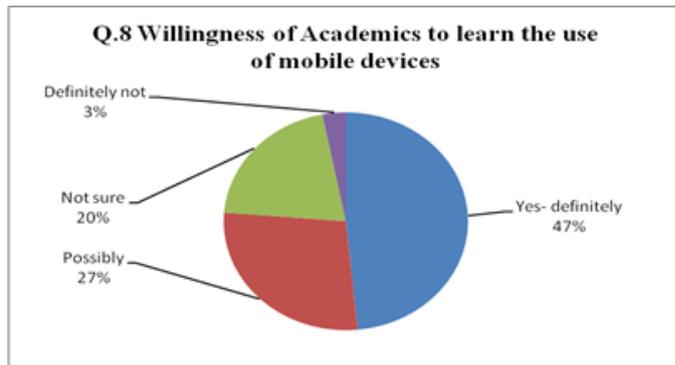


Figure: 6.3. Staff views on the willingness to use mobile devices for academic purposes N=30 respondents (Male 20, 67% and Female 10, 33%)

Table: 6.3. Staff views on the willingness to use mobile devices for academic purposes

Staff – mobile use willingness	Number of respondents	%
Yes- definitely	14	47
Possibly	8	27
Not sure	7	23
Definitely not	1	3

PART (A) (cont'd)

ATTITUDES TOWARDS MOBILE LEARNING

6.4. Willingness of Learners to use the Mobile Devices - the view of Academic Staff

The following survey outcomes (Table: 6.4) explore the academic staff's keenness to embrace the possibility of mobile technology implementation in terms of delivering learning content in Higher Education (Figure 6.5).

Table: 6.4. Details of academic staff questionnaire

Date	Research Method	Who were the participants	Research sample size	How was it conducted
24 Jan. '13	Questionnaire (closed format)	Academic staff	30 respondents Male 20 67% Female 10 33%	Online, Google Docs.

74% of responding academics inferred they would like to learn how to use mobile devices for delivering content for educational use and 47% indicated they were very positive about such a possibility. This further illustrates a willingness on the part of both students and academics to embrace mobile learning technology in higher education.

Overall, it can be summarised that a significant majority of academic staff were positively inclined to embrace the possibility of mobile device implementation in terms of delivering learning content in Higher Education.

These data sets allowed the identification of current attitudes of staff and student towards being prepared for mobile learning at the University, specifically, within the Faculty of Business. This data will also assist the author to provide a proposal for minimum system requirements and broad platform recommendations (*Refer to Chapter 8*) to the Faculty of Business higher management for delivery of a future mobile learning platform.

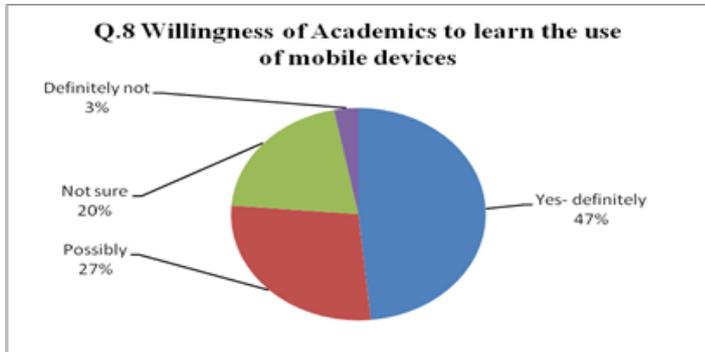


Figure: 6.5. Willingness of Academics to learn the use of mobile devices
N=30 respondents (Male 20, 67% and Female 10, 33%)

Table: 6.5. Willingness of Academics to learn the use of mobile devices by age group

Willingness	Number of respondents	%	Age of respondent			
			25-34	35-44	45-54	55-64
Yes – definitely	14	47	4	6	2	5
Possibly	8	27	2	2	1	3
Not sure	6	20	1	0	0	3
Definitely not	1	3	0	1	0	0

PART (A) (cont'd)

ATTITUDES TOWARDS MOBILE LEARNING

6.5 PERCEIVED EASE OF USE

The following data sets have been used to analyse the ease of mobile learning use's effects on the attitudes toward using mobile devices on staff and students at the Faculty of Business of the University

Data sets: Phase 1, Stage 2 - Questionnaire - Undergraduates (Q-9) and
Phase 2 - Questionnaire- Academic Staff (Q-10 and Q-7)

Perceived ease of use (PEOU) refers to the extent to which a person believes that using a system would be free of mental effort (Davis, 1989). This is another major determinant of attitude toward system use in the TAM model.

6.5.1 Students view on ease of use:

Student respondents clearly accepted that if the mobile learning platform was to be perceived as easy to use, it would in all likelihood, have a higher acceptance and usage among their fellow students. Currently only 30% of respondents were somewhat comfortable with their attitude towards such a level of ease of use, while another 34 % felt comfortable that having a perception of 'ease of use' could lead directly to their having a positive attitude toward a mobile learning platform.

Training was seen as important with 78% of students feeling comfortable or somewhat comfortable that after training they would use the platform –indicating a high level of perceived usefulness.

Table: 6.6. Students' view on ease of use

Ease of use (students)	Number of respondents	%
Confident	34	41
Somewhat comfortable	30	37
Not sure	14	17
Somewhat uncomfortable	5	6
Uncomfortable	2	2

6.5.2. Staff view on ease of use:

50% of the respondents agreed. However, academic staff had a general positive view (Refer to Figure 6.7. *This figure will be discussed further on the next section*) on the importance placed on mobile technology.

Table: 6.7. Academic staff comfort of use Q-10

Amount of confidence	Number of respondents	%
Not sure	11	37
Confident	10	33
Somewhat comfortable	5	17
Uncomfortable	2	7
Somewhat uncomfortable	2	7

The below Figure: 6.6 show that 77% of academic staff felt that the use of mobile apps was a positive thing for them as educators. This infers a high level of acceptance with a positive attitude towards mobile technologies in general.

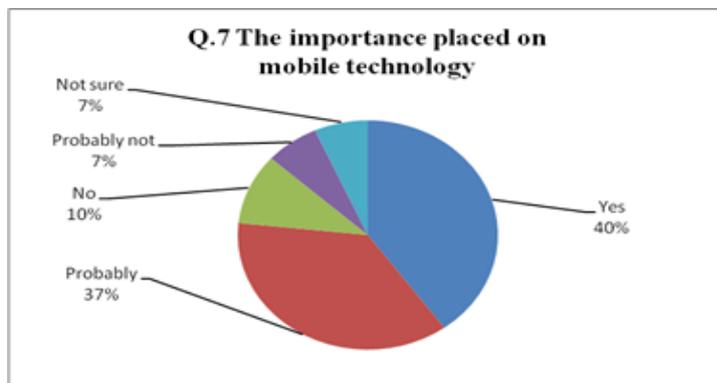


Figure: 6.6. The importance placed on mobile technology by Faculty of Business academic staff

PART (A) (*cont'd*)

ATTITUDES TOWARDS MOBILE LEARNING

6.6 Readiness for Mobile Learning

This section presents the findings from a series of data sets that identify the current and planned content for mobile education and, additionally, research into any nascent content delivery projects, either currently in place or being planned in UK HE institutions. Particularly, the target for this research is to inform concepts for an undergraduate mobile learning project within the Faculty of the Business at the University.

The following data sets have been used to explore these questions. The objective of the questionnaire was to identify both students and staff visions of a mobile learning platform and their willing to accept and expectations of such implementation and the future impacts of such technology on their education experience. Furthermore, the research question has been discussed in the literature review chapter of this thesis. The literature review gives a clear understanding of current mobile learning platforms within UK HE institutions.

The following data sets are samples from staff and students questionnaires. It indicates the staff and students expectation and willingness to embrace the use of mobile technologies in the near future.

Data Sets: Phase 1, Stage 2 - Questionnaire - Undergraduates (Q-18) and
Phase 2 - Questionnaire- Academic Staff (Q-7 and 8)

The questionnaire component of the study allowed the author to explore students' perceptions in relation to their expectations of potential new mobile technology implementation in the near future. In all, N=83 respondents took part in the survey. The details of the interviews are summarised in table 6.8.

Table: 6.8. Survey details, Phase 1- Stage 2; Student questionnaire

Date	Research Method	Who were the participants	Research sample size	How was it conducted
29 Jan.'13	Questionnaire (closed format)	Undergraduates	N= 83 respondents Male 25 30% Female 58 70%	Online, Google Docs.

6.6.1. Student Expectation of Use of Mobile Technologies in the Next Three Years

Figure: 6.6 below indicate that 86% of students have a positive expectation of mobile technology implementation, with 40 % expecting a greatly increased implementation for such technology.

Overall, the survey clearly shows that a considerable majority of students (86%) are prepared for the introduction of mobile learning and also have a willingness to use mobile devices in an educational environment. Positive outcomes were not surprising as the pilot study (see Appendix 3 A) results clearly indicated that there was some level of interest in the use of new technologies from both staff and student groups surveyed.

Table: 6.9. Student expectation of use of mobile technologies in the next three years

Expectation	Number of respondents	Percentage
Increase	37	45%
Greatly increase	33	40%
Stay the same	11	13%
Greatly decrease	2	2%
Decrease	0	0%

Q-18 has been further analysed with the use of SPSS to see if there was any significance of age/gender (Q-24 Age, Q-23 Gender.) in the results: The Chi-square tests (Pls see Appendix 4- C) analysis has shown that there is no significant difference between age and the gender with regard to the students expectations on the use of mobile technologies in the next three years (pls see Appendix 4- A).

6.6.2 The Academic Staff Needs on Implementation of Mobile Learning

Table 6.27 demonstrates the educator's needs in implementation of mobile learning and teaching. As indicated on the below (Table: 6.27.) Academic staff attitudes towards training are very positive and it is understood that well trained staff would have a positive potential impact on the students' Perceived Usefulness as content would be delivered in a managed and uniform way making navigation and content access easier. Additionally, well-planned training would also enhance staffs own Perceived Usefulness of the mobile learning platform. As well as training needs participants also mentioned observing good practice from others. ***“(P2) It would be better to observe examples of good practice from people in similar disciplines.”*** (See Table: 6.27)

Table: 6.10. Academic staff attitudes towards training

Theme	Responses (<i>Supporting Data</i>)	Open coding	Axial Coding
Implementation	(P1) Better guidelines on what is considered good practice and more focused training.	Training	
	(P2) It would be better to observe examples of good practice from people in similar disciplines.	Observing from others	
	(P3) Educator should be oriented and trained to maximise the use of those tools and technologies that are definitely beneficial with a clear view to what the benefits are with specific devices. Just training them because it is an 'in-thing' will be futile.	Training For specific devices	Training Needs
	(P4) We will need training and continuous updating to the new technologies. Some of us may be too old to adapt (not me of course)	Training	
	(P5) We will need some kind of training if we are going to make good use of available technologies, especially if there are more dedicated apps available.	Training	
	(P6) Effective training and reliable and user friendly software and hardware.	User Friendly software Training	

6.6.3. The Views of Educators in facilitating and enhancing the learning experience of students

This section presents the findings from a series of data sets to answer the last research question.

The interview component with academic staff (Refer to Table 6.28) for the study allowed the researcher to explore academic staff perceptions to help answer and analyse research questions. Altogether six interviews were conducted and the full transcript of these interviews can be seen in the Appendices 11 to 11F.

Table: 6.11. Summary of the academic staff interviews details

Dates	Research Method	Who are the participants	Research sample size	How was it conducted
4th, 7th June 2012 & 30th November 2012, 23May 2013	Interview survey	Academic staff	mixed gender	The questions emailed to selected academics

The participants were grouped by age and gender to help with post survey to analysis to get a fair understanding of views by gender. Identifying participants based on their age was important to see if there was any obvious difference in the views between different generations. Participants were also invited to a workshop for further discussions in a focus group environment. The online interview method was welcomed by the participants due to the busy work commitments and time constraints. The interview questions were emailed to selected staff meeting age-group profiles.

Table: 6.12. Academics view on the change in the higher education

Emergent	Supporting Data	Open coding	Axial
As an educator how keen are you to exploit the change in the higher education institutions?	(P1) <i>“I am keen but time management and continuous development of additional skills may be an issue. I agree with continuous improvement but there are also limits as to how fast we can move forward. A sensible academic leadership agenda will need to consider these issues.”</i>	Time management Continuous improvement Training	
	(P2) <i>“ I would be interested to test some applications provided it would be a transferable skill. Often, when there are many apps both commercial and institutional it is difficult to identify whether it is worth the time learning some of them and which ones. Standardisation and interoperability between the packages is probably at early stages?”</i>	Standardisation Interoperability Training Accessibility	
	(P3) <i>“Yes, as long as they provide practical value and are means to an end and not an end in itself.”</i>	Outcomes based Training	
	(P4) <i>No comments</i>		
	(P5) <i>“Yes, but I would need training – I don’t even have a smart phone myself”</i>	Training Accessibility	
	(P6) <i>“Not very keen, I see it as useful contribution but expect it become the default method which for the reasons given above I do not favour.”</i>	Resistance to change	

6.6.4. The outcomes of the interviews with the Academics

Staff felt that outcomes and overall benefits for mobile learning were possible but the project would need to have a well-designed training package implemented to ensure successful delivery of the platform for both faculty and students. There was a certain level of resistance to any implementation by staff of senior years - P6

Table: 6.13. The outcomes of the interviews

Theme	Respondents
Training	4
Accessibility	2
Time Management	1
Continuous improvement	1
Standardisation	1
Interoperability	1
Outcomes	1
Resistance to change	1

Table: 6.14. Academics' encouragement of students to use mobile devices

Question 4-b)	Supporting Data	Emergent codes	Emerging codes
Encouraging students to use	<p>(P1) <i>“During discussions on certain topics students seem to be consulting various websites to enhance their replies through use of their laptops or when too visible, their smart devices. The funny thing is that they feel guilty if I look at them doing their quick research. They are surprised to find out that I encourage it. Learning has many different definitions in different world cultures and even in the ‘global north’ students still assume that using online resources constitutes some kind of cheating.”</i></p>	<p>Engagement</p> <p>Trust</p> <p>Familiarity</p>	<p>Engagement</p> <p>Trust</p> <p>Familiarity</p>
	<p>(P2) <i>“Most likely in tutorials, as it would be difficult to check how students are using mobile devices during a lecture (most likely to use them for activities non-related to the course)”</i></p>	<p>Tutorial</p> <p>Trust</p>	
	<p>(P3) <i>“Yes, as long as they provide practical value and are a means to an end and not an end in itself.”</i></p>	<p>Outcomes</p>	
	<p>(P4) <i>No comments</i></p>		
	<p>(P5) <i>“Yes, as outlined above my students do use mobile technologies in lectures, tutorials and face to face support sessions”</i></p>	<p>Familiarity</p> <p>Engagement</p>	
	<p>(P6) <i>“Yes”</i></p>		

6.6.4 The outcomes of the interviews with the Academics

The academics could see the overall benefits for mobile learning but they would need to have a well-designed training package implemented to ensure successful delivery of the platform for both faculty and students. There was only a minor level of resistance to any implementation at all by staff of more senior years - P6. However, one aspect highlighted was that there was a need for a trust system between tutors and students to ensure relevant content is being researched by students.

Overall, there seems to be a view, amongst the faculty at least, that mobile learning will most likely become another channel for delivering coursework and learning for students in the near future (five years). However this view was broadly seen as conditional, in that training and accessibility issues have to be addressed and were seen as pre-requisites for the successful implementation of such a mobile learning platform.

Table: 6.15. The ranking of Academics' encouragement of students to use mobile devices

Theme	Respondents
Engagement	2
Trust	2
Familiarity	2
Tutorial	1
Outcomes	1

PART (B)
POSSIBLE PATHS OF MOBILE LEARNING IMPLEMENTATION

6.7. Role of Educators in Facilitating Mobile Learning

The following data sets have been used to analyse the ease of mobile learning use's effects on the attitudes toward using mobile devices on staff and students at Faculty of Business of the University.

The interview component with academic staff for the study allowed the author to explore staff perceptions to help answer and analyse research questions. Six interviews were conducted the full transcript of these interviews can be seen in the Appendices between 11 and 11F.

The participants were grouped by age and gender to be help with post survey to analysis to get a fair understanding of views by gender. Participants were also invited to a workshop for further discussions in a focus group environment. The online interview method was welcomed by the participants due to the busy work commitments and time constraints. The interview questions were emailed to selected staff meeting age-group profiles.

Table: 6.16. Academic staff interview details

Participant	Age	Date of Survey	Gender
(P1) Participant 1	35+	4 th June 2012	Male
(P2) Participant 2	35+	30th November 2012	Female
(P3) Participant 3	46+	30th November 2012	Female
(P4) Participant 4	46+	23 rd May 2013	Male
(P5) Participant 5	55+	7th June 2012	Female
(P6) Participant 6	65+	30th November 2012	Male

Table: 6.17. Academics view on the change in the higher education.

Emergent	Supporting Data	Open coding	Axial
Q-4-a) As an educator how keen are you to exploit the change in the higher education institutions?	(P1) <i>“I am keen but time management and continuous development of additional skills may be an issue. I agree with continuous improvement but there are also limits as to how fast we can move forward. A sensible academic leadership agenda will need to consider these issues.”</i>	Time management Continuous improvement Training	
	(P2) <i>“I would be interested to test some applications provided it would be a transferable skill. Often, when there are many apps both commercial and institutional it is difficult to identify whether it is worth the time learning some of them and which ones. Standardisation and interoperability between the packages is probably at early stages?”</i>	Standardisation Interoperability Training Accessibility	
	(P3) <i>“Yes, as long as they provide practical value and are means to an end and not an end in itself.”</i>	Outcomes based Training	
	(P4) -		
	(P5) <i>“Yes, but I would need training – I don’t even have a smart phone myself”</i>	Training Accessibility	
	(P6) <i>“Not very keen, I see it as useful contribution but expect it become the default method which for the reasons given above I do not favour.”</i>	Resistance to change	

6.7.1. How Keen Are the Academic Staff to Exploit the Change In The HE Institutions?

The Outcomes of the Interviews

Academic staff interviews once again outlined training and accessibility needs. The academics require well developed training sessions for both academics and for the students are necessary to ensure successful implementations and delivery of the mobile learning.

Table: 6.18. The ranking of the academic staff interview outcomes

Theme	Respondents
Training	4
Accessibility	2
Time Management	1
Continuous improvement	1
Standardisation	1
Interoperability	1
Outcomes	1
Resistance to change	1

Table: 6.19. Academics encouragement of students to use mobile devices for learning and teaching during your tutorial and lectures

Question 4-b)	Supporting Data	Emergent codes	Emerging codes
Encouraging students to use	<p>(P1) <i>“During discussions on certain topics students seem to be consulting various websites to enhance their replies through use of their laptops or when too visible, their smartphones. The funny thing is that they feel guilty if I look at them doing their quick research. They are surprised to find out that I encourage it. Learning has many different definitions in different world cultures and even in the ‘global north’ students still assume that using online resources constitutes some kind of cheating.”</i></p>	<p>Engagement</p> <p>Trust</p> <p>Familiarity</p>	<p>Engagement</p> <p>Trust</p> <p>Familiarity</p>
	<p>(P2) <i>“Most likely in tutorials, as it would be difficult to check how students are using mobile devices during a lecture (most likely to use them for activities non-related to the course)”</i></p>	<p>Tutorial</p> <p>Trust</p>	
	<p>(P3) <i>“Yes, as long as they provide practical value and are a means to an end and not an end in itself.”</i></p>	<p>Outcomes</p>	
	<p>(P4)</p>		
	<p>(P5) <i>“Yes, as outlined above my students do use mobile technologies in lectures, tutorials and face to face support sessions”</i></p>	<p>Familiarity</p> <p>Engagement</p>	
	<p>(P6) <i>“Yes”</i></p>		

6.7.2 How Encouraging Academics for Students to Use Mobile Devices?

Overall, there seems to be a view, amongst the faculty at least, that mobile learning will most likely become another channel for delivering coursework and learning for students in the near future. However this view was broadly seen as conditional and once again that training and accessibility issues needed to be addressed and were seen as pre-requisites for the successful implementation of such a mobile learning platform.

Table: 6.20. The ranking on encouraging students to use mobile devices

Theme	Respondents
Engagement	2
Trust	2
Familiarity	2
Tutorial	1
Outcomes	1

PART (B) (cont'd)

POSSIBLE PATHS OF MOBILE LEARNING IMPLEMENTATION

6.8. Implementation of Mobile Learning

This section presents the findings from a series of data sets in relation to be able to identify the possible paths of implementation of mobile technologies in order to optimise the potential impact on future learning experiences of undergraduate students.

The data sets as follows:

- Phase 1, Stage 2 - Focus Group Interviews with Years 1, 2 And 3 Undergraduates (Q-6)
- Phase 2 - Interviews with Academic Staff (Q-6)

6.8.1. The 1st Year Students' Suggestions on Implementation of Mobile Learning

There was a striking concern by first year students around the issue of personal accessibility to the mobile learning platform which is discussed at length under 'universal access in the recommendations section. The main concern for 1st year students was their ability to gain use of the platform via their device and also have equitable access to it, irrespective of their current mobile device used and/or their economic situation. It was clear that students wished the university to be pro-active in ensuring that the platform could be accessed by students from most devices, and if this was not possible through their own device lack or functionality, that the University would provide a suitable device/tablet to them on long-term loan for the duration of their course. It was also made plain that students expected the access cost to mobile learning content to be equitable and affordable by all students.

Training was highlighted as being of importance to ensure students could benefit fully from the use of the platform, or they would be put at a disadvantage to other students. This issue was directly linked to accreditation incentives for passing a course on the use of the mobile learning system. Students thought this should be accredited as part of their overall coursework. The computer game activities were mentioned as a functionality that could prove to engage students in course material not tutorial activities by one student.

Table: 6.21. Implementation suggestions from 1st year students

Theme	Responses (<i>Supporting Data</i>)	Open coding	Axial Coding
Suggestions of implementations	(P1) Training would be needed for all stakeholders, lecturers, students and for the support staff.	Training	
	(P2) Requirements in to keep it simple and free or subsidised mobile technologies from the university should make the implementation straight forward.	Accessibility	
	(P3) I agree with the others, university should provide subsidised tools for the students.	Accessibility	
	(P4) They need to give the students credits on their employability passport or for other activities that students would take. These incentives should encourage students to use the mobile technologies.	Incentive	
	(P5) Subject related game activities should be covered on mobile technologies therefore students would have to use the systems.	Game activities	
	(P6) I agree with others.	Accessibility	
	(P7) If the university subsidies it then students would find the technology more accessible.	Accessibility	

Table: 6.22. The ranking- Implementation suggestions from 1st year students

Theme	Respondents
Accessibility	4
Training	1
Accreditation Incentives	1
Game activities	1

Table: 6.23. Implementation suggestions from 2nd year students

Theme	Responses (<i>Supporting Data</i>)	Open coding	Axial Coding
Suggestions of implementations	(P1) They need to consider training to all parties	Training	Training
	(P2) Consideration of free devices from the university where students could loan from the library for the duration of their studies or for each term etc.	Accessibility	
	(P3) Yes- I agree with the others, university should provide subsidised tools for the students.	Accessibility	
	(P4) This focus group is good way to get credit on our passport. Management need to come with ideas where some activities could be delivered from mobile devices. This way these incentives would encourage students to use the mobile technologies.	Accreditation Incentives	Incentives
	(P5) Some activities such as game based should be carried out on our mobile devices	Game activities	Game activates
	(P6) I agree with others, training would be necessary for successful implementations.	Training	
	(P7) If the university subsidies the devices then students would find the technology more accessible.	Accessibility	

6.8.2. The 2nd Year Students' Suggestions on Implementation of Mobile Learning

Second year students had a broad range of comments that they thought could impact on their successful use of any introduced mobile learning platform. Again, accessibility was seen as the key driver for their engagement with the platform.

Training was also seen as important in terms of the implementation stage of the project. One student introduced the idea that the need for passing some kind of training programme should be seen as a prerequisite to the use of the system and that passing such a course should be accredited as part of their overall course marks.

Finally, game activities to test and challenge students was also seen by one student as a potential function of the mobile learning platform.

Table: 6.24. The ranking of the 2nd year students' suggestions on implementation

Theme	Respondents
Accessibility	3
Training	2
Accreditation Incentives	1
Game activities	1

Table: 6.25. The 3-year students' suggestion on implementations

Theme	Responses (<i>Supporting Data</i>)	Open coding	Axial Coding
Suggestions of implementations	(P1) <i>"We need easy access to our tutors and should be able to send email/text straight away. "</i>	Accessibility	Accessibility 
	(P2) <i>"Most likely in tutorials, as it would be difficult to check how students are using mobile devices during a lecture (most likely to use them for activities non-related to the course)"</i>	Trust	Trust 
	(P3) <i>"The university should provide subsidised tools for the students. financial support from the university is essential which i believe would encourage students to use more often"</i>	Accessibility	
	(P4) <i>"Definitely students should have subsidised mobile learning tools so, then we can all participate on that."</i>	Accessibility	
	(P5) <i>"Nothing else to add I agree that University needs to support students in gaining mobile devices. "</i>	Accessibility	
	(P6) <i>" yes to subsidised devices to students"</i>	Accessibility	

6.8.3. The 3rd Year Students' Suggestions on Implementation of Mobile Learning

The Faculty of Business third-year students strongly identified that accessibility was a key driver for their adoption of a mobile learning platform and to ensure they could get access to not just their personal learning, but also study aids and personal course progress metrics and reports.

There was also one comment around the issue of trust, which could actually be classed as a negative response. The context for the student comment was that if mobile content was also used in their tutorials, it could lead to students not paying enough attention to the lecturer.

Table: 6.26. 3rd year students' suggestions on implementation

Theme	Respondents
Accessibility	5
Training	0
Accreditation Incentives	0
Game activities	0
Trust	1

6.8.4. The Overall Ranking On Students Suggestions On Implementation Of Mobile Learning

The following Table: 6.45 illustrate the students' suggestions for implementations of mobile devices. This is clear evidence that students considered that accessibility (universal access) was the primary concern for the successful implementation of a mobile learning platform. Training was also a concern and could have been linked with accessibility as part of a system usability concern. Games activities were also mentioned as an appropriate way of delivering interactive/engagement with learning content.

Table: 6.27. The overall ranking on students suggestions on implementation of mobile learning

Themes	1st year	2nd year	3rd year	Overall ranking
Accessibility	4	3	5	12
Training	1	2	0	3
Accreditation Incentives	1	1	0	2
Game activities	1	1	0	2
Trust	0	0	1	1

PART (B) (cont'd)
IMPLEMENTATION

6.9 Feasibility of Smart Device Usage at the Faculty of Business

The identification of mobile learning situations where smart devices could be the preferred choice to deliver educational content to undergraduates.

The data sets as follows:

- Phase 1 – Stage 2
 - Questionnaire - Masters students (Q-7)
 - Focus Group Interviews outcomes with years 1, 2 and 3rd year Undergraduates (Q-2)

- Phase 2 –
 - Interviews (Q-7) Academic staff
 - Questionnaire (Q-12) Academic staff

6.9.1 Instrument / Master’s Students Questionnaire

This section presents the findings from the questionnaire (Q-7 only) component of the study, which presents Masters level students’ perceptions of the use of mobile devices in supporting their allowing the examination of their educational needs. The purpose of this study was to compare the findings from the Masters group with that of the undergraduates. 68 participants took part in the study (summarised in Table: 6.46). The questionnaire was conducted during lectures with the permission of each lecturer, with data collected and administered via the use of Google docs, a free online software toolset. *(The outcome of the questionnaire and findings are available in Appendices 5 and 5A)*

Table: 6.28. Questionnaire responses from Masters students

Date	Research Method	Who are the participants	Research sample size	How was it conducted
27 Nov. '12	Questionnaire (closed format)	Masters level students	N=68 responses Male 33 49% Female 35 51%	Paper based survey circulated during the lecture and analysed with Google Docs tool after being manually administered.

6.9.2. The Masters Student Views on the Benefits of Mobile Devices In Learning

The outcomes in Figure: 6.10 below illustrate the views of Master’s students’ on potential benefits of mobile devices in learning. It indicated that the majority - 84% - of students agreed that a mobile device could be beneficial for notifications; 68% that using it for finding academic journal articles and checking the tutorial list would be helpful; 53% that the use of a mobile device for discussions with other students would be beneficial; 49% were already using their device to access and communicate through a number of blogging platforms; 68% used their device to read journalistic articles - research papers, access data based newspaper articles - and also to view their tutorial reading list; 51%, additionally, used their device as a project management tool. The use of the mobile device as a project management tool was emphasised by undergraduates during focus group interviews (see Table: 6.29).

Overall, a significant majority – 84% - of Masters’ students expressed the view that mobile learning was very useful for specific notifications. They also valued the possibility to have the capability to conduct both journal and tutorial lists/reading lists look-ups. In general, there was an across-the-board positive response to the above question from Masters Students’ and it was apparent that as a group they were particularly enthusiastic about this aspect of using a mobile learning.

The masters’ students’ results wasn’t much different from the undergraduates view on use of mobile services. The Undergraduate students were also keen to use mobile devices on alarm reminders, exam revision notes and project management functionalities.

Table: 6.29. Summary of all students view on mobile service preferences

Summary for mobile services – themes	1 st year	2 nd year	3 rd year	Overall ranking
Alarm reminders	5	0	4	9
Exam revision notes	3	3	3	9
Project management access	3	2	0	5
Recording lectures facility	2	1	1	4
Diary management	1	0	2	3
Podcasting	0	2	1	3
Journal article look-up	0	2	0	2
Library	0	1	0	1
Language support	0	1	0	1
Simulation games	1	0	0	1

6.9.3. The Academic Staff Interviews

To explore the second research objective further; a series of six interviews with the academic staff were conducted to gain an in depth analysis of the research objective. The survey interviews conducted were analysed with the help the emerging coding summary table, which can be seen in table 6.50. The interview survey (Refer to Appendix 11) was emailed to the selected academic staff, and participants were later invited to a workshop which followed a focus group format.

To analyse the particular objective below, academic staff were asked “**How do you think that our students may benefit from mobile learning and teaching?**” This component of the study, allowed the author to explore the views of the selected academic staff, in relation to identifying the learning situations of students where mobile devices could benefit students in learning and teaching. The aim of the interview questions were to explore the research question and to explore academic staff’s opinion on the how they think students may benefit from mobile learning and teaching? The following answers were taken from participants actual statements. The questions were emailed to selected staff.

Table: 6.34 presents the interview findings. The left hand side of the tables indicates the question asked by the author. The following column (Supporting Data) offers examples of the responses given by interviewees, while the right hand side of the tables refers to the identified Emergent themes and Axial coding which is adopted from the grounded theory (Refer to the details of the interviews in the table 6.50 below).

Table: 6.30. Participants’ details for the interview survey on Academics

Date	Research Method	Who are the participants	Research sample size	How was it conducted
4th, 7th June 12, 30th Nov. '12 and 23May '13	Interview survey	Academic staff	Mixed gender 3 Male 3 Female	Emailed the questions to selected academics & Manually analysed

6.9.4. The Academic Staff Interview Discussions: Benefits Of Mobile Learning For Students

The interview analysis provided a wide variety of staff perspectives, relating to academics' views on the potential benefits of mobile learning for students, all specifically related to the thesis aims. The interviews also contributed to identifying and developing a further set of survey questions, such as questionnaire and focus group interview survey, as participants explained their perceptions relating to their general view of the use of mobile devices in education.

Participants raised concerns relating to the future attendance of students once such a remote learning platform was implemented and that it could potentially affect students' overall performance. Despite these concerns, participants on the whole had a positive view towards potential benefits for educational delivery via a mobile channel.

