SMART PHONE USE FOR LEARNING: A STUDY ON UNIVERSITY OF GHANA STUDENTS

EUNICE SARFOAH
(10206539)

THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MPHIL. COMMUNICATION STUDIES DEGREE.

MARCH, 2017
DECLARATION

With the exception of the quoted references and acknowledged sources, I hereby declare that this thesis is the result of my own research work undertaken under the supervision of Professor Kwasi Ansu-Kyeremeh at the School of Communication Studies, University of Ghana. I also declare that this thesis has not been presented to any other examining body for the award of another degree.

.......................................................... ..........................................................
Eunice Sarfoah                                           Professor Kwasi Ansu-Kyeremeh
(Student)                                               (Supervisor)

Date .......................................................... Date ..........................................................
ABSTRACT

This study was designed to find out the use of smartphones for learning among students in the University of Ghana. The main objectives pursued by this study was to investigate the adoption factors most relevant in student use of smartphone as a learning tool, and also to investigate the role of educators (lecturers) in students’ resolution to learning via smartphones, as well as investigate factors that inhibit the use of smartphones as a learning tool. In accomplishing the objectives above, the study adopted a survey to gather data from students across all the levels in the University. In total two hundred and fifty (250) students were sampled. Response rate for the study was about 97.6%. The study found significant statistical associations between all the smartphone adoption factors, i.e. performance expectancy, effort expectancy, social expectancy, facilitation conditions and students’ willingness and ability to learn with smartphones.

Again, the study found out that crucial to students’ resolution to use smartphones for learning is the role lecturers play. For example, students indicated they would use smartphones to learn on condition that it granted them access to resources online put there by their lecturers.

Finally, the study found that inhibiting factors moderate at least, the relationships between adoption factors like: performance expectancy; effort expectancy; and facilitation conditions, and students’ willingness and ability to learn with smartphones. By way of recommendations, the study recommends that the University should constantly ensure that IT systems are most of the time compatible with all the generations of smartphones, especially as it is a key facilitation condition. Again, the study recommends that the University should provide students with resources that are necessary to enhance smartphone learning. Regarding recommendations for future study; other researchers should attempt examining smartphone learning in other contexts, i.e. other Universities, as well as carry out a comparative study.
among the institutions so as to amply inform authorities on how smartphone learning can be integrated into the learning activities of Universities in Ghana.
DEDICATION

I dedicate this thesis to my dearest father Apostle Dr. Ing. Kwadwo Safo for supporting me in diverse ways to achieve the best that I can be in life.
ACKNOWLEDGEMENT

I am most grateful to Almighty God for His never ending love and protection throughout this academic programme. To my supervisor, Professor Kwasi Ansu-Kyeremeh I say God bless you for your fatherly love, attention and immense contribution towards the success of this work.

My sincerest appreciation also goes to all my lecturers and course mates at the School of Communication Studies, Legon. Both faculty and mates have been a family worth bonding with for eternity considering their advice and encouragement throughout the pursuit of this academic programme.

My heart goes out to my sweetest mother Obaapa Akua Yeboah for all the concerns, encouragement and good will. I wish to particularly say a big thank you to Kofi Nhyira Asare, O.T, Cosmos, Rev. Father Dieudonne, Aunt Vic and Elizier, Nicholas, Agyeiwaa, Sylvia, Kate, Augustine and Kwame: friends who are priceless, having contributed to make this thesis a success.

I pray the blessings of God on you all.
# TABLE OF CONTENTS

DECLARATION ...................................................................................................................................... i
ABSTRACT ........................................................................................................................................ ii
DEDICATION ...................................................................................................................................... iv
ACKNOWLEDGEMENT ....................................................................................................................... v
LIST OF FIGURES ............................................................................................................................ x
CHAPTER ONE ..................................................................................................................................... 1
INTRODUCTION ................................................................................................................................. 1
  1.0 Background of the Study ........................................................................................................... 1
  1.2 Problem Statement ................................................................................................................... 3
  1.3 Research objectives ................................................................................................................ 5
  1.4 Research Questions ................................................................................................................ 5
  1.5 Significance of the Study ......................................................................................................... 5
  1.6 Organisation of the Study ....................................................................................................... 7
CHAPTER TWO ................................................................................................................................... 8
THEORETICAL FRAMEWORK ........................................................................................................... 8
  2.0 Introduction ............................................................................................................................. 8
  2.1 Technology adoption theories ................................................................................................. 8
    2.1.1 Theory of Reason Action (TRA) ....................................................................................... 8
    2.1.2 Technology Acceptance Model (TAM) ........................................................................ 10
    2.1.3 Unified Theory of Acceptance and Use of Technology (UTAUT) ................................ 13
  2.2 Selected Theory and Justification ............................................................................................ 16
CHAPTER THREE ............................................................................................................................... 17
LITERATURE REVIEW ..................................................................................................................... 17
  3.0 Introduction ............................................................................................................................. 17
  3.1 Mobile Learning: M-Learning ............................................................................................... 17
  3.2 Smartphone: An Evolutionally Perspective ......................................................................... 19
  3.3 Harnessing the Potentials of Smartphones as a Learning Device ....................................... 20
  3.4 Inhibitors of Smartphone Learning ...................................................................................... 22
  3.5 Unified Theory of Acceptance and Use of Technology: The Pioneering Work ................ 24
    3.5.1 Studies that have applied the UTAUT Model ............................................................... 26
  3.6 Conceptual Framework .......................................................................................................... 29
    3.6.1 Hypotheses Development ............................................................................................ 30
i. Performance Expectancy ................................................................. 30
ii. Effort Expectancy ................................................................. 32
iii. Facilitation Conditions ................................................................. 33
iv. Social Expectancy ................................................................. 34
v. Lecturers’ Role ................................................................. 35
vi. Inhibiting Factors ................................................................. 35

CHAPTER FOUR .............................................................................. 37

METHODOLOGY ............................................................................. 37

4.0 Introduction .............................................................................. 37

4.1 Research Design ......................................................................... 37

4.2 Research Approach ..................................................................... 38

4.3 Sources of Data ........................................................................... 39

4.4 Study Population ......................................................................... 39

4.5 Sampling Procedure and Sample for the Study ........................................ 40

4.6 Method of Data Analysis and Presentation .......................................................... 41

4.6.1 Analysing Data Quantitatively ............................................................... 41

i. Frequency Distribution Analysis ...................................................... 41

ii. Mean Value Ranking Analysis ....................................................... 42

iii. Chi-Square Test Analysis ............................................................ 42

iv. Regression Analysis ................................................................. 42

4.7 Reliability Test ............................................................................. 44

4.8 Ethical Considerations ................................................................... 46

CHAPTER FIVE .............................................................................. 47

PRESENTATION AND ANALYSIS OF FINDINGS ........................................... 47

5.0 Introduction .............................................................................. 47

5.1 Demographic Characteristics of Respondents ........................................... 47

5.1.1 Gender of Respondents ............................................................. 47

5.1.2 Age of Respondents ............................................................... 48

5.1.3 Educational Level of Respondents ............................................... 48

5.1.4 Frequency of Respondents’ Smartphone Usage ................................ 49

5.1.5 Purpose for Respondents’ use of Smartphones ................................... 50

5.1.6 Respondents’ Extent of use of Smartphones for Learning .................. 51

5.2 Adoption Factors most relevant in Student use of Smartphones as a Learning Tool .... 52
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2.1 Performance Expectancy</td>
<td>52</td>
</tr>
<tr>
<td>5.2.2 Effort Expectancy</td>
<td>53</td>
</tr>
<tr>
<td>5.2.3 Social Expectancy</td>
<td>55</td>
</tr>
<tr>
<td>5.2.4 Facilitation Conditions</td>
<td>56</td>
</tr>
<tr>
<td>5.3 Educators (Lecturers’) Role in Students’ Resolution to Learning via Smartphone</td>
<td>57</td>
</tr>
<tr>
<td>5.4 Factors that inhibit Smartphone as a Learning Tool</td>
<td>62</td>
</tr>
<tr>
<td>5.5 Hypotheses Testing</td>
<td>69</td>
</tr>
<tr>
<td>5.5.1 Performance Expectancy &amp; Smartphone Learning Test</td>
<td>69</td>
</tr>
<tr>
<td>5.5.2 Effort Expectancy &amp; Smartphone Learning Test</td>
<td>70</td>
</tr>
<tr>
<td>5.5.3 Facilitation Condition &amp; Smartphone Learning Test</td>
<td>72</td>
</tr>
<tr>
<td>5.5.4 Social Expectancy &amp; Smartphone Learning Test</td>
<td>73</td>
</tr>
<tr>
<td>5.5.5 Lecturers’ Role &amp; Smartphone Learning Test</td>
<td>74</td>
</tr>
<tr>
<td>5.5.6 Inhibiting Factors moderating relationship between Adoption Factors &amp; Smartphone Learning</td>
<td>76</td>
</tr>
<tr>
<td>DISCUSSION OF RESULTS</td>
<td>78</td>
</tr>
<tr>
<td>6.1 Introduction</td>
<td>78</td>
</tr>
<tr>
<td>6.2 Discussion of Results</td>
<td>78</td>
</tr>
<tr>
<td>6.3 Revisiting the Conceptual Framework</td>
<td>81</td>
</tr>
<tr>
<td>CHAPTER SEVEN</td>
<td>82</td>
</tr>
<tr>
<td>SUMMARY, CONCLUSION AND RECOMMENDATIONS</td>
<td>82</td>
</tr>
<tr>
<td>7.1 Introduction</td>
<td>82</td>
</tr>
<tr>
<td>7.2 Summary of Findings</td>
<td>82</td>
</tr>
<tr>
<td>7.3 Conclusion</td>
<td>85</td>
</tr>
<tr>
<td>7.4 Recommendations</td>
<td>85</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>86</td>
</tr>
<tr>
<td>APPENDICES</td>
<td>94</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 1: Reliability Test........................................................................................................45
Table 2: Reliability Test cont’d ........................................................................................45
Table 3: Gender Distribution of Respondents to the Study ..............................................47
Table 4: Age Distribution of Respondents to the Study ...................................................48
Table 5: Frequency Distribution of Respondents’ Educational Levels ............................48
Table 6: Frequency of Respondents’ Smartphone Usage ..................................................49
Table 7: Respondents’ use of Smartphone for Learning ....................................................50
Table 8: Learning Materials Sourced .................................................................................50
Table 9: Extent of use of Smartphones for Learning .........................................................51
Table 10: Mean Values of Responses for Performance Expectancy ..................................52
Table 11: Mean Values of Responses for Effort Expectancy ............................................54
Table 12: Mean Values of Responses for Social Expectancy ............................................55
Table 13: Mean Values of Responses for Facilitation Condition .......................................56
Table 14: Mean Values of Responses for Facilitation Expectancy ....................................62
Table 15: Mean Values of Responses for Inhibiting Factors ............................................66
Table 16: Usefulness of Smartphones by Format of Content ...........................................67
Table 17: Lecturers’ Encouragement by Students’ Willingness to Use Smartphones ..........68
Table 18: Active Usage of Smartphone for learning By Smartphone for learning enhances my effectiveness on learning activities .................................................................70
Table 19: Active Usage of Smartphone for learning By I find Smartphone learning easy ..................71
Table 20: Active Usage of Smartphone for learning By The University’s I.T systems are compatible with smart devices including Smartphones .............................................72
Table 21:Active Usage of Smartphone for learning By Most of my colleagues use Smartphone in learning, and expect me to do same .....................................................74
Table 22: Active Usage of Smartphone for learning By I would use Smartphone for learning if it grants access to academic resource put online by lecturers ........................................75
Table 23: Summary of Regression Results .......................................................................77
LIST OF FIGURES

Figure 1: Technology Acceptance Model (TAM) ................................................................. 11
Figure 2: Constructs of UTAUT ................................................................................................. 15
Figure 3: Conceptual Framework: Smartphone Learning Adoption ........................................... 30
Figure 4: Using smartphone for learning enhances my effectiveness on learning activities ....... 53
Figure 5: Find Smartphone Learning Easy .................................................................................. 54
Figure 6: Most of my colleagues use Smartphone in learning and expect me to do same ........ 55
Figure 7: University’s I.T systems are compatible with smart devices ....................................... 57
Figure 8: Using Smartphone for Learning if it is recommended to me by my Lecturers ............ 58
Figure 9: Use Smartphone for learning if granted online access by Lecturers ......................... 58
Figure 10: Use Smartphone if Lecturers told us it could improve Academic Performance ...... 59
Figure 11: Use Smartphone for learning if Lecturers would respond to Queries on it ............. 60
Figure 12: Would use Smartphone for Learning if my Lecturer(s) consider it useful ............... 60
Figure 13: Lecturers have not been helpful in the use of Smartphone as a Learning Tool ....... 61
Figure 14: Connectivity is not always stable .............................................................................. 63
Figure 15: Screen and Keyboard Size makes Smartphone uncomfortable for Learning .......... 63
Figure 16: File/Formats of Contents sometimes do not support Smartphone Browsing .......... 64
Figure 17: The Phone Can Freeze During Important Learning Moments .............................. 65
Figure 18: Intruding Calls may come in during Learning ......................................................... 65
Figure 19: Revised Conceptual Framework for the Study ......................................................... 81
Figure 20: Revised Conceptual Framework for the Study ......................................................... 84
CHAPTER ONE

INTRODUCTION

1.0 Background of the Study

In many emerging economies, including Africa, the increasing take-up of mobile phones and its related technologies has become an important issue that has not escaped scholarly attention (Anderson & Billou, 2007; Aker & Mbiti, 2010; Au & Kauffman, 2008; Kalba, 2008; Thakur & Srivastava, 2013; Van der Boor et al. 2014; Wyche & Steinfield, 2015; Fang et al. 2016). According to the International Telecommunication Union, nearly 60 percent of the world population has access to mobile phones (ITU, 2008). The same report notes that there are now more mobile phone users in the developing countries than in the developed ones (Henry & Quansah, 2013), with the ‘millennial’ population at the heart of the mobile application revolution (Cobcroft et al. 2006; Jacobs, 2009; Harris & Junglas, 2012; Yang & Kang, 2015; Stokes, 2016).

Indeed, no generation is arguably more at ease with online, collaborative technologies than today’s young people, ‘digital natives’ who have grown up in an immersive computing environment. Where a notebook and pen may have formed the tool kit of prior generations, today’s students come to class armed with smart phones, laptops and iPods (The Economist Intelligence Unit, October, 2008, p 5). Emphasizing the accessibility of smart phones in the facilitation of learning, Porter et al. (2016) put forward that the “smart phone is now an essential accoutrement of ‘cool’ youth, whether they are rich or poor; even in very remote rural areas, basic mobile phones are increasingly accessible to (if not owned by) young people” (p.23).

Fryer and Bovee (2016) perhaps put up the strongest defence yet as to why it is essential for educators to embrace technological platforms like the smart phone as a way of fruitful engagement. The authors contend that learning itself is a complex endeavour that necessitates
a synergy of sustained cognitive, behavioural and affective engagement, and that for any inroads to be made; educators are obligated to employ every available resource to ensure sufficient exposure to learning materials which includes the use of smartphone for learning.

Reminiscent of its name, a smartphone is a mobile phone that offers advanced capabilities, often with PC-like functionality which is not only limited to making voice calls (Lee, 2013), but also, offer a more advanced computing ability and connectivity with other features such as icons or tiles that present information and provide application access (Santoro & Lagermann, 2004), bundled up with operating systems that manage cellular and wireless network connectivity to the internet (Dinh et al. 2013).