Table: 6.31. The academic staff interview survey details

Participant	Age	Date of Survey	Gender
(P1) Participant 1	35+	4 th June 2012	Male
(P2) Participant 2	35+	30th November 2012	Female
(P3) Participant 3	46+	30th November 2012	Female
(P4) Participant 4	46+	23 rd May 2013	Male
(P5) Participant 5	55+	7th June 2012	Female
(P6) Participant 6	65+	30th November 2012	Male

Table: 6.32. The analysis of Question 3-b – Academic staff interview outcomes

Theme	Responses (Supporting Data)	Open coding	Axial Coding
Benefits of mobile learning to students	(P1) “An inexhaustible source of online information – the caution here needs to be as to how they can learn to critically evaluate the various sources they encounter.”	Critical evaluation	
	(P2) “Most likely, students with non-university responsibilities will see increased benefits as they won’t have to be on campus as much.” (P6)	Reduction in attendance	
	(P3) “The benefits can be derived from the description above e.g., access to all learning material, up to date information, interactive communication, and remote access to lectures/tutorials even while these are being delivered.”(P4)	Accessibility	
	(P4) “I think it will allow interaction in classrooms as well as out and about and should be encouraged but where this technology will take us is any bodies guess.”	Accessibility	
	(P5) “When everyone has a suitable mobile device there will be no more need for printed paper, and each individual will be able to access tutorial notes in digital form. In theory the students will have remote access could utilise SOL opportunities more easily. They will not necessarily need to be in the classroom. However, this conflicts with the School’s idea that students need to be present to get good marks, and I don’t think the pressures on students to attend will get any less. If future financial issues on the university result in cutting back student contact time, this could be supplemented by more on-line support. “	Paperless education Sustainability Portable learning Long-term financial savings	
	(P6) “I think it is a useful asset in increasing study opportunities but removes or at least dilutes the personal contact dimension in teaching.”	Useful asset Attendance changes	

6.9.5. Outcomes of the Academic Staff Interviews

The following three themes (accessibility, attendance and cost saving) were identified in the interviews:

- 1. Accessibility:** Some of the respondents agreed that the level of access to the system would be dependent on everyone having a capable device and having network access. Partly, these are economic and infrastructural debates, largely beyond the scope of the research question. However, these responses raise concerns about the stakeholder equity for access to such a platform and that measures would likely need to be employed to ensure 'access for all' in other words, ensuring there is no economic barrier to access and participation of the mobile learning platform.
- 2. Attendance:** There were contrasting views on the benefits or otherwise on the impact on attendance by students from the introduction of lecture content being made available on the mobile learning platform. One interviewee suggested that the lack of interaction and feedback from both peers and tutors could lead to a student having a diminished educational experience e.g. social interaction, life learning experiences and for overseas students, enhancing their conversational English language skills.
- 3. Cost saving:** The interviewees perceived that there may be beneficial savings for the university and staff in terms of the likelihood that a mobile delivery channel would eventually lead to a paperless environment. One of the participants stated as "When everyone has a suitable mobile device there will be no more need for printed paper, and each individual will be able to access tutorial notes in digital form. In theory the students would have remote access and could utilise SOL opportunities more easily" Related with the cost saving it was also mentioned that mobile learning will be potentially cost effective as it may cut down the tutor preparation time to minimum when delivering content.

6.9.6 Perceived Usefulness - Instrument / Academic Staff Questionnaire

This section presents the findings from the Faculty of Business academics questionnaire; demonstrates the findings of the question-12. This study demonstrates the academic staff perception on potential use of mobile devices in an academic environment. To compare the findings with the masters students view, 30 participants took part in this study and the details of the questionnaire are summarised in Table: 6.51. The questionnaire was developed with the use of online Google docs' free software and emailed it to the Faculty of Business academics with the permission of the senior managers at the University. The data also analysed with the use of Google docs. *(The questionnaire & it is outcomes are available in appendices between 14 and 14 A)*

Table: 6.33. The details of the Academic staff questionnaire

Date	Research Method	Who were the participants	Research sample size	How was it conducted
24 Jan. '13	Questionnaire (closed format)	Academic staff	N=30 respondents Male 20, 67% Female 10, 33%	Online, use of Google Docs. By email

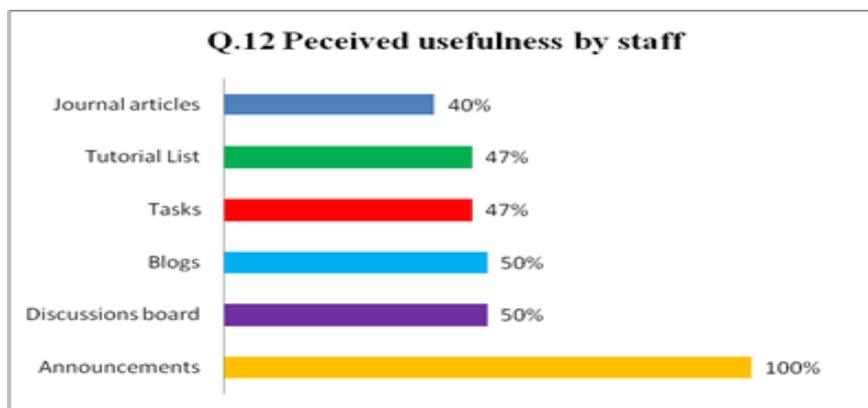


Figure: 6.7. Perceived usefulness of mobile learning by the academic staff
N=30 respondents (Male 20, 67% and Female 10, 33%)

Table: 6.34. Perceived usefulness by staff

Perceived usefulness	Number of respondents	%
Announcements (Assignment due? Class cancelled?)	30	100
Discussions board	15	50
Blogs (Read blog posts and interact with classmates by posting comments on their blogs or responding to comments on your own.)	15	50
Tasks (Tasks allow students to mark when they've started a project, when it's in progress, and when complete)	14	47
Tutorial List (Roster) (Wondering who's in your class?)	14	47
Journals articles (Read and reflect on your Journal posts)	12	40

6.9.7. Findings / Academic Staff Questionnaire on Perceived usefulness

From the analysis of responses, it is clear that majority of respondents were sceptical about maintaining the attendance requirement for students and also the impact on student contact time with staff. Benefits were seen as the ability to deliver an always up-to-date course content schedule and to allow students to keep apprised of their current work course material and also have immediate access to lecture material from a lecture.

Equally, both sides saw the potential in providing 'added value' to course material, in a cost effective and timely manner that could arrive with the introduction of mobile learning. Cost/data and device suitability plus the technical preparedness for both students and staff to use such a platform was considered a hurdle that could only be overcome if the university was prepared to put in place a device subsidy and a platform training program for faculty and students.

Chi-square tests (Pls see Appendix 14-C) were conducted to explore categorical variables in relation to academic items (Pls see Appendix 14 A for the Questionnaire - between Q-9 and Q-21 Gender, Q-20 Age). There was no significant difference between the way men and women responded with regard to interest in attending a workshop to explore how mobile apps can be used to support learning and teaching ($p > .05$).

There was also no significant difference in age groups in relation to whether they would be interested in attending a workshop to explore how mobile apps could be used to support learning and teaching ($p > .05$) (pls see Appendix 14 A for the questionnaire on Academics Appendix 14 C, for Chi-square tests outcomes).

Overall, both staff and students could see the benefits in delivering university course material to mobile devices. However, each was concerned that there could potentially lead to a reduction in contact time. This was seen by both parties as a negative outcome from the introduction of mobile learning.

PART (B) (cont'd)

POSSIBLE PATHS OF MOBILE LEARNING IMPLEMENTATION

6.10 Understanding the Implementation Needs

An analysis of user needs in regards to using mobile learning platform on staff and students at Faculty of Business at the University.

This section demonstrates the academic staff and students views on the following data sets.

The below figure indicates students view on importance of training needs.

The data sets are as follows:

Phase 1, Stage 2 - Questionnaire - Undergraduate students (Q-7)

Phase 2, - Questionnaire - Academic staff (Q-8)

6.10.1 Undergraduate Students view

The figure 6.15 below demonstrates that students believe that appropriate training sessions would make them feel comfortable in using mobile devices. 77% agreed positive toward a formal training session to be useful. The survey also indicates that 17% students were not sure, which can be seen as not having a clear idea regarding the use of mobiles.

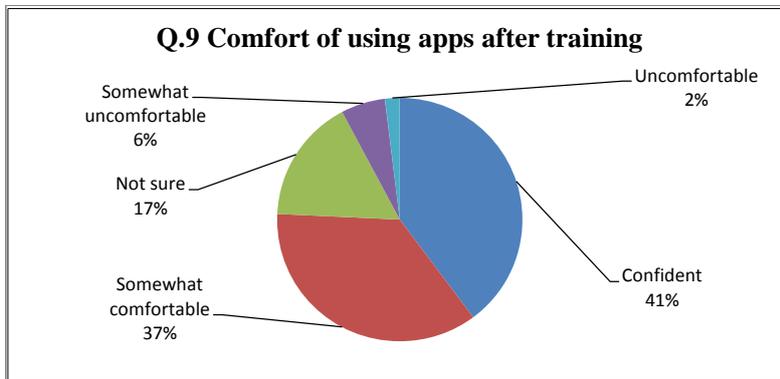


Figure: 6.8. Undergraduate students – Perceived ease of use after training
N=83 (25 Male, 58 Female undergraduates from years 1, 2 and 3)

Table 6.35. Undergraduate students – Perceived ease of use after training

The outcomes of the survey			Age of respondent				
Undergrad comfort of Use after training	Number of respondents	%	17-19	20 - 24	25 - 29	30-34	35-39
Confident	34	41	5	20	5	1	2
Somewhat comfortable	30	37	6	19	1	2	1
Not sure	14	7	5	4	0	0	0
Somewhat uncomfortable	5	6	0	4	2	0	0
Uncomfortable	2	2	0	2	0	0	0

The Table: 6.35 above indicate that the 20 to 24 year old age group has the highest degree of confidence in using mobile apps after a training session.

6.10.2. Academic Staff views’ on implementation of mobile devices in learning and teaching

The figure below (Figure: 6.16.) indicates that staff are keen to learn how to use mobile devices for academic purposes majority (82%) of participants were positive and show their willingness to learn mobile devices but an appropriate training need has been highlighted.

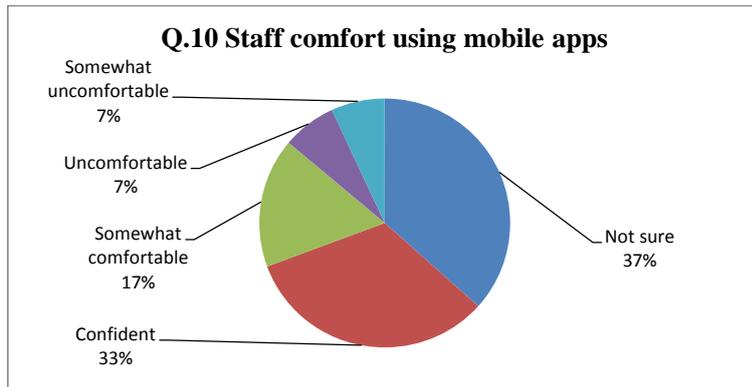


Figure: 6.9. Staff views (Q-10) on using mobile apps
N=30 respondents (Male 20, 67% and Female 10, 33%)

The following table: 6. 54 also clearly indicate that 50% of respondents are comfortable and confident using mobile apps. The table also demonstrates the Survey outcomes in numbers, the majority of respondents are between 23 and 44 age range.

Table: 6.36. Staff views on using mobile app (Q-10)

N=30 respondents (Male 20, 67% and Female 10, 33%)

The outcomes of the Survey			The age of the participants				
Comfort	Number of respondents	%	23 – 34	35 - 44	45 - 54	55 – 64	65 +
Not sure	11	37%	3	2	2	4	0
Confident	10	33%	2	6	1	1	0
Somewhat comfortable	5	17%	1	0	0	4	0
Uncomfortable	2	7%	1	1	0	0	0
Somewhat uncomfortable	2	7%	0	0	0	2	0

The following Table: 6.37 from the staff interview demonstrates the *educator's needs in implementation of mobile learning and teaching*. The participants were asked to identify their needs in terms of using and helping to plan for the potential implementation of mobile devices for learning.

As indicated on the below (Table: 6.37) academic staff attitudes towards training is very positive and it is understood that well trained staff would have a positive potential impact on the students' Perceived Usefulness as content would be delivered in a managed and uniform way making navigation and content access easier. Additionally, well-planned training would also enhance the staffs own Perceived Usefulness of the mobile learning platform, specifically in terms of delivering content to a new communications channel with students. As well as training needs participants also mentioned observing good practice from others. *“(P2) It would be better to observe examples of good practice from people in similar disciplines.”*

Table: 6.37. Academic Staff needs

Theme	Responses (<i>Supporting Data</i>)	Open coding	Axial Coding
Educators needs	(P1) A better guideline on what is considered good practice and more focused training. (P3), (P4), (P5), (P6)	Training	
	(P2) It would be better to observe examples of good practice from people in similar disciplines.	Observing from others	
	(P3) Educator should be oriented and trained to maximise the use of those tools and technologies that are definitely beneficial with a clear view to what the benefits are with specific devices. Just training them because it is an 'in-thing' will be futile.	Training For specific devices	Training Needs 
	(P4) We will need training and continuous updating to the new technologies. Some of us may be too old to adapt (not me of course)	Training	
	(P5) We will need some kind of training if we are going to make good use of available technologies, especially if there are more dedicated apps available.	Training	
	(P6) Effective training and reliable and user friendly software and hardware.	User Friendly software Training	

6.10.3. Overview of the outcomes:

The results prove that both perceived ease of use and perceived usefulness have a positive effect on potential mobile device implementation success as well as on perceived organizational performance.

It was evident from data samples that training and accessibility were the attitude forming questions towards successfully implementing a mobile education platform.

Based on empirical data from the students and the academic staff, perceived usefulness of such a platform was found to have a particular influence on students' intention to use the technology. An explanation for this might be that students are willing to adopt beneficial applications for their mobile devices and this may suggest that students may tend to focus on the usefulness of the technology itself. In regards to providing appropriate user training for directing and solidifying both students' and staff perception of the usefulness of the technology, the perceived usefulness and perceived ease of use were also found to have a significant effect on attitude towards using the technology.

PART (C)
IDENTIFICATION OF TRAINING AND MOBILE LEARNING NEEDS

6.11 Willingness in Using a Mobile Learning

This section presents the findings from a series of data sets from the academic staff survey-questionnaire. The findings are to explore the current and planned content for mobile education. Additionally, to research into any nascent content delivery projects, either currently in place or being planned in UK HE institutions. Particularly, the target for this research is to inform concepts for an undergraduates' mobile learning project within the Faculty of Business at the University.

The objective of the questionnaires was to identify both students and staff's vision of a mobile learning concept and to identify their willingness and expectations of such an implementation for the future impacts of such technology on their educational experience. The following data sets are samples from staff questionnaire; it indicates the staff and students expectation and willingness to embrace the use of mobile technologies in the near future.

The following Datasets are as follows:

Phase 2- Academic staff (N=30) – Questionnaire Q-7 and Q-8 (closed format)

To analyse the research question further, the following data sets from the staff questionnaire (*see figure 6.10 for the outcome of the question 7*) illustrates the outcomes of the findings. The staff questionnaire component of the study allowed the researcher to compare whether staff and students perceptions and expectations were different from each other.

Table 6.38. Details of staff questionnaire

Date	Research Method	Who were the participants	Research sample size	How was it conducted
24 Jan. '13	Questionnaire (closed format)	Academic staff	N=30 respondents Male 20 67% Female 10 33%	Online, Google Docs.

6.11.1. The importance placed on mobile technology by Faculty of Business academic staff.

The below Figure: 6.10 shows that 77% of academic staff felt that the use of mobile apps were a positive thing for them as educators.

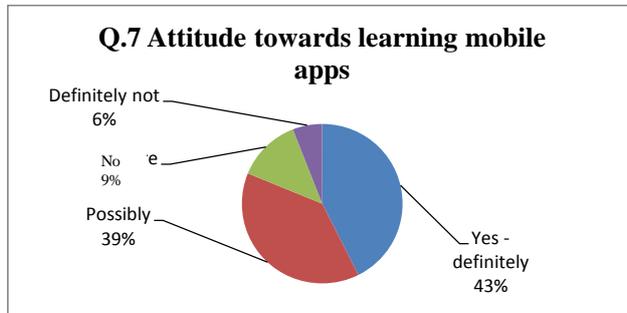


Figure: 6.10. The importance placed on mobile technology by the Faculty of Business academic staff

Table: 6.39. The importance placed on mobile technology by Faculty of Business academic staff

Importance	Number of respondents	Percentage
Yes	12	40%
Probably	11	37%
No	2	9%
Probably not	2	7%
Not sure	2	7%

PART (E) (cont'd)

IDENTIFICATION OF TRAINING AND MOBILE LEARNING NEEDS

6.12. BENEFITS OF MOBILE LEARNING/ PERCEIVED USEFULNESS

The following data sets have been used to analyse the perceived usefulness of mobile learning platform effects on staff and students at the Faculty of Business at the University. The datasets are as follows: Phase 1, Stage 1 - Questionnaire – Undergraduates (Q-12)

Phase 2 - Questionnaire- Academic staff, (Q-12)

The author explored empirical data findings for the potential use of mobile learning adoption within the Faculty of Business by staff and students and if their attitude toward using it is determined by perceived usefulness. Perceived usefulness (PU) in the TAM model was originally defined as the extent to which a person believes that using a system would enhance his or her job performance and effectiveness (Davis, 1989). The next section examines the students view.

6.12.1 Perceived Usefulness / Students' views:

The following figure (Figure 6.18) demonstrates the students' perception on mobile device use for accessing learning platforms in academia. The table 6.58 indicates that respondents perceived that a mobile learning platform had many potential useful functions and could be a considerable asset in their personal learning. Therefore, students responses demonstrated that there was a clear and significant level of perceived usefulness by students towards such a mobile learning platform with the functionalities described and that this would have a very positive impact on both individual and group student use, i.e. collaborative class messaging (see Figure: 6.18 below survey findings).

Overall, the empirical data indicates that a mobile learning had a significant level of perceived usefulness to undergraduate students.

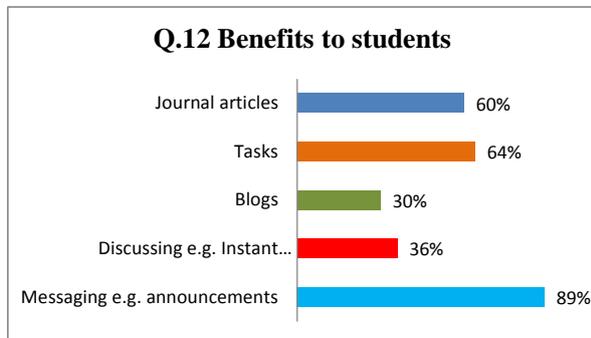


Figure: 6.11. Benefits to students – perceived usefulness
N=960 (561 Male, 399 Female undergraduates from years 1, 2 and 3)

Table: 6.40. Benefits to students – perceived usefulness

Perceived benefits to students	Number of respondents	%
Messaging e.g. announcements, due date of assignments and tutorial cancelation)	74	89
Tasks (Tasks allow you to mark when you've started a project, when it's in progress, and when complete)	53	64
Journal articles (Read and reflect on your journal posts)	50	60
Discussing e.g. Instant messaging boards for each class	30	36
Blogs (Read blog posts and interact with classmates by posting comments on their blogs or responding to comments on your own.)	25	30

N=960 (561 Male, 399 Female undergraduates from years 1, 2 and 3)

6.12.2. Perceived Usefulness- Staff views: The table 6.59 indicates that the respondents' perceived that mobile learning could be used with many applications to help students with their studies. Overall, the empirical data indicates the mobile learning had a strong level of *perceived usefulness* as seen by academic staff. Specifically, staff thought that such a mobile learning was an ideal class collaboration tool and also a good tutor-student communications channel. Additionally, other functions such as blogging, journal, reading/tutorial lists could be both refined and updated in real-time with much impact on staff resources or their time.

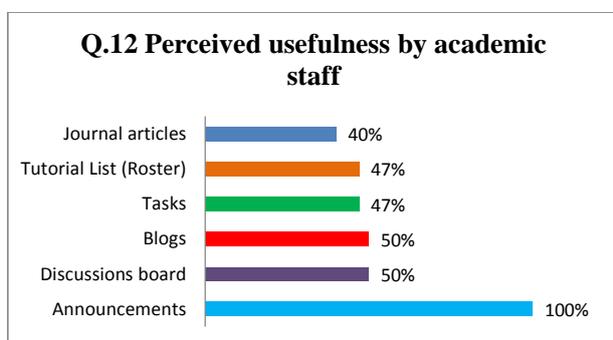


Figure: 6.12. Perceived usefulness by academic staff
N=30 respondents (Male 20, 67% and Female 10, 33%)

Table: 6.41. Perceived usefulness by academic staff

Perceived usefulness by staff	Number of respondents	%
Announcements (Assignment due? Class cancelled?)	30	100
Discussions board	15	50
Blogs (Read blog posts and interact with classmates by posting comments on their blogs or responding to comments on your own.)	15	50
Tasks (Tasks allow students to mark when they've started a project, when it's in progress, and when complete)	14	47
Tutorial List (Roster) (Wondering who's in your class?)	14	47
Journals articles (Read and reflect on your Journal posts)	12	40

N=30 respondents (Male 20, 67% and Female 10, 33%)

PART (C) (cont'd)
IDENTIFICATION OF TRAINING AND MOBILE LEARNING NEEDS

6.13. Universal Mobile Accessibility

The following data sets have been used to analyse the accessibility of mobile devices in mobile learning platform use of staff and students at Faculty of Business at the University

The data sets are as follows:

- Phase 1, Stage 2 - Questionnaire –Masters students (Q-4)
- Phase 2 - Questionnaire - Academic staff (Q-6)
- Follow up meeting –Academic staff (Q-3b, Appendix11C)

Universal Mobile Accessibility (UMA) is proposed as an extension to the TAM model. It refers to the fact that any eligible user can gain access to all their learning material via their own, or a university loaned mobile device, available via a university library device loan service. In such a scenario their attitude toward adoption will be positively enhanced. For example, outcomes of the empirical interview data with staff indicated that accessibility was an important issue to encourage a positive attitude toward use of a potential mobile learning platform.

6.13.1. Academic Staff View (Training - Follow Up Meeting)

Interview outcome indicated a majority of staff agreed on the point about accessibility issues such as individual human technical competence and ergonomic/physical factors.

The following statements were made by participants at the staff interviews on Accessibility issues:

- (P3) *“The benefits can be derived from e.g., access to all learning material, up to date information, interactive communication, and remote access to lectures/tutorials, even while these are being delivered.”(P4)*

From the student side there are a numbers of factors which influence, deny or enhance platform access. These include human factors such as technical competence, physical disabilities and personal device capabilities. On the platform side, the University will have technical and infrastructure constraints that will limit platform accessibility for students. This is discussed in more detail in the Recommendations section including the content delivery method by administrators and Accessibility Policy/Terms of Use restrictions will be further discussed in the literature review.

6.13.2 Masters' Students View:

75% of the respondents feel comfortable installing mobile function on their smartphones. The intention of asking this question was to identify how students feel regarding installing mobile functions on their devices. The prediction here was if they are comfortable, they could access the learning material, up to date information, interactive communication, and remote access to lectures and tutorials.

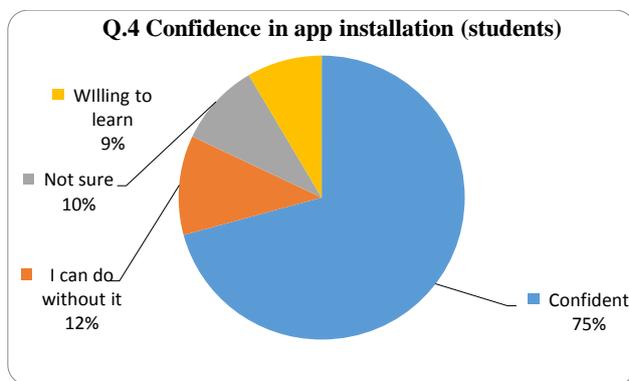


Figure: 6.13. Master's Students' confidence in apps installation

N= 68 (33 Male, 35 Female)

Table 6.42. Masters' students' confidence in apps installation

Amount of confidence	Number of respondents	%
Confident	51	75
I can do without it	8	12
Not sure	7	10
I would like to learn how to do it	6	9

N= 68 (33 Male, 35 Female)

6.13.3 Academic Staff Views: Questionnaire Outcomes

50% of the respondents feel confident and comfortable installing mobile function on their mobile devices. The intention of asking this question was to identify how staff feel about installing mobile functions (apps) on their devices. If they feel comfortable, then they could be more confident in updating learning materials and comfortable updating the teaching materials on their mobile devices. However, about 40% felt uncomfortable installing mobile functions on their devices and 7% were not sure.

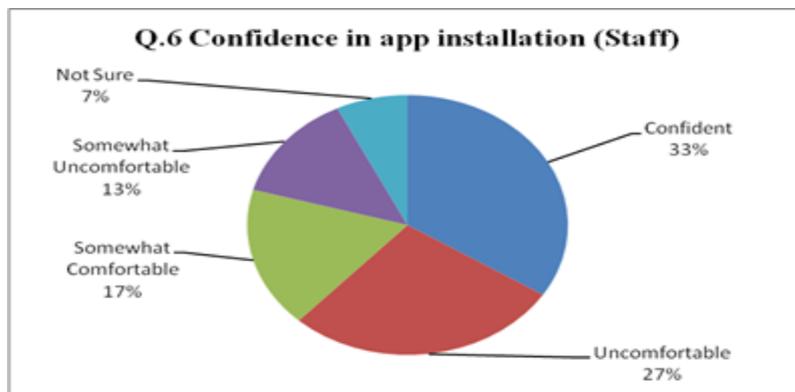


Figure: 6.14. Academic staff views on installing mobile functions to mobile devices
N=30 respondents (Male 20, 67% and Female 10, 33%)

Table: 6.43. The level of academic staff confidence with mobile applications

App installation confidence	Number of respondents	%
Confident	10	33
Uncomfortable	8	27
Somewhat Comfortable	5	17
Somewhat Uncomfortable	4	13
Not Sure	2	7

N=30 respondents (Male 20, 67% and Female 10, 33%)

PART (C) (cont'd)

IDENTIFICATION OF TRAINING AND MOBILE LEARNING NEEDS

6.14. Training Needs

An analysis of stakeholders needs in regards to using mobile learning platform by staff and students at Faculty of Business at the University.

This section demonstrates the staff and students views on the following data sets. The below figure indicates students view on importance of training needs.

The data sets are as follows:

- Phase 1 - Stage 2 - Questionnaire - Undergraduates (Q-9)
- Phase 2 - Questionnaire (Q-10) and Interviews with the Academic staff

6.14.1 Undergraduate Students view

The table below 6.44 and Figure 6.15 demonstrates that students believe that appropriate training sessions would make them feel comfortable in the use of mobile devices. 77% agreed positive toward a formal training session to be useful. The survey also indicates that 17% students were not sure, which can be seen as not having clear idea regards to use of mobile.

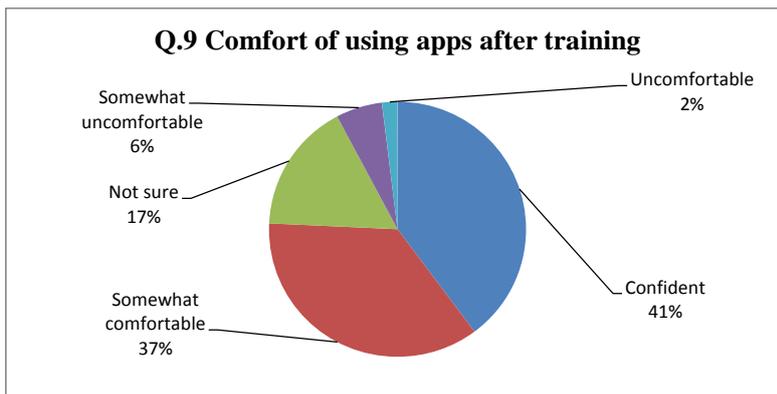


Figure: 6.15 Undergraduate students – ease of use after training
N=83 (25 Male, 58 Female undergraduates from years 1, 2 and 3)

Table: 6.44. Undergraduate students – ease of use after training

The analysis of the survey			Age of respondent				
Undergraduates comfort of Use after training	Number of respondents	%	17-19	20 - 24	25 - 29	30-34	35-39
Confident	34	41	5	20	5	1	2
Somewhat comfortable	30	37	6	19	1	2	1
Not sure	14	7	5	4	0	0	0
Somewhat uncomfortable	5	6	0	4	2	0	0
Uncomfortable	2	2	0	2	0	0	0

N=83 (25 Male, 58 Female undergraduates from years 1, 2 and 3)

The Table: 6.62 indicates that the 20 to 24 year old age group has the highest degree of confidence in using mobile apps after a training session.

6.14.2 Academic Staff Views:

The figure below (Figure 6.16) indicates that staff are keen to learn how to use mobile devices for academic purposes, the majority (82%) of participants were positive and show their willingness to learn to use mobile devices but an appropriate training need has been highlighted.

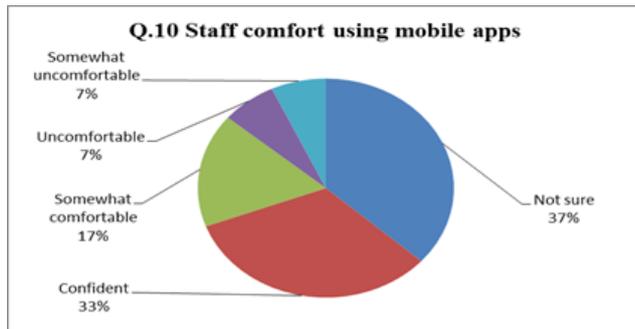


Figure: 6.16. Academic staff views (Q-10) experience of using mobile apps
N=30 respondents (Male 20, 67% and Female 10, 33%)

6.14.3. Staff Views on Implementation of Mobile Devices In Learning and Teaching

Table: 6.46 (below) from the staff interview demonstrate the educator’s needs in implementation of mobile learning and teaching. The participants were asked to identify their needs in terms of using and helping to plan potential implementation of a mobile learning platform.

As indicated below (Table: 6.45) Academic staff attitudes towards training are very positive and it is understood that well trained staff would have a positive potential impact on the students’ Perceived Usefulness as content would be delivered in a managed and uniform way making navigation and content access easier. Additionally, well-planned training would also enhance staff’s own Perceived Usefulness of the mobile learning platform. As well as training needs participants also mentioned observing good practice from others. *“(P2) it would be better to observe examples of good practice from people in similar disciplines.”*

Table: 6.45. Academic staff attitudes towards training

The Analysis of the Q-10			Age of participants				
Comfort	Number of respondents	%	23 – 34	35 - 44	45 - 54	55 - 64	65 +
Not sure	11	37	3	2	2	4	0
Confident	10	33	2	6	1	1	0
Somewhat Comfortable	5	17	1	0	0	4	0
Uncomfortable	2	7	1	1	0	0	0
Somewhat uncomfortable	2	7	0	0	0	2	0

Table: 6.46 Academic Staff needs

Theme	Responses (<i>Supporting Data</i>)	Open coding	Axial Coding
Educators needs	(P1) A better guideline on what is considered good practice and more focused training. (P3), (P4), (P5), (P6)	Training	
	(P2) It would be better to observe examples of good practice from people in similar disciplines.	Observing from others	
	(P3) Educator should be oriented and trained to maximise the use of those tools and technologies that are definitely beneficial with a clear view to what the benefits are with specific devices. Just training them because it is an 'in-thing' will be futile.	Training For specific devices	Training Needs 
	(P4) We will need training and continuous updating to the new technologies. Some of us may be too old to adapt (not me of course)	Training	
	(P5) We will need some kind of training if we are going to make good use of available technologies, especially if there are more dedicated apps available.	Training	
	(P6) Effective training and reliable and user friendly software and hardware.	User Friendly software Training	

Overview: Based on data collected from academic staff, in regards to their needs was related with for providing appropriate user training for directing and solidifying use of new technologies.

6.15. Summary of the Chapter

This section insights from the results of the second research question “What should be the roles of educators in facilitating on the enhancement in the learning experience of students?” and discusses them within the existing literature.

Overall, the data collection exercise from both staff and students provided an invaluable insight into views related to potential use of mobile learning in teaching and learning in the Faculty of Business by academic staff and students. The data sets for staff and students were, by and large, positive and both groups seem at least to accept that change in learning content delivery is likely in the near future. However, there were some conditions highlighted that needed to be addressed before implementation of such a platform.

The general views from undergraduate students, Masters and faculty respondents felt that the outcomes and overall benefits for mobile learning were positive but the project would need to have a well-designed training implementation to ensure successful delivery of the platform for both faculty and students.

Chapter 7: Discussion

7.1. Introduction: This chapter provides the insight following the results of the research questions and discusses them within the existing literature

- Q-1- How can new mobile technologies contribute to the enhancement in the learning experience of students?
and
- Q-2- What should be the roles of educators in facilitating on the enhancement in the learning experience of students?

Research question one (Q-1) comprised of two parts - Part A Impact of mobile devices on learning: benefits, access and confidence and Part B Operational impact of mobile devices on learning.

7.3.The imperical data outcomes

7.2.1.The key findings that emerged from Q-1- Part A were that:

- i- Both Master's and undergraduate students see a future use for mobile devices in Learning and are positive in both its impact and perceived usefulness, and they uniformly see the potential benefits of using the technology in their learning and other learning-related functionality. Both groups demonstrated that there was a clear and significant level of perceived usefulness towards such a mobile learning platform with the outline functionalities described, and that this would have a very positive impact on both individual and group student use, i.e. collaborative class messaging.
- ii- In terms of ease of use, the undergraduate survey clearly indicated that student respondents accepted that if the mobile learning platform was to be perceived to be easy to use, it would, in all likelihood, have a higher acceptance and usage uptake amongst fellow students.
- iii- In terms of students' confidence of installing mobile applications, 75% of the Master's respondents stated that they felt comfortable in installing mobile apps on their smart devices.

7.2.2. The key findings that emerged from Q-1 Part B were that:

- i- The focus group interviews of undergraduate students identified a range of perceived uses of mobile applications to supporting their academic studies, including: alarm reminders, exam revision notes, project management access, and recording lectures facility.
- ii- Further, the majority of the focus group participants pointed out that they were very strongly against any major changes to the traditional classroom. They thought that interactions during tutorials were important to keep communications open between tutor and their fellow students. However, they also thought the tutorials could benefit from additional activities using mobile devices, such as quizzes, podcasts and simulation related games etc.

Research question 2 (Q-2) comprised in 3 parts; Part (A) Attitudes towards mobile learning, Part (B) Possible paths of mobile learning implementation and Part (C) Identification of training and mobile learning needs.

7.2.3. The key findings that emerged from Q-2 Part A were that:

- i- The undergraduate students had a positive attitude (82%) towards the use of mobile devices. At the same time academic staff attitudes towards use of mobile devices for delivering learning was positive with 74%.
- ii- 74% of responding academics inferred they would like to learn how to use mobile devices for delivering content for educational use, and where 47% indicated they were very positive about such a possibility. This further illustrates a willingness on the part of both students and academics to embrace mobile learning technology in higher education.
- iii- Overall, 74% of academic staff were positively inclined to embrace the possibility of mobile device implementation in terms of delivering learning content in Higher Education.

- iv- 86% of students have a positive expectation of mobile technology implementation for the future using mobile learning, 40% of the undergraduates expecting a greatly increased implementation for such technology. Overall a considerable majority of students (86%) are prepared for the introduction of mobile learning and also have a willingness to use mobile devices in an educational environment.

- v- Academic staff believe, that mobile learning will most likely become another channel for delivering coursework and learning for students in the near future (< 5 year time). This view, however, was broadly seen as conditional, in that training and accessibility issues needed to be addressed and were seen as pre-requisites for the successful implementation of such a mobile learning platform.

7.2.4. The key findings that emerged from Q-2 Part B (Possible Paths of Mobile Learning Implementation) were that:

- i) Academic staff felt that outcomes and overall benefits for mobile learning were possible but the project would need to have a well-designed training package implemented to ensure successful delivery of the platform for both faculty and students. One aspect highlighted was that there was a need for a trusted system between tutors and students to ensure relevant content was accepted and used by the both parties.
- ii) The outcomes of the focus group interviews with the undergraduate students were; that the students primary concern for the successful implementation of a mobile learning was accessibility (universal access). Training was also a concern and could have been linked with Accessibility as part of a system usability concern. Games activities were also mentioned as an appropriate way of delivering interactive/engagement with learning content.
- iii) 84% of the master's students views on the potential benefits of mobile devices in learning was positive and 68% students agreed that a mobile device could be beneficial for notifications, 53% thought, using mobile devices for finding academic journal articles and checking the tutorial list would be helpful, 53% thought that the use of a mobile device for discussions with other students would be beneficial, 49% were already using their device to access and

communicate through a number of blogging platforms; 68% used their device to read journal articles - research papers, access data based newspaper articles - and also to view their tutorial reading list; 51% additionally used their device as a project management tool.

iv) **Outcomes of the Academic Staff Interviews:** The following three themes (accessibility, attendance and cost saving) were identified in the interviews:

- a) **Accessibility:** Some of the respondents agreed that the level of access to the system would be dependent on everyone having a capable device and having network access. Partly, these are economic and infrastructural debates, largely beyond the scope of the research question. However, these responses raise concerns about the stakeholder equity for access to such a platform and that measures would likely need to be employed to ensure 'access for all' in other words, ensuring there is no economic barrier to access to and participation in the mobile learning platform.
- b) **Attendance:** There were contrasting views on the benefits or otherwise on the impact on attendance by students from the introduction of lecture content being made available on the mobile learning platform. Although, one interviewee suggested that the lack of interaction and feedback from both peers and tutors could lead to a student having a diminished educational experience for example in relation to social interaction, life learning experiences and for overseas students, enhancing their conversational English language skills.
- c) **Cost saving:** The interviewees perceived that this may be beneficial saving for the university and staff in terms of the likelihood that a mobile delivery channel would eventually lead to a paperless environment. One of the participants stated that "When everyone has a suitable mobile device there will be no more need for printed paper, and each individual will be able to access tutorial notes in digital form". A point related to cost saving mentioned was that mobile learning will be potentially cost effective as it may cut down the tutor preparation time to minimum when delivering content.

- vi- The general views from undergraduate students, Masters and faculty respondent Staff were that outcomes and overall benefits for mobile learning were possible but implementation was dependant on a training package implemented to ensure successful delivery of the platform for both faculty and students.
- vii- Role of educators in facilitating mobile learning: academic staff felt that mobile learning will, most likely, become another channel for delivering coursework and learning for students in the near future. However, this view was broadly seen as conditional, in that training and accessibility issues needed to be addressed and were seen as pre-requisites for the successful implementation of such a mobile learning platform.

7.2.5. The key findings that emerged from Part C (Identification of training and mobile learning needs) were that:

- i- 77% of academic staff felt that the use of mobile apps was a positive thing for them as educators. This infers a high level of acceptance with a positive attitude towards mobile technologies in general, which supports the expectations.
- ii- 75% of the masters' students felt comfortable installing mobile functions on their smartphones. 50% of the academic staff also felt confident and comfortable installing mobile functions on their mobile devices. Although, 40% felt uncomfortable installing mobile functions on their devices and 7% were not sure.
- iii- Academic staff are keen to learn how to use mobile devices for academic purposes majority (82%) of participants were positive and showed their willingness to learn about mobile devices but an appropriate training need has been highlighted. Additionally, as an outcome of the staff interviews it was clear that well-planned training would also enhance staffs own Perceived Usefulness of the mobile learning platform. In terms of delivering content to a new communications channel with students.

- iv- Universal Mobile Accessibility (UMA) is being proposed as an extension to the TAM model. It refers to the fact that any eligible user can gain access to all their learning material via their own, or a university loaned mobile device, available via a university library device loan service. In such a scenario, their attitude toward adoption will be positively enhanced. For example, outcomes of the empirical interview data with staff indicated that Accessibility was an important issue to encourage a positive attitude toward use of a mobile learning platform. The interview outcome indicated a majority of staff agreed on the point about accessibility comprising; access to all learning material, up to date information, interactive communication, and remote access to lectures/tutorials. From the student side, there are a number of factors which influence, deny or enhance platform access. These include human factors such as technical competence, physical disabilities and personal device capabilities. On the platform side, the University will have technical and infrastructure constraints that will limit platform accessibility for students.

- v- Undergraduate Students believe that appropriate training sessions would make them feel comfortable (in terms of feeling confidence) to use mobile devices. 77% were positive toward a formal training session to be useful.
The survey also indicates that 17% students were not sure, which can be seen as not having a clear idea regards the use of mobile technology.

- vi- Academic staff are keen to learn how to use mobile devices for academic purposes, the majority (82%) of participants were positive and they were willing to learn about mobile devices for the academic purposes but an appropriate training need has been highlighted.

Overall, the data collection exercise from both staff and students provided an invaluable insight into views related to potential use of mobile learning in teaching and learning in the Faculty of Business by academic staff and students. The data sets for staff and students were, by and large, positive and both groups seem at least to accept that change in learning content delivery is likely in the near future. However, there were some conditions highlighted that needed to be addressed before implementation of such a platform.

The general views from undergraduate students, Masters and faculty respondents felt that the outcomes and overall benefits for mobile learning were positive but the project would need to have a well-designed training implementation to ensure successful delivery of the platform for both faculty and students.

As an outcome of the empirical data it was evident from data samples that training and accessibility were the attitude forming questions towards successfully implementing a mobile education platform. The data samples on both qualitative and quantitative data collected indicated that training and accessibility needs were strongly supported and emphasised by staff and students which were not part of the original TAM model.

7.3. Original contribution to knowledge

Two elements have emerged from the research carried out and comprise an original contribution of the study, namely: an enhancement of the Technology Model; a development of the existing PESTEL model.

7.3.1. Enhanced Technology Acceptance Model

This study identifies a number of areas currently not addressed by the original TAM.

As training and access issues came up frequently on numerous data sets conducted on both staff and students it was deemed necessary to modify the TAM.

This study examined the research questions with the datasets collected from students and academic staff's acceptance of potential mobile devices as a platform for learning and teaching. Technology Acceptance Model's principles followed during the empirical data. It was evident from data samples that training and accessibility were the attitude forming questions towards successfully implementing a mobile education platform. Thus, the original TAM enhanced and the proposed model, shown in Figure: 5.2. (Davis, 1989).

As the data samples used a mixture of quantitative and qualitative data, it was not possible to demonstrate some of the sub-questions statistically using the TAM model which is a qualitative data model used for the focus group interviews. The qualitative and quantitative data collected identified that training and accessibility needs were strongly supported and emphasised by staff and students which were not part of the original TAM model. The adopted group of factors for the adapted model included training, ease of use, attitudes and concerns related to perceived usefulness. Thus, training and accessibility factors proposed to be included in the TAM model.

Overall, the data collected from students and staff indicated that the perceived usefulness of such a platform was found to have a particular influence on students' intention to use the technology. An explanation for this might be that students are willing to adopt beneficial applications for their mobile devices, and this may suggest that students may tend to focus on the usefulness of the technology itself. In regards to providing appropriate user training for directing and solidifying both students' and staff perception of the usefulness of the technology, the perceived usefulness and perceived ease of use were also found to have a significant effect on attitude towards using the technology.

The outcomes of this research demonstrates that TAM can be re-formatted to capture and explain the students and staff acceptance of mobile devices in teaching and learning.

The overall results prove that both perceived ease of use and perceived usefulness have a positive effect on potential success of mobile device implementation.

As the data samples used a mixture of both quantitative and qualitative data, it was not possible to demonstrate some of the sub-questions statistically using the TAM model alone, which is a qualitative data model used for the focus group interviews.

Both qualitative and quantitative data samples collected, indicate that training and accessibility needs were strongly supported and emphases by staff and students which again did not form part of the original TAM model. The adopted group of factors for the adapted model included training, ease-of-use, attitudes and concerns related to perceived usefulness. Thus, training and accessibility factors were proposed revisions in the TAM model.

The data collected also suggested that training and accessibility were the attitude forming questions towards successful implementation of a mobile education platform. The proposed enhanced TAM model, shown in Figure: 7.1 was based on the original TAM model (Davis *et al.*, 1989).

This study examined TAM for the purpose of collecting students and staff views on the level of acceptance of a potential mobile devices platform for learning and teaching. After surveying 1000 students and academic staff members the empirical data outcomes were perceived as useful for such mobile learning platforms. It was found to have a particular influence on students' intention to use such technology, an explanation for this might be that students are willing to adopt beneficial applications for their mobile devices, and this may suggest that students may tend to focus on the usefulness of the technology itself. In regards to providing appropriate user training for directing and solidifying both students' and staff perception of the usefulness of the technology, the perceived usefulness and perceived ease of use were also found to have a significant effect on attitude towards using the technology by both groups.

The research outcomes demonstrate that TAM can be revised to capture both students and staff acceptance of mobile devices in teaching and learning. However, the limitations of the TAM Adoption of new technology could be related to many unknown factors, which might influence an individual's decision in acceptance of a technology. Bagozzi, (2007) argues that behaviour by adding up measures for perceived usefulness and perceived ease of use which might have different elements which might not covered in the model. A user's intention of using new technology could be subjected to evaluation and reflection which might direct the person to reformulate his or her intention and even to take a different course of action. Hence, TAM might not be suitable for explaining and predicting system use.

The uniqueness of the study and the development of this work's original contribution to new knowledge was enhanced by approaching data collection and analysis within a Technology Acceptance Model. This was also achieved by interpreting the gathered data, within the broader concept of professionalism, sub-divided and conceptualised into examining the adherence of participants.

Further, the research findings influenced and underpinned by the course ethos of the EdD Programme using course assignments as development over the five years of the programme that contributed to the final completed thesis.

Revised Theoretical Framework based on TAM

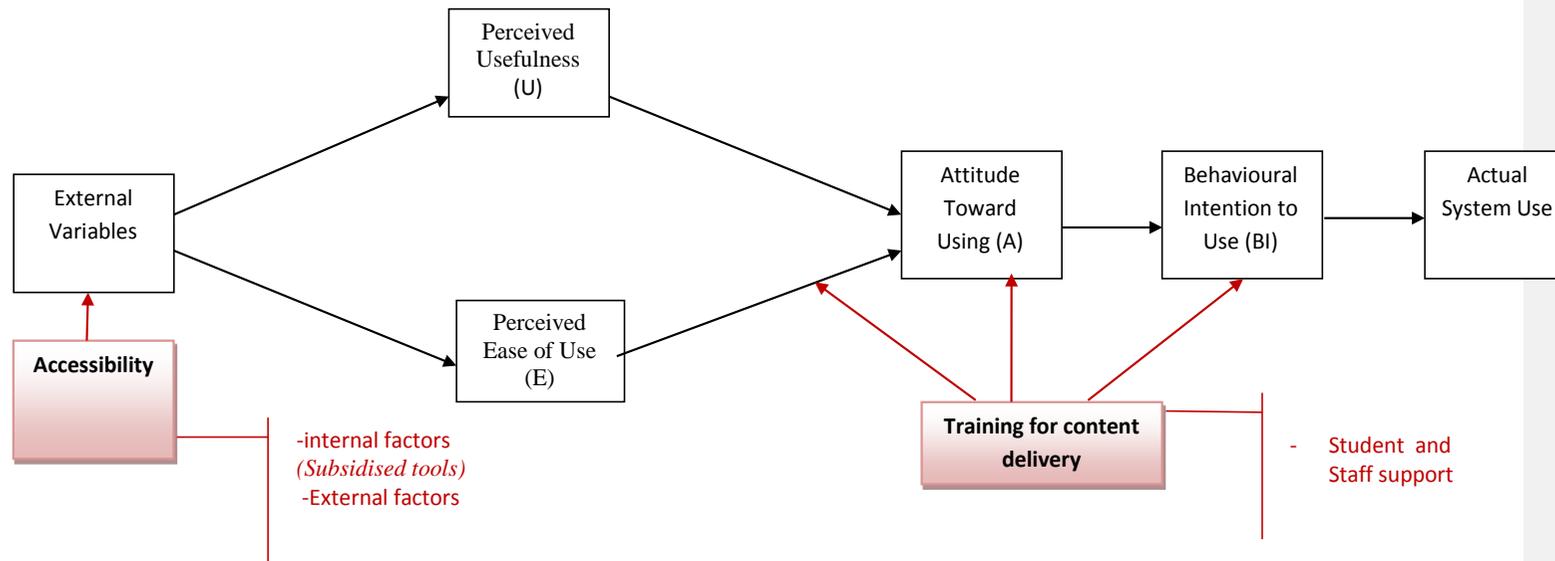


Figure 7.1: Revised Theoretical Framework based on TAM

This research attempts to integrate affect with external variables in order to improve the ability to predict user intentions for mobile technologies within the Faculty of Business at the University.

7.3.2. Summarising This Work`s Original Contribution To New Knowledge: Enhanced `PESTEL` Framework

This study identifies a number of areas currently not addressed by the original PESTEL framework. The uniqueness of the study and the development of this work`s original contribution to new knowledge was enhanced by approaching data collection and analysis within a PESTEL framework. In the following section the research explores the proposed `PESTEEL` framework as an outcome of the review. The review identified the aspects of `PESTEL` learning and teaching. Although as an outcome the author proposes the Education factors to the original framework of PESTEL.

The previous section discussed the government`s earlier introduction of a policy on new tuition fees on both home and overseas students. The government has also introduced new visa restrictions to overseas students studying in the UK. These new political changes have created intense competition between universities around student recruitment and their ability to sustain current student numbers. Institutions` greater marketing efforts are now being targeted at both overseas and home students with a greater emphasis being related to a students` perceived needs and reviewing the current delivery methods with more flexible learning and teaching channels, of which, m-learning is a core technology. The economics section explores the benefits of the new technology use in learning and teaching in the wider economy especially the potential higher impact in developing nations both as a cost-effective delivery channel but also as a social trend. The social factors examine the evaluation in the traditional learning and teaching with the digital education with the new use of advanced and unique mobile technologies. The audience that can access and understand the technology is far larger than traditional teaching delivery methods. Another benefit of use of mobile learning is the environmental benefits through going paperless by using mobile devices in learning and teaching. Furthermore, the final part of the framework emphasises some aspects of legal and IP issues in mobile device and content use in learning and teaching.

The outcome of the review identifies additional external factor, `Education` hence, this has been proposed as an adaptation to the original framework to PESTEL. The `Education` points have been proposed to support this additional factor:

7.3.2.1. Application of PESTEEL to practice:

- i) **Addressing the need for flexible education:** The factors around the current economic downturn have negatively impacted on UK universities' ability to attract students, mainly through the enforced increase in tuition fees which were introduced 2012. Hence, virtual learning is promising greater 'reach', wider and easier access, than traditionally. It offers potentially a kind of democratisation of education (Theo, 2007). Consequently, the emerging technologies have been accompanied by economic, political and social changes which are related and connected and if anything, more profound in their effects; this heightens both the effects and the expectations. Portable learning offers flexibility to students. Richardson *et al.*,(2009) highlights that many 'full time' students also have to work part-time, so the distinction between full and part-time students is now less distinct than before due to the economic crisis. Hence, use of Podcasting allows users to listen to an audio or watch a video. Podcasts can easily be delivered to most internet enabled mobile devices which allows the learner to choose when, where and how to listen to or watch. According to Campbell (2010) the material is delivered directly from the source Internet location to the device on demand, rather than requiring the learner to seek it out and download it. This way a learner would not waste time on having to search for, locate, and retrieve material etc. According to Juana and Palak, (2011). (2006) producing podcasts is both relatively easy and is effective for educators to use to create and deliver content with limited resources.
- ii) **Addressing new generation needs:** The new generation student body is looking for value, learning flexibility, accessibility and high levels of personal convenience that is beyond the capabilities of existing systems. New technologies shaped by the experience and expectation of the new generation of students serve their educational demands (Theo, 2007). Micro learning, as a new emerging field for the design of learning processes and courseware, provides answers to pressing questions posed by the post-modern information society and provides solutions to the paradoxes of the post-modern vocational training.

iii) *Interest in mobile learning:* In the current decade, with fast growing, advanced wireless communications, mobile learning has become important (Chu *et al.*, 2008). Theo, (2007) highlights mobile learning as on the increase due to its mobility, flexible and accessibility on the go. Although, students of a younger generation are expected to know how to use the latest technology and it could be argued, that the younger the generation, the greater the pressure from external influences is to use and be competent with new information systems (Wang *et al.*, 2009). However, it is acknowledged that educators/lectures acceptance of new technologies might not be straight forward due to the generation differences (Aldrich, 2005).

“PESTEEL” ANALYSIS ADAPTED FROM PESTEL FRAMEWORK

Table 7.1: Proposed “Pesteeel” Analysis Adapted From Pestel Framework

Political	Economic	Social	Technology	Environmental	Education	Legal
<p>New funding regimes: caused by the economic crisis has reduced HEFCE funding 2011 (Dearden et al., 2011). Universities need to be more flexible in delivery and academic activities to attract different market group of students. Hajhashemi, et al., (2014).</p>	<p>Governmental funding support: in innovation and adaptation of new technologies are crucial for any country’s development socially and economically (Alcatel-Lucent, 2011).</p>	<p>Changing societal values: The social change of being available at all times is due to the advanced high-speed internet protocols (Alcatel-Lucent, 2011).</p>	<p>Growth advance smart devices and it’s use: The current use of new advanced network technologies have enabled the flexible, portable teaching and learning in the higher education in the recent years (Hajhashemi, et al., (2014).</p>	<p>Going paperless: Technology offers opportunities to replace current paper processes with innovative methods (Dodds (2007)</p>	<p>Need for flexible education: UK universities’ ability to attract students, mainly through the enforced increase in tuition fees which will be introduced 2012 (Brown, 2011).</p>	<p>Security and Privacy: The growing concern regarding the security and privacy issues have slowed down the adoption of new technologies (GSMA Association Mobile and Privacy, 2011).</p>
<p>Tuition fees and overseas students: the Government is looking closely at changes to the student visa program for overseas students wishing to study in the UK. Also, introduction of new tuition fees have impacted many urban universities. Lunt (2008).</p>	<p>Opportunities for local economy: Mobile device use has a massive impact on many different areas of use e.g. creating effective opportunities for local economic development Gianluca and Misurace (2009).</p>	<p>Evolution in academic activities: Due to the advanced technological innovation teaching and learning will no longer being restricted to a classroom environment According to Wang et al., (2003)</p>	<p>Growth in technology The use of technologies such as instant messaging, video or photo sharing, social networking, podcasting and m-blogging are integrated into our mobile daily lifestyles Peters, (2007).</p>	<p>Advantages: Going paperless would reduce administrative costs and improve the following: Efficiencies, Make better use of office space, improve services to students such as flexibility (Salkin and Gross 2013).</p>	<p>Addressing new generation needs: The new generation student body is looking for value, learning flexibility, accessibility and high levels of personal convenience that is beyond the capabilities of existing systems (Hajhashemi, et al., (2014).</p>	<p>Sustainability of Trust in use of new technologies: Governments are trying to address data privacy and ensure the trust is sustainable in users’ perception of new technologies (Wishart, 2009).</p>
<p>Governmental policies and financial funding: The fast internet protocol is due to the investment of Government funding into ICT; the governments positive vision for the adoption of new technologies (Alcatel-Lucent, 2012).</p>	<p>Positive impact to economy: Mobile learning will have massive impact, for example, the market will reach from \$632.2 million in 2009 to \$1,464.8 million by 2014 in U.S. (GSMA embedded Mobile, 2011).</p>	<p>Use of mobile apps: The recent history of technologies that have dramatically changed the way of life and work. Mobile commerce had been expected to become a major force of e-commerce in the 21st century (Hu et al., 2008).</p>	<p>Cloud computing: These technologies focuses on running applications as services over the internet on a flexible infrastructure. They provide a low cost solution to academic institutions for academic activities (Al-Zoubi et al., 2010)</p>	<p>Carbon foot-print reduction: Producing one ton of copy paper releases 5,690 pounds of greenhouse gases into the atmosphere. That’s the equivalent of six months of automobile exhaust fumes (PowerDMS., 2014)</p>	<p>Interest in mobile learning: In the recent decade with the fast growing and advanced wireless communications and mobile learning have become very important (Chu et al., 2008).</p>	<p>Applying legal changes: To ensure the regulatory bodies are aware of the changes and be positive on innovation projects in applying legal changes (Alcatel-Lucent, 2011).</p>

Chapter 8: Conclusions and Recommendations

8.1 Conclusions:

This research summarises a case study which took place in a post 1992 university. The overall aims of this project was to investigate current and planned mobile-centric education content delivery project, some of which are either already in place or being planned in UK HE institutions, specifically for undergraduate programmes at the Faculty of Business of the University. Learning situations were explored through analysis with different levels of expectation and acceptance from both educators and students. Identification of the possible paths of implementation for mobile technologies in order to optimise the potential impact on future learning experiences of undergraduate students was also undertaken.

Two questions framed the research within this study:

RQ1: How can new mobile technologies contribute to enhancement of the learning experience of students?

RQ2: What should be the roles of educators in facilitating to enhancement of the learning experience of students?

The rationale for the research is the author's practical work experience as an academic with the responsibilities of teaching and designing courses for both undergraduate and postgraduate students. A large part of the responsibilities include the need for an understanding of using technology related to learning, including the design and delivery of programmes. This has both provided the experience and identified the opportunity for observation and is the basis of motivation for this research project. The originality of the thesis has been the experience of collecting the data for exploring student and academics insights of current and future use of mobile technology and their willingness to use in the academic environment at the University.

Overall, the empirical data results have provided an invaluable insight into potential user views related to likely use patterns for a mobile learning platform, both in teaching and learning by staff and students. The data sets for staff and students were, by and large, positive and both groups seem at least to accept that change in content delivery for learning is likely to arrive in the near future. The positive attitudes of academics and staff were also proved with numerous Chi-square (SPSS) tests to explore categorical variables in relations to students (including masters level students) and academics perception of using mobile technologies. The tests showed that these were not affected by their gender and their age.

The results demonstrated that there was no significant difference between the way men and women answered on various questions on the potential use of mobile technologies.

The impact of mobile devices through informal learning use in higher education has dramatically increased over the last decade. Institutions are becoming or are already aware of such trends and are starting to formally plan for their introduction, but often it is individual tutors who are leading through offering informally delivered learning content to allow connectivity via a student's mobile device. Separately there is an increasing expectation from students that universities will increase and enhance the use of mobile enabled teaching content to disseminate learning information as quickly as possible within institutions.

Moodle, while being the preferred platform for e-learning in most UK institutions, tends to remain focused on academic work and management with limited capacity for interaction with social networks, the preferred communication platforms for this current generation of students. Currently, students are wholly dependent on their lecturer having the requisite skills to deploy such functionality as social networks which can actively promote the construction of formal and informal online student learning communities to help extend learning beyond the confines of the campus.

University educators in general have a unique set of personal values, motivations, organisational politics and alliances that can significantly influence the impact, content decisions, delivery timeframes and early adoption of m-learning technology. Some of these factors have both negative and positive impacts on educators' learning, use and promotion of m-learning technology in their environments. Most importantly, mobile for learning requires educators to have been given time to plan and blend existing materials for delivery through new digital format. Teaching staff also need time for self-learning, or at least a group-based training program which is ideally a peer-led mentoring program.

The key themes that emerged from the review of literature related to digital learning; diffusion of technological innovations, the life cycle model and smart device industry life cycle, "TAM" (Technology Acceptance model). It was clearly demonstrated as the outcome of the empirical findings that a number of areas currently not addressed by the original TAM. As training and access issues came up frequently on numerous data sets conducted on both staff and students it was deemed necessary to modify the TAM.

Hence, this study proposes a modified TAM model as the outcome of these empirical findings. Besides this, the review of literature looks at of the Higher Education Institution impact from external factors through a PESTEL analysis, and the study explores some of the aspects of the contextual issues through utilising political, social, technological, legal and environmental perspectives. The study identifies a number of areas currently not addressed by the original PESTEL framework. The uniqueness of the study and the development of this work's contribution to new knowledge was enhanced by approaching data collection and analysis through a PESTEL framework. In the discussion chapter section, the research explores a proposed 'PESTEEL' framework as an outcome of the review. The review identified the aspects of 'PESTEL' learning and teaching. Although, as an outcome, the author proposes that education factors be added to the original framework of PESTEL.

8.2. Limitations of the Study and Future Research Avenues

8.2.1. Limitations of This Study

It is acknowledged that the present research has limitations which need to be highlighted. The use of data collected from students from within a single Faculty could possibly be viewed as a limitation in the survey. However, it is important to point out that the particular Faculty studied was the largest in terms of both staff and students, from both home and international.

The initial interviews with staff were conducted via email; perhaps certain inhibitions about using an online survey tool may have unintentionally introduced a bias by offering the potential for individuals to respond in a controlled manner instead of with instant answers. The study examined only one academic institution whereas a comparison with another, similar academic institution, may have offered additional insights. However, here again, this could offer further research for a follow-on study.

8.2.2. Future Research Avenues

The following key opportunities for further potential research has emerged from the research undertaken

- i. Future research should be carried out at other, similar-sized universities to see if the results observed in this study hold true in other, similar academic environments.
- ii. Additionally, future studies should compare strictly online courses with the same course offered using classroom based learning.
- iii. The current study offers strong initial evidence that students perceive benefits to having some in-class sessions, but we do not make a direct comparison between blended-learning and strictly online courses.
- iv. Future research should potentially look into the introduction of paperless course delivery as currently the university have a project called MfD (Multi-Functional Device) (Islam, 2013) that has replaced the majority of desktop printers and cut down paper usage substantially (defaulting to double-sided printing).
 - a. The potential study should explore the level of satisfaction of students with the concept of a paperless classroom

- b. Related to this study there should be monitoring of any implementation of a more sustainable paperless classroom to obtain environmental-related cost saving benefits to the Faculty of Business
 - v. Explore the possibilities to extend mobile learning to overseas students enrolled with University partner colleges.
 - In regards to use of qualitative methods, face-to-face interview techniques will be introduced instead of using emailed online surveys.
- Additionally, to increase the prospect for a wider group of faculty and student audience, the future study will reach out to other schools within the institution.

8.3 Recommendations

Recommendations arising from the research have been divided into three sections. One section is targeted at University management and the other focuses on general higher education institutions. There are three themes, first is the Financial impact arising from the introduction of a Mobile Learning Environment (MLE); the next relates to the Human centric design and pedagogical around content creation, managing and supporting development of the 'softer' skills needed by educators to deliver content to students using the final one, is the technological environment needed for a MLE.

8.3.1 Financial impacts of the introduction of MLE (Mobile Learning Environment):

- i) The implementation of a mobile learning platform also has some environmental side benefits, particularly the potential to reduce paper use for course materials;
- ii) Mobile learning offers key cost advantages in delivering content beyond the campus to overseas partner colleges;
- iii) Sustainability efforts can be achieved more readily through the introduction of a paperless platform;
- iv) Increased level of attractiveness to potential future students;
- v) Offers financial flexibility in terms of competing on tuition fees due to lower operating costs.

8.3.2 Human Centric Design and Pedagogical Focused Content Creation

- i) **Understanding The Need for a Change Culture:** The unique aspects of mobile learning need to be understood both by educators and management and this will require application and encouragement for instilling a change culture in higher education institutions. Senior teaching staff that resist change are not necessarily rejecting a need for change itself, but they are often the very people who are expected to lead new developments when they lack the necessary skills to deliver the required change. This is of real concern as a minority of senior staff in the survey were skeptical or wary of potential benefits of mobile learning.
Such groups may need to be offered additional orientation courses to persuade them of the benefits of mobile learning

- ii) **Pedagogical issues:** Course leaders should prioritise the implementation of pedagogical best practice for mobile learning, and their aim should be to ensure successful implementation of mobile learning: often ICT training is focused on the technical aspects and outcomes with little thought given to the pedagogical practices required and how to incorporate this into the curriculum. Mobile learning should be promoted through a Virtual Learning Environment (VLE) within the academic environment to enrich the curriculum by the use of existing technology or systems. Mobile-centric learning functionalities should be considered or pre-tested as part of the curriculum: e.g. mobile learning should be introduced by enabling learning through the use of gamification to enable active learning as identified within this research study by University students.

8.3.3. Technology Platform and Service Deliverables

- i- **Accessibility (Universal Access)** It was evident that the majority of students from the focus group interviews and questionnaire outcomes considered that accessibility was a primary concern for any successful implementation of a mobile learning platform.
- ii- **IT Infrastructure Design** to support the mobile learning environment needs to be clearly reviewed at an early stage to take account of the unique on-demand nature of a campus-wide mobile learning service for students. This may well have an impact on current and future levels of resources needed to deliver Universal Access.
- iii- **Universal Access:** Unimpeded Mobile Wireless Access. IT infrastructure and wide coverage using additional WiFi nodes throughout the campus would be required to ensure 'always present' network access to students and staff throughout the environs of the campus.
- iv- **Universal Access:** A Mobile Device Loan System was emphasised as desirable by students, where a subsidised mobile device would be made available from the library as part of the Mobile Learning Service.

8.3.4 Outsourcing:

The requisite wireless skillsets within in-house IT department may not be sufficient to deliver an 'always-on' mobile learning platform and infrastructure environment. One potential solution is to investigate the possibility of partnering with an experienced wireless services provider to ensure successful deployment and outcomes for the wireless infrastructure. External organisations which have already implemented outsourced wireless services could be contacted to discuss their experiences and to help in drawing up a short-list of possible service providers and SLA's (service level agreements).

- i- Test environment and approval to ensure all MLE approved connected devices work as expected to allow unrestricted mobile learning access. At the start of each academic year a list of approved devices should be made available through the University library for students. However, the actual testing and approval services are likely to be outsourced to a professional mobile services company for the initial phase of introducing mobile learning environment. One example of a firm offering such integrated services is DeviceAnywhere.
- ii- To ensure that mobile learning platform software development will identify all the needs of potential users, there will be a need for a follow-on study to gather additional requirements and also to conduct a risk analysis to determine the way in which risks change throughout the software development cycle. This process will need buy-in and approval from senior management at the University.

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Appendix 2: Research Methods Process Grid for the Faculty of Business Students

Research Methods Process Grid For the Business School Students						
Date	Research Method	Goals of this research	Who are the participants	Research sample size	How was it conducted	What was Accomplished
5 th May 2011	Preliminary Questionnaire (closed format)	The aim of this research was to understand current and future use of students mobile devices	Undergraduate students	Undergraduate students, over 900 students responded.	Online by the use of Google Docs online tool	The research provided preliminary data to assist my understanding of students' current use of mobile devices in learning.
	Questionnaire (closed format)	To understand undergraduate students views on mobile learning and its potential	Undergraduate Students		Online by the use of Google Docs online tool	The data gathered will assist in clarifying views of the student body in regards to the use and variety of mobile learning tools and its necessary implementation
15th Nov. '12 at 3pm, Venue: D234	Focus Group meetings with 1. Year students	Deeper understanding students views	Undergraduate students	6 mixed gender students	Face to face /50-60 min.	The data gathered will assist in clarifying views of the student body in regards to the use and variety of mobile learning tools and its necessary implementation
22 nd Nov. at 3pm in QA 084	Focus Group meetings with 2. Year students	Deeper understanding students views	Undergraduate students	6 mixed gender students	Face to face /50-60 min.	The data gathered will assist in clarifying views of the student body in regards to the use and variety of mobile learning tools and its necessary implementation
23 rd Oct.'12 at 1pm, Venue: QA238.	Focus Group meetings with 3rd Year students	Deeper understanding students views	Undergraduate students	6 mixed gender students	Face to face /50-60 min.	he data gathered will assist in clarifying views of the student body in regards to the use and variety of mobile learning tools and its necessary implementation
27 Nov.'12	Questionnaire (closed format)	To understand overseas students level of mobile device use and compare that with UK resident undergraduates	Post Graduate Students	The survey were conducted during their lecture	Hard copy survey circulated during the lecture	The goal was to establish if ethnic origin influenced the use and likelihood of students' willingness to use mobile learning tools in academic environments.