It also offers users the freedom to jailbreak or root some devices through the system and the ability to run software, commonly known as “apps” that deliver highly practical and tightly focused functionality (Louw & von Solms., 2015). These features without a doubt make smartphones ideal gadgets for learning. Additionally, the easy access and the relatively inexpensive price tags of many emerging smartphones (Porter et al. 2016), allow for increased audiovisual engagements by readily making available materials that may hitherto not have been easily available for easy viewing (Fryer & Bovee, 2016).

With e-learning technologies shaping how educational content is consumed today (Ahmed, 2010), one cannot deny that students born in the digital and mobile age would be approaching learning from a very different perspective than their predecessors. Indeed, learners are increasingly using smartphone technologies and its related tools to not only construct, but, also, share knowledge in new, interesting and interactive ways (Pollara, 2011; Kim 2005; Woodcock et al. 2012). Across Africa, and the world, many universities are integrating e-learning platforms into their educational curriculums as a means of not only enhancing the students learning experience (Deng & Tavares, 2013), but also as a way of staying
competitive (Mazzarol & Soutar, 2012), and University of Ghana is no exception. Indeed, in its ICT Strategic Plan for 2005-2010, one of the tenets of the document spelt out that the University is determined to integrate ICT into teaching and learning thereby enhancing students’ access to learning and other materials via multimedia platforms (University of Ghana, 2007).

Recently, the University has launched the University of Ghana Integrated Mobile Learning Platform for distance education and provided distance students with an internet enabled mobile tablets with pre-loaded course materials and other relevant applications (Tagoe, 2014). Given this backdrop, it is only logical that useful insights be shared on how or the extent to which the use of smartphones in learning at the University is shaping learning and content consumption on the campus. This study is highly justified, especially, given the arguably hefty investments that has gone into ICT specific (University of Ghana, 2007), and distance learning of the University in general.

1.2 Problem Statement

Mobile devices are becoming increasingly prevalent in a variety of fields. In the health service industry - a number of positives have been recorded with smartphones. Doctors, for example, are increasingly using their smart phones to access medical information like looking up information about drugs, investigating drug interactions and prescribing from their mobiles. A recent survey regarding physicians’ views with emerging technology found that 95 per cent of physicians that owned smart phones reported downloading applications to access medical information (Dolan, 2010). Similarly, in the pharmaceutical industry smartphones are now increasingly resorted to as a means of combating counterfeit drugs (M-Pedigree) whist helping patients follow and keep track on treatments (Curioso & Mechael, 2010). In communications, Journalists are also using the various functions of smart phones to
write, record audio and video, take photos and keep abreast of breaking news (Vaataja et al. 2009 cited in Pollara, 2011, p 4). In the economic sphere of life too, smartphones are increasingly being used to not only include the poor in financial services, but also, providing important decisional points to farmers on how to increase yield on produce (Batchelor et al. 2014).

The uses described above are among the various 21st century skills that researchers believe are becoming increasingly crucial for success in life and work (Partner for 21st Century Skills, 2011), and one which ought to be replicated in the academic setting. While efforts have been expanded in the understanding of for example; e-learning pedagogies (Govindasamy, 2002; Daspit & D’Souza, 2012; Keengwe, et al. 2014), attitudes (Link & Marz., 2006; Brown et al. 2009; Bertea, 2009; Ghadei & Rudd., 2015; Chong et al., 2016), knowledge management (Rosenberg, 2001; Lytras, Welsh et al., 2003; Naeve & Pouloudi, 2005; Lytras et al., 2005; Maier & Schmidt 2007; Palacios-Marqués et al., 2013; Levy & Ramim, 2015; Miller, 2016), and to factors that influence e-learning, christen in the literature as adoption factors(Sun et al., 2008; Park, 2009; Lee., 2010; Ndubisi, 2006; Bhuasiri et al., 2012; McGill et al., 2014; King & Boyatt., 2015; Boateng et al., 2016), relatively little interchange, arguably, has been seen by way of how smartphones per se helps in the e-learning process.

More importantly, for the few studies that have investigated the potential of smartphone in e-learning of educational institutions, there is evidence to show that most of these have been carried out in westernised European context (Tagoe, 2014), leaving educational institutions of emergent economies like University of Ghana that is making some strides in their e-learning segment largely unattended to (Tagoe, 2010). On this note, the study proposes to fill this research gap by shedding useful insights into smartphone learning in general. More specifically, the study bridges the research gap by detailing the factors that higher educational
set ups in emergent economies like University of Ghana would need to focus on in order to make smartphone learning on their various e-learning zones attractive to students.

1.3 Research objectives

From the problem statement, the following objectives are set for the study.

1. To investigate the adoption factors most relevant in student use of smartphone as a learning tool
2. To investigate the role of educators (lecturers) in students’ resolve to learning via smartphone
3. To investigate the factors that inhibit smartphone as a learning tool

1.4 Research Questions

Based on the objectives, the following research questions are pursued.

1. What are the factors most relevant in students’ decision to use smartphone as a learning tool?
2. Do educators (lecturers) have any role to play in students resolve to learn via smartphone.
3. What factors inhibit smartphone as a learning tool?

1.5 Significance of the Study

In Ghana, and many parts of the Africa, and the world, globalisation and technology are changing the fate of how business and in generality how things are done. These changes have not been immune (at least for now) from how educational services are delivered. Indeed, as alluded by Mazzarol and Soutar, (2012), discussion on higher education cannot be unpacked from the “global-national-local” character of higher education and the idiosyncrasies of
cross-border movements of talents and technologies (i.e., mainly online-delivery). Also Gopalan et al. (2011) in previous submissions posited that emergent economies including Africa stand to benefit the most from e-learning. By embracing e-learning platforms, the authors contend that, it narrows the educational access gap between the rich and poor, and also mitigates the challenges of lack of infrastructure, teachers, and, chiefly, cost which can be beneficial to poor communities. More importantly, for people who may have the financial means but little time, distance education or e-leaning offers have been proven to be a useful alternative to their educational access (Mazzarol & Soutar, 2012).

Giving, therefore that early research offers encouraging results for the use of mobile devices to support teaching and learning (Kukulska-Hulme et al., 2005; Kennedy et al., 2006; Yordanova, 2007 as cited in Pollara, 2011), coupled with the fact that favourable academic outcomes have been reported with mobile learning (ibid), together with the sheered number of mobile phone subscribers in emerging economies like Ghana (i.e., averaging 6.8 billion subscribers, ITU report, 2013), no doubt has implication for how educational services are delivered. Consequently, such a study can sign-post higher educational managers, marketers, and communication strategists alike on not only strategies to rack in high number of students into their learning sites, but most importantly, they would be able to know the various drivers of students smartphone learning behaviours, and be able to craft appropriate contents for attention. Additionally, the study has the added advantage of providing useful insights into vital information about how smart phones are changing the way students learn and think about learning. ‘Digital natives’ love entertainment, therefore if the same source can be used for learning then it becomes a springboard for academic discourse.
1.6 Organisation of the Study

This thesis is organised into seven chapters. Chapter one comprises a general introduction to the study and contains the background to the study, the problem statement, the objectives and research significance of the study and the chapter disposition. Chapter two focuses on the theoretical framework, chapter three is literature review, and a discussion of the theory underpinning the study with a conceptual framework that test hypothesised relationships. The fourth chapter is dedicated to the methodology of the study. Mainly, the chapter discusses the methodological approaches employed by the study and justification for their employment. Chapter five presents the findings of the study, including testing of the hypotheses while chapter six contains the discussion of the findings. Chapter seven sums up the findings; shows the limitations, recommendations and conclusions of the study.
CHAPTER TWO
THEORETICAL FRAMEWORK

2.0 Introduction

Researchers have long been concerned about why certain technologies diffuse to the public and have attempted to build theoretical models to understand and predict the acceptance and adoption of technologies. This chapter comprises a discussion of important theories in technology acceptance/ adoption. To analyse how the use of a new technology may be dependent on its acceptance, Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Diffusion of Innovation Theory (DIT) and the Unified Theory of Acceptance and Use of Technology (UTAUT) model reviewed, which eventually, led to one theory being chosen (UTAUT) as the most appropriate theory, with a strong justification why it was chosen and how it fits into the study.

2.1 Technology adoption theories

2.1.1 Theory of Reason Action (TRA)

The TRA, was originally introduced by Fishbein in 1967, and was later expounded/refined by the author and Ajzen in 1975 to explain customer behavioural intention. The theory which was originally developed to predict how humans take reasoned actions in ordinary life experiences, in areas such as birth control (Guo et al., 2007), has proven useful in many other disciplines including in the understanding of peoples’ take-up of new technologies. As argued by Sheldon (2016), TRA suggests that a person’s behaviour is determined by his/her intention to perform the behaviour, and that this intention is, in turn, a function of his or her attitude toward the behaviour and his or her subjective norm (p.270). Ajzen and Fishbein (1980) contend that the most accurate means that one can predict a person’s behaviour is to simply inquire about what they have purpose or intended to do, and consequently, match it with their
actual behaviour. Relying on the Theory of Reasoned Action as a conceptual map, Ajzen and Fishbein (1977) argued that attitudes toward behaviours have roots in the underlying beliefs concerning behaviours. Hence, attitudes result from a combination of beliefs about the characteristics of particular attitude objects and evaluations of these characteristics (Ajzen and Fishbein, 1977), in which intent plays a very important role, and categorised as the greatest predictor of whether or not someone will complete a specific behaviour or not (Ajzen & Fishbein, 1977).

In the literature on TRA, two important precursors (i.e., individual attitude and social norms) have been identified in the reason action-behavioural dimension, as having the strongest influence on individuals’ propensity to behave along a predictable pattern. Essentially TRA states that the two major determinants of intention are an individual’s attitude toward the behaviour and the pressures of subjective norms, as together, these precursors determine intent. Ajzen and Fishbein (1980) contend that in general, individuals will intend to perform a behaviour when they evaluate it positively and when they believe important “others” think they should perform it. Similar sentiment is voiced by Hassandoust et al. (2011) who argue that attitude explains the predisposition of a person to respond either favourably or unfavourably to self, others and the environment and has been shown to affect how people behave.

On the other spectrum, social norm defines the way one thinks others expect one to act. In the literature linking social norms with TRA, a number of information and communications studies have drawn a correlation or relationship between social norms and behavioural intentions (Mathieson 1991; Sánchez, et al. 2014; Doane et al. 2016).

In the domain of communication studies and the harnessing of technological platforms, several studies have utilized this theory in their empirical research. Limayem et al. (2000)
employed TRA, and provided evidence that friends, the media, and family members can affect user’s intention to behave in a certain way. In the area of education, Sánchez et al. (2013) set out to investigate whether it would be worthwhile for faculty to invest the time to integrate Facebook into their teaching. Employing a sample of 214 undergraduate students to identify the factors that may motivate students to adopt and use social network tools for educational purposes; the scholars’ established social influence to be most important factor in predicting the adoption of Facebook. Essentially, it was found that students are influenced to adopt Facebook to establish or maintain contact with other people with whom they share (educational) interests.

2.1.2 Technology Acceptance Model (TAM)

Technology Acceptance Model is an adaptation of TRA which was developed by Davis in 1989 to identify factors that facilitate integration of technologies into an organization and to discover motives behind acceptance or rejection of the technology. Based on adaptation of the theory of reasoned action as argued by Lindsay et al. (2011, p. 391), the theory suggests that when users are presented with a new piece of technology, a number of factors influence their decision about how and when they will use the technology.

In the technological acceptance literature two measurement yardsticks are employed to evaluate probable factors that could impact on adoption. These measures are: (1) perceived usefulness and (2) perceived ease of use. Davis (1989) states that perceived usefulness (PU) explains the extent to which the technology will enhance the user’s job performance, whereas its counterpart (i.e., perceived ease of use-PEU) relates to the extent to which using the new or identified technology is free from effort. Consequently, for higher levels of acceptance, the new technology must be one that is perceived to be useful to work performance, and, most definitely must be perceived by users to be easier to use.
In the past decades, however, a great number of changes have been witnessed as regards to TAM, with Wixom and Todd (2005), for example, coming out with extension of TAM in three main ways. In the first way, variables from a number of other models including PBC, SN, and TPB, have been included. Secondly, various alternatives or additional beliefs have been incorporated into the model; and lastly, external factors like demographic characteristics and personality traits that impact PEU and PU have been accommodated in the set up.

A follow up study of the author and colleague (Venkatesh & Davis, 1996) then defined perceived usefulness as the level to which an individual believes that using a particular technology can produce a better outcome compared to not using it. It has been established that the TAM theoretical model can be used to explain approximately 50% of the variance in technology acceptance level (Davis et al. 1992), whilst the model has further been modified and improved to include significant variables such as subject norms, experience and motivation (Venkatesh et al. 2003). However, despite the importance of TAM as a theoretical model, critics have taken a swipe at the model for sometimes giving inconclusive and inconsistent results (Ma & Liu, 2004).
2.1.3 Diffusion of Innovation Theory (DIT)

Since its introduction by Rogers in 1963, diffusion of innovation has been an important theoretical reference model and has been applied across large segments of disciplines, including education, communication, marketing, sociology, and, in the fields of information and technology (Venkatesh et al. 2003). DIT according to Rogers (1963) relates to a procedure through which innovation is communicated via a number of different channels during a particular period of time amongst members of a social system. Rogers’s theory is centred on four theoretical tenants popularly referred to as individual user characteristics. These are;

i. The innovation characteristics

ii. Communication channels

iii. Social systems, and;

iv. Time

However, since the focus of this study is on a smartphone as a learning device which happens to fall under innovations, the researcher focused on innovation given that it was most relevant in the context of this study. Rogers (1995, p.11) define innovation as “an idea, practice, or object that is perceived as new by an individual or another unit of adoption”. On the other wing, the author notes that diffusion is a process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 1995, p.5).

Putting the two together, therefore Agarwal (2000) articulated that the IDT theory involves how potential users make decisions to adopt or reject an innovation based on beliefs that they form about the innovation (p.90). In the view of Koenig-Lewis et al. (2010) and Lee et al. (2003), the IDT models exhibit the nuance curve(s) that a new technology must travel before eventual acceptance/adoption, hence, the IDT model argues that the adoption of a new
technological innovation requires time to digest by users. Within the innovation realm of IDT, Rogers (1995) posit that for a new technology to gain wider level of acceptance/Adoption the following perceptual factors must be fulfilled.

1. **Compatibility**: The degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters

2. **Relative advantage**: the degree to which an innovation is perceived as being better than its precursor.

3. **Complexity**: The degree to which an innovation is perceived as being difficult to use

4. **Observability**: The degree to which the results of an innovation are observable to others.

5. **Trialability**: The degree to which an innovation may be experimented with before adoption

In the literature, a number of studies have employed the IDT model to investigate technology adoption.

### 2.1.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

With growing technology needs in the 1970s and increasing failures of system adoption in organisations, predicting system use became an area of interest for many researchers. However, most of the studies carried out failed to produce reliable measures that could explain system acceptance or rejection (Davis, 1989). In 1985, Fred Davis proposed the Technology Acceptance Model (TAM) in his doctoral thesis at the MIT Sloan School of Management (Davis, 1986). He proposed that system use is a response that can be explained and predicted by user motivation, which in turn is directly influenced by an external stimulus consisting of the actual system’s features and capabilities (Chuttur, 2009). Venkatesh et al. (2003) synthesized eight user acceptance and motivation models to propose the Unified Theory of Acceptance and Use of Technology (UTAUT).
In particular, the UTAUT draws on the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model, the Theory of Planned Behaviour (TPB), the combined TAM and TPB, the model of Personal Computer Utilization, the Innovation Diffusion Theory (IDT) and Social Cognitive Theory (Venkatesh et al. 2003). Since its publication in 2003, UTAUT has been cited by a large number of studies. However, among the studies citing UTAUT, very few have implemented the full model probing all of its constructs (Williams et al. 2011). Venkatesh et al. (2012) also reported that their “…review of this body of work revealed that most studies using UTAUT employed only a subset of the constructs” (p.2), referring to the replications and applications of the theory.