Appendix 3-A): Preliminary Investigation /Students Questionnaire

(Available online:

<https://docs.google.com/spreadsheet/viewform?fromEmail=true&formkey=dDJGV211Tk9QaGNWRzhETGwyYTBQV3c6MA>)

University of ████████: Student views on the use of mobile service delivery

While there is no obligation for you take the survey, it shouldn't take any longer than five minutes. All participants who complete it will be entered into a prize draw and the winner will receive a new smart phone device. The survey must be completed by the end of March and the winner of the prize draw will be announced in the first week of April. The survey is anonymous and your personal data will not be used for any other purpose. Your feedback will be used in our research. Please let me know if you have any questions or comments. Thank you for participating in the survey. Idil Ersoy email - ja15@ure.ac.uk

Q1. What make is your primary mobile device? * [Nokia]

Q3. Is your mobile device internet-enabled so that you can receive and send e-mail? * [Yes √]

Q4. How regularly do you use your mobile device to check your email? Note: If you answered 'No' to the previous question, please go straight to Question 5 [Very often - daily √]

Q5. What is the physical input method for your mobile device? * [Touch interface √]

Q6. Which network operator do you use for your primary mobile device? * [T-Mobile √]

Q2. What is the model? * Example: Apple iPhone 3GS, Nokia N8, HTC Desire HD, Sony Ericsson Xperia X10, etc.

Q7. What type of billing relationship do you have with your mobile operator for your primary device? * [Pay-As-You-Go √]

Q9. Which of these functions would you consider to be useful in supporting your academic studies? * Please tick as many as is appropriate

- Having an on-device course scheduler and tracking tool
- Making or capturing course lecture notes on your device
- Capturing videos of lectures on your device
- Alarm reminder for hand-in dates/group work sessions
- A reader for reviewing and editing course material
- Using your mobile device to view lecture podcasts
- Using your mobile device for self-testing and revision

Q8. If you use your current mobile device to support your learning, how frequently do you use it? * [Several times a day ✓]

Q10. How often do you use social networking sites e.g. 'Facebook' * [More than once per day ✓]

Q11. Please indicate if you use any of these social networks * Please tick as many as appropriate.

- Facebook
- Hi5
- Twitter
- MySpace
- Bebo
- Other
- None

Q12. If your mobile device was linked to the University email system, how often would you use it? *
[I would use it daily ✓]

Q13. If made available, which of these services would you use on your mobile device for Library or School mobile-centric services? *

- View library fines
- Pay library fines
- Make book renewals using ISBN code
- Make payment for binding, printing, etc.
- Get confirmation of coursework submission

Q14. If it was possible, what level of use would you consider using your mobile device to participate in a * E.g. WebCT or group discussion boards? [I would use my mobile device as my primary information channel, rather than a PC]

Q15. Which of these services would you subscribe to as part of a university-wide SMS notifications service *

- Lecture room change notifications
- Reminders of course work hand-in dates
- Notifications from lecturers
- Timetabling changes
- Upcoming seminar notification, registration and ticketing
- Notification of possible employment/ potential upcoming industry placements from GET

Q16. If a mobile payment service was made available across the university, which of the following services would you use it for? *

- To pay for meals in dining halls/restaurants,
- As a mobile payment service to buy printing credit, binding, or to pay off library fines
- To make purchases in student Union shops
- To make purchases from campus vending machines
- To purchase travel tickets for coach travel between university campuses
- To register and purchase tickets for Student Union events

Q17. If an integrated student mobile ID/loyalty/discount/rewards card service was made available to [REDACTED] students, how likely is it that you would use it? * [Very likely ✓]

Q18. If an integrated student mobile ID/loyalty/discount/rewards card service was made available for you to use, where would you most likely use it? * [Only on campus ✓]

Q19. What is your gender? * [Male ✓]

Q20. What is your age group? * [18-24 ✓]

Q21. What is your current year of study? * [UG1 ✓]

Q22. What School is your program of study associated with? * [School of Computing ✓]

Q23. How often do you use your mobile device to connect to the campus WiFi network? * [Daily ✓]

Q24. What do you think are the key limitations to mobile devices being used in Higher Education? *

- Overall device size
- keyboard size
- Screen size
- Data costs
- Wireless/network reception
- WiFi access

Thank you for participating in the survey. If you are interested in participating in a pilot for future mobile services at University [REDACTED], please enter your full name below? e.g. John Smith

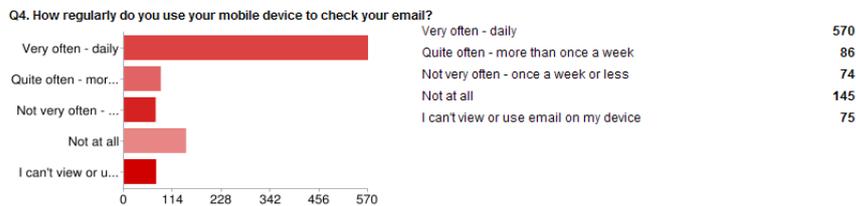
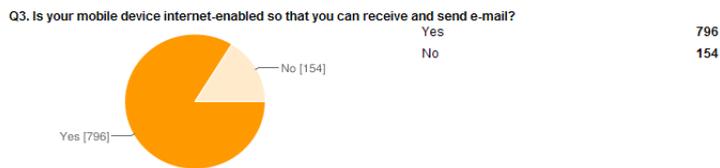
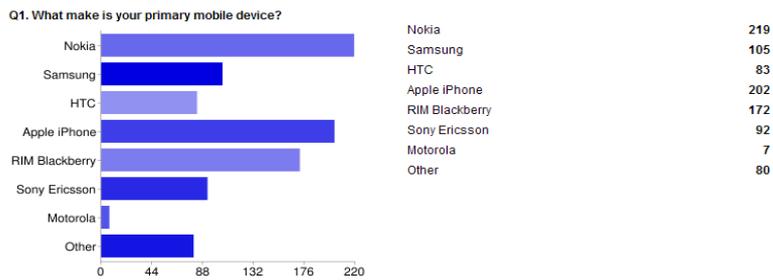
Please enter your mobile number below to be entered into the prize draw to win a smart phone device E.g: 0785 624 1234

Please make any suggestions you think may be relevant to help deliver student mobile services.

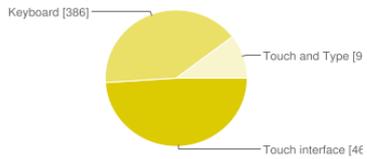
Appendix 3-B): Preliminary Study Outcomes

960 [responses](#)

Summary [See complete responses](#)

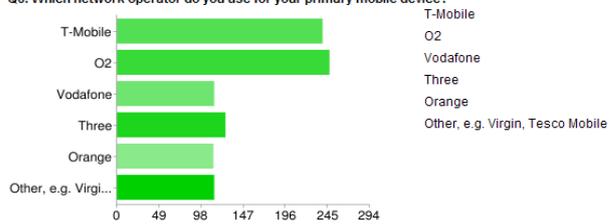


Q5. What is the physical input method for your mobile device?



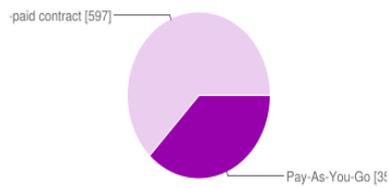
Touch interface	465
Keyboard	386
Touch and Type	99

Q6. Which network operator do you use for your primary mobile device?



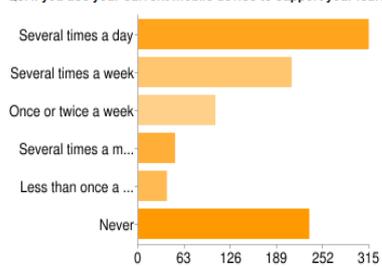
T-Mobile	239
O2	247
Vodafone	113
Three	126
Orange	112
Other, e.g. Virgin, Tesco Mobile	113

Q7. What type of billing relationship do you have with your mobile operator for your primary device?



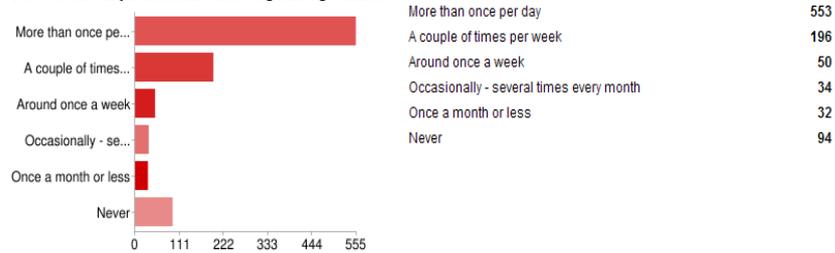
Pay-As-You-Go	353
Post-paid contract	597

Q8. If you use your current mobile device to support your learning, how frequently do you use it?

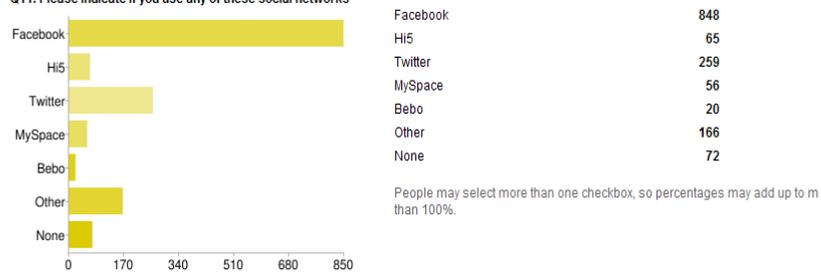


Several times a day	314
Several times a week	209
Once or twice a week	105
Several times a month	50
Less than once a month	39
Never	233

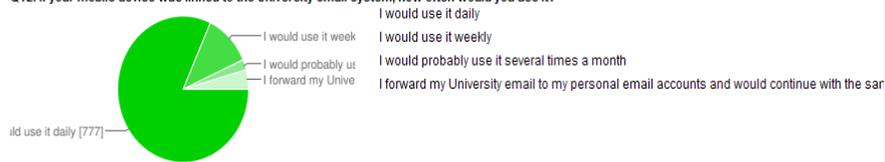
Q10. How often do you use social networking sites e.g. 'Facebook'



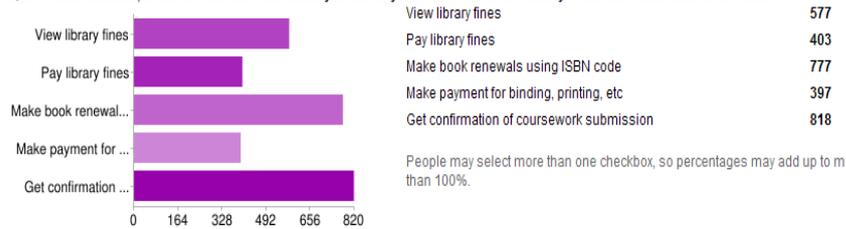
Q11. Please indicate if you use any of these social networks



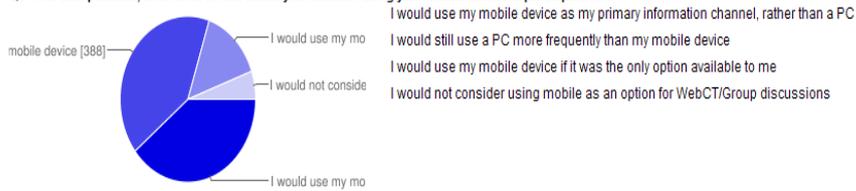
Q12. If your mobile device was linked to the University email system, how often would you use it?



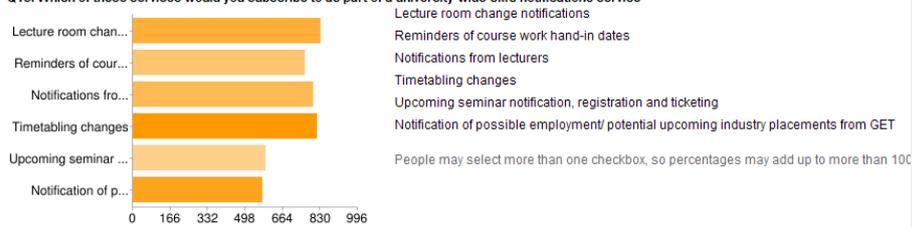
Q13. If made available, which of these services would you use on your mobile device for Library or School mobile-centric services?



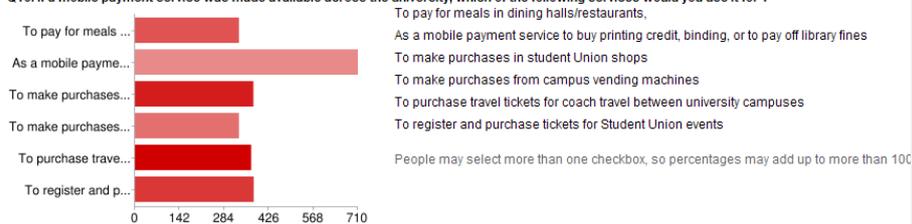
Q14. If it was possible, what level of use would you consider using your mobile device to participate in a



Q15. Which of these services would you subscribe to as part of a university-wide SMS notifications service



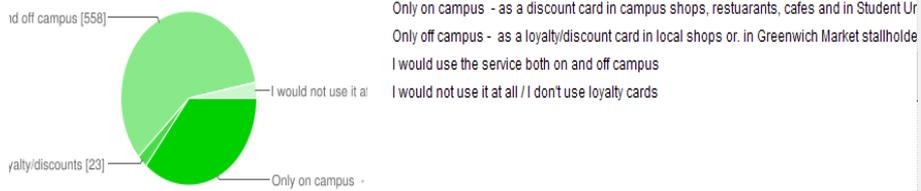
Q16. If a mobile payment service was made available across the university, which of the following services would you use it for ?



Q17. If an integrated student mobile ID/loyalty/discount/rewards card service was made available to Greenwich students, how likely is it that you would use it?



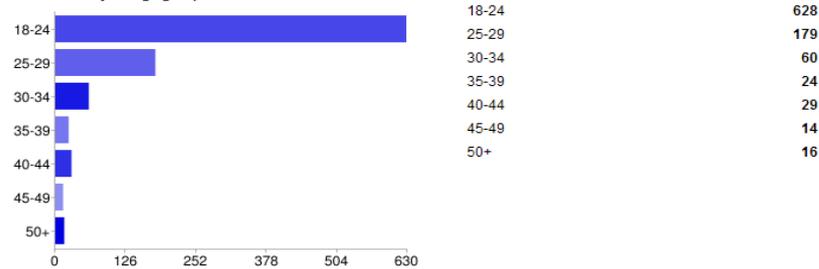
Q18. If an integrated student mobile ID/loyalty/discount/rewards card service was made available for you to use, where would you most likely use it?



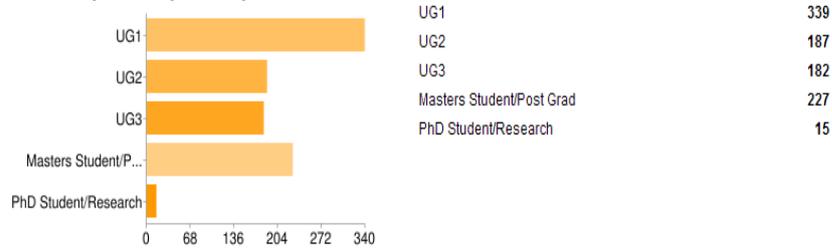
Q19. What is your gender?



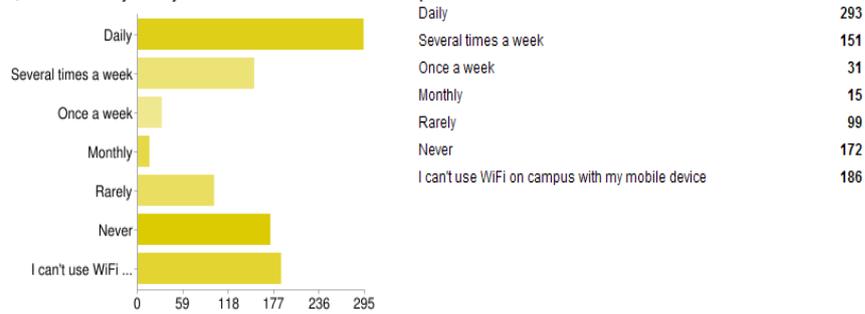
Q20. What is your age group?



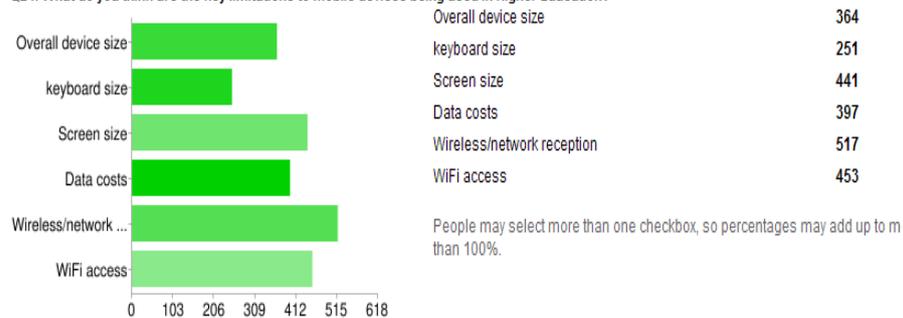
Q21. What is your current year of study?



Q23. How often do you use your mobile device to connect to the campus WiFi network



Q24. What do you think are the key limitations to mobile devices being used in Higher Education?



Appendix 4-A): Final Questionnaire – Undergraduate Students

[Available online:

<https://docs.google.com/spreadsheet/viewform?fromEmail=true&formkey=dEJ2bTlsR1BuODVncGhCNWpsSFhXeEE6MA>]

Learning on the Move: New mobile technologies - students' perspective

This research is mainly focused on understanding how new mobile technologies can contribute to the enhancement of the learning experiences for students. The objective is to identify the possible paths of implementation of mobile technologies. This is important because HE needs to optimise teaching tools to enhance future learning experiences of undergraduate students. This survey should take no more than 7-10 mins of your time. Data captured are confidential and are maintained securely under the terms of the University ethics guidelines and the UK Data Protection Act (1998) - Taking part in this study indicates your agreement to participate in this study. For further information or to make a query please contact Idil Ersoy: a.i.ersoy@[REDACTED] who will be able to answer any questions. Thank you for taking part Ms. Idil Ersoy

1. How often do you use your mobile device (including tablets etc.) to access the internet? *

- More than 7 hours a day
- 5 to 7 hours a day
- 3 to 5 times a day
- less than 2 hours a day
- Don't use it

2. Please indicate if you use any of the following Apps/functionality * Please tick as many as appropriate

- GPS (navigation) Enabled Apps
- Social Networking Apps (Facebook, twitter etc.)
- Messaging Apps
- Camera Enabled Apps
- Gaming Apps
- Other
- Don't use

3. What type of mobile device do you have? *

- Nokia
- Samsung
- HTC
- Apple iPhone
- Blackberry
- Ericsson
- Motorola
- LGC
- Sony
- Other

4. Which Operating System (OS) does your phone use? *

- Android
- IOS
- Windows
- Symbian
- Other

5. How often do you use your mobile device to access Moodle? *

- Before every lecture and seminar
- Before submitting coursework
- Daily to check announcements, etc.
- Never
- Other

6. Do you think it is worth learning about the use of mobile apps for academic activities? *

- No
- Probably not
- Not sure
- Probably
- Yes

7. Would you like to learn how to use mobile apps for academic purposes? *

- Yes - definitely
- Possibly
- Not sure
- Definitely not

8. Would you be interested in attending a workshop to explore how mobile apps can be used to support your learning? *

- No
- Yes
- Not sure

9. After an appropriate training session, do you think you would be comfortable using mobile apps for your learning? *

- Uncomfortable
- Somewhat uncomfortable
- Not sure
- Somewhat comfortable
- Confident

10. Do you use your mobile device to access the University library? *

- No
- Sometimes
- Rarely
- Not at all

11. Do you feel comfortable installing any kind of mobile apps on your mobile device? *

- Uncomfortable
- Somewhat comfortable
- Not Sure
- Quite comfortable
- Very comfortable

12. If the University offers mobile services/apps, which of the following would benefit you in your studies? * Please click as appropriate

- Messaging e.g. announcements (Assignment due? Class cancelled?)
- Discussing e.g. Instant messaging boards for each class
- Blogs (Read blog posts and interact with classmates by posting comments on their blogs or responding to comments on your own.)
- Tasks (Tasks allow you to mark when you've started a project, when it's in progress, and when complete)
- Journal articles (Read and reflect on your journal posts)

13. Do you have any personal experience with using mobile apps in learning? *

- No
- Yes

14. Do you agree that the use of mobile apps in learning would require one or more of the following? * Please tick as many as appropriate

- Training
- Willingness to learn
- Understanding of the current technology
- Encouragement from tutors
- Don't know

15. Do you think the type of device (phone or tablet) you use would influence how often and when you would use mobile learning services? *

- Yes
- No

16. I think listening to lectures podcasted through my mobile device or tablet would improve my ability to learn *

- Agree
- Disagree

17. I think reading textbooks through my mobile device or tablet would be an effective way to revise. *

- Agree
- Disagree

18. In the next three years, I expect my use of mobile technologies will: *

- Greatly decrease
- Decrease
- Stay the same
- Increase
- Greatly increase

19. Do you think the use mobile technologies can eventually replace the traditional way of learning and teaching? *

- Yes
- No
- Not sure

20. To which of the following groups do you belong? *

- A home student
- An overseas student

21. Which year are you studying? *

- First year
- Second year
- Third year

22. To which of the following groups do you consider you belong? (please select one only) *

- White- British
- White- Any other white background
- Mixed- White &Black
- Mixed-White & Asian
- Black or Black British
- Asian or Asian British
- Chinese
- Middle Eastern
- Other

23. Please indicate your gender *

- Male
- Female

24. Please indicate your age group * Age range

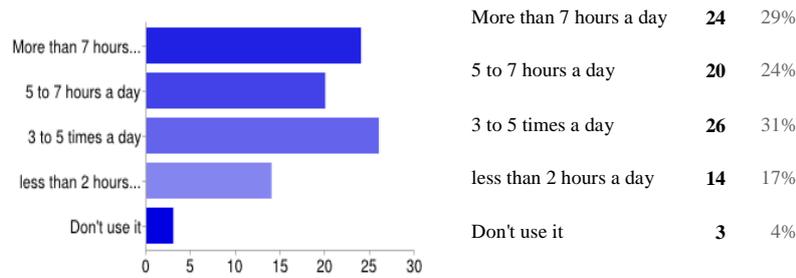
- 17 - 19
- 20 - 24
- 25 - 29
- 30 -34
- 35 -39
- 40- 44
- 45 -49
- 50 -54
- 55+

25. Please add very briefly in your overall comments concerning mobile learning in higher education

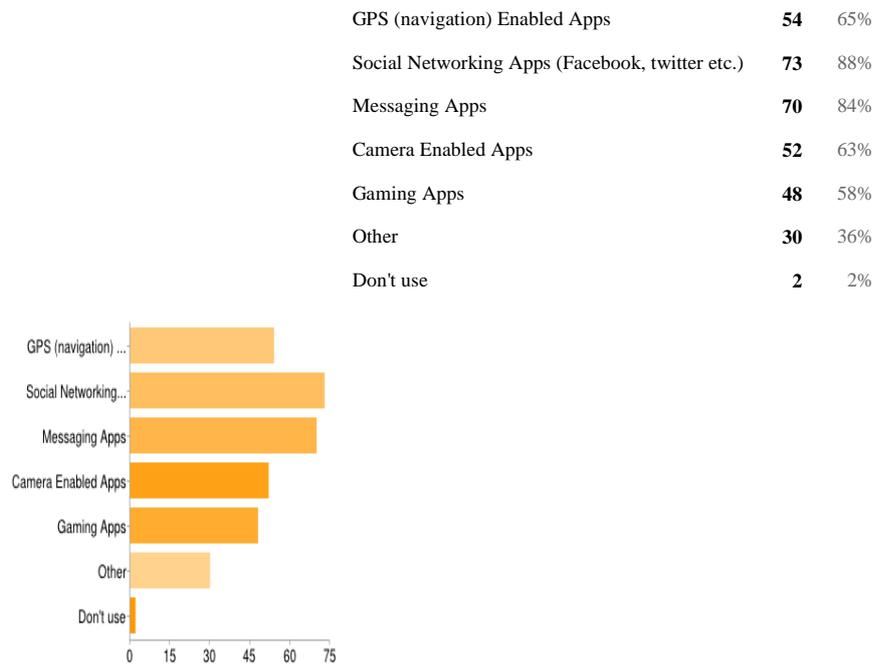
[Submit]

Appendix 4-B) Final Students Questionnaire Outcomes

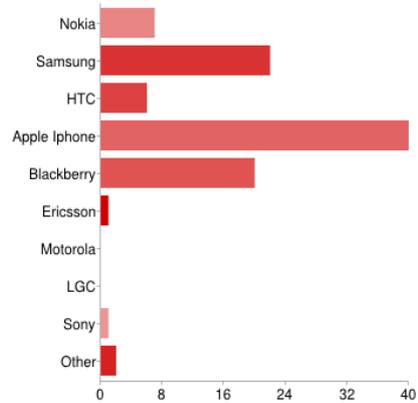
1. How often do you use your mobile device (including tablets etc.) to access the internet?



2. Please indicate if you use any of the following Apps/functionality

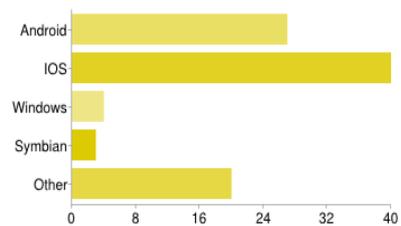


3. What type of mobile device do you have?



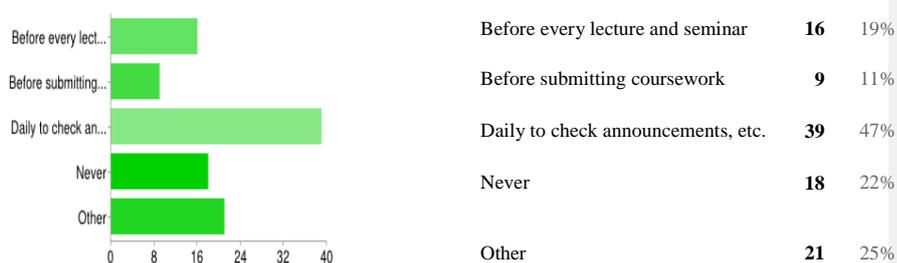
Nokia	7	8%
Samsung	22	27%
HTC	6	7%
Apple Iphone	40	48%
Blackberry	20	24%
Ericsson	1	1%
Motorola	0	0%
LGC	0	0%
Sony	1	1%
Other	2	2%

4. Which Operating System (OS) does your phone use?

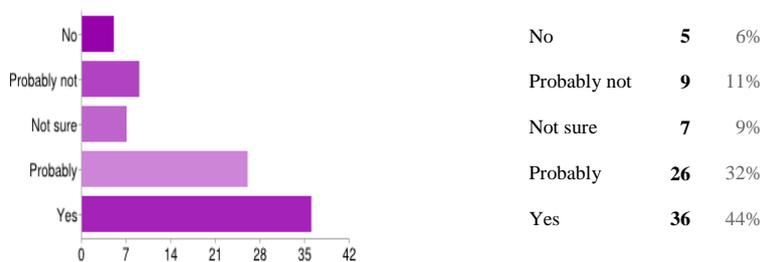


Android	27	33%
IOS	40	48%
Windows	4	5%
Symbian	3	4%
Other	20	24%

5. How often do you use your mobile device to access Moodle?

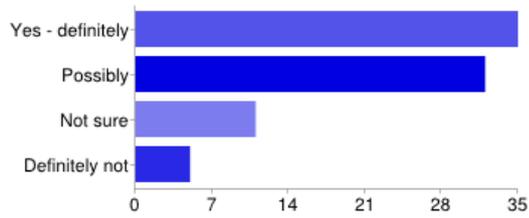


6. Do you think it is worth learning about the use of mobile apps for academic activities?

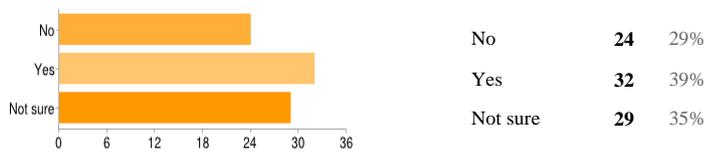


7. Would you like to learn how to use mobile apps for academic purposes?

Yes - definitely	35	43%
Possibly	32	39%
Not sure	11	13%
Definitely not	5	6%



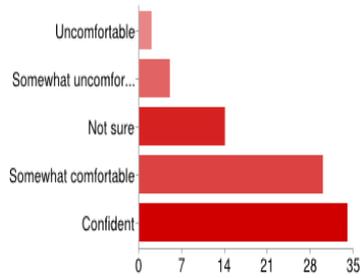
8. Would you be interested in attending a workshop to explore how mobile apps can be used to support your learning?



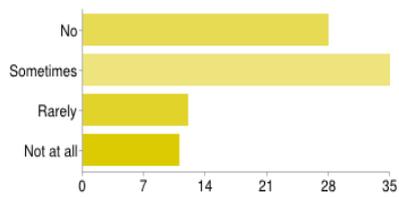
9. After an appropriate training session, do you think you would be comfortable using mobile apps for your learning?

Uncomfortable	2	2%
Somewhat uncomfortable	5	6%
Not sure	14	17%
Somewhat comfortable	30	37%

Confident **34** 41%

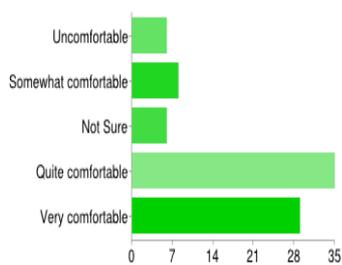


10. Do you use your mobile device to access the University library?



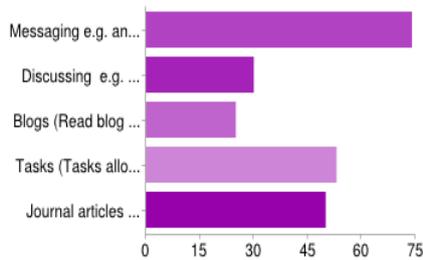
No **28** 34%
 Sometimes **35** 42%
 Rarely **12** 14%
 Not at all **11** 13%

11. Do you feel comfortable installing any kind of mobile apps on your mobile device?



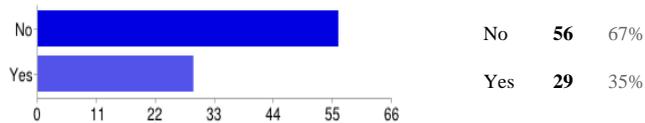
Uncomfortable **6** 7%
 Somewhat comfortable **8** 10%
 Not Sure **6** 7%
 Quite comfortable **35** 42%
 Very comfortable **29** 35%

12. If the University offers mobile services/apps, which of the following would benefit you in your studies?

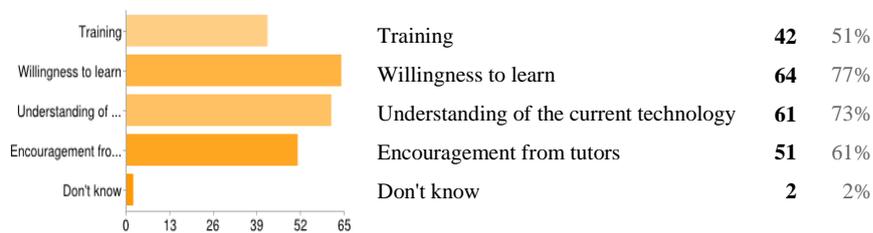


Messaging e.g. announcements (Assignment due? Class cancelled?)	74	89%
Discussing e.g. Instant messaging boards for each class	30	36%
Blogs (Read blog posts and interact with classmates by posting comments on their blogs or responding to comments on your own.)	25	30%
Tasks (Tasks allow you to mark when you've started a project, when it's in progress, and when complete)	53	64%
Journal articles (Read and reflect on your journal posts)	50	60%

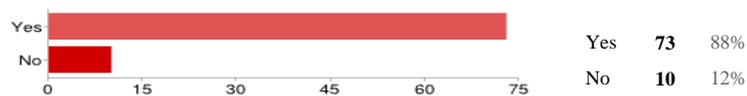
13. Do you have any personal experience with using mobile apps in learning?