2.1.4.1 Main assumptions or constructs of UTAUT

The UTAUT model consists of four main constructs:

- **Performance Expectancy**: The degree to which the individuals believe that the use of the technologies will result in performance gains. This may also be viewed as the perceived usefulness of the technologies.
- **Effort Expectancy**: The ease of use of the technologies
- **Social Factors**: The extent to which the individuals believe that important others believe that they should use the technologies.
- **Facilitating Conditions**: The perceived extent to which the organisational and technical infrastructure required for the support of the technologies exists.

The model also includes four moderating variables: age, gender, education and voluntariness of use. These are posited to moderate the impact of the four key constructs on usage intention and behaviour. In the UTAUT model, performance expectancy, effort expectancy and social factors have direct effects on behavioural intention, which along with facilitating conditions have direct effects on use behaviour. The effects of interactions of age and gender;
interactions of experience with each of effort expectancy and social factors; and an interaction of voluntariness of use and social factors on behavioural intention are also included.

Finally, there are effects of interactions of age and facilitating conditions and experience on use behaviour. The theory was developed through a review and consolidation of the constructs of eight models that earlier research had employed to explain information systems usage behaviour. Subsequent validation by Venkatesh et al. of UTAUT in a longitudinal study found it to account for an impressive 70% of variance in Behavioural Intention (BI) and about 50% in actual use.

Figure 2: Constructs of UTAUT

UTAUT Research Model

- Integrates elements across the above models
  - 4 core determinants of intention and usage,
  - 4 moderators of key relationship

2.2 Selected Theory and Justification

Technology adoption has witnessed overwhelming levels of scholarship, using varied theoretical models and frameworks. Key among these theories have been argued to be the Theory of Reasoned and Planned Action, the Innovation Diffusion Theory, the Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology, Institutional Theory among others (Ondago et al., 2012). However, Boateng et al. (2016) contend that in as much as the abundance of these theories is welcoming news, it nonetheless, poses some amount of difficulty in selecting appropriate theory. The authors, however, argue that guided by the level of analysis of the theory, one can clearly distinguish the respective theories.

In the words of the authors "...some theories are developed to study individual adoption, while others are developed to study organizational adoption” (Boateng et al. 2016, p.251). Since the study is more focused on an individual adoption “students”, it is only proper that the research tow that line. Within the ambit of individual technology adoption (), and more specifically literature spanning e-/distance learning shows an overwhelming support for UTAUT (), as it incorporates most of the technology adoption theories into its set up Venkatesh et al. (2012).
CHAPTER THREE
LITERATURE REVIEW

3.0 Introduction

The preceding chapter of the study reviewed some relevant theories on technology adoption and acceptance, and made a justification for UTAUT as the preferred theoretical model. This chapter focuses on the theoretical underpinnings of the study. In view of the objectives and theoretical parameters outlined in the previous chapter of this study, the chapter reviews relevant and contemporary literature on the concept of mobile-learning or m-learning. It looks at some empirics on smartphone as a learning device, some challenges in using smartphone as a learning device, and some empirics on studies that have employed UTAUT in technology adoption studies. The chapter finally concludes with a conceptual model that discusses factors that drive students’ adoption of smartphone learning with hypotheses guiding the empirical investigation.

3.1 Mobile Learning: M-Learning

The past few years have witnessed an increased use of mobile and wireless technologies in offering learning opportunities both within and beyond the traditional classroom settings (Lacohee et al. 2003; Horton, 2006; Caverly et al. 2009; Litchfield, 2010; Yu & Conway, 2012; Karimi, 2016). Within the higher educational space or set up, the ubiquitous access to wireless technologies to a very large extent have drawn universities and other educational institutes to mobile technology as a way of improving learning and teaching methods (Lam et al. 2011).

Indeed, within the past decade, the use of mobile and wireless technologies in offering learning opportunities within and beyond the traditional class room settings has grown significant (Yu & Conway, 2012). These devices have no doubt facilitated the communication
and interaction between students and lecturers (Yu & Conway, 2012). In addition, there is room for users to learn on the go, and more importantly to exchange the information outside the university (Lam et al., 2011). While the definitions of m-learning may be varied, one thing is certain, that is; it is deployed by wireless mobile devices to facilitate learning. In light of this, Naismith et al. (2004) defines mobile learning as learning which employs wireless devices like smart phone, PDA, iPod, palmtop, laptop or even digital camera and USB keys in the learning and teaching process. According to Karimi (2016), m-learning involves using mobile devices such as smart phones, personal digital assistants (PDAs) and tablets, to allow learners to learn anywhere and anytime.

Keegan (2005) on his part concentrated on the mobility in the definition of mobile learning, and as such, defined m-learning as the provision of education and training using PDAs, palmtops, handhelds and smart phones (devices easy to carry and use everywhere and anytime). However, for this study, m-learning will be defined as the use of any mobile or wireless device be it a smartphone, PDAs, tablet or related devices that is used for learning. Naismit et al. (2004) however note that one should not confuse m-learning with e-learning as there is a thin line between m-learning and e-learning.

While m-learning is concerned with learning models that use mobile technologies, e-learning has to do with learning experiences that support individual learning with various types of computer technologies (Clark & Mayer, 2008). According to Horton (2006), m-learning embraces many features of e-learning such as multimedia contents and communications with other students although it’s unique in terms of flexibility of time and location (Peters, 2007). However, Trifonova and Ronchetti (2003) are of the view that m-learning can be considered as an extension of e-learning, where the concentration is on the use of mobile devices with Totkov (2006) proclaiming m-learning to be the next step of e-learning. M-learning among others facilitate learning by enhancing teaching and learning methods (Lacohee et al. 2003)
by offering learners iniquitousness through cheaper cost effective means of learning (Yu & Conway, 2012). However, since the focus of this study is on how a smartphone is used in learning, the next section is dedicated to a review on smartphone for learning within a higher educational context.

3.2 Smartphone: An Evolutionally Perspective

In its embryonic stages, mobile phones were elite devices primarily reserved for the middle to upper class (Lacohee et al. 2003), and arguably had little connection to learning, especially, within an academic setting. Compared to land phones, mobile phones have many abilities beyond just communication. Today, mobile phones and their features have evolved to the extent that in most parts of the world, including, Africa, mobile phones have become substitutes to computers as the primary wireless internet access portal (Caverly et al. 2009). Caverly et al. (2009) stress that manufacturers are increasingly making mobile phones smarter, and that it’s gotten to a stage where the line between smart and dumb/ordinary phones has become hard to demarcate, as actually many ordinary phones can have some smartphones features.

Although the definition of smartphone is still unclear, a number of scholarly attempts have been expounded on the issue. For instance, Litchfield (2010) examined the top five most accepted definitions of smart phone, and concluded that there was no singularly accepted definition. This state of affairs as explained by Litchfield (2010) is as a result of the constantly evolving nature of mobile phone technology, especially, given the fact that the lines between “smart” and “ordinary” phones are unclear (Caverly et al. 2009).

At the conclusion of his follow up study, however, Litchfield (2010) defined a smartphone as a phone that runs an open operating system and is permanently connected to the Internet. As part of its evolution, today’s smart phones, just like PCs also incorporate operating systems
which allow the add-on applications (or software) to run on top (Yu & Conway, 2012). Also Yu and Conway (2012) put forward that the hundreds and thousands of applications, which operate as software in PCs allow users to customise to their own needs, computing power and capabilities as opposed to old ordinary phones which do not have these features. Additionally, smartphones as argued by the author has constant internet connectivity allowing users to stay informed and to have unlimited services available at their fingertips. Yu and Conway (2012) particularly note that the QWERTY keyboard, either physically or virtually available on smart phones, makes typing as easy as on a PC whilst basic functions as phone call, text messaging, and camera give an added bonus of mobility to the device.

3.3 Harnessing the Potentials of Smartphones as a Learning Device

The increasing importance of smartphones in education has been acknowledged. Attewell and Savill-Smith (2004), defined mobile learning as the process of using Smartphone and other cellular phones or devices which are pocketed and which students can use wherever and whenever to receive unbroken transmission signals. Scornavac et al. (2009) recount that the use of mobile phones potentially impacts learning experience especially in large classrooms, and potentially culminates into increase student-instructor relations to the extent that sometimes unaddressed questions during the lecture could be provided by the lecturers via SMS (Scornavac et al. 2009).

On her part, Pollara (2011) took a glimpse and comparison of student and faculty readiness for mobile learning in higher education. Her study investigated current use and perceptions of mobile devices for educational purposes by students and faculty. Using a multi or mixed method approach, and questionnaires and interviews as data collection instruments, both faculty and students were reached for responses. The findings indicated that majority of faculty members knew how to perform basic tasks on mobile devices. On the student front, it
was established that majority of the students knew how to perform more than just basic tasks on mobile devices. Also, students believed that participation and engagement would increase if they could use their mobile devices in the classrooms.

On their part, Woodcock et al. (2012), set out to investigate the extent to which students were autonomously harnessing smartphone technology to support their learning and the nature of smartphone uses in learning. Findings were derived from initial online survey to establish the validity of the study, then an in-depth online survey and student interviews. For the online survey, an initial questionnaire was created and distributed to Sheffield Hallam University students using the Facebook social media networking site to establish the validity of the study.

Having established the validity of the study, an in depth questionnaire was designed and delivered targeting undergraduate and postgraduate students from the faculty of Arts, Computing, Engineering and Sciences (ACES) at the university. The survey was created and presented in Google Forms. Also interviews were conducted with four students to validate the findings of the quantitative surveys and to develop those findings using a more qualitative, open-ended approach in order to provide insight through accounts of their experiences. The study found that students who owned smart phones are interested in, and actually are opened to explore learning via their smart phone if they were aware of such opportunities.

Similarly, Vázquez-cano (2014) in a Spanish study employed a quantitative method with the objective of investigating the use of smartphones and specific subject-apps in use at the Spanish National University of Distance Education. The purpose of the trial was to assess the app’s didactic use and potential to enhance student learning. Following this, a scale was developed and validated upon which a total of 388 completed questionnaires were returned to the researcher for analysis. The findings revealed that the use of apps developed specifically
for following university subjects is highly valued by students. More importantly, it was established that app formats which both supports and enhances learning practices provides not only further opportunities to establish connections and relations, but also, fosters collaborative work among students and professors.

Likewise, a favourable response was reported on the potential of Smartphone as a learning tool in laboratories by Shi et al. (2016). In this study, the authors were interested in how smartphones impact on active learning experiences prior to the laboratory meeting. The researchers surveyed students’ view on the effect of using Smartphone to enhance learning in a physics laboratory. Utilizing a sample of 120 students, the results showed that Smartphone was a very useful tool as among others it provides an effective background on the lab safety information, administrative requirements and general knowledge of physics lab equipment. From the review of the literature therefore, there is little doubt that mobile phones and, particularly, smartphones has enormous potential for learning, although it sometimes not all sacrosanct due to certain challenges/inhibitors as discussed in the next section of this chapter.

3.4 Inhibitors of Smartphone Learning

While the importance of smart devices as a learning tool has been documented (Pollara, 2011), factors that inhibits smartphone learning has also attracted scholarship in both past and extant literature. Kim (2005) put out two stream of literature on resistance to new technologies- i.e., consumer and innovation characteristics. Innovation characteristics have been described to be related to the resulting effect of new technology on consumers which has a predictive power on technology adoption or acceptance (Ram, 1987).

On the contrary, consumer characteristics describe the consumer’s psychological disposition towards the introduced innovation (Dunphy & Herbig, 1995). These dispositional qualities as identified by Ram (1987) include a person’ general personality, attitude and personal values
expressed towards the technology. Further, the author delineated innovation characteristics into two, which comprised; consumer-independent context and consumers-dependent context. However, for this study the latter is of more importance as it directly affects consumer’s decision to adopt almost immediately. Issues pertinent to this context include whether the new technology offer any rare advantage, is it easily compatible? Is it risk free or pose a minimum risk? Is it less complex in usage? and is there an expectation of better product?

Generally, the expectation is that where technological channels such as smartphone learning, offer rare advantage, possess minimal or no risk, is less complex in usage, and the expectation of the product getting better is high the higher the degree of acceptance or adoption. However, where these aforementioned factors are deemed unfavourably the likelihood of adoption could arguably slow.

Indeed, the literature is rife on studies that have drawn similar conclusions. Wang et al. (2003) for instance found a liner relationship between the risk consumers were prepared to take and technology adoption. Similarly, Koenig-Lewis et al. (2010) investigated the barriers to mobile banking adoption. The findings reported perceived risk to be crucial to mobile banking adoption. On complexity which refers to the extent to which the user perceive difficulty in the use of the new technology, studies have demonstrated that less complex systems have higher adoption proclivity compared with complex ones (Rogers, 2002; Brown et al., 2003; Eriksson et al. 2008; Cruz & Laukkanen 2010).

Also, research suggests that compatibility has a large spectrum of appeal in technology adoption (Holak & Lehmann, 1990). For 21st century technology such as smartphone the inability to synchronize with other wireless devices could without doubt prove to be a disincentive for adoption especially in today’s technological savvy world where device synchronization or compatibility with wireless systems has arguably become the industry’s
benchmark. This assertion is substantiated by the study of Dunphy & Herbig (1995) who established that new technologies get easily adopted where existing or old technologies easily synchronize with the newer ones.

In the specific case of mobile learning, a number of factors have been outlined as inhibiting mobile learning. Gabarre et al. (2012) looked at mobile learning on a social media site (Facebook) found that students think they were generally not secured using social media site i.e. Facebook for learning. In particular, students expressed their apprehension in the area of information sharing as they were of the view that such information jeopardized their cyber safety. For those who even felt like adopting Facebook site for learning, it was found that as a way of securing their cyber safety they only grant access to people they know which hinders adoption rate.

Also, intrusion caused by mobile phones, particularly when attending classes and compulsion to sometimes reply also affected learning. Also, it was established that students preferred to access their course notes on a laptop, as it is equipped with a larger screen, thus providing a more comfortable reading compared with smartphones. Another interesting finding was that mobile phone/smartphone was not always reliable as they required a stable network access. In the same vein, a study Gikas and Grant (2013) focused on students experience in mobile computing devices in higher educational learning via cell phones, smartphones & social media made similar conclusions. Essentially, students were unhappy with downsides of mobile learning such as; applications not working properly, small nature of mobile device keyboards, and also mobile devices serving as distractions in class.

3.5 Unified Theory of Acceptance and Use of Technology: The Pioneering Work

Venkatesh et al. (2003) puts forward that the UTAUT model is among the most sought after and widely used model when it comes to studies on technology adoption or acceptance due to
its ability to explain about 70% of variance in consumer intention to use a new technology. According to the authors, UTAUT outperforms previous models, as it provides a useful tool for people to assess the success of new technologies (Ibrahim & Jaafar, 2011). Relying on the UTAUT model, it brings to light that a number of multifaceted issues affect technology adoption.