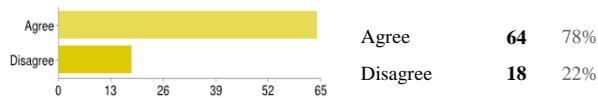
14. Do you agree that the use of mobile apps in learning would require one or more of the following?



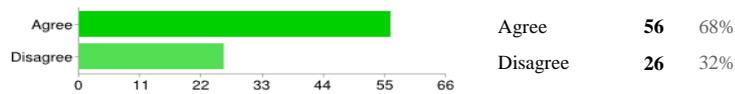
15. Do you think the type of device (phone or tablet) you use would influence how often and when you would use mobile learning services?



16. I think listening to lectures podcasted through my mobile device or tablet would improve my ability to learn

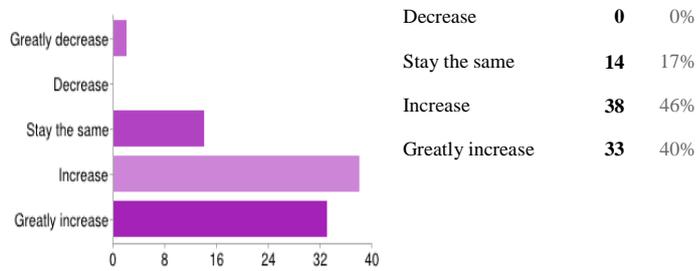


17. I think reading textbooks through my mobile device or tablet would be an effective way to revise.

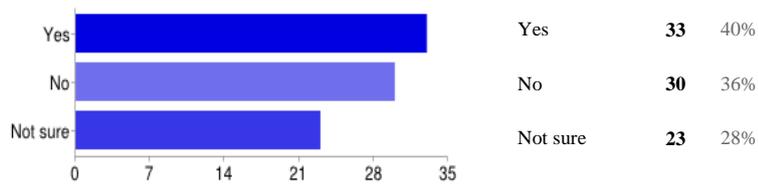


18. In the next three years, I expect my use of mobile technologies will:

Greatly decrease 2 2%



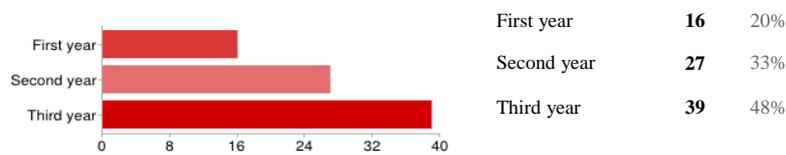
19. Do you think the use mobile technologies can eventually replace the traditional way of learning and teaching?



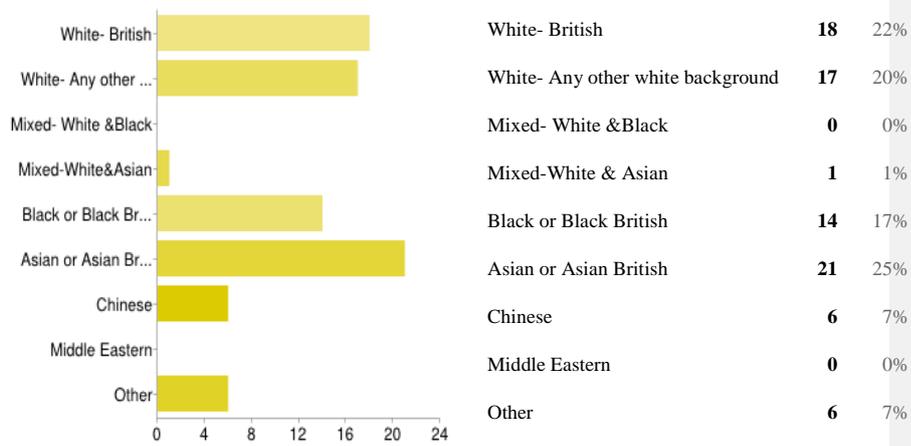
20. To which of the following groups do you belong?



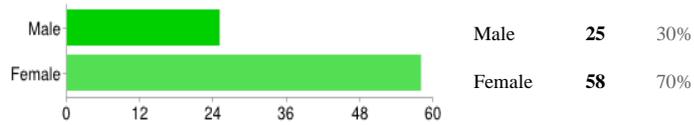
21. Which year are you studying?



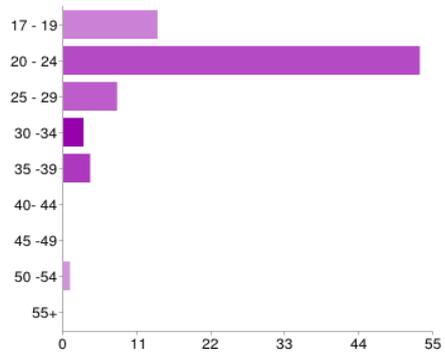
22. To which of the following groups do you consider you belong?



23. Please indicate your gender



24. Please indicate your age group



17 - 19	14	17%
20 - 24	53	64%
25 - 29	8	10%
30 - 34	3	4%
35 - 39	4	5%
40 - 44	0	0%
45 - 49	0	0%
50 - 54	1	1%
55+	0	0%

Appendix 4- C) Chi-square tests Outcomes (SPSS)

Q-23 Gender, Q-24 Age, Q-6 and Q-18.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
gender * Q6	83	100.0%	0	.0%	83	100.0%
gender * Q18	83	100.0%	0	.0%	83	100.0%
age * Q6	83	100.0%	0	.0%	83	100.0%
age * Q18	83	100.0%	0	.0%	83	100.0%

gender * Q6

Crosstab

			Q6						Total	
			No	No, Probably	Not sure	Probably	Probably not	Yes		
gender	Female	Count	0	3	1	3	17	6	28	58
		Expected Count	.7	2.8	.7	4.9	17.5	6.3	25.2	58.0
		% within gender	.0%	5.2%	1.7%	5.2%	29.3%	10.3%	48.3%	100.0%
		% within Q6	.0%	75.0%	100.0%	42.9%	68.0%	66.7%	77.8%	69.9%
		% of Total	.0%	3.6%	1.2%	3.6%	20.5%	7.2%	33.7%	69.9%
Male	Count	1	1	0	4	8	3	8	25	
	Expected Count	.3	1.2	.3	2.1	7.5	2.7	10.8	25.0	
	% within gender	4.0%	4.0%	.0%	16.0%	32.0%	12.0%	32.0%	100.0%	
	% within Q6	100.0%	25.0%	.0%	57.1%	32.0%	33.3%	22.2%	30.1%	
	% of Total	1.2%	1.2%	.0%	4.8%	9.6%	3.6%	9.6%	30.1%	
Total	Count	1	4	1	7	25	9	36	83	
	Expected Count	1.0	4.0	1.0	7.0	25.0	9.0	36.0	83.0	
	% within gender	1.2%	4.8%	1.2%	8.4%	30.1%	10.8%	43.4%	100.0%	
	% within Q6	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
	% of Total	1.2%	4.8%	1.2%	8.4%	30.1%	10.8%	43.4%	100.0%	

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)		
				99% Confidence Interval		
				Sig.	Lower Bound	Upper Bound
Pearson Chi-Square	6.382 ^a	6	.382	.394 ^b	.382	.407
Likelihood Ratio	6.573	6	.362	.491 ^b	.478	.503
Fisher's Exact Test	6.293			.372 ^b	.360	.385
N of Valid Cases	83					

a. 9 cells (64.3%) have expected count less than 5. The minimum expected count is .30.

b. Based on 10000 sampled tables with starting seed 2000000.

gender * Q18

		Crosstab						Total	
		Q18							
		Greatly decrease	Greatly increase	Increase	Increase, Greatly increase	Stay the same	Stay the same, Increase		
gender	Female	Count	2	19	26	2	7	2	58
		Expected Count	1.4	21.7	23.8	1.4	8.4	1.4	58.0
		% within gender	3.4%	32.8%	44.8%	3.4%	12.1%	3.4%	100.0%
		% within Q18	100.0%	61.3%	76.5%	100.0%	58.3%	100.0%	69.9%
		% of Total	2.4%	22.9%	31.3%	2.4%	8.4%	2.4%	69.9%
Male	Count	0	12	8	0	5	0	25	
		Expected Count	.6	9.3	10.2	.6	3.6	.6	25.0
		% within gender	.0%	48.0%	32.0%	.0%	20.0%	.0%	100.0%
		% within Q18	.0%	38.7%	23.5%	.0%	41.7%	.0%	30.1%
		% of Total	.0%	14.5%	9.6%	.0%	6.0%	.0%	30.1%
Total	Count	2	31	34	2	12	2	83	
		Expected Count	2.0	31.0	34.0	2.0	12.0	2.0	83.0
		% within gender	2.4%	37.3%	41.0%	2.4%	14.5%	2.4%	100.0%
		% within Q18	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	2.4%	37.3%	41.0%	2.4%	14.5%	2.4%	100.0%

Chi-Square Tests						
	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)		
				Sig.	99% Confidence Interval	
					Lower Bound	Upper Bound
Pearson Chi-Square	5.135 ^a	5	.400	.412 ^b	.399	.425
Likelihood Ratio	6.791	5	.237	.345 ^b	.333	.357
Fisher's Exact Test	4.055			.497 ^b	.484	.510
N of Valid Cases	83					

a. 7 cells (58.3%) have expected count less than 5. The minimum expected count is .60.

b. Based on 10000 sampled tables with starting seed 2000000.

age * Q6

Crosstab

			Q6						Total
			No	No, Probably	Not sure	Probably	Probably not	Yes	
age 17 - 19	Count	0	0	0	2	5	2	5	14
	Expected Count	.2	.7	.2	1.2	4.2	1.5	6.1	14.0
	% within age	.0%	.0%	.0%	14.3%	35.7%	14.3%	35.7%	100.0%
	% within Q6	.0%	.0%	.0%	28.6%	20.0%	22.2%	13.9%	16.9%
	% of Total	.0%	.0%	.0%	2.4%	6.0%	2.4%	6.0%	16.9%
20 - 24	Count	1	4	0	5	16	5	22	53
	Expected Count	.6	2.6	.6	4.5	16.0	5.7	23.0	53.0
	% within age	1.9%	7.5%	.0%	9.4%	30.2%	9.4%	41.5%	100.0%
	% within Q6	100.0%	100.0%	.0%	71.4%	64.0%	55.6%	61.1%	63.9%
	% of Total	1.2%	4.8%	.0%	6.0%	19.3%	6.0%	26.5%	63.9%
25 - 29	Count	0	0	1	0	1	1	5	8
	Expected Count	.1	.4	.1	.7	2.4	.9	3.5	8.0
	% within age	.0%	.0%	12.5%	.0%	12.5%	12.5%	62.5%	100.0%
	% within Q6	.0%	.0%	100.0%	.0%	4.0%	11.1%	13.9%	9.6%
	% of Total	.0%	.0%	1.2%	.0%	1.2%	1.2%	6.0%	9.6%
30 - 34	Count	0	0	0	0	2	0	1	3
	Expected Count	.0	.1	.0	.3	.9	.3	1.3	3.0
	% within age	.0%	.0%	.0%	.0%	66.7%	.0%	33.3%	100.0%
	% within Q6	.0%	.0%	.0%	.0%	8.0%	.0%	2.8%	3.6%
	% of Total	.0%	.0%	.0%	.0%	2.4%	.0%	1.2%	3.6%
35 - 39	Count	0	0	0	0	1	1	2	4
	Expected Count	.0	.2	.0	.3	1.2	.4	1.7	4.0
	% within age	.0%	.0%	.0%	.0%	25.0%	25.0%	50.0%	100.0%
	% within Q6	.0%	.0%	.0%	.0%	4.0%	11.1%	5.6%	4.8%
	% of Total	.0%	.0%	.0%	.0%	1.2%	1.2%	2.4%	4.8%
50 - 54	Count	0	0	0	0	0	0	1	1
	Expected Count	.0	.0	.0	.1	.3	.1	.4	1.0
	% within age	.0%	.0%	.0%	.0%	.0%	.0%	100.0%	100.0%
	% within Q6	.0%	.0%	.0%	.0%	.0%	.0%	2.8%	1.2%
	% of Total	.0%	.0%	.0%	.0%	.0%	.0%	1.2%	1.2%
Total	Count	1	4	1	7	25	9	36	83
	Expected Count	1.0	4.0	1.0	7.0	25.0	9.0	36.0	83.0
	% within age	1.2%	4.8%	1.2%	8.4%	30.1%	10.8%	43.4%	100.0%
	% within Q6	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	1.2%	4.8%	1.2%	8.4%	30.1%	10.8%	43.4%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)		
				Sig.	99% Confidence Interval	
					Lower Bound	Upper Bound
Pearson Chi-Square	20.022 ^a	30	.916	.751 ^b	.740	.762
Likelihood Ratio	18.371	30	.952	.854 ^b	.844	.863
Fisher's Exact Test	30.533			.899 ^b	.891	.906
N of Valid Cases	83					

a. 38 cells (90.5%) have expected count less than 5. The minimum expected count is .01.

b. Based on 10000 sampled tables with starting seed 2000000.

age * Q18

		Crosstab							
		Q18							
		Greatly decrease	Greatly increase	Increase	Increase, Greatly increase	Stay the same	Stay the same, Increase	Total	
age	17 - 19	Count	1	5	5	0	2	1	14
		Expected Count	.3	5.2	5.7	.3	2.0	.3	14.0
		% within age	7.1%	35.7%	35.7%	.0%	14.3%	7.1%	100.0%
		% within Q18	50.0%	16.1%	14.7%	.0%	16.7%	50.0%	16.9%
		% of Total	1.2%	6.0%	6.0%	.0%	2.4%	1.2%	16.9%
20 - 24	Count	1	19	21	2	9	1	53	
		Expected Count	1.3	19.8	21.7	1.3	7.7	1.3	53.0
		% within age	1.9%	35.8%	39.6%	3.8%	17.0%	1.9%	100.0%
		% within Q18	50.0%	61.3%	61.8%	100.0%	75.0%	50.0%	63.9%
		% of Total	1.2%	22.9%	25.3%	2.4%	10.8%	1.2%	63.9%
25 - 29	Count	0	4	3	0	1	0	8	
		Expected Count	.2	3.0	3.3	.2	1.2	.2	8.0
		% within age	.0%	50.0%	37.5%	.0%	12.5%	.0%	100.0%
		% within Q18	.0%	12.9%	8.8%	.0%	8.3%	.0%	9.6%
		% of Total	.0%	4.8%	3.6%	.0%	1.2%	.0%	9.6%
30 - 34	Count	0	1	2	0	0	0	3	
		Expected Count	.1	1.1	1.2	.1	.4	.1	3.0
		% within age	.0%	33.3%	66.7%	.0%	.0%	.0%	100.0%
		% within Q18	.0%	3.2%	5.9%	.0%	.0%	.0%	3.6%
		% of Total	.0%	1.2%	2.4%	.0%	.0%	.0%	3.6%
35 - 39	Count	0	1	3	0	0	0	4	
		Expected Count	.1	1.5	1.6	.1	.6	.1	4.0
		% within age	.0%	25.0%	75.0%	.0%	.0%	.0%	100.0%
		% within Q18	.0%	3.2%	8.8%	.0%	.0%	.0%	4.8%
		% of Total	.0%	1.2%	3.6%	.0%	.0%	.0%	4.8%
50 - 54	Count	0	1	0	0	0	0	1	
		Expected Count	.0	.4	.4	.0	.1	.0	1.0
		% within age	.0%	100.0%	.0%	.0%	.0%	.0%	100.0%
		% within Q18	.0%	3.2%	.0%	.0%	.0%	.0%	1.2%
		% of Total	.0%	1.2%	.0%	.0%	.0%	.0%	1.2%
Total	Count	2	31	34	2	12	2	83	
		Expected Count	2.0	31.0	34.0	2.0	12.0	2.0	83.0
		% within age	2.4%	37.3%	41.0%	2.4%	14.5%	2.4%	100.0%
		% within Q18	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	2.4%	37.3%	41.0%	2.4%	14.5%	2.4%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)		
				Sig.	99% Confidence Interval	
					Lower Bound	Upper Bound
Pearson Chi-Square	9.816 ^a	25	.997	.977 ^b	.973	.981
Likelihood Ratio	11.264	25	.992	.981 ^b	.978	.985
Fisher's Exact Test	21.210			.978 ^b	.974	.981
N of Valid Cases	83					

a. 31 cells (86.1%) have expected count less than 5. The minimum expected count is .02.

b. Based on 10000 sampled tables with starting seed 2000000.

Appendix 5-A): Questionnaire with Postgraduate Students

[Available online:

<https://docs.google.com/spreadsheet/viewform?fromEmail=true&formkey=dEctSVpKbmFuLU91VFFCOVd3SEI5ZUE6MA>]

Learning on the Move:

New mobile technologies and the potential impact on students' learning – Masters

This research is focused on understanding how new mobile technologies can contribute to and enhance the learning experience of students. The objective is to identify possible paths for implementation of mobile technologies in order to optimise the potential impact on future learning experiences of students and to understand the educators' point of view regarding the future use of emerging mobile technologies in education. This survey should take no more than 7-10 minutes of your time. Data held is confidential and secure under the terms of University ethics guidelines and the UK Data Protection Act(1998) - I have read the information sheet about this study - I have had an opportunity to ask questions and discuss this study (please contact Idil Ersoy: a.iersoy@ who will be able to answer any questions) - I have received enough information about this study - I understand that I am free to withdraw from this study - Taking part in this study indicates my agreement Thank you for taking part in this survey, Idil Ersoy.

1. What type of phone do you have? *

- Nokia
- Samsung
- Apple iPhone
- Blackberry
- Sony Ericsson
- Motorola
- Other

2. Which mobile Apps do you have and use on your mobile phone? *

- GPS (navigation) enabled Apps
- Social (Facebook etc.) Networking Apps
- Messaging Apps
- Camera Enabled Apps
- Gaming Apps
- Other

3. Which activity do you most often engage in on your mobile phone? * Please tick as many as appropriate.

- SMS/ MMS
- Phone calls
- Email
- Apps related activities

4. How do you feel about installing mobile apps on your mobile phone? *

- Confident
- Not sure
- I can do without it
- I would like to learn how to do it

5. Do you think it would be useful to be able to use mobile apps as part of your learning at the University of [REDACTED] so that you can access course materials, PowerPoint's, lecture notes, and online quizzes etc. *

- Yes
- Not sure
- No
- I can't see how using Apps would help support learning

6. Would you invest your time in learning to use and installing mobile apps that could be used for learning activities? *

- No
- Probably not
- Not sure
- Probably
- Yes

7. If the University offers the mobile apps to our students where you see this app could benefit the students, please select from the following * Tick as many as appropriate

- Announcements (Assignment due? Class cancelled?)
- Discussions (The Discussion Board is a key course communication tool for engaging students and promoting learning)
- Blogs (Read blog posts and interact with classmates by posting comments on their blogs or responding to comments on your own.)
- Tasks (Tasks allow students to mark when they've started a project, when it's in progress, and when complete)
- Tutorial List (Roster) (Wondering who's in your class?)
- Journals articles (Read and reflect on your Journal posts)
- No

8. Do you agree that most of the teaching in the near future (next 5 years) will use mobile apps as part of teaching/learning methods at the University of [REDACTED]? *

- No
- Probably not
- Not sure
- Probably
- Yes

9. In which department do you study your programme? *

- Accounting & Finance
- International Business & Economics
- Human Resources & Organisational Behaviour
- Marketing, Events & Tourism
- Systems Management & Strategy
- Other

10. Are you a Home student or an overseas student? *

- Home Student
- Overseas Student

11. To which of the following groups do you consider you belong? *

- White - British
- White - Irish
- White - Any other White background
- Mixed - White & Black Caribbean
- Mixed - White & Black African
- Mixed - White & Asian
- Mixed - Any other Mixed background
- Black or Black British - Caribbean
- Black or Black British - African
- Black or Black British - Any other Black background
- Asian or Asian British - Indian
- Asian or Asian British - Pakistani
- Asian or Asian British - Bangladeshi
- Asian or Asian British - Any other Asian background
- Chinese
- Other ethnic group

12. Please indicate your age group * Age range

- 18 - 20
- 21 - 29
- 30 - 39
- 40 - 49
- 50 or over

13. Please indicate your gender *

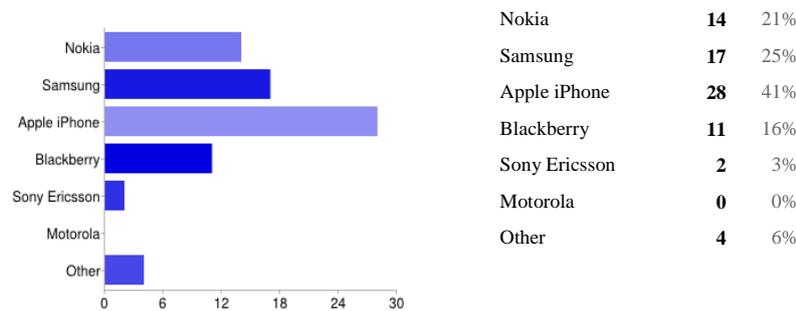
- Male
- Female

[Submit]

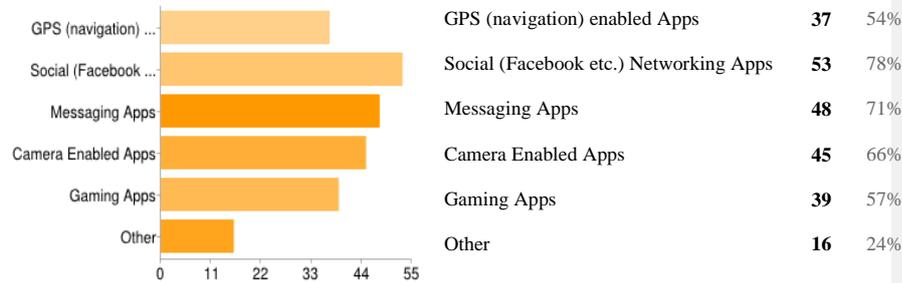
Appendix 5-B): Final Masters Questionnaire Outcomes

Masters Students (68 Responses)

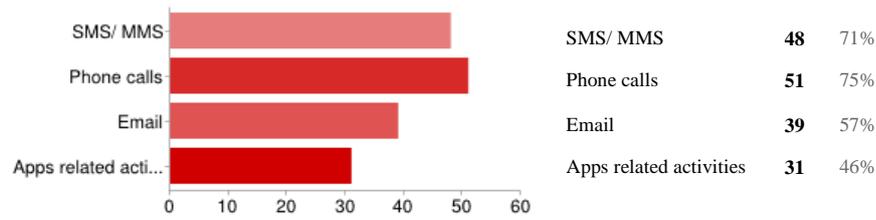
1. What type of phone do you have?



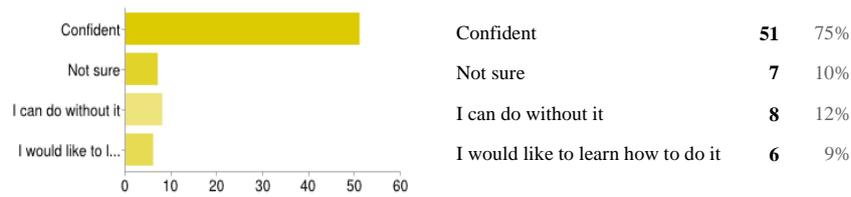
2. Which mobile Apps do you have and use on your mobile phone?



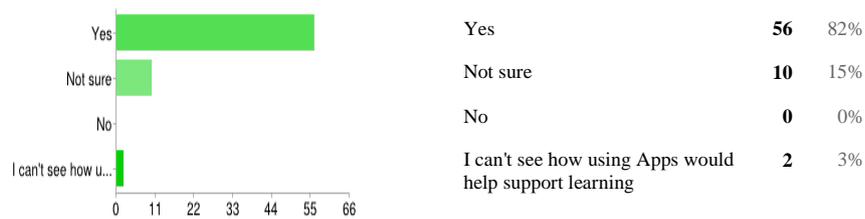
3. Which activity do you most often engage in on your mobile phone?



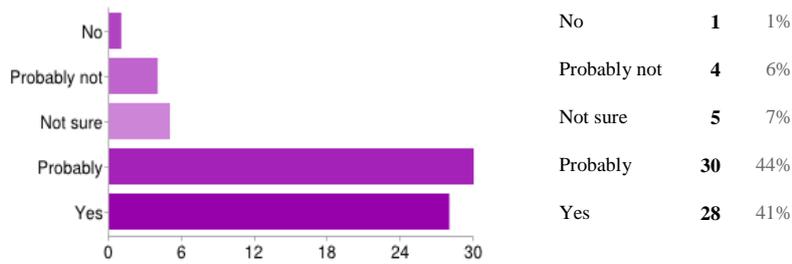
4. How do you feel about installing mobile apps on your mobile phone?



5. Do you think it would be useful to be able to use mobile apps as part of your learning at the University of [redacted] so that you can access course materials, PowerPoint's, lecture notes, and online quizzes etc.



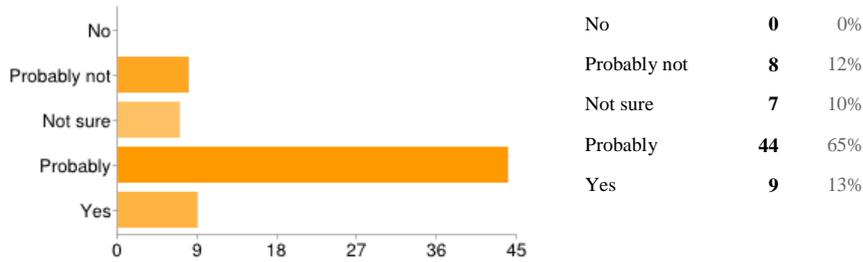
6. Would you invest your time in learning to use and installing mobile apps that could be used for learning activities?



7. If the University offers the mobile apps to our students where you see this app could benefit the students, please select from the following

Announcements (Assignment due? Class cancelled?)	57	84%
Discussions (The Discussion Board is a key course communication tool for engaging students and promoting learning)	36	53%
Blogs (Read blog posts and interact with classmates by posting comments on their blogs or responding to comments on your own.)	33	49%
Tasks (Tasks allow students to mark when they've started a project, when it's in progress, and when complete)	35	51%
Tutorial List (Roster) (Wondering who's in your class?)	46	68%
Journals articles (Read and reflect on your Journal posts)	46	68%
No	0	0%

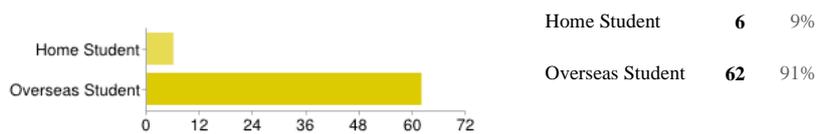
8. Do you agree that most of the teaching in the near future (next 5 years) will use mobile apps as part of teaching/learning methods at the University of [REDACTED]?



9. In which department do you study your programme?



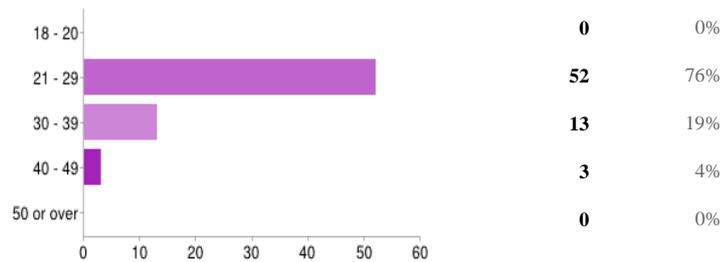
10. Are you a Home student or an overseas student?



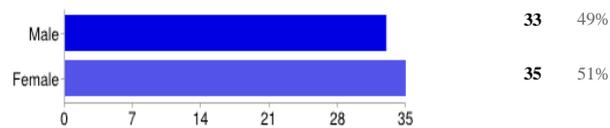
11. To which of the following groups do you consider you belong?

Asian or Asian British - Indian	13	19%
White - Any other White background	12	18%
Chinese	12	18%
Black or Black British - African	10	15%
Other ethnic group	7	10%
Asian or Asian British - Bangladeshi	5	7%
Mixed - Any other Mixed background	3	4%
Asian or Asian British - Any other Asian background	3	4%
Mixed - White & Black Caribbean	1	1%
Mixed - White & Asian	1	1%
Asian or Asian British - Pakistani	1	1%
White – British	0	0%
White – Irish	0	0%
Mixed - White & Black African	0	0%
Black or Black British - Caribbean	0	0%
Black or Black British - Any other Black background	0	0%

12. Please indicate your age group



13. Please indicate your gender



Appendix 5- C) Chi-square tests Outcomes (SPSS)

Crosstab

		9. Would you be interested in attending a workshop to explore how mobile apps can be used to support learning/teaching?				
		No	Not sure	Yes	Total	
21. Please indicate your gender	Female	Count	1	1	8	10
		Expected Count	2.3	2.3	5.3	10.0
		% within 21. Please indicate your gender	10.0%	10.0%	80.0%	100.0%
		% within 9. Would you be interested in attending a workshop to explore how mobile apps can be used to support learning/teaching?	14.3%	14.3%	50.0%	33.3%
		% of Total	3.3%	3.3%	26.7%	33.3%
	Male	Count	6	6	8	20
		Expected Count	4.7	4.7	10.7	20.0
		% within 21. Please indicate your gender	30.0%	30.0%	40.0%	100.0%
		% within 9. Would you be interested in attending a workshop to explore how mobile apps can be used to support learning/teaching?	85.7%	85.7%	50.0%	66.7%
		% of Total	20.0%	20.0%	26.7%	66.7%
Total	Count	7	7	16	30	
	Expected Count	7.0	7.0	16.0	30.0	
	% within 21. Please indicate your gender	23.3%	23.3%	53.3%	100.0%	
	% within 9. Would you be interested in attending a workshop to explore how mobile apps can be used to support learning/teaching?	100.0%	100.0%	100.0%	100.0%	
	% of Total	23.3%	23.3%	53.3%	100.0%	

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)	99% Confidence Interval	
				Sig.	Lower Bound	Upper Bound
Pearson Chi-Square	4.286 ^a	2	.117	.144 ^b	.135	.153
Likelihood Ratio	4.527	2	.104	.144 ^b	.135	.153
Fisher's Exact Test	3.797			.144 ^b	.135	.153
N of Valid Cases	30					

a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is 2.33.

b. Based on 10000 sampled tables with starting seed 2000000.

Appendix 6-A): Transcripts (Focus Group Interviews)- 1st Year Business Students at the University Of [REDACTED], Mixed Gender

Date: 15 November 2012 At 3pm, Venue: D234, 50 Minutes.

Statement of Purpose and Confidentiality

Thank you for agreeing to participate in this focus group interview. The purpose of this focus group is to learn about your current use of mobile technologies as well understanding your expectations for the future use of mobile technologies in education. I also would like your opinions about how mobile apps should be used for educational purposes. Your comments are completely confidential. Your name will not be associated with any comments you make. Dr. Veersma will be recording all the ideas and comments we discuss today and we will be combining this information with ideas collected from other focus groups. This is an opportunity for you to share what is important to you. I encourage you to speak up. I also encourage you to speak about yourself and your own experiences. There are no right or wrong answers, please feel free to be totally honest. Do you have any questions or concerns?

It is important that everyone has an opportunity to share their ideas. So I may call upon you to discuss your views, or ask that you allow someone else to speak who may not have had an opportunity to share their ideas.

QUESTION AND RESPONSES

Q-1: Do you have a smart phone? If yes, what do you use it for?

Student 1 Yes, I have smart phone and I use the mobile apps generally on transportation and games related mobile apps.

Student 2 I have an old mobile phone is a bit slow. I chose to use my laptop.

Student 3 Yes- I use games generally on my mobile phones

Student 4 Yes- same games

Student 5 I use it for dictionary mobile apps

Student 6 I download and read the lecture notes on mobile phone

Student 7 I download the lecture materials or case studies to read before tutorials.

Q-2: Which mobile functions would you consider to be useful in supporting your academic studies?

Student 1 Loads of things – especially to download lecture notes

Student 2 Making or capturing course lecture notes on your device, alarm reminder for hand-in dates/ group work sessions, using the mobile device to view lecture podcasts, using the mobile device for self-testing and revision.

I believe with a phone we can do a lot, we can use the phone to view lectures, Facebook, email, call and other, also for reminder of hand in dates.

Student 3 Having an on-device course scheduler and tracking tool, alarm reminder for hand-in dates/group work sessions, using your mobile device to view lecture podcasts, using your mobile device for self-testing and revision. Even though a mobile device could be pretty useful recording lectures. I still take my own notes by hand and do the heavy study at home by reading books.

Student 4 Capturing lecture notes, reminder for hand-in dates/ group work sessions, listening to lecture podcasts, exam revision.

I think having these functions would benefit us, as they always have their mobile phone on them and sometimes forget other materials i.e. pen and paper, they would then be able to use their mobiles whilst at university to help them with learning.