Venkatesh et al. (2003) allude to this fact, as the authors observed that researchers were at times overwhelmed by the multitude of models, and, were bound to choose a popular model, or better still, where they want to enrich technology acceptance perspectives rely on multiple models across the technology adoption spectrum. However, as argued by the authors, any of these approaches still violated or ignored equally important models. Consequently, the researchers felt the need to synthesize all the technology adoption/acceptance models in order to reach a unified view on technology acceptance, and hence, culminating into what has now become known as the UTAUT model. The UTAUT combines a whipping eight technology acceptance/adoption models (i.e., TAM - TPB, DOI, SCT, MM, TRA, TPB, TAM and MPCU) to form the model.

According to Venkatesh et al. (2003) UTAUT was an antidote to addressing prior studies failed attempts at addressing the following specific issues within technology acceptance or adoption models. According to the authors previous studies suffered the following shortcomings:

- Most of the technologies studied were simple or micro (individual-oriented) level, as opposed to macro (organizational) levels
- Most of the samples for the study were students, with exception to some few studies that appear to have stepped beyond the student boundary
- The studies time span was generic, and conducted either after acceptance or rejection
The nature of measurement was mostly cross-sectional, and, lastly,

- Most of the studies were conducted in voluntary usage context making generalization in mandatory context often problematic

Having articulated these gaps in previous studies therefore, the authors set out to compare the aforementioned eight technology acceptance models in a longitudinal study using four different organizations. Also, the researchers made sure that the measurement of the new technology was done under three consecutive time lines. First, it was carried out post training, a month after implementation, and three months after implementation. However, the actual usage behaviour was measured six months post-training period. Guided by the identified gaps, the data was sub-divided into two samples for the eight models- i.e., the voluntary and mandatory settings, moderated by demographic variables such as; level of respondents’ technological experience, age, gender and voluntariness.

The findings reported seven out of the eight measurements constructs to have a direct and significant impact on consumers’ intention and usage of the technology. Out of these seven, four (i.e., performance expectancy, effort expectancy, facilitation expectancy, and social expectancy) of the hypothesized relationship were found to have direct effect on behavioural intention towards adoption whilst, attitude, computer self-efficacy, and anxiety were found not to have direct effect on behavioural intention to adopt.

**3.5.1 Studies that have applied the UTAUT Model**

After the pioneering work of Venkatesh et al. (2003), numerous studies have tried to test technology adoption using UTAUT model, and to come out with new frontier(s) on the UTAUT measurement scale. Li and Kishore (2006), on this note set out to test whether the key constructs in the UTAUT model were invariant across different population subgroups. The area of application for their study was Web log system users. Hence, the difference in
subgroups was based on the demographic characteristics like user’s gender, user’s general computing knowledge, user’s specific Web log-related knowledge, user’s experience with Web logs, and user’s usage frequency of Web logs. Based on previous literature, they hypothesized that the UTAUT four key constructs would remain invariant across gender, low and high computing general knowledge users, users with or without particular Web log knowledge/ experience, and users with low and high frequency use of Web logs.

The findings revealed that users with different experiences and computing knowledge have more or less similar interpretation of performance and effort expectancy, whilst, users in low to higher Web log usage frequencies do not interpret social influence in the same way; nor, are scores of facilitating conditions comparable for users with different levels of web log experience and usage frequency, at least, from a statistical significance viewpoint. On gender, the findings revealed that effort expectancy and facilitating conditions are comparable, but not the same for performance expectancy and social influence.

Shin et al. (2011) also resorted to the UTAUT model in their investigation of smartphones as smart pedagogical tools and its implications for ubiquitous learning within higher educational settings. The survey instrument was then distributed to ten national universities in Korea. Each university was given 50 surveys and were administered either online or in class to students, faculty and staff who had experienced smartphone learning. In total, 298 questionnaires were completed and submitted to the researcher of which 215 were validly completed and used in the analysis. On the whole the study examined ten hypotheses as impacting the smartphone learning experience:

**H1.** Users’ satisfaction with the initial smartphone learning experience is positively associated with their continuance intention in ubiquitous campus services

**H2.** Confirmation of smartphone learning has a positive effect on satisfaction

**H3.** Confirmation has a positive effect on the perceive usefulness of smartphone learning
H4. Confirmation has a positive effect on the perceive ease of use of smartphone learning

H5. Perceive usability while using smartphones as a learning tool has a positive effect on satisfaction

H6. Perceive ease of use while using smartphones as a learning tool has a positive effect on satisfaction

H7. Perceived service quality has a positive effect on smartphone learning confirmation

H8. Perceived content quality has a positive effect on smartphone learning confirmation.

H9. Previous online learning experience has a positive effect on the continuance intention of smartphone learning usage, and lastly;

H10. Social influence has a positive effect on users’ continuance intention to use smartphones in a ubiquitous learning context.

Out of these ten hypothesized relationships only H4 and H10 were not supported, indicating that respondents did not think that smartphone was easy to use and that social influence had no rare impact on smartphone learning. Indeed, the application of the UTAUT models has been widespread. From payment systems (i.e., mobile banking, mobile money and its related services) (Zhou et al. 2010; Kim et al. 2010; Shaikh et al. 2015), to Information Technology (Gupta et al. 2008; Nwagwu & Akeem, 2013; Barnes, 2013; Oye et al. 2014; Kaba & Touré, 2014; Rodrigues, et al. 2016), and to the academic field, the evidence of the increasing importance of UTAUT has been overwhelming (ŠUmak, et al. 2011; Shin et al. 2011; Woodcock et al. 2012; Pollara 2011; Vázquez-cano 2014).

In a very recent study by Mikalef et al. (2016), the scholars employed UTAUT model in determining online-video based learning acceptance. The study employed questionnaire as the main instrument for data collection. The major antecedents of behaviour intention for the study were: computer self-efficacy, effort expectancy, performance expectancy, social influence, and perceived behavioural control. The findings report that computer self-efficacy
has a positive effect on effort expectancy, perceived behavioural control, and behavioural intention. However, the effect of perceived behavioural control on behavioural intention was found to be non-significant. Furthermore, effort expectancy was found to have a positive effect on performance expectancy, but has no significant effect on behavioural intention. In addition, performance expectancy was established to have a positive effect on behavioural intention, whilst, social influence was found to significantly impact performance expectancy but had no effect on behavioural intention.

In another development, other studies have charted the role of instructors or lecturers in the students-electronic learning dimension (Webster & Hackley 1997; Piccoli et al. 2001; Smeets, 2005; Sun et al. 2008). Sun et al. (2008) for instance found engagement of instructors on the on-line front to have a favourable impact on students take up of mobile learning. On this score, the authors advocate educational institutions to ensure that their faculty are proactive on-line, as although response timeliness from instructor may not prove to a rare determinant of students take up of mobile learning a non-response or unreasonable delays in responding to students’ requests definitely can affect adoption, and could arguably lead to loss of potential revenue as few people would arguably find the institution an attractive destination for distance learning.

3.6 Conceptual Framework

Based on the reviewed literature, this study intends to test the relationship between technology adoption factors, and its relationship with learning via smartphones using the UTAUT model. The conceptual model, on this note posits that students’ take-up of smartphone as a learning device will be influenced by multiplicity of adoption factors (i.e., performance expectancy-PE, effort expectancy-EF, facilitation expectancy-FE, social expectancy-SE, and, lecturers’ role-LR) as identified from the review. However, the level of
smartphone learning take-up would not be straight forward, as other inhibiting factors like connectivity challenges (i.e., slow network and phone freezes), screen size, content format/compatibility, and intrusion (i.e., in the form of incoming calls) can impact on the smartphone learning experience as shown in the figure below.

**Figure 3: Conceptual Framework: Smartphone Learning Adoption**

Adoption factors

![Diagram showing the conceptual framework of smartphone learning adoption with factors including Performance Expectancy (PE), Effort Expectancy (EE), Facilitating Conditions (FC), Social Influence (S.E), and Learning Readiness (LR). Connectors between these factors lead to Smartphone Learning. Inhibitors include Connectivity, Screen size, Content format, and Intrusion.]

*Source: Researcher's own conceptualisation*

3.6.1 Hypotheses Development

i. **Performance Expectancy**

Performance expectancy is defined by Lwoga et al. (2015), as the extent or degree to which students perceive that the technology—in this case, smartphone usage will enable them to perform better in their course programmes. Previous studies have established that Smartphone has enormous benefit on learning (Attewell & Savill-Smith 2004; Scornavac et al. 2009; Pollara, 2011; Woodcock et al. 2012; Vázquez-cano 2014; Shi et al. 2016).
However, for Smartphone to be seen as a largely accepted device or tool for learning there is no doubt that the technology must be viewed as one that could enhance students’ academic programme (Venkatesh et al. 2003).

Indeed, both Davies (1989) and Venkatesh et al. (2003) argue that performance expectancy shares similar characteristics with five technology adoption models, which specifically includes; extrinsic motivation (MM), perceived usefulness (TAM), extrinsic motivation (MM), job-fit (MPCU), relative advantage (IDT) and outcome expectations (SCT). Davies (1989) in particular, argues that among these models, the definition of perceived usefulness as; the belief that the given technology could improve job performance is the most similar or closest to performance expectation. According to Davies (1989), performance expectancy is the most influential adoption factor in an m-learning context. This assertion was substantiated by Wu et al. (2009), whose studies actually demonstrated m-learning to be very useful, as it gives students the convenience and quick response they want during learning.

Tan and Lau (2015) examined the intention to adopt mobile banking services among Generation Y student consumers, using the Unified Theory of Acceptance and Use of Technology model. On the whole 347 respondents responded to the questionnaires representing a response rate of 90.4 per cent. In the study, two sets of analyses were performed: multiple regression analyses testing the extended UTAUT model and a mediated regression analysis testing the intervening effect of performance expectancy (PE) on the relationship between effort expectancy and behavioural intention.

The findings point out that performance expectation is strongest predictor variable, as the model explained 68.3 per cent of the variance in intention to adopt mobile banking. Similarly, Mikalef et al. (2016), set out to investigate the impact of video-based learning on classroom and open online learning. Utilizing a survey of 260 respondents, the results indicated that
performance expectancy and computer self-efficacy had a positive direct effect on
behavioural intention to adopt. On the evidences of these submissions, there is no doubt that
students take up of Smartphone learning would increase when such universities e-learning
zones are perceived as enhancing student academic experience/performance. Consequently, it
is hypothesised that:

\[ H_1: \text{There is likely to be a significant statistical association between performance expectation and student smartphone learning.} \]

ii. **Effort Expectancy**

Effort expectancy according to Venkatesh et al. (2003), explains the extent of effort that the
individual needs to exert in using the technology (Venkateshet al. 2003). The author also
posit that it is reminiscent or has certain traits of perceived ease of use (TAM), which
describes the degree of one personal belief that using a particular technological system would
be free of effort (Davis, 1989). Effort expectancy according to the authors also share some
kind of traits with perceive complexity (IDT). In the literature, studies have demonstrated that
demographic dynamics such as gender, age and experience impact on effort expectancy as far
as technology is concerned.

On his part, Selwyn (2004) established that while millennials and generation Y consumers
may have high appetite for technology, their aged counterparts are averse to technology. On
the student front, it has been established based on UTAUT model that students’ acceptance of
an m-learning system would at least depend on whether or not the learning medium is easy to
use. Indeed, in the specific case of small gadgets such as smartphones, it has been proven that
there is a lot more complexity in using such smaller devices (Riquelme & Rios, 2010), and
hence, making such technologies effortless when it comes to usage is an important step
towards the adoption process. Indeed, Wong et al. (2015), showed evidence of this, when the
authors set out to explore the factors that influence users’ behavioural intention to adopt
mobile social networking sites in facilitating formal/informal learning. Among the salient things the researchers sought to investigate were the association of mobility, reachability and convenience with performance expectancy and effort expectancy. The findings revealed among others that effort expectation has a significant effect on behavioural intention. Also, other related studies have found effort expectation to exert great influence on students/consumers’ adoption behaviour. Hence, the researcher is of the view that where Smartphones usage is free of effort, they more favourably the adoption of Smartphones by students as a learning device, and, hence the second hypothesis:

\[ H_2: \text{There is likely to be a significant statistical association between effort expectation and student Smartphone learning.} \]

iii. Facilitation Conditions

Facilitating expectancy is defined as the degree to which an individual of the technology believes that an organizational or infrastructure exists to support the new technology or in this case, Smartphone usage for learning (Venkatesh et al. 2003). Venkatesh et al. (2008) further argue that where there are institutional policies, and key leadership support as well as an adequate training and support system for the given technology, the higher the magnitude and vice versa. This assertion is corroborated by Joshua and Koshy (2011) who note that the more convenient the access, the more proficient the use of the technology culminating eventually into higher levels or rate of adoption.

The opposite holds true as Shahadat et al. (2012) established that lack of equipment, unreliability of equipment, lack of technical support and other resource related issues affects adoption. This therefore implies that for increased levels of adoption one cannot deny the fact that facilitation environment is key. Indeed, in their study investigating mobile learning among students and lecturers in the developing world, Singh et al. (2016) found facilitating conditions to be most critical variable in students and lecturers take up of mobile devices as
learning tools. On this note, it is not too farfetched to assume that smartphone learning would increase when/where there are suitable facilitating conditions available, and hence, the third hypothesis:

\[ H_3: \text{There is likely to be a significant statistical association between facilitating conditions and student Smartphone learning.} \]

iv. Social Expectancy

According to Venkatesh et al. (2003), social expectancy measures the degree or extent to which an individual perceives that significant others believe s/he should use a new technology, like Smartphone for learning. According to the authors social expectancy share similar traits with other technology adoption models like TRA, TAM2, TPB/DTPB, and also combined models of TAM-TPB, DOI and MPCU). In the literature, it has been established that social influence is one of the most critical step towards the technology adoption (Venkatesh et al. 2003), and that for first time patrons of a new technological platform, who may be naive about the technology, just the influence of significant others through recommendation or seeing them use the technology goes a long way to influence try of the new technology (Datta, 2011).

In the field of learning, Escobar-Rodríguez et al. (2014) investigated factors that influence the perceived advantages and relevance of Facebook as a learning tool. The findings, among others established/identified that social influence has enormous influence on students take up of Facebook as a learning tool, as students were largely influenced by their peers to log onto Facebook, and to use it for learning because they were also there. Juxtaposing this situation in the context of Smartphone as a learning tool, it is believed that similar results would be obtained as regards students’ take up of Smartphone as a learning device. Consequently, it is hypothesised that:
\( H_4: \) There is likely to be a significant statistical association between social expectation and student Smartphone learning.

v. Lecturers’ Role

Previous studies have highlighted the importance of instructors/lecturers’ on students’ technological behaviour. These studies including Moore and Benbasat (1991); Harrisonet al. (1997); Karahanna and Straub (1999), as well as Venkatesh & Davis (2000) have all drawn some sort of linkage between instructors influence and students’ technology intention/adoption. In their quest to find out the extent to which faculty's awareness of the benefits of Web 2.0 supplement in-class learning, Ajjan and Hartshorne (2008) found that faculty's attitude, and, indeed, their perceived behavioural control are strong indicators of students intention to use the Web 2.0, and that faculty predisposition towards electronic or on-line learning greatly impact student mobile learning (Sun et al. 2008). On this note it is acceptable, and arguably within logical realm to postulate that:

\( H_5: \) There is likely to be a significant statistical association between lecturers’ role and student Smartphone learning.

vi. Inhibiting Factors

As indicated by prior studies, students’ adoption of mobile learning is affected by a number of factors. On their part Gabarre et al. (2012) note that for smartphone learning to be really acceptable as an effective medium of learning, a number of interventions must be put in place to ensure success. Key among these interventions as pointed out by the scholars is to put in cyber security mechanisms tailored to protect students’ privacy. Also, in order to facilitate the use of mobile devices outside of the university, and related hostels, the authors put forward that micro learning activities could be designed to fit learning on the move.
In the specific situation of University of Ghana, a good case can be made for such novel designs that can enable students’ access e-learning or mobile learning platforms even as they are on the go, and outside the borders of the university. Also, it has been established by studies that unnecessary intrusion, small screen and unstable connectivity (Gabarre et al. 2012; Machado, 2012; Gikas & Grant, 2013) impact on the student-smartphone learning experience. It appears therefore that regardless of the enabling environment, certain technical aspect of smartphone learning can adversely impact on adoption, and hence, necessitating this hypothesis:

\[ H_6: \text{Inhibiting factors would moderate, at least, the relationships between adoption factors and smartphone learning} \]

In sum, all these hypotheses sought to test some previously established relationships in the Ghanaian setting.
CHAPTER FOUR

METHODOLOGY

4.0 Introduction

This chapter explains the research methodology underpinning the current study and looks at the procedures used to achieve the objectives of the study. Sections discussed in this chapter include: the research design, the study population, the sampling procedure, the sample size, data collection procedure and the analytical techniques, as well as the ethical considerations related to the study.

4.1 Research Design

A research design in the view of Burns and Grove (2003) is the conceptual structure within which a study is carried out. This means that, the design informs the type of data to be collected and how the data should be analysed. For that matter a research design typically provides the means for results obtained to satisfy the research questions posed clearly. In other words, the research design constitutes the blueprint for the collection, measurement and analysis of data. Furthermore, every research study requires a well-structured approach in collecting data for analysis and interpretation.

The study employs a survey design. This design has the potential to offer the researcher with a lot of information obtained from quite a large number of individuals within the area of study (Frankel & Wallen, 2000). A sample survey study takes a description of the sampled population. According to Neuman (2007), this design involves the collection of information from any given sampled population. It will therefore be unreasonable to sample the views of all students in the University of Ghana hence, the design is chosen to collect the views from a representative pool of students within the population.
Furthermore, Leeuw, Hox and Dillman (2016) added that a survey method is one that obtains data from a subset of the population in order to estimate population attributes, in other words it is a study carried out using a sampling method in which a portion only and not the whole population is surveyed (Leeuw, Hox & Dillman, 2016). Tashakkori and Teddie (2003) have argued that the survey approach or method is appropriate for all types of research because it allows the use of both qualitative and quantitative data collection instruments in a study. The quantitative analysis involved computations of means and ranking them, frequency distributions, correlation analysis, and a regression analysis from responses observed, whereas qualitative data were analysed thematically using Miles and Huberman’s (1994) approach to analysing qualitative data.

4.2 Research Approach

This study was approached quantitatively. A questionnaire with both open and close ended questions was used for the data collection. The researcher sought to elicit detailed answers to questions asked hence the open ended questions which lend itself more to qualitative approach. This is due to the fact that the mixed-method involves collecting and analysing quantitative and qualitative data in a single study (Creswell, 2009). Also, the mixed –method is referred to as the methodological triangulation, as it is a research that emphasizes on the use of both qualitative and quantitative methods, and has been used in collecting research related to developing countries (Ibeh & Young, 2001). The mixed-method approach also is seen to be swayed by the observations and findings made by several authors on its virtues.

According to Aina (2002), quantitative and qualitative approaches have their own particular weaknesses or biases, hence, it is idyllic to use multiple methods that supplement each other to deal with the biases and produce data which are more adequate and balanced. This assertion made by Aina (2002) has also been confirmed by Okpara and Wynn (2008);
Commonwealth of Learning (2012); Creswell and Plano-Clarke (2007); and Tashakkori and Teddie, (2003). For instance, Creswell and Plano-Clark (2007) indicated that both qualitative and quantitative approaches are used to reinforce each other. In short, the overall strength of a research study is greater when the mixed–method form of approach is used.

4.3 Sources of Data

For this study, quantitative data was collected from the respective sample through the questionnaire that was administered. Implying that data for this study was basically primary data. Primary data is information observed or collected directly from first-hand experience (Burns & Grove, 2003). The main instrument used for the data collection was the questionnaire. Kumekpor (2002) noted that the questionnaire is an effective and an accurate means of determining relatively inexpensive, quicker and reliable information about a population.

The questionnaire for this study was divided into three sections. Section A looked at the demographic characteristics of respondents, Section B focused on the research constructs for the study from the sample, and Section C requested miscellaneous views and recommendations from the sampled respondents. To administer the questionnaire, the researcher went from lecture halls (Jones Quartey Building and New N-Block) to the Balme Library and other places administering the questionnaire with the assistance of some research aides.

4.4 Study Population

The population to a study includes all units or entities with certain characteristics of interest to a researcher (Creswell, 2007). Kumekpor (2002) indicated that, a population or universe of investigation may be considered as the total number of units of the phenomenon to be
investigated that exist in the area of investigation, which are all possible observations of the same kind. The population of interest in this study were students in University in Ghana, with a current population of 37,940 (UG Website, assessed on 08/08/16) irrespective of their course of study, i.e. Business; Communication; French, or level of study, i.e. level 100; Level 400; M.Phil.; PhD.

4.5 Sampling Procedure and Sample for the Study

A sampling procedure is basically the means by which responding elements to a study are selected from the entire population. As in most cases, it is practically cumbersome and tedious to study all the elements within a population (Singleton & Straits, 2010). In this study, a purposive and convenience sampling technique were used in the selection of the University of Ghana and the study sample respectively. Having purposely identified University of Ghana as a study, two hundred and fifty (250) students were conveniently sampled from any college, school, faculty, centre or department to respond to questions raised. The convenience sampling technique was used because a lot of students on campus were identified as having smartphones. In collecting data, research aides were positioned at the Balme Library, Jones Quartey Buiding, UGBS, Valco and New N-Block; places where most of the students attend lectures and/or stay. In order to ensure randomness, every 3rd student that came to these data collection points was given a questionnaire which were self-administered.

Krejcie and Morgan (1970), offer a categorisation of population sizes and suitable sample sizes. They posit that a population size of 30,000 and 40,000 requires a sample size of 379 and 380 respectively. Considering that the current University of Ghana population is close to 40,000, a sample size of about 380 should have been used, however, due to time constraints
and students apathy to answering research questionnaire, the research sampled 250 students for the study.

### 4.6 Method of Data Analysis and Presentation

Data analysis is basically applying statistical and/or logical procedures systematically to describe, illustrate and evaluate data. Thus, data analysis considers methods and approaches which are performed with the aim of organising and summarising data in a way to answer the stated research questions. Data coding and analysis were largely carried out using the statistical software SPSS version 22 and Microsoft Excel.

#### 4.6.1 Analysing Data Quantitatively

To respond to hypothesis one (H1) through to hypothesis five (H5), the study used a Chi-square analysis to determine significant associations between the adoption factors and students use of smartphones for learning. Similarly, the last hypothesis (H6) was tested using a regression analysis, in which case, all the computed adoption factors are regressed on the computed inhibiting factor to see if significant relationships are observable.

Aside the tests mentioned above, other related quantitative procedures employed, i.e. frequency distribution analysis; and mean value ranking are all discussed briefly below.

i. **Frequency Distribution Analysis**

Lewis, et al., (2007) remarked that, one of the first ways of organizing raw data is to group scores or values into frequency distributions. Frequency distribution analysis is used for reporting descriptive information from empirical research. Frequency tables are used to report the number of occurrence of each data variable. These frequencies can then be presented either in tallies or in percentages. Frequency distribution analysis can be used for both nominal and ordinal data and also numeric data (Miles & Huberman, 2002). Frequency distribution analysis can also be used to conduct elementary statistics on both subjective and
objective data. Further, it is useful for comparing and contrasting within groups of variables or across groups of variables (Lind, et al., 1999).

ii. **Mean Value Ranking Analysis**

Mean value ranking analysis tries to rank the average of some weighted responses generated to determine the averagely preferred choice of response from a group of responses observed in a study. In this study, mean response scores were generated by aggregating all the responses observed in the frequency distribution analysis. In this study mean value ranking analysis was used to analyse data collected in the form of opinions expressed by research participants to identify responses that dominate among the lots of responses observed. To do the mean response, weights were assigned to the responses and then the respective means were computed and ranked.

iii. **Chi-Square Test Analysis**

The chi-squared test is used to determine whether there is a significant association between the expected frequencies and the observed frequencies in one or more categories (Hair, et al., 2010). In this study, the Chi-Square test analysis assumed two tails with a confidence level of 90%. To compute the Chi-Square test statistic using the Pearson Chi-Square is as simplified below. Suppose that, \(i = \text{rows}\) and \(j = \text{columns}\), then \(P_i\) and \(P_j\) are the respective marginal probabilities, and the test statistic implies:

\[
\chi^2 \text{value} = \sum_{i=1}^{i} \sum_{j=1}^{j} \left[ \frac{(O-E)^2}{E} \right] \text{with} \ df = (i - 1)(j - 1) \ldots \text{Equation. (1)}
\]

Where \(O\) is the observed frequency, \(E\) is the Expected frequency and \(df\) is the degree of freedom.

iv. **Regression Analysis**

On the premise of Hypothesis six (H6), the study adopted the generic Ordinary Least Square (OLS) regression model. The OLS estimation involves choosing a model that minimises the
residual sum of squares, with no constraints imposed. With this model, the study tries to determine whether there are any significant relationships between a set of independent variables and a dependent variable. The general OLS specification equation is given as:

\[ Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i \]  \hspace{1cm}  \text{Equation (2)}

Where the subscript \( i \) represents the identity dimension of the variables. The left hand variable \( Y_i \) stands for the explained or dependent variable in the model, and the \( X_i \) is the set of independent or explanatory variables in the model. \( \beta_1 \) represents the set of coefficients for each of the independent variables; \( \beta_0 \) is the coefficient of the constant term in the model; and \( \varepsilon_i \) is the error term capturing all the disturbances in the model.

From the general model stated above, the study deduced the specific model specified below:

\[ \text{Inh}_i = \beta_0 + \beta_1 PE_i + \beta_2 EE_i + \beta_3 FC + \beta_4 SE_i + \beta_5 LR_i + \varepsilon_i \]  \hspace{1cm}  \text{Equation (3)}

From the specification above, \( \text{Inh}_i \) is the set of inhibitors to smartphone use in learning, the respective independent variables are: performance expectancy; effort expectancy; facilitation expectancy; social expectancy; and lecturers’ role respectively. The \( \beta_0 \) term is given as the constant and \( \beta_{1-5} \) are the coefficients of the independent variable terms, and \( \varepsilon_i \) is the residual error term.

**Decision Criterion for the Regression Analysis**

The regression specification as mentioned earlier, when estimated determines the relationship between the independent variables and the dependent variable(s). The regression equation predicts the variance in the dependent variable in this study from the independent variables.

This means that if any of the coefficients is negative, the predictor or independent variable affects dependent variable negatively; such that, a one unit increase in a particular independent variable will decrease the dependent variable by the coefficient amount. In the same way, if any of the beta coefficients is positive, then the dependent variable increases by
the coefficient amount. $\beta_0$ is the constant value which dependent variable predicted to have when independent variables are equal to zero (i.e. if $\beta_1$ are 0 then $Inh_i = \beta_0$). The significant level for this study is 0.1 (10%).

4.7 Reliability Test

To check how reliable responses expected to be generated from the study were, a pilot study was conducted with 10% (N=25) of the total sample considered randomly. Having gathered their responses, a reliability test using the Cronbach Alpha was employed. Reliability test is basically the measure of the overall consistency of items used on a scale. A measure is considered to have a high reliability if it produces similar results under consistent conditions (Wang, 2014). Ritter (2010) noted that, the Cronbach’s (1951) alpha is the popular and most widely used reliability test. The coefficient of the Cronbach’s (1951) alpha was used to describe how well the items in the questionnaire focus on the idea of assessing employee engagement in the sampled companies. Simply put, the Cronbach’s alpha was used to determine the reliability and the level of internal consistency in the questions used, especially in capturing the impact of smartphone on learning in the University of Ghana. As noted by Tavakol and Dennick (2011), internal consistency of a study should be determined before a test is used to ensure validity.

Using the Cronbach alpha coefficients, which measures the extent to which variables observed from a scale are reliable, it was noted that all the dimensions considered recorded alphas above 0.7. A Cronbach alpha of 0.7 implies that the variables/factors extracted from the scale used in this study is reliable. Hence, all variables under each expectancy considered was maintained and used in subsequent analysis. Below is the summary of the reliability test conducted.
### Table 1: Reliability Test

<table>
<thead>
<tr>
<th>Factors</th>
<th>Cronbach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using the smartphone for learning improves performance in my learning activities</td>
<td>0.94</td>
</tr>
<tr>
<td>Using the smartphone for learning enhances my effectiveness on learning activities</td>
<td>0.94</td>
</tr>
<tr>
<td>Using the smartphone in my learning activities increases my productivity</td>
<td>0.94</td>
</tr>
<tr>
<td>I find smartphone learning useful for my learning activities</td>
<td>0.94</td>
</tr>
<tr>
<td>Using smartphones, it becomes easy for me to become skillful at learning</td>
<td>0.95</td>
</tr>
<tr>
<td>I find smartphone learning easy</td>
<td>0.95</td>
</tr>
<tr>
<td>I find it easy to get my smartphone to do what I want it to do during learning</td>
<td>0.94</td>
</tr>
<tr>
<td>I find it easy navigating e-learning sites using my Smartphone</td>
<td>0.94</td>
</tr>
<tr>
<td>Most of my colleagues use smartphone in learning, and expect me to do same</td>
<td>0.94</td>
</tr>
<tr>
<td>People who influence my behaviour think that my smartphone enhance learning</td>
<td>0.94</td>
</tr>
<tr>
<td>My school/faculty required that smartphone be use in learning</td>
<td>0.94</td>
</tr>
<tr>
<td>My department provides me with resources necessary to enhance smartphone learning</td>
<td>0.94</td>
</tr>
<tr>
<td>I would use smartphone for learning if it was recommended to me by my lecturers</td>
<td>0.93</td>
</tr>
</tbody>
</table>

**Source: Field Survey, 2016**

### Table 2: Reliability Test cont’d

<table>
<thead>
<tr>
<th>Factors</th>
<th>Cronbach</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would use smartphone if my lecturer tells me it can improve my academic performance</td>
<td>0.94</td>
</tr>
<tr>
<td>I would use smartphone for learning if my lecturers would respond to my queries on it</td>
<td>0.91</td>
</tr>
<tr>
<td>I have adequate knowledge to use smartphone as a learning device</td>
<td>0.94</td>
</tr>
<tr>
<td>The university’s IT systems are compatible with smart devices including smartphones</td>
<td>0.93</td>
</tr>
<tr>
<td>I would use smartphone for learning if my lecturer(s) consider it useful</td>
<td>0.92</td>
</tr>
<tr>
<td>Lecturers in my Department haven’t been helpful in using smartphone as a learning tool</td>
<td>0.93</td>
</tr>
</tbody>
</table>
Connectivity is not always stable.

The screen and key sizes make smartphone uncomfortable for learning.

File/formats of contents sometimes do not support smartphone browsing.

The phone can freeze during important learning moments.

Intruding calls may come in during learning.

I would use smartphone for learning if it grants access to academic resource online by lecturers.