Student 5 Alarm reminder for coursework hand-in dates, it would be useful for exam revision, coursework preparations etc.

It is useful to have a device that will remind you of upcoming deadlines, test knowledge.

Student 6 Exam revision, alarm on coursework hand-in deadlines.

Just like in project management, test quiz, simulation games again subject-related.

Student 7 It would be good to use it like a project management to remind us when we need to start the project/ coursework and reminding us also the stages when we need to take the activities etc.

Employment related activities would also be good to have.

Q-3: If the university offered you SMS (texting) notification service would you use it?

Student 1 I would use it for instance if the lecture rooms changed, work hand in dates, any notifications from the lectures, if there was a change in timetabling or I would use it even if there was an industry placements from get. I would be very interested in student life and want to know about any changes in my timetable or seminars which would add points to my passport and portfolio.

Student 2 I would be very interested in what the other students said. They all would be really useful, as I have to travel up to an hour and half and I am unable to check Moodle whilst travelling. If there are room changes, SMS would help to ensure I'm kept up-to-date.

Student 3 Classroom changing notifications would be good to know beforehand. Small/ quick notifications, such as classroom, lecture room changes and timetable changes would really asset if sent to our mobile phones because even though it's fairly common, not everyone has internet on their mobile phones.

Student 4 I agree with the other student's view nothing to add additionally.

Student 5 Today phone can do a lot it is used as a note pad and reminder of all the important appointments, each be used as a map for internet utility of course is not only a phone but it will become important.

Student 6 Lecture, seminar room and timetable changes should be notified by SMS.

Student 7 Instead of emailing SMS would be ideal to be informed with.

Q-4: What do you think about limitations of using mobile technologies in education?

- Student 1** Usually all phones have small screens. This doesn't access to the information properly. Moreover, using mobile internet is rather costly.
- Student 2** Not sure - maybe the size and not having much around that's why I don't know much about it
- Student 3** Size might be a problem in using mobile technologies.
- Student 4** Screen size is a problem to use the mobile technologies in education. Keyboard size is also another negative element. But, again we would like to use it as much as we can.
- Student 5** Size would be a problem. Network reception would also be a negative thing to prevent it to be used further.
- Student 6** Size and wireless network reception would be a problem.
Nowadays, it's easy to have good wireless reception in most places, but with different kind of web pages, especially the ones with pictures and videos you might have difficulties when viewing. Besides that, I think that the biggest problem is its size. Even an iPhone on the new Nokia size makes it harder to focus/read for a long time.
- Student 7** The screen size, data costs and network reception would be a problem. Some mobiles are small and therefore have trouble viewing items on the phone, however, most phones getting bigger, data costs can also be high.

Q-5: What do you think that mobile technologies could change the classroom learning experiences?

Student 1 Mobile apps can be used with virtual activities to complete in tutorials

Student 2 With the use of mobile technologies the classroom activities could be more dynamic. However, not sure how they could be used.

Student 3 In certain areas i.e. updates on materials needed for lectures and tutorials due dates and online tasks. But, not everyone has smart phones, so some students might be disadvantaged. Perhaps the university could offer some subsidies, so all can have smart phones.

Student 4 Maybe for simple tasks but, if it is too complicated then people will not want to use it. The most popular apps are the clever ones that incredibly simple.

Student 5 It can be used as social networking site and it can also be used for virtual learning but, perhaps for only certain situations such as quiz and games rather than complex theories.

Student 6 Perhaps podcast could be used for academic purposes.

Student 7 Some students may feel inadequate using some of the technologies due to lack of understanding so, the university needs to provide training.

Q-6: What kind of suggestions would you make to senior managers which would help implement student mobile learning at the university?

- Student 1** Training would be needed for all stakeholders, lecturers, students and for the support staff.
- Student 2** Requirements in to keep it simple and free or subsidised mobile technologies from the university should make the implementation straight forward.
- Student 3** Yes- I agree with the others, university should provide subsidised tools for the students.
- Student 4** They need to give the students credits on their employability passport or for other activities that students would take. These incentives should encourage students to use the technologies.
- Student 5** Subject related game activities should be covered on mobile technologies therefore students would have to use the systems.
- Student 6** I agree with others to support the idea.
- Student 7** If the university subsidies it then students would find the technology more accessible.

Q-7: How important it is to you attend the lectures in person once the podcast are available for each course.

Would you still attend the lectures?

- Student 1** podcast should be available to enhance learning but, I would still attend the lectures and definitely to the tutorials. Because the discussions are important to fully understanding the topic.
- Student 2** I agree- podcast should only be reminder of the lecture content but, will never replace the traditional interaction with the lecturer.
- Student 3** If every course would have the podcast I might not attend the lectures as I live far away. I would follow them in my own time.
- Student 4** I would still need to discuss the subject with the tutor so, the podcast would not replace the traditional tutorial sessions. I feel they are very useful to discuss your opinion with the peer group and the tutor.

Student 5 we pay so much tutorial fees so, I would always attend the lectures and the tutorials. Attending the lectures and tutorials keeps me motivated.

Student 6 I agree with all- I would definitely attend the classes even if the podcast are commonly used. I would still need lecturers and the peer group to understand the subject matter in more details.

Student 7 yes – definitely I would attend all the required activities.

Q-8: Are you happy with what university offers currently use of IT in learning/teaching?

Student 1 Yes, very happy

Student 2 Yes, fine, I am also happy with the support we receive from the Uni.

Student 3 Yes, happy but, perhaps they could focus more on podcast on the lectures

Student 4 I agree with others, I am satisfied with the service.

Student 5 Also, happy with it.

Student 6 Podcast would be good to have

Student 7 Yes, I am also happy with what the university offers.

Q-9: In summary, how would you list the most popular mobile apps function that you would like to have it on your mobile device?

Student 1 Hand-in dates for coursework

Student 2 Project management- informing us of coursework deadlines

Student 7 Handing in coursework or informing of coursework deadlines.

Student 3 Game related mobile apps would be useful

Student 4 Employability apps would be good

Student 5 I agree with everyone. But, I think each course should have mobile apps.

Student 6 exam revision and should be used for quiz/ test prepare for the exam

Appendix 6- B): Field Work with the University 1st Year Students

During the focus group meeting, students were also asked to fill in the following open ended questionnaire on the mobile device learning in their academic studies. This helped the author to identify the certain issues where possibly could have been missed out during the focus group meetings. Hence, it solicited additional information to be contributed by respondents. They are sometimes also called infinite response questions, or unsaturated type questions.

Please note the answers to the following questions were written by the students during the interviews and then later on it was typed as seen without editing by the researcher.

Question and Responses

Q-1: Which of the following functions would you consider to be useful in supporting your academic studies?

- a) **Having an on-device course scheduler and tracking tool**
- b) **Making or capturing course lecture notes on your device**
- c) **Capturing videos of lectures on your device**
- d) **Alarm reminder for hand-in dates/group work sessions**
- e) **A reader for reviewing and editing course material**
- f) **Using your mobile device to view lecture podcasts**
- g) **Using your mobile device for self-testing and revision**

Student 1 (a, d, f and g points ticked by the student)

Even though a mobile device could be pretty useful than recording lectures. I still take my own notes by hand and do the heavy study at home with physical books.

Student 2 (a and d points were ticked by the student)

No comments were made.

Student 3 (b, d, f and g points were noted by the student)

I believe with a phone we can do a lot, we can use the phone to view lecture, Facebook, email, call etc. Also, for reminder of assignment dates.

Student 4 (a and d points noted)

It is useful to have a device that will remind you of upcoming deadlines, text knowledge.

Student 5 (a and d points agreed) No comments were made.

Student 6 (f and g points agreed) No comments were made.

Student 7 (The following points were agreed a, b, d, e, f and g).

I think that having the above functions would benefit students, as they always have their mobile phone on them and sometimes forget other materials i.e. pen & paper, they would then be able to use their mobiles whilst at University to help them with learning.

Q-2: Which of the following services would you subscribe to as part of a university-wide SMS notifications services

- a) **Lecture room change notifications**
- b) **Reminders of course work hand-in dates**
- c) **Notifications from lectures**
- d) **Timetabling changes**
- e) **Upcoming seminar notification, registration and ticketing**
- f) **Notification of possible employment/ potential upcoming industry placements from GET**

Student 1 (a, b, c, d, e and f points were ticked by the students)

Small/quick notifications, such as classroom change on timetable changes would be really asset it sent to our own mobile numbers because, even though it's fairly common, not everyone has internet on their mobile phones.

Student 2 (a, b, c and d points ticked)

Student 3 (a, b, c, d, e, f and g points were agreed).

Today phone can do a lot it used as a note pad and reminder of all the important appointment, can be used as a map for internet utility of course is not only a phone but it become an important things what we can't be separate.

Student 4 (a, b, c, d, e, f and g points were agreed).

I would subscribe to all services as I am very interested in student life and want to know about any changes in any timetable or seminars which can add points to my employability passport and portfolio.

Student 5 (a, b, c, d and f points agreed).

Student 6 (a and f points agreed).

Student 7 This would be really useful, as I have to travel up to an hour And a half and I am unable to check Moodle whilst travelling. If these items i.e. room changes were sent by SMS would help to ensure I'm kept up-to-date.

Q-3: What do you think are the key limitations to mobile devices being used in Higher Education?

- a) Overall device size
- b) Keyboard size
- c) Screen size
- d) Data costs
- e) Wireless/ network reception

Student 1 (points a, c and e agreed).

Nowadays it's easy to have a good wireless in most places, but with different kind of web pages (especially the ones with pictures and videos) you might have difficulties when viewing. Besides that, I think that the biggest problem is its size. Even an Iphone on the new NokiaXpedia's size makes it harder to focus on a long time learning.

Student 2 (a and e points were ticked)

Student 3 (b and c points agreed)

Because of the size of the phone is small we can't really do a lot in higher education but it is very important

Student 4 (c and d points agreed)

Usually all phone have a small services. This doesn't allow to get access to the information properly. Moreover, using mobile internet is rather costly.

Student 5 (b, c and e points were agreed).

Student 6 (only point 'c' was agreed).

Student 7 (a, d and e points were agreed).

Some mobiles are small and therefore have trouble viewing items on the phone, however, most phones getting bigger, data costs can also be high.

Q-4: Please answer the following questions on regards to helping us to plan and possibly deliver a student mobile services at the University

1- How mobile technologies may be used in future; Would it be a beneficial to relevant projects at the University?

1-a) Could these devices become part of a Virtual Learning Environment? How?

**1-b) Could they form part of a classroom learning experience?
E.g. can mobile internet/ text messaging be used as a virtual learning channel by faculty?**

Student 1

1-a) Yes 3D virtual conferences could be useful for lectures,

1-b) Yes, they would transform the learning and making it more dynamic.

Student 2

1-a) Yes, interactive tasks, reminders, help guides revision materials through apps, links to added material, mobile apps to increase speed and ease,

1-b) Yes, in certain areas i.e. updates on materials needed for lectures/ tutorials, due dates, online tasks. But, not everyone has smart phones so, some at disadvantage so, University could offer subsidies scheme so all can have smart device

Student 3

1-a) Download exam revision, download quiz. Deadline, online schedule planner, project manager.

1-b) no comments

Student 5

1-a) I believe that they could hold some involvements but it would be most beneficial for it to be used as reminders and to keep you up to date on your course.

1-b) Maybe for simple tasks but if you try and get to complicated then people just won't want use it. The most popular apps are the clever ones that are made incredibly simple.

Student 6

- 1-a)** Yes, mobile phones can become a party of VLE because everyone today has a smartphone and if it is to become a part of it, then chances are VLE is undoubtedly higher. It is also possible because everyone use mobile phone apps for social networking and if there is an apps from the University to exchange innovation, it would be great.
- 1-b)** Yes, it can be useful as social networking, it can also be used for virtual learning but, in a small amount like for just doing some text exchange points etc.

Student 7

- 1-a)** Exam revision, Lecture notes, Case studies,
- 1-b)** Can have apps with virtual activities to complete in tutorials.

CLOSING STATEMENT

Finally, I would like to thank you all for taking part in this focus group and for your time. I would like to assure you that your responses will be kept completely confidential. The outcome of this research will be combined with other focus group meetings and will be presented in academic publications. If anyone would like to receive the outcome of this survey, please contact me on a.i.ersoy@grc.ac.uk. The completion of this research is expected to be published around 2015

Appendix 7-A): Focus Group Interviews With The 2-Year Students

Date: 22 November, 2012/ Venue: Qa084, 60 Minutes.

Introduction

Thank you for agreeing to participate in this focus group. The purpose of this focus group is to learn about your current use of mobile technologies as well understanding your expectations for the future use of mobile technologies in education. I also would like your opinions about how mobile apps should be used for educational purposes.

Your comments are completely confidential. Your name will not be associated with any comments you make. Nigel Roake will be recording all the ideas and comments we discuss today and we will be combining this information with ideas collected from other focus groups. This is an opportunity for you to share what is important to you. I encourage you to speak up. I also encourage you to speak about yourself and your own experiences. There are no right or wrong answers, please feel free to be totally honest. Do you have any questions or concerns?

It is important that everyone has an opportunity to share their ideas. Thus, I may call upon you to discuss your views, or ask that you allow someone else to speak who may not have had an opportunity to share their ideas.

Q-1- : Do You Have A Smart Phone? If Yes, What Do You Use It For?

All students –yes

Student 1 Iphone 4 s and I use Ipad.

Student 2 I use it for games for stupid games.

Student 3 I use it for everything. WhatsApp. Facebook, music.

Student 3 I use it for banking. For example HSBC bank apps and very good.

Student 4 I think the transactions much easier and faster than using PC.

Student 2 I can basically check everything on my smart phone which includes apps for so many things such as shopping..

Student 4 I find using a mobile apps very easy especially downloading the music and doing my own personal banking, it is much better than using PC.

Student 3 You don't need to put password on mobile banking- it is opened itself.

Student 2 Everything can be checked by mobile device.

Student 3 I can download everything easily on mobile

Q-2- Which Mobile Functions Would You Consider To Be Useful In Supporting Your Academic Studies?

Student 1 I don't search it but, I would expect student

Student 3 I think it would be easier for finding an academic articles

Student 4 Lecture if there is an apps for shorter notes of the lectures

Student 5 Project management style apps would be useful. Start of the project and finishing the project.

Student 3 Exam revision should be good to have use of mobile apps.

Student 2 podcasting would be good then when I revise I could go back and revise it again.

Student 4 You can read papers- I don't have good search engine on my device. I read papers. I haven't used it. But, it could be useful. University should look into it. I would expect university to advertise it I don't search it. But, again because of the screen size it is difficult to read anything related with academic work.

Student 2 There is an apps for foreign students it helps language. Even local kids could benefit from it.

Student 2 Library apps would be good

Student 3 More directly related with the academic work. Instead of log in to many sites it would be easy to use apps.

Student Lecture notes should be available via apps some sort of notes would be useful. It would be helpful.

Q-3: If the university offered you SMS notification service would you use it?

Student 1 It would be good to check timetable, announcement, reminders etc.

Student 3 I feel it is a good concept but can irritate some people if it is over excessive but if you could have options to select which ones you want notifications and you can turn them on and off.

Student 4 Only academic notifications would be good.

Student 2 SMS notifications would be a good idea

Student 5 Lecture reminders and notifications would be beneficial.

Q-4 : What do you think about limitations of using mobile technologies in education?

Student 4 Size and connection

Student 2 Connection and screen size are key issues.

Student 5 Screen size, on computers you split the screen and have multiple items on at the same time whereas a mobile is too small and the processor cannot handle that much information.

Student 3 Screen size is small- good reception is needed

Q- 5: What do you think that mobile technologies could change the classroom learning experiences?

Student 5 It would be mean to ask tutor to ask for recording the lecture notes as body language is important for tutors to see if the student is interested in

Student 1 You would come to University because you pay for the tuition fees. If people want to study online they would sign online.

Student 2 Online should be enhance learning but not replacing it

Student 3 Traditional learning should not be replaced but enhance it.

Student 4 Interpersonal for reasons it is important to attend the physical to campus.

Student 2 Like shopping majority shops have online but even so people still use high street for shopping.

Q- 6: What kind of suggestions would you make to senior managers which would help implement student mobile learning at the University?

Student 1 They need to consider training to all parties

Student 2 Consideration of free devices from the university where students could loan from the library for the duration of their studies.

Student 3 Yes- I agree with the others, university should provide subsidised tools for the students.

- Student 4** This focus group is good way to get credit to credit on our passport. Management need to come with ideas where some activities could be delivered from mobile devices. This way this incentives would encourage students to use the mobile technologies.
- Student 5** Some activities such as game based should be carried out on our mobile devices
- Student 6** I agree with others, training would be necessary for successful implementations
- Student 7** If the university subsidies the devices then students would find the technology more accessible.

Q-7: How important it is to you attend the lectures in person once the podcast are available for each course. Would you still attend the lectures?

- Student 2** Podcast is a good idea but should not replace the traditional classroom experience
- Student 3** Podcast might be useful for some students if they live far from the campus. But, for me it is important that I feel I am part of the classroom/lecture. It much better to be at present in the tutorial.
- Student 4** I always find it much easier to deal and discuss the issues with the tutor and the peers
- Student 5** I would always attend the lectures and the tutorials otherwise I would have gone for an online mode which would have been cheaper tuition fee.
- Student 6** Podcast should be available to enhance learning but, I would still attend the lectures and definitely to the tutorials. Because the discussions are important to fully understanding the lessons.

Q- 8: Are you happy with what university offers currently use of ICT in learning/teaching?

Student 1 Some locations of the university hasn't got internet.

Student 2 Finding an academic journal should be easier with use of mobile apps.

Student 3 Yes, but, I will believe we can use it more often to support our learning.

Student 4 Exam times – power point slides university can provide some apps where we can download it on our phones and we can check it on the move- buses etc.

Student 5 There was no internet access in the lab session so, we could work on the one of the course last year.

Student 2 Library apps would be very useful, instead of waiting in the library.

Student 3 Moodle is not user friendly. Good opportunity to see students profiles. Exam revisions, power point slides should be very useful. On the bus, on the move students could benefit from the apps for the revisions.

Q- 9: In summary, how would you list the most popular mobile apps function that you would like to have it on your mobile device?

Student 1 We can use an apps on capturing video's so, then we can check the notes later on and when we want it .

Student 2 There could be an apps on university map where the new students can find easily the rooms/lecture rooms.

Student 3 An apps can use for capturing lecture notes on my device will help me to process the information easier. Also, project management apps would be good to organise the deadlines etc.

Student 4 We could have an apps to capture lecture notes and listen it again. Also, use it for the revision would be good!

Student 5 We could use it for project management; reminders about the deadline and for the announcement especially for the last minute changes i.e. room changes or cancellations or reminder about the tutorial activities so forth.

Appendix 7-B): Field Work With 2-Year Students

During the focus group meeting with the second year students, the author conducted additional open-ended questionnaire with the students. The questions were as same as the same 1-year students questions. The purpose of this survey as mentioned previously, was an opportunity for the author to identify the certain issues which may have missed during the meeting.

(Please note that students answers for the following questions were typed as seen without editing by the researcher).

Q-1: Which of the following functions would you consider to be useful in supporting your academic studies?

- a) Having an on-device course scheduler and tracking tool**
- b) Making or capturing course lecture notes on your device**
- c) Capturing videos of lectures on your device**
- d) Alarm reminder for hand-in dates/group work sessions**
- e) A reader for reviewing and editing course material**
- f) Using your mobile device to view lecture podcasts**
- g) Using your mobile device for self-testing and revision**

Student 1 (a, b, c, d and g points agreed).

- 1- Capturing videos of lectures on my device is important because you can view it several times, stopping the video, when needed, so it is more clear and easy to understand.
- 2- I use microphone to capture lecture's voice and listen to it once more at home, to understand better.
- 3- Using the device on course scheduler was brilliant very helpful last academic year. But this year it's not there!

Student 2 (a, b, c, e, f, g and h points were agreed)

Using mobile device in order to find the right room of the classes.

Student 3 (a, b, c, d, e, f and g points were agreed)

Being dyslexic being able to capture lecture notes on my device will help me to process the information easier. Being very organised and meeting deadlines will help me to manage my time.

Student 4 (a, b, c, d, e, f and g points were agreed).

To view lecture podcasts on your mobile would be great as we can then listen through again for information we've have missed during the lecture. Mobile for self-testing, on the go revision easier then using tons of books.

Student 5 (a, b, c, d, e, f and g points were agreed).

By have these functions on a mobile device it would be easier and quicker to access meaning student would be more likely to use the service.

Q-2. Which of the following services would you subscribe to as part of a university-wide SMS notifications services

- a) Lecture room change notifications,
- b) Reminders of course work hand-in dates,
- c) Notifications from lectures,
- d) Timetabling changes,
- e) Upcoming seminar notification, registration and ticketing,
- f) Notification of possible employment
- g) Potential upcoming industry placements from GET

Student 1 (a, b, c, d and e points were ticked by the student).

All the above mentioned points would be great-
The above functionalities would save time.

Student 2 (a, b, c and d points were ticked by the student).

SMS notifications would be a good idea, because we tend to check text messages more often than emails. It would be a useful facilitator.

Student 3 (a, b, c, d, f and g points were agreed).

I feel it is a good concept but can irritate some people if it is over excessive but if you could have options to select which ones you want notifications and you can turn them on and off.

Student 4 (a, b, c, d, e, f and g points were agreed).

Moodle is an extremely long process, having an apps for tutorial sessions, lecture reminders and notifications would be beneficial.

Student 5 (a, b, c and d points were agreed).

These points would be to regular and get annoying it would be only important information in the SMS, not information about broken lifts and meetings.

Q-3: What do you think are the key limitations to mobile devices being used in Higher Education?

- a) Overall device size,
- b) Keyboard size,
- c) Screen size,
- d) Data costs,
- e) Wireless/ network reception

Student 1 (only point 'j' was agreed).

I can't check my Moodle / University portal while outside.

Student 2 (a, c and e points were agreed).

Limitations to mobile devices used in HE may affect negatively out use of it. We might not be able to do things which could for exactly cause delays in doing a particular things (e.g. we may not prepare for the tutorials)

Student 3 (a, b, c and d points were agreed)

Internet connection and screen size are key issues as it prevents easy use to carry out notes and research.

Student 4 (a, c and d points were agreed).

Screen size, on computers you split the screen and have multiple items on at the same time whereas a mobile is too small and the processor cannot handle that much information.

Student 5 (c and e points were agreed).

Without good reception it can be useless to be used in education environment screen size must be large.

Q- 4: Please answer the following questions on regards to helping us to plan and possibly deliver a student mobile services at the University.

1- How mobile technologies may be used in future; Would it be a beneficial to relevant projects at the University?

1-a) Could these devices become part of a Virtual Learning Environment? How?

1-b) Could they form part of a classroom learning experience?

E.g. can mobile internet/ text messaging be used as a virtual learning channel by faculty?

Student 1

1-a) Yes, they could become part of a virtual learning environment/ such as participating in skype group discussions, watching lectures in real time or saved on Moodle.

1-b) Yes, we could make notes on mobile devices, do excel exercises on laptops/Ipad's etc. In general, the enrichment of university's teaching by downloading video records of lectures, letting students do group works together via skype would be very helpful. But, it would only complement not replace a traditional teaching.

Student 2

1-a) It could be a good idea to record the lectures and tutorials that students could not be able to attend because of serious reasons. Plus it could be a useful recap for exam preparations.

1-b) Virtual learning could not replace the class experience as during the tutorials we can ask the tutor things that we don't understand and ask for explanation.

Student 3

1-a) Yes, apps to access the library reminders of deadlines and tablets to be rent out.

1-b) Definitely but only to enhance the learning experience not to replace the physical contact aspect as this communication that you learn through socialising is needed to get a job.

Student 4

1-a) no comments were made by the student for 1-a.

1-b) To a certain extent technology could enhance education but not replace as this would result in a much lazier experience.

The hands-on experience of university is worth it but having everything online would remove the essence of socialising and education as a whole.

Too much technology can cause less motivation in students.

Student 5

1-a) University could subsidise the cost of mobile devices to be used by students. Then students could rent the devices as long-term use.

1-b) Revision, pre-reading reminders, networking with other students on the course, and messaging tutors on the go.

CLOSING STATEMENT

Finally, I would like to thank you all for taking part in this focus group and for your time. I would like to assure you that your responses will be kept completely confidential. The outcome of this research will be combined with other focus group meetings and will be presented in academic publications. If anyone would like to receive the outcome of this survey, please contact me on a.i.ersoy@krc.ac.uk. The completion of this research is expected to be published in 2015.

Appendix 8-A): Focus Group Interview With The 3-Year Students

Focus Group Interview With 3rd Year Business Students At The University, Mixed Gender

(Date: 23rd October 2012 At 1pm, Venue: Qa238, 50 Minutes).

Introduction

Thank you for agreeing to participate in this focus group. The purpose of this focus group is to learn about your current use of mobile technologies as well understanding your expectations for the future use of mobile technologies in education. I also would like your opinions about how mobile apps should be used for educational purposes.

Your comments are completely confidential. Your name will not be associated with any comments you make. My colleague John, will be recording all the ideas and comments we discuss today and we will be combining this information with ideas collected from other focus groups. This is an opportunity for you to share what is important to you. I encourage you to speak up. I also encourage you to speak about yourself and your own experiences. There are no right or wrong answers, please feel free to be totally honest. Do you have any questions or concerns? It is important that everyone has an opportunity to share their ideas. So I may call upon you to discuss your views, or ask that you allow someone else to speak who may not have had an opportunity to share their ideas.

Question and Responses

Q-1 Do you have a smart phone? If yes, what do you use it for?

Student 1 Yes, I have smart phone and I use the mobile apps generally on transportation and games related mobile apps.

Student 2 Yes- many mobile apps I use and they are related with daily things such as reading BBC news, some radio apps etc.

Student 3 Yes- some mobile apps Facebook; social media communications etc.

Student 4 Yes- transport for London

Student 5 Yes- I do for booking taxis, etc.

Student 6 I use many apps but, none of them are academic related.

Student 7 I download the lecture materials or case studies to read before the tutorials. But, I can't fully read the materials due to the size of the screen.

Q-2: Which mobile functions would you consider to be useful in supporting your academic studies?

Student 1 I would use any helpful tool which makes my daily life easier to organise my academic work. Alarm reminder would be good to keep up with the upcoming coursework deadlines etc.

Student 2 Notifications from lecturers: timetabling changes, lecture room change notifications etc.

Student 3 I could use a timetable apps with my mobile device. Capturing Lecture notes and tutorial activities could be helpful for my revisions if the podcast quality is good.

Student 4 If done well mobile apps could be very useful to aid revision and exam preparation. Videos could also be very successful. Alarm reminder about coursework would be good to have as a functions one of the mobile apps. Using mobile device to view lecture podcasts.

Student 5 A function with a reminder on the upcoming coursework deadlines and exam revisions.

Student 6 Exam revision, alarm on coursework hand-in deadlines.
I can use the mobile device for self-testing with a small straight forward questions.

Q-3: If the university offered you SMS notification service would you use it?

Student 1 For notification an apps will be fine so you can check it when you want without getting any text or email.

Student 2 Only important notifications I would prefer to use an apps rather than using text.

Student 3 Would not want to be notified and bothered all the time by SMS about everything. It would be good if we could tailor and make what we want and don't want to receive.

Student 4 would not want to be bothered with many messages. Only would be related things such as: lecture / seminar room changes and timetabling changes and of course notification from the lecturer related with the exam revision or anything related with the tutorial activities.

Student 5 Notifications from lecturers: not junk or general notes- these should be email only.

Student 6 It is all about supply and demand. At the end you are able to delete them. it would be useful to have notifications from the lecturers or room changes, coursework deadlines reminders would be good. Instead of emailing SMS would be ideal to be informed with.

Q-4: what do you think about limitations of using mobile technologies in education?

Student 1 I guess it would be costly and current screen size would be a problem.

Student 2 Wireless network reception might be a problem. Of course current size again would be a negative element to use it long period.

Student 3 Typing is always problem due to its size.

Student 4 Agree with everyone.

Student 5 Some mobiles are small and therefore have trouble viewing items on the phone, however, most phones getting bigger, data costs can also be high.

Student 6 I think that the biggest problem is that it's size, even an iPhone and the new Nokia's size makes it harder to focus/ read for a long time.

Q-5: what do you think that mobile technologies could change the classroom learning experiences?

Student 1 Some students would definitely would need training due to lack of understanding so, the university needs to provide training.

Student 2 Should not replace personal classroom interaction. Especially one to one discussions with a tutor should not be replaced. However, additional materials such as podcast should be provided to enhance the learning activities.

Student 3 The apps must be adopted to our phones and technical specifications (data speed /cost) should be considered.

Student 4 As an additional learning resource notification service but in no way be replaced tutorials. podcasts may be a suitable alternative to lectures. However, tutorials should be very much stay as they are. Because we need the interaction with the peers and the tutors.

Student 5 During the tutorials perhaps we could use our mobile apps to take part in subject related quiz and perhaps some interesting games should be included in the tutorials. But, not replace the tutors.

Student 6 Podcasts should be good but not to replace the tutorials and lectures.

Q-6: What kind of suggestions would you make to senior managers which would help implement student mobile learning at the University?

Student 1 Simple university apps should include the subjects.

Also, should include the timetable, room changes/lecture room changes etc. job's availability and should be able to send an email to our tutors if we have any problem/ any enquiry.

Student 2 I agree, we need easy access to our tutors and should be able to send email/text straight away.

Student 3 Yes, I agree with the others, university should provide subsidised tools for the students. Financial support from the University is essential which I believe would encourage students to use more often.

Student 4 Definitely students should have subsidised mobile learning tools so, then we can all participate on that.

Student 5 Nothing else to add I agree that University needs to support students in gaining mobile devices.

Student 6 Agree, mobile interactive services should be standard across the University e.g. library, Moodle etc.

**Q-7: How important it is to you attend the lectures in person once the podcast are available for each course. Would you still attend the lectures?
How important it is to you attend the lectures in person once the podcast are available for each course. Would you still attend the lectures?**

Student 1 Podcast would enhance learning but, I would still attend the lectures and tutorials. Discussions are important to fully understanding the topic.

Student 2 I agree- podcast should not replace interaction with the lecturer. Supplementary subject content could be delivered by mobile device.

Student 3 If every course would have the podcast I would still attend the lectures to ask questions if necessary. I could follow the again in my own time.

Student 4 I would still need to discuss the subject with the tutor so, the podcast would not replace the traditional tutorial sessions. I feel they are very useful to discuss your opinion with the peer group and the tutor.

Student 5 Fees are so high, I would always attend the lectures to get value for money. Attending the lectures and tutorials keeps me motivated.

Student 6 I agree with all- I would definitely attend the classes even if the podcast are commonly used. Interaction with other students still helps with understanding the topic.

Q- 8: Are you happy with what university offers currently use of ICT in learning/teaching?

Student 1 Yes, I am very happy with have been offered by the University.

Student 2 Yes, I am also ok with what have been offered. Although, I would like to see more ICT linking in lectures and tutorial to be used for us to benefit more on our academic studies.

Student 3 Yes, I am very happy but, more focus on podcasting lectures would be good

Student 4 I agree with the others. We can use more ICT on our academic studies.

Student 5 I am happy with the offerings of the University. We have been offered Very useful resources for academic studies. Although, if we can use more that would be even better.

Student 6 Podcasts would be good to use for our academic studies especially for revisions.

Q- 9: In summary, how would you list the most popular mobile apps function that you would like to have it on your mobile device?

Student 1 I would like to have it for a date reminder for coursework/ exams etc. this is the first thing comes to my mind but, I am sure there are so many many functionalities would be very useful for academic use.

Student 2 Time management- informing us of coursework deadlines etc. would be very useful.

Student 3 Game related interactive mobile apps would be useful to help understanding of subject areas.

Student 4 Employability apps would be good for use to check if there is any suitable jobs are available for use apply to.

Student 5 I agree with everyone. I think each course should have mobile apps. However, these should have a standard format across all modules for ease of use and understanding.

Student 6 I think a mobile application would be great for us to use it for an exam revision etc. An app and it is whether in a form of a revision quizzes / tests or any other way for us to work for our revisions.

Student 7 I struggle with remembering the assessments deadlines e.g. coursework deadlines etc. so, It would be great to have an application where we can see all our assessments deadlines including coursework, presentations deadlines etc. So, yes an app for reminding us for the assessments would be great.

Appendix 8-B) Field Work With University Of Greenwich 3.Year Students

As previously conducted focus group interviews the author also conducted the same open-ended questionnaire the final year students to see whether if the different level of students' opinion were different than other students. The questions remained the same as the previous groups' questions. Again, previously mentioned that this was an opportunity for the author to identify any issues which could have been missed during the meeting.

(Please note that students' answers for the following questions were typed as seen without editing by the author).

Question and Responses

Q-1: Which of the following functions would you consider to be useful in supporting your academic studies?

- a) **Having an on-device course scheduler and tracking tool,**
- b) **Making or capturing course lecture notes on your device**
- c) **Capturing videos of lectures on your device,**
- d) **Alarm reminder for hand-in dates/group work sessions,**
- e) **A reader for reviewing and editing course material,**
- f) **Using your mobile device to view lecture podcasts,**
- g) **Using your mobile device for self-testing and revision**

Student 1 (a, d and g points were agreed).

These options I have ticked would be useful as an mobile applications
And especially for keeping up with deadlines and exam revisions.

Student 2 (All of the above points agreed by the student).

I would use any helpful tool which makes my daily academic
life easier, I am especially interested in the organizer.

Student 3 Only point d was agreed I can use the mobile device for
Self-testing with small flash question.

Student 4 (a, d and g points were agreed).

I could use a timetable apps to use on my mobile device.

Capturing videos could be helpful if the quality would be very good.

Student 5 (a, c, d, f and g points were agreed).

If done well mobile apps could be very useful to aid revision and exam preparation. Videos could also be very successful.

Student 6 (d and f points were agreed).

I am interested in Podcasts but, if they are high quality audio only

Q-2. Which of the following services would you subscribe to as part of a university-wide SMS notifications services.

- a) Lecture room change notifications,
- b) Reminders of course work hand-in dates
- c) Notifications from lectures
- d) Timetabling changes,
- e) Upcoming seminar notification, registration and ticketing
- f) Notification of possible employment
- g) Potential upcoming industry placements from GET

Student 1 (a, b, c and d points were ticked by the student).

Only important notifications I would prefer an apps rather than texts.

Student 2 (a, b, c and d points were ticked).

SMS notifications would be a good idea, because we tend to check text messages more often than emails. It would be a useful facilitator.

Student 3 (a, b, c and d points were agreed).

For notification an apps will be fine so you can delete it when you want without getting any text or email.

Student 4 (a, b, c and d points were agreed).

All the options I have ticked could be included in an application, so we get to choose when to open it and do not get led up with too much information.

Student 5 (a and c points were agreed).

Don't want to be notified and bothered all the time by SMS about everything. It would be good if we could tailor and make what we want and don't want to receive.

Student 6 (a, c and d points were agreed).

Notifications from lectures: not junk or general notes. These should be emailed only.

Q-3: What do you think are the key limitations to mobile devices being used in Higher Education?

- a) Overall device size,
- b) Keyboard size
- c) Screen size
- d) Data costs
- e) Wireless/ network reception

Student 1 (a, b, c and d points were agreed).

Student 2 (a, c and e points were agreed).

Limitations to mobile devices used in HE may affect negatively our use of it. We might not be able to do things which could for exactly cause delays in doing a particular things (e.g. we may not prepare for the tutorials)

Student 3 (only point 'a' was agreed)

Student 4 (a, and d points were agreed).

Student 5 (a, b, c and e points were agreed).

Student 6 (a and e points were agreed).

Q- 4: Please answer the following questions on regards to helping us to plan and possibly deliver a student mobile services at the University.

1- How mobile technologies may be used in future? Would it be a beneficial to relevant projects at the University?

1-a) Could these devices become part of a Virtual Learning Environment? How?

1-b) Could they form part of a classroom learning experience? E.g. can mobile internet/ text messaging be used as a virtual learning channel by faculty?

Student 1

1-a) Individual courses should have an apps.

1-b) Moodle apps –sync with your phone library apps –
much like Facebook, journal apps and job/employability applications.

Student 2

1-a) Easy access into Moodle and notification / timetable changes

1-b) No comments.

Student 3

1-a) You can log in and read your tutorial/lecture material
beforehand. It is positive.

1-b) No comments

Student 4

1-a) No comments,

1-b) Yes, but the apps must be adapted to our phones technical
specification (data speed/cost). Web apps/timetable apps/
reminder apps etc.

Student 5

1-a) Should not replace personal one to one tutoring but
could be a good provider for additional material.

1-b) My needs: simple apps on timetable, room changes,
job's available, area to easily send message to tutor.

Student 6

1-a) Yes, as an additional learning resource/ notification service
but in no way to replace tutorials. Podcasts may be a suitable
alternative to lectures.

CLOSING STATEMENT

Finally, I would like to thank you all for taking part in this focus group and for your time.

I would like to assure you that your responses will be kept completely confidential.

The outcome of this research will be combined with other focus group meetings and will be presented in academic publications. If anyone would like to receive the outcome of this survey, please contact me on a.i.ersoy@gre.ac.uk. The completion of this research is expected to be published in 2015.

Appendix 10: Research Methods Process Grid

Research Methods Process Grid For The Business School Teaching Staff						
Week of (date)	Research Method	Goals of this research	Who were the participants	Research sample size	How was it conducted	What was Accomplished
4th, 7th June 2012 & 30th November 2012	Survey Interviews	The preliminary study to understand staff views on their willingness and experience in delivering mobile learning in HE education	Academic staff	Total 8 academic staff: With different age groups 2x 61+, 2x 50-60, 2x 39-49, 2x 23-38	Questions were sent by email than discussed the answers	The outcome of the research will be helpful in identifying training needs and incentives to bring faculty along in terms of delivery mobile learning in HE
24 Jan. 2013	Questionnaire (closed format)	The awareness of their knowledge and their view on mobile device use	All academic staff		Google docs, Online survey emailed all	Capturing current technical knowledge, individual understanding of mobile learning concepts and willingness to participate
21st November 2012	Training Session	Make them aware of the wider use of mobile devices	Staff divided into two groups; A- Good with mobile apps, B- Little experienced with mobile apps	6 member of Business School academics	Staff invited was to Greenwich Campus, QA216	Identifying the current level of competence and understanding of the potential for mobile learning across BS faculty.
5th December 2012	Training - Follow up meeting 5th December 2012	Staff to discuss their view on how mobile devices enhance learning experience	The same staff who attended the training session	The same staff who attended the training session	Queen Mary Canteen	Captured the current views of academics about the needs for delivering and use of mobile learning in the classroom for a successful implementation.

Appendix 11: Interview Questions

Indicative Questions for the academic staff interviews

The interviews will start with the following introduction on mobile learning:

Mobile learning, or m-learning, describes a relatively new environment for learning which has been facilitated by the combination of advancements in wireless technology, mobile computing and intelligent user interfaces.

O'Malley *et al.*, (2003) define mobile learning as "any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies". The 2009 Horizon Report suggests that mobile devices will be widely adopted for learning in the next year - unsurprising given that UK mobile ownership now exceeds one per person. Smart devices (like iPhones and Blackberries) are capable of much more than calls, with features like web browsing, running of diverse applications and location awareness becoming standard.

Q.1. What do you understand about mobile learning & teaching?

Q.2. What is your experience with mobile learning and teaching?

Q.3. The mobile technologies are more than smart phones. Some researchers claim that there will be many different educational related mobile technologies used in future. How do you see future use of mobile learning and teaching in higher education?

3.1 How do you think it will reform the higher education the way that most of the universities function; let's say in ten year's time?

3.2. How do you think that our students may benefit from mobile learning and teaching?

Q.4. There are already numerous commercial and institutional e-Learning packages and 'apps' for students to install and access on the go.

4.1. As an educator how keen are you to exploit the change in the higher Education institutions?

4.2. Would you encourage students to use mobile devices for learning and teaching during your tutorial /lectures?

4.3. Have you experienced any students using their mobile devices in tutorials/lectures? If yes - what was the course topic and tutorial activity?

Q.5. What do you think the ethical problems could be for *students* with regards to Mobile learning & teaching?

Q.6. What do you think the ethical problems could be for the *educators* in teaching with regards to Mobile learning & teaching?

6.1. What do you think the educator's needs are in implementation of mobile learning and teaching?

Q.7. What could your recommendations be to senior management in HE (higher education):
The best way of implementation of mobile devices in learning and teaching?

Appendix 11-A): Transcripts of the Interview Participant (age group 23-38+)

(P1) Participant 1 35+

Indicative Questions For The Interviews

Q-1- What do you understand about mobile learning & teaching?

Mobile learning and teaching is about making resources available to students through the use of portable electronic devices. However, the key skill is to go beyond the standard material provided within courses and start creating a personal learning environment through the vast number of relevant resources available on the www.

Make Resources available to students

Personal learning environment

Gradually increases

Q-2- What is your experience (if any) with mobile learning and teaching?

I saw the initial stages of implementation of mobile learning technologies at the Open University. When I joined Greenwich the technology use was much lower but has gradually increased to the point that now students come in class and access all material electronically on their laptops and tablets.

Changing in student

Q-3- The mobile technologies are more than smart phones. Some researchers claim that there will be many different educational related mobile technologies used in future. How do you see future use of mobile learning and teaching in higher education?

The range of devices and the way these will be used will be an exciting new frontier for learning. As long as there are ways of controlling the quality of the learning material and reduction of technical glitches then knowledge transfer will come to stages where the students may need to train the educators on the use of some technologies.

Future is exciting

Control is essential

Students are fast learners

Q- 3-1) How do you think it will reform the higher education the way that most of the universities function; let's say in ten years' time?

Many universities resist joining the digital age. That may be correct for now in some sense and for some disciplines, but it will also be the minority voice in the future. In ten years' time resolving the issues of sustainable energy use and distribution may overpower some of the current barriers for a more widespread use of IT in learning as well as conducting business remotely.

Rejection from others

future is positive

Q-3- b) How do you think that our students may benefit from mobile learning and teaching?

An inexhaustible source of online information – the caution here needs to be as to how they can learn to critically evaluate the various sources they encounter.

Q-4- There are already numerous commercial and institutional e-Learning packages and 'apps' for students to install and access on the go.

Effective use
necessary

Q-4- 1) As an educator how keen are you to exploit the change in the higher education institutions?

Training needs

I am keen but time management and continuous development of additional skills may be an issue. I agree with continuous improvement but there are also limits as to how fast we can move forward. A sensible academic leadership agenda will need to consider these issues.

Acknowledgement

Q-4- 2) Would you encourage students to use mobile devices for learning and teaching during your tutorial /lectures?

Depends on topics

During discussions on certain topics students seem to be consulting various websites to enhance their replies through use of their laptops or when too visible, their smartphones. The funny thing is that they feel guilty if I look at them doing their quick research. They are surprised to find out that I encourage it. Learning has many different definitions in different world cultures and even in the 'global north' students still assume that using online resources constitutes some kind of cheating.

Encouraging

Student's
Perception

Q-4-3) Have you experienced any students using their mobile devices in tutorials/lectures? If yes - what was the course topic and tutorial activity?

Same as above.

Sustainable Transport, Passenger Transport, Transport Policy –

All these courses use discussions and debates during tutorials which are often enhanced by last minute news downloaded on iPhones etc.

Experienced in
tutorials

Q-5- What do you think the ethical problems could be for *students* with regards to Mobile learning & teaching?

Among other obvious problems is the fact that they may rely on constantly up to date information and only allow very brief time to understand an issue. Deep learning may be an issue for the past – or for those destined to produce the online learning material that the rest will be reading.

Current knowle
only

Prevent deeper
understanding

Q-6- What do you think the ethical problems could be for the *educators* in teaching with regards to Mobile learning & teaching?

Some misuse of time already exists as sometimes material uploaded on shared course sites are redundant by the time students get to access them. The use of more unreliable sources may also be an issue. Another point may relate to the fact that some students will not work well with this new learning environment.

**Misuse
Unreliable sources
Rejection from
students**

Q-6-1) What do you think the educator's needs are in implementation of mobile learning and teaching?

Better guidelines on what is considered good practice and more focused training.

Training

Q-7- What could your recommendations be to senior management in HE (higher education): *The best way of implementation of mobile devices in learning and teaching?*

An assessment of needs and demand is the only way to understand the drivers for implementation. There will be contextual factors involved – between departments, Schools, Universities, cities, regions, and countries. All these need to be taken into consideration for financial planning issues as well as the learning and teaching strategies. Also, the capability and capacity of staff and students is something that seems to be left out of the equation quite often.

Understanding ne

Working together

consistency

Resources planning

Appendix 11-B): Transcript of the Interview Participant (age group 23-38+)

(P2) Participant 2 35+

Indicative Questions For The Interviews

Q-1- What do you understand about mobile learning & teaching?

Mobile learning: Use of mobile phones (mainly smartphones) or tablet devices for aspects of learning (e.g. access to course materials, participation in student forum or participation in social media for aspects relating to the course) and also for supporting functions such as access to marks, timetable information and contact with the university administration.

Regarding the definition provided above, I find the former part harder to clarify.

Mobile teaching I assume would mean that both the instructor and the students are using mobile devices? If people answer students' emails on a smartphone while out of office, would this count as mobile teaching?

Q-2- What is your experience (if any) with mobile learning and teaching?

I don't use a mobile device myself as I prefer to use laptop/desktop for teaching work.

However, I have noticed that students use their phones/tablets to access some of the course materials during class.

Q-3- The mobile technologies are more than smart phones. Some researchers claim that there will be many different educational related mobile technologies used in future.

How do you see future use of mobile learning and teaching in higher education?

Q-3-1) How do you think it will reform the higher education the way that most of the universities function; let's say in ten years' time?

Probably more pressure for the lower ranking institutions will emerge. For instance, when Ivy league universities are already providing some of their course materials

online, it will become harder to argue for the traditional model of university education (campus based). We may also see more collaboration and joint curriculum development between institutions.

Q-3-2) How do you think that our students may benefit from mobile learning and teaching?

Most likely, students with non-university responsibilities will see increased benefits as they won't have to be on campus as much.

Keen to use

Identifying

Q-4- There are already numerous commercial and institutional e-Learning packages and 'apps' for students to install and access on the go.

**Needs for
standardisa**

Q-4-1) As an educator how keen are you to exploit the change in the higher education institutions?

I would be interested to test some applications provided it would be a transferable skill. Often, when there are many apps both commercial and institutional it is difficult to identify whether it is worth the time learning some of them and which ones. Standardisation and interoperability between the packages is probably at early stages?

Q-4-2) Would you encourage students to use mobile devices for learning and teaching during your tutorial /lectures?

Most likely in tutorials, as it would be difficult to check how students are using mobile devices during a lecture (for activities non-related to the course)

Tutorials only

Q-4-3) Have you experienced any students using their mobile devices in tutorials/lectures?

If yes - what was the course topic and tutorial activity?

I have noticed students using tutorials to access the case studies on moodle (in various courses, Value Chain Management , Quality management etc.). Some international students are using them for quick translation (in the innovation in action course, mostly). Also, sometimes students use their phone's camera to take a picture of the slides. That I find quite unusual since they know the slides are on Moodle.

Case studies

**Overseas
students use**

**Photo of lecture
notes**

Q-5- What do you think the ethical problems could be for *students* with regards to Mobile learning & teaching?

Not exactly an ethical problem but we should take into account that not all students have access to mobile devices such as smartphones.

**Access to
smartphone**

Q-6- What do you think the ethical problems could be for the *educators* in teaching with regards to Mobile learning & teaching?

It may blur the distinction between work /personal life. For instance, some people use blogs and social media for research purposes. How will it be clear when staff are communicating in personal capacity or in their role as educators? Also, potential issues of copyright though these still exist whenever a VLE is used.

Copyright

Q-6-1) What do you think the educator's needs are in implementation of mobile learning and teaching?

It would be better to observe examples of good practice from people in similar disciplines.

**Observing from
others**

devel
b
institutions.

Q-7- What could your recommendations be to senior management in HE (higher education):

The best way of implementation of mobile devices in learning and teaching?

I think senior management could promote an approach where staff can learn from others instead of defining the technology all staff are expected to follow.

Mentoring

However, some degree of consistency would still be needed.

Consistency

Appendix 11-C): Transcript of the Interview Participant (age group 39-49+)

(P3) Participant 3 46+

Indicative Questions For The Interviews

Q-1- What do you understand about mobile learning & teaching?

Mobile teaching and learning takes place 'on the move' implying that both learning as well as teaching, unlike orthodox practice, can take place even without the learner and the tutor being at the same place at the same time i.e., 'face to face'.

Q-2- What is your experience (if any) with mobile learning and teaching?

In my teaching experience over the past 6 years, I can clearly see the rapidly increasing use of learners as well as teachers on the use of mobile devices and a primary reliance on these devices as a means of communication. E.g.

- Increasing exchange of emails on the move with the use of smart phones. Further emails in general have provided students and tutors (myself) the platform to seek and provide feedback on their draft coursework and specific issues pertaining to them. It has provided myself a mode to provide students additional guidance, samples etc. with regard to their work.
- Increasing exchange of text messages via telephones and 'chat' services – information regarding absences, class room reallocation/cancellations, meetings etc.
- Brief conversation over the phone in times of need.
- Moodle platform to provide information pertaining to all students and discussion forum
- Emails, USB sticks and Moodle to access information/learning and teaching material on the move – e.g. home, classroom and laptop and iPads'

I believe The Online library to be a truly beneficial aspect of mobile access to learning and to be able to access this from anywhere, even the classroom to show students how it can be used is indeed a revolution.

Portability
learning

Reliance

Additional
guidance

Wide rang
use

Fast
communic

Portability

Library
services

Q-3- The mobile technologies are more than smart phones. Some researchers claim that there will be many different educational related mobile technologies used in future. How do you see future use of mobile learning and teaching in higher education?

Q-3-1) How do you think it will reform the higher education the way that most of the universities function; let's say in ten years' time?

The mobile devices will no doubt form a major or the only tool through which all exchanges between the teacher/school and the learner takes place apart from the actual classroom 'contact time' leading to a truly 'paperless educational environment'.

Even the classroom teaching will perhaps all be recorded and be made available not just after the event but even while it is being delivered so that those not attending due to some reason can be a part to it and perhaps even be able to contribute remotely to classroom discussions.

Currently the online library has limited access and no doubt in ten years' time 'every possible source will be made available online and more effective 'smart' search tools will be possible. Therefore in terms of information, communication and learning materials I believe mobile devices will take higher education to unprecedented heights. However, having greater and easy access does not naturally lend to better teaching and learning.

Q-3- 2) How do you think that our students may benefit from mobile learning and teaching?

The benefits can be derived from the description above e.g. access to all learning material, up to date information, interactive communication, and remote access to lectures/tutorials even while these are being delivered.

Q-4- There are already numerous commercial and institutional e-Learning packages and 'apps' for students to install and access on the go.

Q-4-1) As an educator how keen are you to exploit the change in the higher education institutions?

Yes, as long as they provide practical value and are a means to an end and not an end in itself.

Contact ti

Less phys
interaction

Paperless
environm

Smart sea
tools

Teaching
learning
concerns

Easy access

Updated
information

Quite keen

Q-4-2) Would you encourage students to use mobile devices for learning and teaching during your tutorial /lectures?

Based on above – yes

Q-4-c) Have you experienced any students using their mobile devices in tutorials/lectures? If yes - what was the course topic and tutorial activity?

As we are moving towards a ‘paperless environment’ we no longer provide printed case studies for discussion in the classroom. Students therefore use their iPad’s, laptops and even smart phones to refer to the case study. Further, a majority of Chinese students use their phone to interpret English terms that they do not understand.

Paperless is driving force.

Language app

Q-5- What do you think the ethical problems could be for *students* with regards to Mobile learning & teaching?

With the onset of the internet, plagiarism has already been seen to be a ‘problem’ area. With increasing access to ‘learning’ sources, including World-wide students’ works, the inclination of students to obtain ideas, opinions and thoughts of others and turn them into their ‘own words’ with smart devices which will no doubt be available, can be heightened. Further the sources available may be so much that unless and until smarter ‘plagiarism’ detection tools are invented, it may be a challenge for tutors to assess the actual similarity level with the current devices alone.

Plagiarism

Detection too

As more and more courses are moving towards making coursework as the main assessment method in higher education, there already are in the market numerous businesses functioning simply to sell student coursework with a guarantee for a first or a second depending on the payment amount. This is major ethical challenge.

Paid-for coursework

Q-6- What do you think the ethical problems could be for the *educators* in teaching with regards to Mobile learning & teaching?

Partly answered above.

Q-6-1) What do you think the ethical problems could be for students with regards to Mobile learning and teaching?

Educator should be oriented and trained to maximise the use of those tools and technologies that are definitely beneficial with a clear view to what the benefits are with specific devices. Just training them because it is a 'in-thing' will be futile.

Q-7- What could your recommendations be to senior management in HE (higher education): *The best way of implementation of mobile devices in learning and teaching?*

Each of these tools and applications should be analysed thoroughly for their true value in terms of learning and teaching and not be adopted as a 'fad'.

These should be used as a means to an end and not as an end in itself.

Educator train
For sp
devices

Device tes

Appendix 11-D) Transcript of the Interview Participant (age group 50-60+)

(P4) Participant 4 46 -60

INDICATIVE QUESTIONS FOR THE INTERVIEWS

Q-1- What do you understand about mobile learning & teaching?

I think of mobile learning as listening to podcasts and other activities that can be conducted anywhere and at any time using mobile enabled devices such as MP3 players, smart phones, Tablets and laptops. It can occur when the person has a few minutes to spare such as on the train/bus, sitting waiting for someone, even in school board meetings when the content of the meeting seems uninteresting or irrelevant.

Instant access

Mobility

Q-2- What is your experience (if any) with mobile learning and teaching?

I have no experience of mobile teaching but I use my down time in school board meetings to extend my studies. I use mobile learning whenever I have the opportunity and the need.

None
experience

Keen to us

Q-3- The mobile technologies are more than smart phones. Some researchers claim that there will be many different educational related mobile technologies used in future. How do you see future use of mobile learning and teaching in HE?

I think it will become more utilised in our busy lives.

Positive

Q-3-1) How do you think it will reform the higher education the way that most of the universities function; let's say in ten years' time?

I think mobile learning technologies will not change universities by themselves but will be an enabler for more SOL type educational strategies.
- "Get your MBA on the way to and from work"

**Not much
change
Increase online
learning**

Q- 3-2) How do you think that our students may benefit from mobile learning and teaching?

I think it will allow interaction in classrooms as well as out and about and should be encouraged but where this technology will take us is anybody's guess.

Positive

Q-4- There are already numerous commercial and institutional e-Learning packages and 'apps' for students to install and access on the go.

Very keen

Q-4-1) As an educator how keen are you to exploit the change in the HE institutions?

I am always open to new ways of learning, I am trying a new strategy for group work and collaborations on one of my courses.

Q-4- 2) Would you encourage students to use mobile devices for learning and teaching during your tutorial /lectures?

Yes.

Positive outlo

Q-4-3) Have you experienced any students using their mobile devices in tutorials/lectures?

If yes - what was the course topic and tutorial activity?

They do it all of the time in some of my courses already. It allows them to research and share in the tutorial.

Currently use

Q-5- What do you think the ethical problems could be for *students* with regards to Mobile learning & teaching?

No comments

-

Q-6- What do you think the ethical problems could be for the *educators* in teaching with regards to Mobile learning & teaching? No Idea

-

Q-6-1) What do you think the educator's needs are in implementation of mobile learning and teaching?

We will need training and continuous updating to the new technologies.
Some of us may be too old to adapt (not me of course).

Training

Q-7- What could your recommendations be to senior management in HE (higher education):

The best way of implementation of mobile devices in learning and teaching?

Tough one. I guess we should be introduced to new technologies and allow us to experiment with them and work out how WE can make them work for us.

Trial of technologies

Appendix 11-E) Transcript of the Interview Participant (age group 50-60+)

Q-1- What do you understand about mobile learning & teaching?

For me mobile learning refers to the use that students make of their smart phones, their laptops and iPads, the technologies that they carry around in their bags.

I think that, at the moment, they have quite powerful equipment that lets them transport their own work in a digital form as well as giving them instant access to information available for a particular course on the portal and to check issues such as hand in dates and their individual marks and transcript.

Q-2- What is your experience (if any) with mobile learning and teaching?

Not really any experience of personal mobile learning, although for academics transportable technologies that can use Wi-Fi are obviously very useful if you are at a conference, as you keep in touch with e-mails, and other university business, I think that being able to connect to the internet at any time or place is the most significant issue that these mobile technologies facilitate. In teaching situations you come across students using their mobiles all the time.

In lectures they use them to annotate your power points if these have already been put on Moodle. Some students ask if they can use their phone to record a lecture or tutorial – some do this without asking - these are very often students who do not have English as their first language. I've had students often taking photographs of the final feedback notes that I put on the screen at the end of a tutorial. They also bring an electronic version of written work for me to read through now whereas they used to always bring a paper version.

Administrative support

Accessibility

Portability

Connectivity

Q-3- The mobile technologies are more than smart phones. Some researchers claim that there will be many different educational related mobile technologies used in future. How do you see future use of mobile learning and teaching in HE?

I think all the soft technologies will still end up with only one hardware device because of the issues of carrying around more than one piece of equipment, although students are carrying iPads and laptops as well as their smart phone at the moment. The problem with phones is the screen size – as it is small it is not really easy to use for all learning needs – for working on drafts of essays etc. Also I'm not sure that the internet connections are always very reliable, or whether the screens are easy to read.

Q-3-1 How do you think it will reform the higher education the way that most of the universities function; let's say in ten years' time?

It's hard to predict as innovation in mobile technologies is really proceeding quickly. I also think that mobile phone technologies are actually very well adapted for their main use which is for talking and texting, I can't really see that if you want a small phone you can also get something that you can really use for integrated learning – which implies that the learning aspect may lie more in the future of the laptop or iPad which will continue to get smaller and lighter as the capabilities improve.

Q-3-2 How do you think that our students may benefit from mobile learning and teaching?

When everyone has a suitable mobile device there will be no more need for printed paper, and each individual will be able to access tutorial notes in digital form. In theory the students will have remote access could utilise SOL opportunities more easily. They will not necessarily need to be in the classroom. However, this conflicts with the School's idea that students need to be present to get good marks, and I don't think the pressures on students to attend will get any less. If future financial issues on the university result in cutting back student contact time, this could be supplemented by more on-line support.

Q-4- There are already numerous commercial and institutional e-Learning packages and 'apps' for students to install and access on the go.

Q-4-1) As an educator how keen are you to exploit the change in the higher education institutions?

Yes, but I would need training – I don't even have a smart phone myself

Q-4-2) Would you encourage students to use mobile devices for learning and teaching during your tutorial /lectures?

Yes, as outlined above my students do use mobile technologies in lectures, tutorials and face to face support sessions.

Q-4.c) Have you experienced any students using their mobile devices in tutorials/lectures? If yes - what was the course topic and tutorial activity?

Only, what I have answered in Q. 2.

Q-5- What do you think the ethical problems could be for *students* with regards to Mobile learning & teaching?

As mobile use gets more common, I think there will have to be a School wide policy on how they are used in teaching situations. Also students should be aware that they should ask permission if they want to record materials presented in a learning environment. I think that, in practice, individual lecturers will decide on their own attitude to the use of mobile technologies in the classroom.

Q-6- What do you think the ethical problems could be for the *educators* in teaching with regards to Mobile learning & teaching?

Same as 5 – also be aware of the needs of those students who do not have access to powerful technologies.

Q-6-1) What do you think the educator's needs are in implementation of mobile learning and teaching?

We will need some kind of training if we are going to make good use of available technologies, especially if there are more dedicated apps available.

Q-7- What could your recommendations be to senior management in HE (higher education): *The best way of implementation of mobile devices in learning and teaching?*

1. Decide whether this is something the School/university really supports
2. Become aware of how students are using these technologies at the moment in consultation with staff
3. Find out exactly what the trends might be both in use and in new applications.
4. Devise a strategy for monitoring the situation or for encouraging faster uptake and use of mobiles in teaching and learning.
5. Invest in any enabling technologies necessary to facilitate adoption and use
6. Communicate policy to the teaching staff with clear guidelines, support and training
7. Communicate to the students exactly what facilities are available and what the expectations are.

Additional The future of mobile learning by the Participant 5

I think we can expect rapid technological change relating to the functionality of mobile phones. There is a good argument for only needing to carry around one mobile device in which the phone, laptop, e-book reader, and tablet computers are rolled into one. Internet connection will become more reliable and I expect a lot of innovation relating to screen durability and resolution.

In terms of mobile learning, continual incremental innovation, and technology maturity can be expected to result in increased adoption and use. This will mean that the vast majority of students, and presumably lecturers will be using smart phones or their future variants. Such wide diffusion will open up real opportunities to incorporate types of mobile learning into the teaching activities in higher education. The lecturer would not necessarily have to be physically present to all students who could pick up a video transmission in real time of a lecture at whatever location they find themselves. This could really help part time students who could be allowed an hour off work, for example, to watch a lecture or who could record it to watch later. Lectures could become shorter to facilitate this type of engagement. Also – moving to a situation where lectures are being videoed and transmitted via the internet might require innovative thinking regarding the delivery of material – possibly we may need training in drama based techniques which would improve our teaching performance in the new medium.

Video telephoning could be used for tutors to talk on a face to face basis without the need for the student to come to the office.

Appendix 11-F): Transcript of the Interview Participant (age group 61+)

Q-1- What do you understand about mobile learning & teaching?

I see it as just an extension of learning technology and enabling 'opportunistic' learning.

Q-2- What is your experience (if any) with mobile learning and teaching?

None

Q-3- The mobile technologies are more than smart phones. Some researchers claim that there will be many different educational related mobile technologies used in future. How do you see future use of mobile learning and teaching in higher education?

Q-3-1) How do you think it will reform the higher education the way that most of the universities function; let's say in ten years' time?

I think it will become very extensive because of cost considerations.

Q-3-2) How do you think that our students may benefit from mobile learning and teaching?

I think it is a useful asset in increasing study opportunities but removes or at least dilutes the personal contact dimension in teaching.

Q-4- There are already numerous commercial and institutional e-Learning packages and 'apps' for students to install and access on the go.

Q-4-1) As an educator how keen are you to exploit the change in the higher education institutions?

Not very keen, I see it as useful contribution but expect it become the default method which for the reasons given above I do not favour.

Q-4-2) Would you encourage students to use mobile devices for learning and teaching during your tutorial /lectures?

Yes.

Q-4-c) Have you experienced any students using their mobile devices in tutorials/lectures? If yes - what was the course topic and tutorial activity?

Not for positive purposes but frequently as an entertaining alternative to listening to a lecture or participating in a tutorial.

Q-5- What do you think the ethical problems could be for *students* with regards to Mobile learning & teaching?

I can't see any ethical problems other than the existing ones of privacy and security. This may simply reflect my limited IT skills and the fact that I can't therefore anticipate problems.

Q-6- What do you think the ethical problems could be for the *educators* in teaching with regards to Mobile learning & teaching?

My answer has to be as above, Q5.

Q-6-1) What do you think the educator's needs are in implementation of mobile learning and teaching?

Effective training and reliable and user friendly software and hardware.

Q-7- What could your recommendations be to senior management in HE (higher education): *The best way of implementation of mobile devices in learning and teaching?*

Don't see them as simply a cost reducing tool, stage their introduction and pay particular regard to my points in 6.1.

Appendix 12: Workshop with the Academics/ Power-Point Presentation slides

Learning on the Move: New mobile technologies and the potential impact on students' learning
İdil Ersoy
 Doctorate researcher
 29th November 2012



BUSINESS SCHOOL
UNIVERSITY OF GREENWICH

RESEARCH INTEREST:

Mobile technology is a rapidly advancing technology sector, and research activities regarding its use are quite frequent.

This research will look into the possibility of using of mobile technology in enhancing classroom learning in higher education in classroom, improving literacy and student academic skills.

Developmental educators might, in the near future, look to mobile phones as a potential resource or classroom learning tool, rather than as a classroom distractor. Currently most mobiles phones are required to be switched off during the academic lectures, both in schools, and in higher educations. Mobile phones can, however, also be used as a learning platform to build on critical literacy skills for academic literacy tests etc....

BUSINESS SCHOOL
UNIVERSITY OF GREENWICH

Do you think we will ask students to...
Please Turn ON Your Mobile Phones!!!
For teaching purposes?

- Mobile devices should not just be seen as a distraction from learning, but can actually form an important part of the learning process.



BUSINESS SCHOOL
UNIVERSITY OF GREENWICH

Mobile Devices:
Constructive Not Destructive
 Do you agree?



BUSINESS SCHOOL
UNIVERSITY OF GREENWICH

How to interact with our students?



BUSINESS SCHOOL
UNIVERSITY OF GREENWICH

Are our students ready?



BUSINESS SCHOOL
UNIVERSITY OF GREENWICH

Appendix 13: Transcripts (Follow Up Meeting/Discussions)

Follow Up Meeting With The Business School *Academic Staff* At The University, Mixed Gender, Age: 35+60

Date: 5th December 2012 At 12pm, Venue: Qa216, 90 Minutes.

The selected member of academic staff were invited for a brief work shop on use of mobile technologies in education. After the power point presentation the participants were briefed on the following ethics procedure and discussion started at 12pm.

Introductions / Statement Of Purpose And Confidentiality

Thank you for agreeing to participate in this focus group. The purpose of this focus group is to learn about your current use of mobile technologies as well understanding your expectations for the future use of mobile technologies in education. I also would like your opinions about how mobile apps should be used for educational purposes.

Your comments are completely confidential. Your name will not be associated with any comments you make. The session will be recorded so, then I can transcribe the discussion for analysis. This is an opportunity for you to share what is important to you. I encourage you to speak up. I also encourage you to speak about yourself and your own experiences. There are no right or wrong answers, please feel free to be totally honest. Do you have any questions or concerns?