Source: Field Survey, 2016

4.8 Ethical Considerations

Clearly noting the demands of the conventional ethical standards in academic research, the researcher tried to adhere to standards by seeing to it that issues of privacy, confidentiality and anonymity of all respondents were not compromised and wholly protected. Since the study involved collection of information about people and their opinions at a point in time; confidentiality was of great value and importance. Therefore, the information gathered from each respondent was held and presented in the state of complete anonymity. Furthermore, the researcher ensured that participation in the research was purely voluntary and all participants were informed of the purpose and nature of the research before giving them the questionnaire. No statements were attributed to personalities or names. Finally, consents were sought where necessary before any forms of voice recording of informal discussions were done. In summary, all ethical issues were taken into serious consideration in the process of planning, designing, conducting, analysing and reporting on this study. Responding participant were informed of the purpose of this study and assured responses to questions posed were treated confidentially.
CHAPTER FIVE
PRESENTATION AND ANALYSIS OF FINDINGS

5.0 Introduction

This chapter consists of analysis and interpretation of the data collected from the questionnaire for the purposes of this study. Particularly, this chapter discusses sections such as: demographic characteristics of respondents; Adoption Factors; Inhibitors; Correlation Analysis; and Regression Analysis. Figures and tables are employed to present some of the findings.

From the two hundred and fifty (n=250) questionnaires that were distributed, although all were returned, six (6) were not validly filled, i.e. multiple choice selections on questionnaires, and several blank spaces. For that matter, the invalidly filled questionnaires were taken out, leaving the entire analysis to be carried out with the remaining two hundred and forty-four (n=244). Hence, the response rate for the study was 97.6%.

5.1 Demographic Characteristics of Respondents

With the demographic characteristics, the study sought to know whether respondents were suitable in providing responses for the study. Under this section, first respondents’ gender was analysed, followed by the age; educational level; frequency of using smartphone; and the purpose for using smartphone.

5.1.1 Gender of Respondents

The observed gender distributions of sampled respondents are summarised below in Table 3.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Cum. Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>115</td>
<td>47%</td>
<td>47%</td>
</tr>
<tr>
<td>Male</td>
<td>129</td>
<td>53%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>244</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Source: Field Survey, 2016
From the responses observed, 47% were females and the remaining 53% were males.

5.1.2 Age of Respondents

The observed age distributions of sampled respondents are summarised below in Table 4.

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Cum. Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 20 years</td>
<td>48</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>20 years – 29 years</td>
<td>74</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td>30 years – 39 years</td>
<td>59</td>
<td>24%</td>
<td>74%</td>
</tr>
<tr>
<td>40 years – 49 years</td>
<td>39</td>
<td>16%</td>
<td>90%</td>
</tr>
<tr>
<td>50 years – 59 years</td>
<td>15</td>
<td>6%</td>
<td>96%</td>
</tr>
<tr>
<td>Above 60 years</td>
<td>9</td>
<td>4%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>244</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Field Survey, 2016

From the table, it is observed that most of the respondents are within the age ranges of below 20 years and 49 years as that age brackets cumulatively accounts for 90% of total valid responses. Although there may be no balance in terms of the age distributions, the observed frequencies seem appropriate for the study, given that smartphone use is common among the age brackets of below 20 years through to 40 years – 49 years.

5.1.3 Educational Level of Respondents

Once again, seeking to determine the educational level of respondent was merely to aid this study to know whether views on the topic has fairly been discussed within the main categories of students within the University. Table 5 below summarises the observed educational levels.

<table>
<thead>
<tr>
<th>Educ. Level</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Cum. Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma</td>
<td>28</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>84</td>
<td>34%</td>
<td>46%</td>
</tr>
<tr>
<td>Masters</td>
<td>93</td>
<td>38%</td>
<td>84%</td>
</tr>
<tr>
<td>PhD</td>
<td>39</td>
<td>16%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>244</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Field Survey, 2016
From the frequency distribution above, it is observed that all the levels of study in the University are fairly represented in this study. For example, 11% of respondents were studying for Diplomas, 34% were studying for undergraduate degrees, and 38% were studying for Masters’ degrees from the various colleges, schools, and faculties in the University of Ghana. Last but not least, 16% indicated that they were studying for PhD honours.

5.1.4 Frequency of Respondents’ Smartphone Usage

Again, to establish whether our selected sample were the right choice for this study, respondents were asked to indicate whether they have smartphones or otherwise. To this question, all the respondents indicated they have smartphones. Implying that 100% of respondents had smartphones. Having established that all respondents to the study had smartphones, the study further enquired of the frequency of using the smartphones in the past month. The table below summaries the responses observed.

Table 6: Frequency of Respondents’ Smartphone Usage

<table>
<thead>
<tr>
<th>Usage</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Cum. Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>2</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Rarely</td>
<td>8</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Often</td>
<td>30</td>
<td>12%</td>
<td>16%</td>
</tr>
<tr>
<td>Everyday</td>
<td>204</td>
<td>84%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>244</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Source: Field Survey, 2016

From the response noted in the table above, it is observed that about 84% of total respondents use their smartphones on a daily basis. 12% indicated they use it often. Cumulatively, these two categories of users equal 96% of total respondents. Hence, the suitability of selected sample for the study.
5.1.5 Purpose for Respondents’ use of Smartphones

Respondents were requested to indicate whether they used their smartphone for learning purposes or otherwise. After which they were also requested to indicate the nature of the materials they accessed for learning purposes. In response to whether respondents used their smartphones for learning, 91% of respondents indicated they use their smartphones for learning, 3% pointed out they are not aware of learning with their phones, and 6% responded they do not use their smartphones to learn. The table below summaries the observed responses.

Table 7: Respondents’ use of Smartphone for Learning

<table>
<thead>
<tr>
<th>Learn with Smartphone</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Cum. Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>222</td>
<td>91%</td>
<td>91%</td>
</tr>
<tr>
<td>I am not aware</td>
<td>7</td>
<td>3%</td>
<td>94%</td>
</tr>
<tr>
<td>No</td>
<td>15</td>
<td>6%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>244</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Source: Field Survey, 2016

Furthermore, respondents were asked to indicate the nature of learning material they sourced with their smartphone. At this point the study was particular about responses from those that responded ‘yes’ to learning with their smartphones. The responses observed are shown in the table below.

Table 8: Learning Materials Sourced

<table>
<thead>
<tr>
<th>Type of Materials/Category</th>
<th>Diploma</th>
<th>Undergraduate</th>
<th>Masters</th>
<th>PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture Notes</td>
<td>19</td>
<td>78</td>
<td>90</td>
<td>35</td>
</tr>
<tr>
<td>Assignments</td>
<td>19</td>
<td>78</td>
<td>90</td>
<td>35</td>
</tr>
<tr>
<td>Tutorial Sets</td>
<td>19</td>
<td>78</td>
<td>90</td>
<td>35</td>
</tr>
<tr>
<td>Supplementary lecture notes</td>
<td>10</td>
<td>65</td>
<td>87</td>
<td>32</td>
</tr>
<tr>
<td>Journal Articles</td>
<td>1</td>
<td>20</td>
<td>88</td>
<td>35</td>
</tr>
<tr>
<td>Lecture Videos</td>
<td>10</td>
<td>30</td>
<td>79</td>
<td>34</td>
</tr>
<tr>
<td>Academic Conferences</td>
<td>-</td>
<td>5</td>
<td>70</td>
<td>35</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2016

From the table above, it is observed that a fair representation of the selected sample, particularly across the various categories of study, i.e. Diploma, Undergraduate, Masters, and
PhD. indicated that, in using their smartphones for learning, they sourced materials which include: lecture notes, assignments, tutorial sets, journal articles, lecture videos, and other related learning materials. Of all the respondents, it appeared that students pursuing PhDs and Masters had more use of their smartphones for learning than the other levels of learning, particularly students within the Diploma category of students.

**5.1.6 Respondents’ Extent of use of Smartphones for Learning**

For purposes of consistency, respondents were again requested to indicate the extent to which they used smartphones to learn. This was to observe the extent to which respondents that noted they used their smartphones for learning were using it. Hence, the study excluded responses from questionnaires that indicated ‘No’ or ‘I’m not aware’ in Table 7 from the rest of the analysis. The table below summarises the frequencies for the responses that were observed.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
<th>Cum. Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagreed</td>
<td>9</td>
<td>4%</td>
</tr>
<tr>
<td>Disagreed</td>
<td>19</td>
<td>9%</td>
</tr>
<tr>
<td>Neutral</td>
<td>53</td>
<td>24%</td>
</tr>
<tr>
<td>Agreed</td>
<td>74</td>
<td>33%</td>
</tr>
<tr>
<td>Strongly Agreed</td>
<td>67</td>
<td>30%</td>
</tr>
<tr>
<td>Total</td>
<td>222</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Source: Field Survey, 2016**

From the summaries presented above, it is observed that a cumulative sum of 63% indicated they either agreed or strongly agreed to frequently using smartphones for learning. 24% of respondents pointed out that they are indifferent, in other words neutral with a cumulative total of 13% indicating they disagreed or strongly disagreed with actively and frequently using smartphones for learning, although they use their smartphones for learning purposes.
In general, all the demographic characteristics observed points out that the selected sample is fairly appropriate for the study. Thus, the succeeding sections attempts to examine the adoption factors among the selected sample as well as the inhibitors to smartphone use for learning.

5.2 Adoption Factors most relevant in Student use of Smartphones as a Learning Tool

On the adoption factors, respondents were presented with series of questions on a Likert scale for them to indicate their opinions, after which weights were assigned to the responses, and their means were computed. Having computed the means, the responses were ranked to know the dominant factor that is related to a particular adoption factor. In this section, emphasis was placed on responses from those who indicated they use their smartphone for learning. In that sense, only two hundred and twenty-two (222) responses were used in the analysis below. The first factor discussed was Performance Expectancy, followed by Effort Expectance, Social Expectancy, Facilitating Conditions, and the Lecturer’s Role.

5.2.1 Performance Expectancy

As noted earlier, Lwoga, et al. (2015) pointed out that performance expectancy is basically the extent to which students perceive smartphone usage to aid them perform better in their course programmes. In that regards, respondents were requested to indicate whether they ‘strongly disagreed’, ‘disagreed’, ‘neutral’, ‘agreed’ or ‘strongly agreed’ to the questions raised. The table below summarises the respective mean values observed for each response and the ranks.

| Table 10: Mean Values of Responses for Performance Expectancy |
|---------------------------------------------------------------|-------------|
| Performance Expectancy                                        | Mean        |
| Using the Smartphone for learning enhances my effectiveness on learning activities | 3.96        |
| Using the Smartphone for learning improves my performance in my learning activities | 3.87        |
| I find Smartphone learning useful for my learning activities  | 3.62        |
Using the Smartphone in my learning activities increases my productivity 3.39

**Source: Field Survey, 2016**

From the mean values observed, ‘using the smartphone for learning enhances my effectiveness on learning activities’ ranked higher than all the other performance expectation factors with a mean value of 3.96. Correspondingly, the frequency distributions observed for this response indicated that a 75% cumulative total of respondents responded they either agreed or strongly agreed to the use of smartphones for learning enhancing their effectiveness on learning activities, with a cumulative sum of 17% of respondents either disagreeing or strongly disagreeing with the use of smartphone for learning enhancing their effectiveness on learning activities. The figure below illustrates the respective frequency distributions to each response that was observed.

**Figure 4: Using smartphone for learning enhances my effectiveness on learning activities**

![Frequency Distribution Chart]

**Source: Field Survey, 2016**

**5.2.2 Effort Expectancy**

Venkatesh, et al. (2003) explained that effort expectancy is the amount of effort individuals require to exert in using technology, particularly with perceived complexity. To observe the dominant factors regarding effort expectancy, again, responses observed from respondents were weighed and their respective mean values were computed.
Table 11: Mean Values of Responses for Effort Expectancy

<table>
<thead>
<tr>
<th>Effort Expectancy</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>I find Smartphone learning easy</td>
<td>3.33</td>
</tr>
<tr>
<td>Using Smartphones, it becomes easy for me to become skillful at learning</td>
<td>3.15</td>
</tr>
<tr>
<td>I find it easy to get my Smartphone to do what I want it to do during learning</td>
<td>2.73</td>
</tr>
<tr>
<td>I find it easy navigating e-learning sites using my Smartphone</td>
<td>2.66</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2016

From the ranked mean values presented in the table above, it is observed that the dominant factor related to effort expectancy is ‘I find smartphone learning easy’ as it had the highest mean value of 3.33. Referring to the frequency distribution associated to the dominant responses, 24% and 25% of the sampled respondents indicated they either agreed or strongly agreed to ‘finding smartphone learning easy’ respectively. This gives a cumulative total of 49% of respondents indicating they agree or strongly agree to smartphone learning being easy. On the contrary, a cumulative total of 31% of respondents either disagreed or strongly disagreed with finding smartphone learning easy. The figure below illustrates the respective frequencies observed for each response.

Figure 5: Find Smartphone Learning Easy

Source: Field Survey, 2016
5.2.3 Social Expectancy

Again, Venkatesh, et al. (2003) indicated that social expectancy factors measure the extent to which individuals perceive significant others believe they should use a new technology, particularly smartphones for learning purposes. From the factors that were given under social expectancy, ‘most of my colleagues use smartphone in learning, and expect me to do same’ recorded the highest mean value of 3.12. The table below summaries the respective mean values that were observed.

<table>
<thead>
<tr>
<th>Social Expectancy</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most of my colleagues use Smartphone in learning, and expect me to do same</td>
<td>3.12</td>
</tr>
<tr>
<td>People who influence my behavior think that I Smartphone enhance learning</td>
<td>2.40</td>
</tr>
<tr>
<td>My school/faculty required that Smartphone be use in learning</td>
<td>2.04</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2016

Furthermore, the respective frequency distributions associated with the responses observed are presented in the figure below.

**Figure 6: Most of my colleagues use Smartphone in learning and expect me to do same**

Source: Field Survey, 2016
From the figure above, it is observed that most of the respondents, i.e. 68% were indifferent regarding their decision to use smartphone in learning based on the expectations their colleagues have for them. Cumulatively, 12% of respondents pointed out that they either disagree or strongly disagree to the claim that their decision to use smartphone in learning is based on the expectations their colleagues have about them. Similarly, a cumulative sum of 21% indicated they strongly agreed or simply agreed.

### 5.2.4 Facilitation Conditions

Facilitating expectancy refers to the instance where an individual of a technology (smartphone) tends to believe that an organisation’s infrastructure to a large extent exists to support the use of the technology. For that matter respondents were requested to provide responses to questions that would enable the study observe the dominant factor. The mean responses are summarised in the table below.

<table>
<thead>
<tr>
<th>Facilitation Condition</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>The University’s I.T systems are compatible with smart devices including Smartphones</td>
<td>3.92</td>
</tr>
<tr>
<td>I have adequate knowledge to use Smartphone as a learning device</td>
<td>3.50</td>
</tr>
<tr>
<td>My university provides me with resources necessary to enhance Smartphone learning</td>
<td>2.90</td>
</tr>
</tbody>
</table>

**Source:** Field Survey, 2016

From the summaries in the table above, respondents indicated that ‘the University’s I.T systems are compatible with smart devices’ is the dominant factor related to their facilitation Condition. In respect of the frequency distributions associated with the responses the study observed that 52% of respondents agreed to the fact that I.T systems in the University are compatible with their smart devices. Similarly, 27% of respondents strongly agreed. On the contrary, a cumulative total of 11% of respondents indicated that they either disagreed or strongly disagreed with the University’s I.T systems being compatible with their smart
devices. The table figure below summaries the respective frequencies that were observed from respondents.