It is important that everyone has an opportunity to share their ideas. Thus, I may call upon you to discuss your views, or ask that you allow someone else to speak who may not have had an opportunity to share their ideas.

Question and Responses

Q-1 What are your concerns in terms of using mobile devices in education?

Staff 1 Security, data protection. There is no control what students might be recording and how they may use it negatively.

Researcher: do you think that would be the only concern.

Staff 3 Yes definitely, the university is using mobile learning but, they are taking lead on as controlling students how and where to link up with their sides students in their teaching they need to be controlled and staff needs to be protected especially with the copy right issues etc. They you can record things where we would not have much controlled on what they record and use.

Staff 2 I would not want students to record my lectures/ tutorial. as they might use it for other purposes, which I would not know.

Staff 4 I agree with other colleague, students may be put use it unethically such on they may use it out of contest in social media etc. For example my students know my sense of humour but, other people might take it differently perhaps understand it wrongly.

Q-2- How Would You Feel About Teaching In A Virtual Environment?

Staff 2 I have done that before. I gave an online lectures. But, I did not like it. that wasn't very satisfactory for me as I did not get whether student very clear about the slides. I like the interaction with the students.

Researcher: Do you think you would support student's use of mobile device use:

Staff 1 There should be some uninformative on that in terms of it related compatibility.

Staff 2 But, this can easily be done.

Staff 4 Yes, I would not have problem. It can be done.

Researcher: How do you think the idea could be implemented?

Staff 2 Probably some of the compatible interface with other devices may work. University to consider interface issues to provide it to everyone. Each classroom should have it.

Staff 4 Yes, each classroom should have it.

Staff 2 We need training. University should provide effective training to educators.

Staff 1 Yes, training would be essential.

Q-3- Which mobile functions would you consider to be useful in supporting your academic studies?

Staff 1 Some certain applications could be useful. We don't need start from the beginning.
We need to see what is out there so, then we can continue from that point.

Staff 2 You can use blog case study to analyse on the screen. It may be a good idea.

Staff 1 I think that would be a good idea.

Staff 3 It might be a good idea that some students don't like talking in front of the tutorial. so, it would give them opportunity to communicate via mobile device which would be beneficial for the students.

Researcher: any other exercise we can use in classroom?

Staff 2: You may say to each group you may ask them to link their mobile device to present or do any group activities.

Staff 4: They are linking their devices in the, it is a bit futuristic.

Q-4- Do You Think Mobile Learning Is Futuristic?

Staff 4 it is a good idea but, there are ethical issues. Mobile device ethical issues.
People might not like it. Staff /educators won't like it. I would not it.
It needs to be controlled.

Staff 2 Moodle copy right issues might be a problem.

Staff 1 You may not be aware that students are recording your lectures.
It would be a problem.

Staff 2 Yes, agree. I would not like it.

Staff 3 Loads of student on my Facebook. Which I don't like it. They can see everything.

Staff 2 You don't want to accept them if you don't want

Staff 4 Other universities are using it. but, they are ethical issues they the university covered well. We need to consider it as well.

Staff 4 Mobile is personal and it need to be used carefully.

Q-5- Many Other Academic Institutions Are Started Using Smart Devices For Academic Purposes. Do you think we should also consider it?

Staff 4 It has got positive sides. But, ethical issues e.g. people can copy for teaching materials etc.

Staff 2 If somebody want to use it as long as I have not been pushed or push students to use it, it is ok. It should start slowly with training and preparations etc.

Staff 4 I have no problem with it and I think we should consider it.

Staff 1 Technology is moving fast. 10 years ago, things that considered private are now not private any more. Baring this mind we need to consider the ethical issues such as security, data protection, copy rights etc.

Staff 4 The security is a major problem.

Staff 2 I agree with all but, it needs to be controlled.

Q-6- Let's focus on the positive side of using mobile learning. In summary we said it can be used in many areas. So, what do you think?

Staff 2 Go away and they are already on the internet.

Staff 3 Sometimes, interface might be easier. The university system is complex perhaps mobile can be used to make it easier as it is not easy to use it.

Staff 4 It has got positive sides. But, ethical issues e.g. people can copy for teaching materials etc.

Staff 2 If somebody want to use it as long as I have not been pushed or push students to use it, it is ok. It should start slowly with training and preparations etc.

Staff 4 I cannot think at the moment as I need to think and perhaps read more about the topic to be able to see how can they be used. Personally, I think I need more time to adapt the change. I need to be given training and be educated in regards to use of mobile technologies.

Staff 1 It can be used in many areas but, we still need to consider the ethical issues such as security, data protection, copy rights etc.

Staff 4 They could be used for tutorial activities where we could interact with the students by asking them to use their devices to take part in discussions.

Apps used to support learning

Issue of students without access to smart phones

Training identified
Price consideration

Linked to employability passport
Subject related activities

Staff 2 We could use it for exam revisions; I am sure students would appreciate it – as any exercise related with the exam they like it. Perhaps this way they also like the idea of using mobile devices for exam preparations.

Q-7- What do you think the educators needs are during the implementations of mobile learning?

Staff 2 Mobile technology won't be replacing the classic teaching. it can enhance the change. This is not going to be quick.

Staff 4 Mobile learning has potential and it will be used in the future more.

Staff 1 I need someone to talk about the subject and inform us in regards to how to use it. But, I would want to be part of it hence, I would not be happy if I feel I was force Into use it. I would help to implement it and be proactive with it. Overall, I do not have any problem with it. I would want to use it.

Staff 3 I think you have to have some understanding in regards to it is benefits. You have to have training and discussions group so forth before using it.

Q-8- Would you be interested if someone to give a lecture/training on mobile learning?

Staff 2 No, I would not like formal lectures. The info should be shared I do not want anyone to tell me what to do. I need to understand it in my own time. Hence, senior management should understand our own work load also.

Staff 2 It needs to be in interesting for the both parties.

Staff 3 Yes, needs to be interesting.

Staff 2 we should all learn it same way. it is very simple.

Staff 1 I would be interested in training sessions but, they need to be interesting and interactive.

Staff 2 I want someone to tell me actual things that I would need.

Staff 3 They need to show us how can use it on our courses first then we can see the benefits e.g. case studies would be beneficial.

Staff 4 I think training sessions would be most useful; if it is done efficiently.

Staff 3 Efficient training sessions are essential.

Podcast would not replace the lectures and tutorials

Podcast could support distance students

Agree with use of i

Q-9-What would make you to use mobile devices in teaching for you as educators?

Staff 2 I firstly need to like the idea start with so, I consider if it is for me to use the technology.

Staff 3 If there is encouragement and available resources such as training sessions by the University I would then use it.

Staff 4 If I believe that it has been done and benefited from other institutions and also Some training sessions provided along with valid resources available then I would use it.

Staff 1 Yes, I agree with others.

Staff 4 Moodle is not popular by students. So, I believe students would be interested In mobile learning as they are already familiar with many different mobile applications.

Staff 1 Students are already very advanced. So, we should be considering it before it is late. We have to feel comfortable with the tools as in this case we will be delivering with the use of tools.

Staff 2 I have no problem with learning how to use the tools and using new technologies but, firstly I need to understand the benefits. Especially how my students could benefits by using these tools.

Staff 3 Sure- with some of the colleagues, if there is an encouragement from the University And available resources and training sessions provided then I would be using the Tools in my teaching.

RESERACHER:

Finally, I would like to thank you all for taking part in this focus group and for your time.

I would like to assure you that your responses will be kept completely confidential.

The outcome of this research will be combined with other focus group meetings and will be presented in academic publications. If anyone would like to receive the outcome of this survey, please contact me on a.i.ersoy@ere.ac.uk. The completion of this research is expected to be published around 2015.

Informing student o
deadlines
Game related
Employability
related
Exam preparation

Appendix 14-A): Academic Staff Questionnaire

Learning on the Move: New mobile technologies and the potential impact on students' learning

As part of my Doctoral research on mobile learning technologies, I am carrying out this research focusing on understanding how new mobile technologies can enhance the learning experiences for students. The objective is to identify the potential for using such technology and to identify the possible ways to implement mobile technologies. Below is the survey which could help to increase our understanding of the potential for future learning experiences of students and to increase our understanding of the educators' point of view regarding the use of mobile technologies in education. The survey should take no more than 7-10 mins. of your time. The data captured are kept confidential and are maintained securely under the terms of the University ethics guidelines and the UK Data Protection Act (1998) - Taking part in this survey indicates your agreement to participate in this study. For further information or to make a query please contact me on ja15@gre.ac.uk .

Many thanks in advance for your support.

Ms. Idil Ersoy

1. How many hours a day do you use your mobile device to access the internet? *

- More than 7 hours a day
- 5-7 hours
- 2-5 hours
- less than 2 hours
- Don't use it

2. What make of mobile device do you have? *

- Nokia
- Samsung
- HTC
- Apple Iphone
- Blackberry
- Ericsson
- Motorola
- LGC
- Sony
- Other

3. Which Operating System does your mobile device use? *

- Android
- Blackberry OS
- IOS
- Windows
- Symbian
- Bada
- Other
- Don't know

4. What mobile apps/functionality do you use on your mobile device? * Please tick as many as is appropriate.

- GPS (navigation) Enabled Apps
- Social (Facebook etc.) Networking Apps
- Messaging Apps
- Camera enabled Apps
- Gaming Apps
- Web browsing
- Other
- I don't use any apps

5. In which activity do you most often engage using your mobile device? * Please tick as many as is appropriate.

- SMS/ MMS
- Phone calls
- Email
- Web browsing
- Apps related activities
- Other

6. Do you feel comfortable installing any kind of mobile apps on your mobile device? *

- Uncomfortable
- Somewhat Uncomfortable
- Not Sure
- Somewhat Comfortable
- Confident

7. Do you think it is worth learning about the use of mobile apps for academic activities? *

- No
- Probably not
- Not sure
- Probably
- Yes

8. Would you like to learn how to use mobile apps for academic purposes? *

- Yes- definitely
- Possibly
- Not sure
- Definitely not

9. Would you be interested in attending a workshop to explore how mobile apps can be used to support learning/teaching? *

- No
- Yes
- Not sure

10. After an appropriate training session, do you think you would be comfortable using mobile apps for teaching/learning purposes through your mobile device? *

- Uncomfortable
- Somewhat uncomfortable
- Not sure
- Somewhat comfortable
- Confident

11. Do you use your mobile device to access the University library? *

- Often
- Occasionally

Not at all

12. Do you think that mobile apps could be used to provide the following in an academic environment? * Please tick as many as is appropriate.

- Announcements (Assignment due? Class cancelled?)
- Discussions board
- Blogs (Read blog posts and interact with classmates by posting comments on their blogs or responding to comments on your own.)
- Tasks (start and finish of a project/ coursework etc.)
- Tutorial List (Roster) (Wondering who's in your class?)
- Journals articles (Read and reflect on your Journal posts)

13. Do you feel that the use of mobile apps for teaching/learning would improve overall student success in delivering your courses? * Please tick as many as is appropriate.

- No
- Probably not
- Not sure
- Probably
- Yes

14. Do you have any experience or observations (if any) with mobile learning and teaching? * Please tick as many as is appropriate.

- I have seen some students using accessing Moodle, course materials etc. via their phones
- Encouraged students to use their mobile technologies to access course materials during tutorials
- I sometime login to Moodle via my mobile technology.
- None
- Not really interested

15. Do you agree that mobile communications usage will increase (next 5 years+) within the academic environment at the University of Greenwich? *

- No
- Probably Not
- Not Sure
- Probably
- Quite likely
- Very likely

16. Please indicate which of the following statements you agree with? * Please tick as many as is appropriate.

- Mobile technology can enhance flexibility and access to learning and teaching.
- Mobile technology in learning and teaching can support effective dissemination and sharing of good practice within the school.
- The financial costs need to be considered before mobile technology is implemented as part of learning and teaching.
- Training and support needs to be provided to ensure staff and students are up to date with current mobile technologies.
- In the next 3-5 years students will be using mobile apps as an everyday part of their learning at HE.

17. Do you agree that when using mobile apps, academics require one or more of the following: * Please tick as many as is appropriate.

- Training
- A willingness to learn
- Understanding of current technology
- The University will need to provide funding for a suitable mobile learning platform
- Encouragement from University Management
- Don't know

18. In which department, office or subject area do you work? *

- Accounting & Finance
- International Business & Economics
- Human Resources & Organisational Behaviour
- Marketing, Events & Tourism

- Systems Management & Strategy
- Other

19. How long have you been working as an academic? *

- A year or less
- 2-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- 21 years +

20. Please indicate your age group * Age range

- 23 -34
- 35 - 44
- 45 - 54
- 55 - 64
- 65 or over

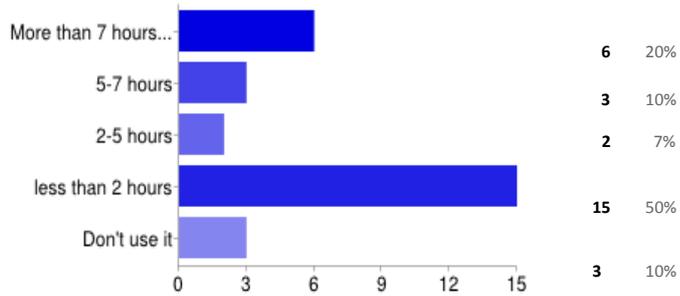
21. Please indicate your gender *

- Male
- Female

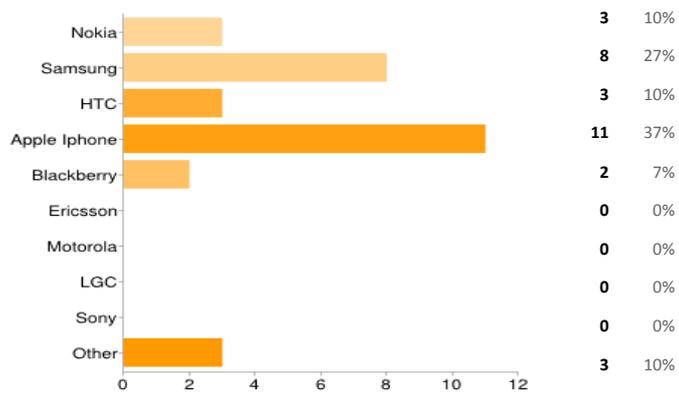
22. Please add very briefly, your overall comments concerning mobile learning in higher education.

Appendix 14- B): Academic Staff Questionnaire Survey Outcomes

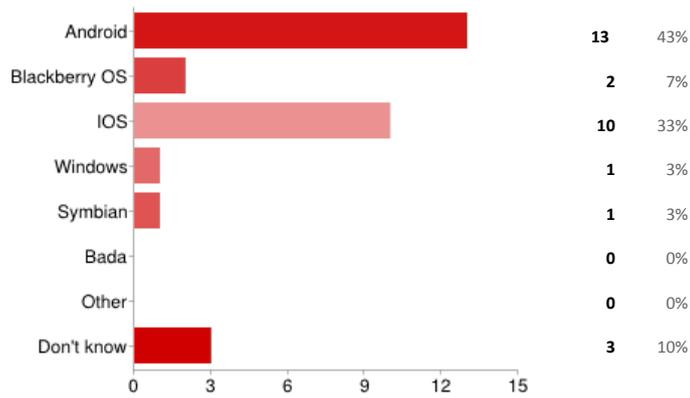
1. How many hours a day do you use your mobile device to access the internet?



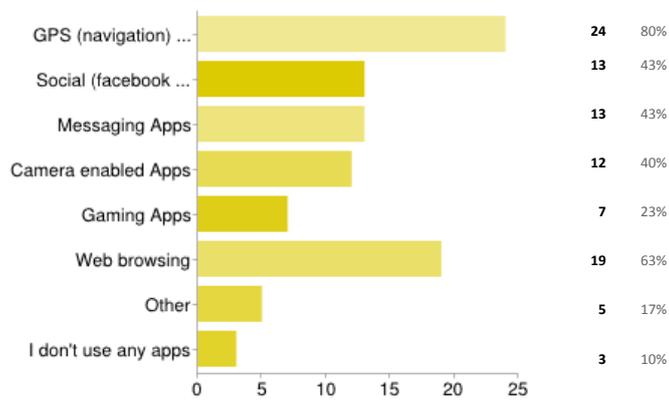
2. What make of mobile device do you have?



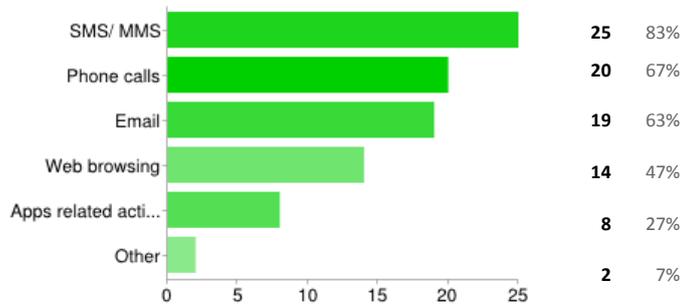
3. Which Operating System does your mobile device use?



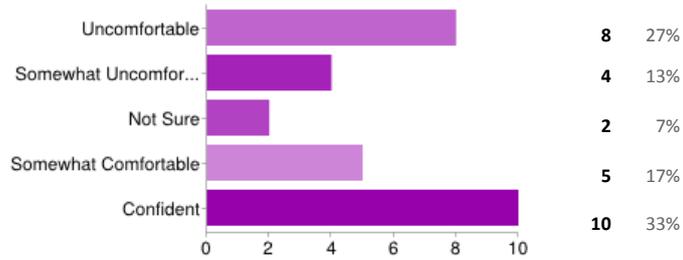
4. What mobile apps/functionality do you use on your mobile device?



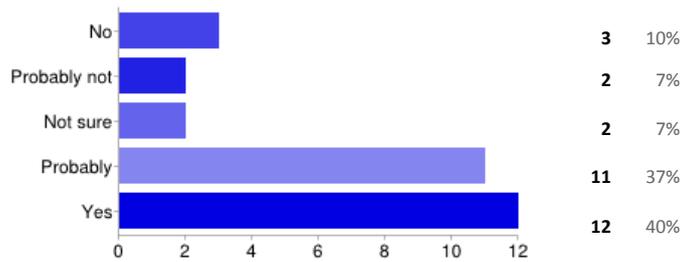
5. In which activity do you most often engage using your mobile device?



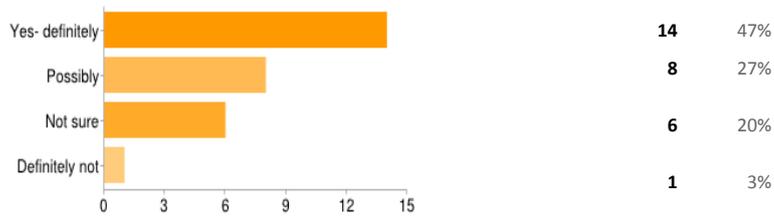
6. Do you feel comfortable installing any kind of mobile apps on your mobile device?



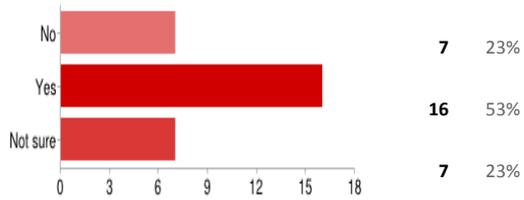
7. Do you think it is worth learning about the use of mobile apps for academic activities?



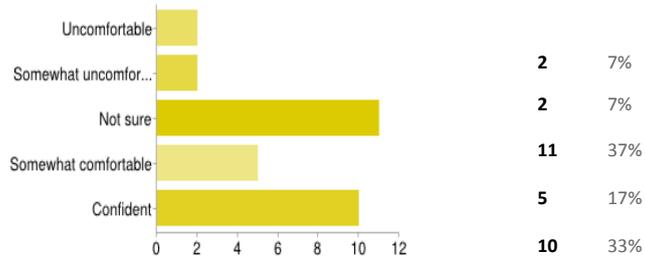
8. Would you like to learn how to use mobile apps for academic purposes?



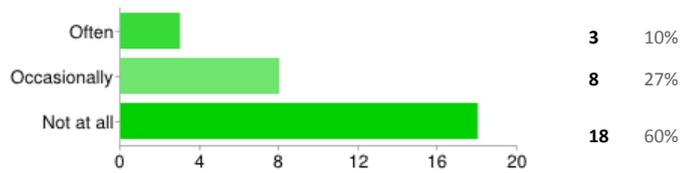
9. Would you be interested in attending a workshop to explore how mobile apps can be used to support learning/teaching?



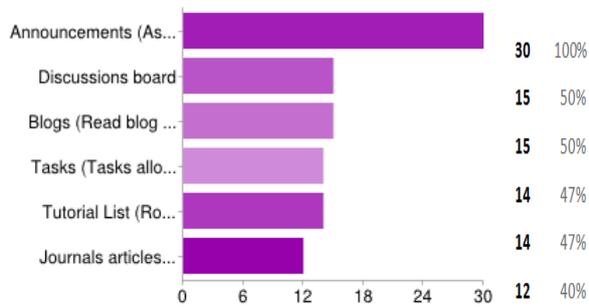
10. After an appropriate training session, do you think you would be comfortable using mobile apps for teaching/learning purposes through your mobile device?



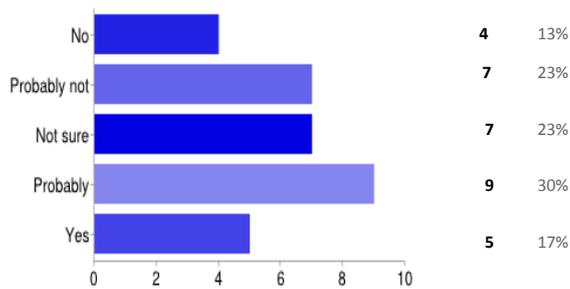
11. Do you use your mobile device to access the University library?



12. Do you think that mobile apps could be used to provide the following in an academic environment?



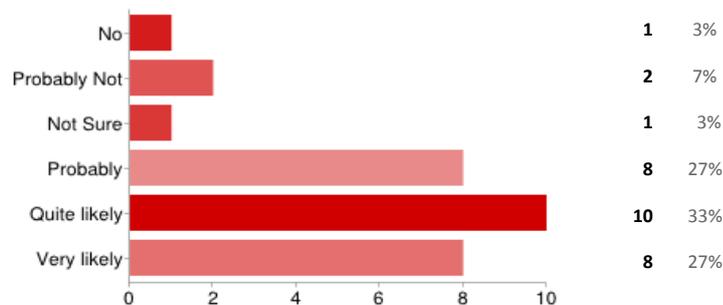
13. Do you feel that the use of mobile apps for teaching/learning would improve overall student success in delivering your courses?



14. Do you have any experience or observations (if any) with mobile learning and teaching?

I have seen some students using accessing Moodle, course materials etc. via their phones	19	63%
Encouraged students to use their mobile technologies to access course materials during tutorials	7	23%
I sometime login to Moodle via my mobile technology.	9	30%
None	9	30%
Not really interested	1	3%

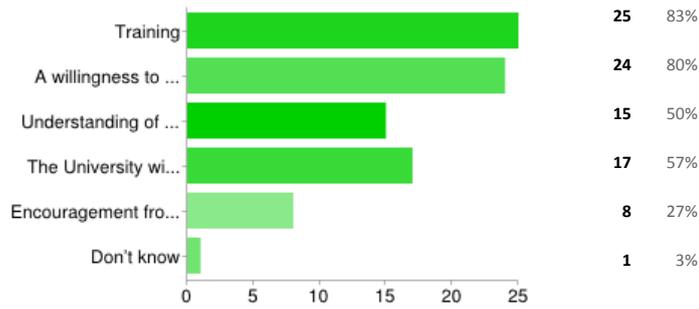
15. Do you agree that mobile communications usage will increase (next 5 years+) within the academic environment at the University of Greenwich?



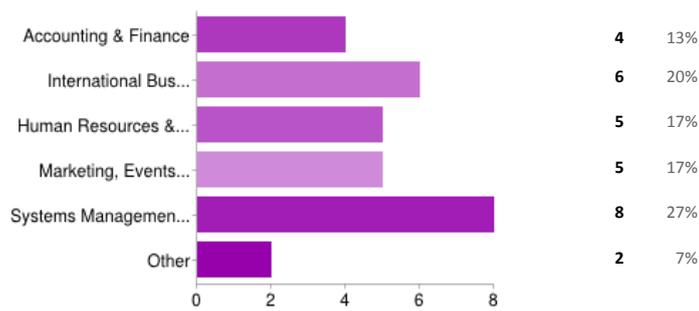
16. Please indicate which of the following statements you agree with?

Mobile technology can enhance flexibility and access to learning and teaching.	20	67%
Mobile technology in learning and teaching can support effective dissemination and sharing of good practice within the school.	11	37%
The financial costs need to be considered before mobile technology is implemented as part of learning and teaching.	10	33%
Training and support needs to be provided to ensure staff and students are up to date with current mobile technologies.	15	50%
In the next 3-5 years students will be using mobile apps as an everyday part of their learning at HE.	11	37%

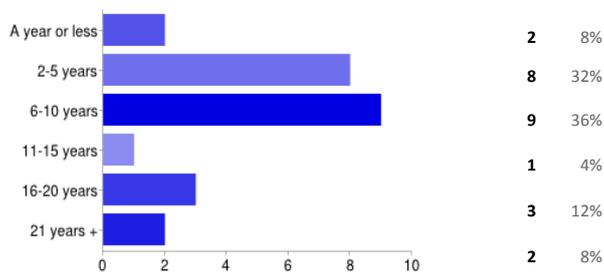
17. Do you agree that when using mobile apps, academics require one or more of the following:



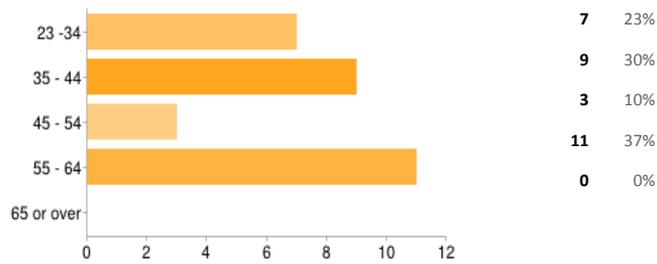
18. In which department, office or subject area do you work?



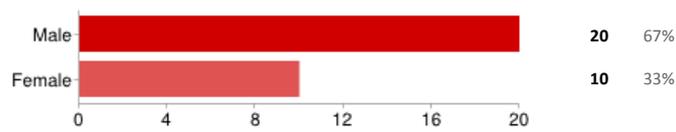
19. In which department, office or subject area do you work?



20. Please indicate your age group



21. Please indicate your gender



22. Please add very briefly, your overall comments concerning mobile learning in higher education.

excellent future-Excellent-Students are already using their mobile apps to record, access and capture data from their learning environments. -Academic staff will have to adapt to this situation and become more expert themselves. -It will not necessarily improve student attainment but will change their learning needs. -Moodle may need to be redesigned for effective use if mobile use is encouraged, worth considering this when developing our sites each year, how students may view them. I think that the kind of communication that mobile devices foster - quick, brief, often informal

Appendix 14-C) Chi-square tests Outcomes (SPSS)

Crosstab

		9. Would you be interested in attending a workshop to explore how mobile apps can be used to support learning/teaching?				
		No	Not sure	Yes	Total	
21. Please indicate your gender	Female	Count	1	1	8	10
		Expected Count	2.3	2.3	5.3	10.0
		% within 21. Please indicate your gender	10.0%	10.0%	80.0%	100.0%
		% within 9. Would you be interested in attending a workshop to explore how mobile apps can be used to support learning/teaching?	14.3%	14.3%	50.0%	33.3%
		% of Total	3.3%	3.3%	26.7%	33.3%
	Male	Count	6	6	8	20
		Expected Count	4.7	4.7	10.7	20.0
		% within 21. Please indicate your gender	30.0%	30.0%	40.0%	100.0%
		% within 9. Would you be interested in attending a workshop to explore how mobile apps can be used to support learning/teaching?	85.7%	85.7%	50.0%	66.7%
		% of Total	20.0%	20.0%	26.7%	66.7%
Total	Count	7	7	16	30	
	Expected Count	7.0	7.0	16.0	30.0	
	% within 21. Please indicate your gender	23.3%	23.3%	53.3%	100.0%	
	% within 9. Would you be interested in attending a workshop to explore how mobile apps can be used to support learning/teaching?	100.0%	100.0%	100.0%	100.0%	
	% of Total	23.3%	23.3%	53.3%	100.0%	

Chi-Square Tests

	Value	df	Asymp. Sig. (2- sided)	Monte Carlo Sig. (2-sided)		
				Sig.	99% Confidence Interval	
					Lower Bound	Upper Bound
Pearson Chi-Square	4.286 ^a	2	.117	.144 ^b	.135	.153
Likelihood Ratio	4.527	2	.104	.144 ^b	.135	.153
Fisher's Exact Test	3.797			.144 ^b	.135	.153
N of Valid Cases	30					

a. 4 cells (66.7%) have expected count less than 5. The minimum expected count is 2.33.

b. Based on 10000 sampled tables with starting seed 2000000.

Appendix 15-A): University of Greenwich Research Ethics Policy

1. Scope and Purpose

1.1 The aim of the University of Greenwich Research Ethics policy is to encourage a high quality research and enterprise culture, with the highest possible standards of integrity and practice. The policy applies to all academic, contract research and administrative staff, all postgraduate research students, as also undergraduate and masters students who are undertaking research. In short, the policy applies to all disciplines and research activities within the University, or sub-contracted on its behalf.

1.2 All staff and students are expected to act ethically when engaged in University business. Any research involving animals, human participants, human tissue or the collection of data on individuals requires ethical consideration. While particular attention must be paid to the interests of potentially vulnerable groups, such as children, the University recognises that it has a duty of care towards *all* members of the wider community affected by its activities. The University also recognises that it has a duty of care to its own staff, and that this includes the avoidance of harm to those undertaking research.

1.3 The University has established a framework for research ethics governance in which its Research Ethics Committee, a Committee of Academic Council, has a central approval, monitoring and training role. It is, however, recognised that it may not always be appropriate or practicable for ethical approval to be sought from the Research Ethics Committee – see the Guidance on Ethical Approval for Research. Where this is the case, the Faculty or Department must have formal, documented, procedures in place to ensure good practice and accountability. In particular, university staff have an obligation to ensure that not only their own research but any undergraduate or masters student research conducted under their supervision is ethically sound. Where research projects are subject to external approval, such as the NHS or professional bodies, the Faculty or Department responsible must ensure that this approval is sought and given. Where approval for a project has been given by a Research Ethics Committee at another university, as may be the case with a collaborative project, the University of Greenwich Research Ethics Committee must be provided with proof of this.

2. General Principles

2.1 The University Research Ethics Policy is based upon widely accepted principles and practices governing research involving human participants. The key elements are:

- Minimal risk of harm to participants and researchers;
- Potential for benefit by society;
- Maintenance of the dignity of participants;
- Minimal risk of harm to the environment;
- Voluntary informed consent by participants, or special safeguards where this is not possible;
- Transparency in declaring funding sources;
- Confidentiality of information supplied by research participants and anonymity of respondents;
- Acknowledgement of assistance;
- Appropriate publication and dissemination of research results;
- Independence and impartiality of researchers.

3. The Definition of Human-Related Research

3.1 All human-related research which includes one or more of the following require ethical assessment and approval at the appropriate level:

1. Direct involvement through physically invasive procedures, such as the taking of blood samples
2. Direct involvement through non-invasive procedures, such as laboratory-based experiments, interviews, questionnaires, surveys, observation
3. Indirect involvement through access to personal information and/or tissue
4. Involvement requiring consent on behalf of others, such as by parents for a child participant

4. Vulnerable Participants

4.1 Some participants may be particularly vulnerable to harm and may require special safeguards for their welfare. In general, it may be inappropriate for undergraduates to undertake research projects involving such participants.

4.2 Particularly vulnerable participants might be:

1. Infants and children under the age of eighteen
2. People with physiological and/or psychological impairments and/or learning difficulties.
3. People in poverty
4. Relatives of sick, or recently-deceased, people
5. People with only a basic/elementary knowledge of the language of the researcher

5. The Legal Framework, the Role of Professional Associations, and Research Councils

5.1 All research undertaken under the auspices of the University of Greenwich must meet statutory requirements. Of particular relevance is the *Equality Act (2010)*, as well as

the *Race Relations Act* (1976), the *Disability Discrimination Act* (1995), the *Human Rights Act* (1998), the *Data Protection Act* (1998), as also the requirement for Criminal Records Bureau clearance for those working with children and provision within the existing legal framework for those working with vulnerable adults. All research involving National Health Service patients and staff must be reviewed by the appropriate NHS Research Ethics body.

5.2 Researchers in particular disciplines should comply with any research ethics guidelines set out by their professional associations.

5.3 Research Councils, charitable trusts and other research funding bodies in most cases require an undertaking from grant applicants that research proposals involving human participants have been approved by the University Research Ethics Committee or another appropriate body. Some also require audited compliance with their guidelines.

Approved by Academic Council 20 June 2006 and Amended January and June 2007, and March 2012