**Figure 7: University’s I.T systems are compatible with smart devices**

![Bar chart showing responses](chart.png)

**Source: Field Survey, 2016**

5.3 Educators (Lecturers’) Role in Students’ Resolution to Learning via Smartphone

Having identified the dominant and relevant factors in students’ use of smartphones as a learning tool, this section sought to investigate the role of educators (lecturers) in students’ resolution to learn via smartphones. With the educators’ role, Moore and Benbasat (1991); Harrison, et al. (1997); Karahanna and Straub (1999), as well as Venkatesh and Davis (2000) mentioned that it influences adopting technology for learning purposes. First, respondents were asked to indicate the extent to which they agreed or otherwise to using smartphone for learning if it was recommended to them by their lecturers.

Responses observed indicated that 33% of respondents strongly agreed; 43% simply agreed; with a cumulative total of 9% pointing out that they either disagree or strongly disagree with the statement that they would use smartphones for learning if recommended to them by their lecturer. The figure below summarises the responses that were observed.
Figure 8: Using Smartphone for Learning if it is recommended to me by my Lecturers

Source: Field Survey, 2016

Additionally, respondents were asked whether they would use smartphone for learning if it granted them access to academic resources put online by their lecturers. To this question, a cumulative total of 81% of respondents either agreed or strongly agreed with using smartphone for learning if it granted access to academic resources put online by their respective lecturers. On the other hand, a cumulative sum of 10% of respondents either disagreed or strongly disagreed with using smartphones for learning even if it granted access to academic resource put online by their lecturers. The figure below summarises the responses that were observed.

Figure 9: Use Smartphone for learning if granted online access by Lecturers
Source: Field Survey, 2016

Again, respondents were asked to indicate if they strongly agreed or otherwise to using smartphone if their lecturer told them it could improve their academic performances. With this question, 2% of respondents pointed out that they strongly disagreed, with 5% being of the view that they only disagree. On the contrary, a cumulative sum of 71% indicated they either agree or strongly agree to using smartphone if they were told by their lecturer it could improve their academic performances. The figure below summarises the responses that were observed.

Figure 10: Use Smartphone if Lecturers told us it could improve Academic Performance

Source: Field Survey, 2016

Respondents were again asked if they would use smartphones for learning if their lecturers were to respond to their queries. Of the total valid responses observed from respondents, 34% strongly agreed; 37% only agreed; 16% were indifferent; and a cumulative sum of 13% either disagreed or strongly disagreed. The figure below illustrates the distributions observed.
Similarly, respondents were asked if they would or would not use smartphones for learning even if their lecturers considered it useful. To this question 37% and 33% responded that they strongly agree or simply agree respectively to using smartphones for learning if their lecturers considered it useful. On the contrary 5% and 1% pointed out they disagree or strongly disagree respectively with using smartphone for learning even if their lecturers considered it useful. The figure illustrated below summarises the responses observed.

**Figure 11: Use Smartphone for learning if Lecturers would respond to Queries on it**

**Source: Field Survey, 2016**

**Figure 12: Would use Smartphone for Learning if my Lecturer(s) consider it useful**

**Source: Field Survey, 2016**
The last but not least question asked respondents was related to indicating their extent of agreeing or otherwise on their lecturers being helpful in using smartphones as a learning tool. In this regards, 2% strongly disagreed and 6% simply disagreed. This gives the indication that 8% of respondents believed that lecturers in their departments have been helpful in using smartphones for learning. On the contrary, 42% and 30% respectively pointed out that they agree and strongly agree respectively to lecturers in their departments not being helpful in the use of smartphones as a learning tool. Similarly, this gives the indication that a cumulative sum of 72% of respondents believe that lecturers are not being helpful in terms of students adopting smartphones as a learning tool. The figure below summarises the responses that were noted.

Figure 13: Lecturers have not been helpful in the use of Smartphone as a Learning Tool

Source: Field Survey, 2016

Having observed the respective frequency distributions for all the factors related to the educators’ role in students resolving to learn via smartphone, the study proceeded to compute the mean values of the responses for each factor and then ranked them to determine the factor that dominates. The table below summarises the mean values recorded for each factor.
Table 14: Mean Values of Responses for Facilitation Expectancy

<table>
<thead>
<tr>
<th>Lecturer’s Role</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would use Smartphone for learning if it grants access to academic resource put online by lecturers</td>
<td>4.10</td>
</tr>
<tr>
<td>I would use Smartphone for learning if my lecturer(s) consider it useful</td>
<td>4.01</td>
</tr>
<tr>
<td>I would use Smartphone for learning if it was recommended to me by my lecturers</td>
<td>3.97</td>
</tr>
<tr>
<td>Lecturers in my Department haven’t been helpful in using smartphone as a learning tool</td>
<td>3.92</td>
</tr>
<tr>
<td>I would use Smartphone for learning if my lecturers would respond to my queries on it</td>
<td>3.88</td>
</tr>
<tr>
<td>I would use Smartphone if my lecturer tells me it can improve my academic performance</td>
<td>3.86</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2016

From the summaries ‘I would use the smartphone for learning if it grants access to academic resources put online by lecturers’ recorded the highest mean values with a mean of 4.10 followed by ‘I would use smartphone for learning if my lecturer considered it useful with a mean value of 4.01.

5.4 Factors that inhibit Smartphone as a Learning Tool

Having identified the dominant and relevant factors in students’ use of smartphones as a learning tool, the study sought to identify factors that inhibits the use of smartphones as a learning tool. For that matter, series of possible reasons were presented to respondents for them to indicate the extent to which they agreed or otherwise. First, respondents were requested to indicate whether they agreed or not to connectivity not always being stable.

To this request, a cumulative sum of 72% of respondents either agreed or strongly agreed to connectivity not always being stable, with only a cumulative total of 8% of respondents pointing out that they either disagreed or strongly disagreed to connectivity not always being stable. The figure displayed below illustrates the respective frequencies that were noted from respondents.
Figure 14: Connectivity is not always stable

Source: Field Survey, 2016

After noting respondents’ view on the stability of connectivity, the study went further to enquire of respondents their extent of agreement on the screen and keyboard size making smartphone learning uncomfortable. To this request, again, more than half of the valid responses, i.e. 79% indicated they either agreed or strongly agreed to screen and keyboard size making smartphone usage uncomfortable. On the contrary a cumulative sum of 8% either disagreed or strongly disagreed. The figure below illustrates in a pie chart the noted responses.

Figure 15: Screen and Keyboard Size makes Smartphone uncomfortable for Learning

Source: Field Survey, 2016
Furthermore, on the inhibiting factors, respondents were requested to indicate their extent of agreement or otherwise on file/formats of contents sometimes not being supported by the smartphone, sometimes during browsing. From the responses noted more than 80% of the respondents either agreed or strongly disagreed with file/format of contents sometimes not being supported by the smartphone. On the other hand, only 4% and 1% disagreed and strongly disagreed respectively. The figure below illustrates the responses observed.

**Figure 16: File/Formats of Contents sometimes do not support Smartphone Browsing**

![Bar Chart](chart.png)

**Source: Field Survey, 2016**

Similarly, the extent to which respondents agree or otherwise to phone freezing during important leaning moments was posed. From the responses gathered, 1% strongly disagreed; 2% only disagreed; 7% were indifferent; and a cumulative sum of 90% indicated they either agreed or strongly agreed to phone freezing during important learning moments. The figure below illustrates the respective frequencies of the responses observed.
Last but not least for the inhibiting factors, respondents were requested to indicate their degree of agreement or otherwise on intruding calls interrupting during learning periods. In response to this question, a cumulative sum of 93% agreed or strongly agreed to calls interrupting during learning periods. Only 5% of respondents were indifferent about calls interrupting during learning periods, with a cumulative sum of 2% either disagreeing or strongly disagreeing to calls interrupting during learning periods. The figure below illustrates the respective responses noted.

**Figure 17: The Phone Can Freeze During Important Learning Moments**

**Source: Field Survey, 2016**

**Figure 18: Intruding Calls may come in during Learning**

**Source: Field Survey, 2016**
After observing the frequency distributions relating to all the inhibiting factors, the study at this point tried to weigh the responses and compute the mean values for each factor, for purposes of ranking them to determine the dominant factor among the inhibiting factors.

Summaries of the mean value ranks are presented in the tables below.

**Table 15: Mean Values of Responses for Inhibiting Factors**

<table>
<thead>
<tr>
<th>Inhibiting Factors</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intruding calls may come in during learning</td>
<td>4.58</td>
</tr>
<tr>
<td>The phone can freeze during important learning moments</td>
<td>4.42</td>
</tr>
<tr>
<td>File/formats of contents sometimes do not support Smartphone browsing</td>
<td>4.29</td>
</tr>
<tr>
<td>The screen and key sizes make Smartphone uncomfortable for learning</td>
<td>4.06</td>
</tr>
<tr>
<td>Connectivity is not always stable</td>
<td>4.04</td>
</tr>
</tbody>
</table>

**Source: Field Survey, 2016**

From the mean value rankings summarised in the table above, it is observed that the dominant inhibiting factor is intruding calls coming in during learning periods with a mean value of 4.58 followed by phone freezing during important learning moments with a mean value of 4.42.

Flowing from all these analyses, the researcher was curious to find out if there were any relationships between some of these findings. Therefore, some cross tabulations were made as follows.
Table 16: Usefulness of Smartphones by Format of Content

<table>
<thead>
<tr>
<th>File/formats of contents sometimes do not support Smartphone browsing</th>
<th>I find Smartphone learning useful for my learning activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
</tr>
<tr>
<td>Neutral</td>
<td>0</td>
</tr>
<tr>
<td>Agree</td>
<td>8</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2016

From table 16, the researcher wanted to know if a student would find learning with a smartphone useful in spite of some challenges faced. Of respondents who strongly disagreed that smartphone was useful for learning activities, it was observed that, all of them agreed when they were asked if file/format of contents sometimes do not support smartphone for browsing. The findings also showed those who agreed that smartphone was useful for learning activities, all of them (100%) agreed that file/format does not sometimes browsing and also those who strongly agreed that smartphone was useful for learning also strongly agreed that file/format of content could sometimes not support browsing. What is deduced from this is that, although learning with a smartphone could be useful for learning, there are still some inhibiting factors which affect such usage because majority of those who agreed using a smartphone to learn was useful still agreed that some file/format of content sometimes did not support learning.

Again, the researcher was interested in finding out if respondents would consider smartphone for learning if lecturers told them the device could improve student's academic performance.
in spite of lecturers not being generally helpful when it comes to using smartphone as a learning tool (for instance in the classroom/lecture hall).

### Table 17: Lecturers' Encouragement by Students' Willingness to Use Smartphones

<table>
<thead>
<tr>
<th>Lecturers in my Department have not been helpful in the use of smartphone as a learning tool</th>
<th>I would use Smartphone if my lecturer tells me it can improve my academic performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>4</td>
</tr>
<tr>
<td>Disagree</td>
<td>100.0%</td>
</tr>
<tr>
<td>Neutral</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0.0%</td>
</tr>
<tr>
<td>Agree</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0.0%</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0.0%</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2016

From the above table, of those who disagreed that they would use smartphone for learning should their lecturer tell them the device could improve their academic performance, nine out of ten (91.7%) added that lecturers in their departments had not been helpful in the use of smartphone as a learning tool. Of those who even agreed that they would use smartphone for learning should a lecturer tell them it could improve academic performance, more than four out of ten (45.1%) similarly agreed that lecturers in their departments had not been helpful in the use of smartphone as a learning tool. This seem to indicate that, students may feel more at ease with using the device to improve their learning should lecturers be more supportive in seeing smartphone as a learning tool.
5.5 Hypotheses Testing

Previous sections investigated the adoption factors that are most relevant in students using smartphone as a learning tool; and investigating educators’ role in making students resolve to learning with smartphones; as well as investigating the inhibiting factors. This section examined the various hypothesis raised in this study, and consequently determined whether the conceptual framework appropriately explained the broad objectives of this study. To measure the variables for the Chi-square tests, the study used the highest mean ranks as proxies for the respective variables.

5.5.1 Performance Expectancy & Smartphone Learning Test

To determine whether there is any significant association between performance expectancy and students’ smartphone learning, the responses were cross-tabulated and the Chi-square P-values were used. The hypothesis tested was:

\[ H_1: \text{There is a significant statistical association between performance expectation and student smartphone learning.} \]

The findings showed that of respondents who strongly agreed that they actively use their Smartphone for learning, more 30 percent (38.8%) disagreed that using Smartphone for learning enhances their effectiveness on learning activities, a quarter (25.4%) were neutral and more than 30 percent (35.8%) strongly agreed that using smartphone for learning enhances their effectiveness on learning activities. Of those agreed that they actively use their Smartphone for learning, almost all of them (97.3%) strongly agreed that using smartphone for learning enhancing their effectiveness on learning activities. Also, all those who disagreed that they actively use their Smartphone for learning strongly agreed that using Smartphone for learning enhances their effectiveness on learning activities. The table below summarises the Chi-square test results.
Table 18: Active Usage of Smartphone for learning By Smartphone for learning enhances my effectiveness on learning activities

<table>
<thead>
<tr>
<th>I actively use Smartphone for learning</th>
<th>Using the Smartphone for learning enhances my effectiveness on learning activities</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>0</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
<td>38.8%</td>
</tr>
<tr>
<td>Agree</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2.7%</td>
<td>.0%</td>
</tr>
<tr>
<td>Indifferent</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>18.9%</td>
<td>.0%</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
<td>.0%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
<td>.0%</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>5.4%</td>
<td>11.7%</td>
</tr>
</tbody>
</table>

\[X^2 = 334.896\]  \[df = 16\]  \[P-value = 0.00\]

**Source: Field Survey, 2016**

From the Chi-square test results above, it is noted that at a significant level of 10%, the asymptotic P-value of the Pearson Chi-square test points to a significant statistical relationship between performance expectancy and student smartphone learning. Hence, the study accepts the hypothesis and concludes that there is a significant relationship between performance expectancy and student smartphone learning.

### 5.5.2 Effort Expectancy & Smartphone Learning Test

With the second hypothesis of determining whether there is a significant statistical association between effort expectancy and students’ smartphone learning, the summarised crosstabulation and Chi-square test result are shown below. The hypothesis tested was:
There is a significant statistical association between effort expectation and student Smartphone learning.

Table 19: Active Usage of Smartphone for learning By I find Smartphone learning easy

<table>
<thead>
<tr>
<th>I actively use Smartphone for learning</th>
<th>I find Smartphone learning easy</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>0</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
<td>41.8%</td>
</tr>
<tr>
<td>Agree</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Indifferent</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>18.9%</td>
<td>37.7%</td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>5.3%</td>
<td>.0%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>.0%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>9.0%</td>
<td>22.1%</td>
</tr>
</tbody>
</table>

Χ² = 224.757  df = 16  P-value = 0.00

Source: Field Survey, 2016

Respondents who strongly agreed that they actively use their Smartphone for learning, more than 40 percent (41.8%) disagreed to the statement that, I find Smartphone learning easy. Also, more than 30 percent (34.3%) agreed and (22.4%) strongly agreed that they find Smartphone learning easy. Of all the respondents who strongly disagreed that they actively use their smartphone for learning all of them also strongly disagreed to the statement that, I find smartphone learning easy.

From the Chi-square test results, it is noted again that, at a significant level of 10%, the asymptotic P-value of the Pearson Chi-square test indicates a significant statistical relationship between effort expectancy and student smartphone learning. Hence, the study
accepts the hypothesis and concludes that there is a significant relationship between effort expectancy and student smartphone learning.

5.5.3 Facilitation Condition & Smartphone Learning Test

With the third hypothesis of determining whether there is a significant statistical association between facilitation conditions and students’ smartphone learning, the summarised crosstab table and Chi-square test result are shown in the tables below. The hypothesis tested was:

\[ H_3: \text{There is likely to be a significant statistical association between facilitation conditions and student Smartphone learning.} \]

Table 20: Active Usage of Smartphone for learning By The University’s I.T systems are compatible with smart devices including Smartphones

<table>
<thead>
<tr>
<th>I actively use Smartphone for learning</th>
<th>The University’s I.T systems are compatible with smart devices including Smartphones</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
</tr>
<tr>
<td>Agree</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
</tr>
<tr>
<td>Indifferent</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>77.8%</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>3.2%</td>
</tr>
</tbody>
</table>

\[ X^2 = 567.360 \] \[ df = 16 \] \[ P-value = 0.00 \]

Source: Field Survey, 2016

The table below showed that respondents who strongly agreed that they actively use smartphone for learning, more than 80 percent (89.6%) strongly agreed and confirmed that the University’s I.T. systems are compatible with smart devices including smartphone. On the
other hand, those who strongly disagreed to actively using their smartphones for learning, more than 70 percent (77.8%) strongly disagreed that the university’s IT systems are compatible with smart devices including smartphones.

Furthermore, from the computations observed in the Chi-square test results above, it is noted once more that, at a significant level of 10%, the asymptotic P-value of the Pearson Chi-square test indicates a significant statistical relationship between facilitation conditions and student smartphone learning. Hence, the study accepts the hypothesis and concludes that there is a significant relationship between facilitation conditions and student smartphone learning.

5.5.4 Social Expectancy & Smartphone Learning Test

The fourth hypothesis is related to determining whether there is a significant statistical association between social expectancy and students’ smartphone learning. In that respect, the summarised Chi-square test result is shown in the table below. The hypothesis tested was:

\[ H_4: \text{There is a significant statistical association between social expectation and student Smartphone learning.} \]

From the table above, of those who strongly agreed that they actively used smartphone for learning, more than four out of ten (44.8%) said that as a social expectation most of their mates were using the device for learning so expected them to do same. For those who also strongly disagreed to actively using their smartphones for learning, close to 90 percent (88.9%) similarly disagreed that they would use smartphone for learning just because their mates used the device and expected them to do same.
Table 21: Active Usage of Smartphone for learning By Most of my colleagues use Smartphone in learning, and expect me to do same

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>0</td>
<td>0</td>
<td>22</td>
<td>30</td>
<td>15</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
<td>.0%</td>
<td>32.8%</td>
<td>44.8%</td>
<td>22.4%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Agree</td>
<td>0</td>
<td>0</td>
<td>74</td>
<td>0</td>
<td>0</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
<td>.0%</td>
<td>100.0%</td>
<td>.0%</td>
<td>.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Indifferent</td>
<td>0</td>
<td>0</td>
<td>53</td>
<td>0</td>
<td>0</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
<td>.0%</td>
<td>100.0%</td>
<td>.0%</td>
<td>.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>16</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
<td>84.2%</td>
<td>15.8%</td>
<td>.0%</td>
<td>.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>88.9%</td>
<td>11.1%</td>
<td>.0%</td>
<td>.0%</td>
<td>.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>17</td>
<td>152</td>
<td>30</td>
<td>15</td>
<td>222</td>
</tr>
<tr>
<td></td>
<td>3.6%</td>
<td>7.7%</td>
<td>68.5%</td>
<td>13.5%</td>
<td>6.8%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

$X^2 = 498.569$  $df = 16$  $P$-value = 0.00

Source: Field Survey, 2016

From the computations observed in the Chi-square test results above, it is noted once again that, at a significant level of 10%, the asymptotic $P$-value of the Pearson Chi-square test indicates a significant statistical relationship between social expectancy and student smartphone learning. Hence, the study accepts the hypothesis and concludes that there is a significant relationship between social expectancy and student smartphone learning.

5.5.5 Lecturers’ Role & Smartphone Learning Test

The fifth and last hypothesis to use the Chi-square test is related to determining whether there is a significant statistical association between lecturers’ role and students’ smartphone learning. The Chi-square test result shown in the table below summarises the findings. The fifth hypothesis tested was:
There is a significant statistical association between lecturers’ role and student Smartphone learning.

Table 22: Active Usage of Smartphone for learning By I would use Smartphone for learning if it grants access to academic resource put online by lecturers

<table>
<thead>
<tr>
<th>I actively use Smartphone for learning</th>
<th>I would use Smartphone for learning if it grants access to academic resource put online by lecturers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>Strongly Disagree  Disagree  Neutral  Agree  Strongly Agree  Total</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>0 0 22 0 45 67</td>
</tr>
<tr>
<td>Agree</td>
<td>0 0 0 31 43 74</td>
</tr>
<tr>
<td>Indifferent</td>
<td>0 0 0 53 0 53</td>
</tr>
<tr>
<td>Disagree</td>
<td>2 10 0 7 0 19</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>0 9 0 0 0 9</td>
</tr>
<tr>
<td>Total</td>
<td>2 19 22 91 88 222</td>
</tr>
</tbody>
</table>

X² = 347.468  df = 16  P-value = 0.00

Source: Field Survey, 2016

The table indicates that of those who strongly agreed that they were actively using their smartphones for learning, more than 60 percent (67.2%) strongly agreed that they would use smartphones for learning if the device granted them access to academic resource put online by their lecturers. Interestingly on the other hand, for those who disagreed to actively using their smartphones for learning, close to four out of ten (36.8%) agreed they would use smartphone for learning if the device grants access to academic resource put online by lecturers.

From the computations observed in the Chi-square test results above, it is noted once again that, at a significant level of 10%, the asymptotic P-value of (0.00) the Pearson Chi-square test indicates a significant statistical relationship between lecturers’ role and student...
smartphone learning. Hence, the study accepts the hypothesis and concludes that there is a significant relationship between lecturers’ role and student smartphone learning.

5.5.6 Inhibiting Factors moderating relationship between Adoption Factors & Smartphone Learning

With this hypothesis, a regression analysis was employed to determine whether inhibiting factors would moderate, at least, partially, the relationship between adoption factors and smartphone learning. As noted earlier, the regression model to be estimated is as specified in Equation (3) in the methodology chapter. From the estimation presented below, an R-squared which measures the extent to which a model is appropriate for the data used was 0.84. This implies that the model is able to explain approximately about 84% variations among the data. With an F-statistic of 231.28 and a corresponding P-value of 0.00, the implication is that all the variables are jointly significant in explaining variations in the model as presented. In respect of the descriptive about the model mentioned earlier, the study is confident with reporting the coefficient estimates that were observed for variables considered. The hypothesis that was tested was:

\[ H_6: \text{Inhibiting factors would moderate, at least, the relationships between adoption factors and smartphone learning} \]

From the estimations presented, significant relationships were observed between inhibiting factors and: performance expectancy as it recorded a P-value of 0.04 (4%) which is less than the 0.1 (10%) used as the benchmark; effort expectancy as it also recorded a P-value of 0.01 (1%), again less than the 0.1 (10%) significance level used in this study; as well as facilitation conditions which recorded a P-value of 0.00. Apart from the mentioned variables above, social expectancy and lecturers’ roles were not significant as they recorded P-values above 0.1 (10%). The implications of the significant relationships observed indicates that inhibiting
factors moderate at least, partially, the relationship between adoption factors and smartphone learning. In other words, inhibiting factors significantly influences or moderate’s adoption factors such as performance expectancy, effort expectancy and facilitation conditions. The table below summarises the regression results estimated.

**Table 23: Summary of Regression Results**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>10.87070</td>
<td>0.815475</td>
<td>13.33052</td>
<td>0.0000</td>
</tr>
<tr>
<td>Performance Expectancy</td>
<td>0.096416</td>
<td>0.045539</td>
<td>2.117231</td>
<td>0.0354</td>
</tr>
<tr>
<td>Effort Expectancy</td>
<td>0.066755</td>
<td>0.026483</td>
<td>2.520654</td>
<td>0.0124</td>
</tr>
<tr>
<td>Facilitation Condition</td>
<td>0.786367</td>
<td>0.043012</td>
<td>18.28260</td>
<td>0.0000</td>
</tr>
<tr>
<td>Social Expectancy</td>
<td>-0.050848</td>
<td>0.038700</td>
<td>-1.313919</td>
<td>0.1903</td>
</tr>
<tr>
<td>Lecturers’ Role</td>
<td>0.023688</td>
<td>0.022094</td>
<td>1.072145</td>
<td>0.2849</td>
</tr>
</tbody>
</table>

R-squared 0.842613  Adjusted R-squared 0.838970
S.E. of regression 0.883260  F-statistic 231.2827
Sum squared residual 168.5118  Prob. (F-statistic) 0.000000

**Source:** Field Survey, 2016
CHAPTER SIX
DISCUSSION OF RESULTS

6.1 Introduction

This chapter focused on providing a discussion to the findings presented in the preceding chapter, and revisited the conceptual framework proposed in this work for understanding students’ smartphone learning in the University of Ghana.

6.2 Discussion of Results

Davies (1989) noted that performance expectancy is one of the most influential adoption factors within the context of mobile or electronic learning. Similarly, Wu, et al., (2009) also asserted that the performance expectancy related to mobile-learning typically should allow students the convenience and quick response they want during learning. Consequently, from the observations made regarding performance expectancy, it is not surprising when most respondents indicated their performance expectations of smartphone learning should enhance their capability to produce an intended result or having a striking effect, in other words, it should enhance their learning effectiveness, and not just adding to their performances. The dominance of this response from the other responses appears to parallel the assertions of Wu, et al., (2009) as well as Davies (1989) who noted that the use of technology in learning should contribute to students’ ability to perform well in addition to having an understanding of what they learn.

With effort expectancy, as Venkatesh, et al., (2003) pointed out, is more concerned with the ease with which students would want to use their smartphones to learn. Interestingly, findings from this study clearly indicated that the effort expectancy of students was dominantly related to finding smartphone learning in a general sense easy. Compared to other responses such as ‘using smartphone because it enables them to be skilful only at learning’ or ‘smartphones
merely making them do what they want to do when learning’. Similar to assertions by Venkatesh, et al., (2003) on social expectancy, the dominant response observed by the study is in agreement. This is because the response that dominated the other factors was that, most students would use smartphones to learn because their colleagues use it and are expecting them to do same. Datta (2011), also noted that in most instances, people’s quest to use technology in activities such as learning, is often induced by what others around them are doing.

On facilitation conditions, the dominant response observed gives the implication that, smartphone learning would be on the increase in instances where the IT system infrastructure within the learning community supports the use of smart devices. In that sense, having adequate knowledge on how to use the devices for learning does not become a priority for students, nor are students interested in the devices the school would give them to work with. Likewise, Joshua and Koshy (2011) also noted that the more convenient people have access to use their devices at anytime and anywhere, the more proficient people would be at using technology, which will culminate eventually into higher adoption rates.

From the responses observed on the role of lecturers, most students were of the view that they would use smartphones for learning if it granted them access to academic resources put online by their lecturers. What this suggests is that, educators also have crucial roles to play when it comes to students making a decision to learn using smartphones. On the role of lecturers, which mirrors the dominant response this study observed, Ajjan and Hartshorne (2008) also found that a faculty's attitude, and, indeed, their perceived behavioural control were strong indicators of students’ intention to use the smart devices, and that faculty’s predisposition towards electronic or on-line learning greatly impacted student mobile learning. With the inhibiting factors, the study noted that intruding calls during learning with
smartphones was the dominant inhibitor. On their part Gabarre et al. (2012) noted that for smartphone learning to be really acceptable as an effective medium of learning, a number of interventions must be put in place to ensure success.

With the hypothesis testing, all five (5) hypothesis formulated were statistically significant and indicated that there are associations between performance expectancy; effort expectancy; facilitation conditions; social expectancy; lecturers’ role and student smartphone learning. Although these significant statistical associations are expressly not noted in literature, partly because different methodologies were used. To a large extent, the findings make intuitive meanings. First, if students expect their performances to improve by means of using smartphones to learn, it is more likely that students’ performance expectancy would have a significant association with their smartphone learning. Again, if the students perceive they do not require extreme special skills to use learn with their smartphones, it is more likely effort expectancy would also have a significant statistical association with learning with smartphone.

Concerning the last hypothesis on inhibiting factors moderating the relationship between adoption factors and smartphone learning. The study found out that only three (3) of the variables were significant. This gives the indication that, of all the factors looked at, inhibiting factors significantly modulate performance expectancy, effort expectancy, and facilitation conditions. Additionally, the respective coefficients of the significant factors were all positive implying that as inhibiting factors are on the increase, the more it modulates the adoption factors, particularly, performance expectancy, effort expectancy, and facilitation conditions.
6.3 Revisiting the Conceptual Framework

Davies (1989) noted that performance expectancy is one of the most influential adoption factors.

In respect of the results observed through the regression analysis, the proposed conceptual framework is now revised to the diagram below.

Figure 19: Revised Conceptual Framework for the Study

Adoption factors

[Diagram showing revised conceptual framework]

Source: Researcher's own conceptualisation

The differences in the proposed conceptualisation and the revisited conceptualisation as shown above is seen in the inhibiting factors. Initially, the study hypothesised that inhibiting actors are likely to modulate all the factors. However, from the regression analysis carried out, the study observed that, inhibiting factors significantly modulated Performance Expectancy (PE); Effort Expectancy (EE); and Facilitation Conditions (FC). Hence, the reason why the arrow from the inhibiting factors does not extend to cover Social Expectancy (SE) and Lecturers’ Role (LR) in the diagram, but intersecting with the arrows from PE, EE and FC.
CHAPTER SEVEN
SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This chapter focused on providing a summary to the results discussed in Chapter Five above, as well as a conclusion to the study. The chapter also makes recommendations for students and also for future studies into the subject area. The prime objectives of the study comprised the under listed:

i. To investigate the adoption factors most relevant in student use of Smartphone as a learning tool.

ii. To investigate the role of educators (lecturers) in student resolve to learning via Smartphone.

iii. To investigate the factors that inhibit Smartphone as a learning tool

From the objectives listed, the analysis and discussions carried out are summarised below:

7.2 Summary of Findings

In summary, the demographic characteristics of respondents to the study established that the sample which was selected for the study was appropriate. For instance, the gender distribution noted for the study was fairly proportional; the age distributions too were fairly dispersed; levels of education were equally proportional among the levels of study in the University; and a relatively fair percentage of respondents indicated they actively or frequently used smartphones in learning.

On the adoption factors most relevant in students’ use of smartphones as a learning tool, the study noted and hypothesised five key factors: performance expectancy, effort expectancy, facilitation conditions; social expectancy and lecturers’ role. In each of the factors mentioned, respondents were asked series of questions capturing a dimension of the...
respective factor. Responses related to each factor were weighted, and their means computed and ranked to observe the dominant dimensions to a factor. With performance expectancy, the dominant response noted from respondents was in connection to ‘using smartphones for learning because it was going to enhance their effectiveness on learning activities’ as it recorded the highest mean of 3.96. On the factor of effort expectancy, the dominant response that was noted was that ‘students found learning with smartphones easy’ as it recorded a mean value of 3.33. ‘Most of my colleagues use smartphone in learning and expect me to do same’ was the dominant response with a mean value of 3.12 for social expectancy; ‘the university’s IT systems are compatible with smart devices including smartphones’ was also the dominant response with a mean of 3.92 for facilitation conditions.

On educators (lecturers) role, the dominant dimension was in relation to students using smartphones for learning on conditions that it granted them access to academic resources put online by lecturers, as it recorded a mean value of 4.1. Similarly, ‘intruding calls during learning’ was identified as the dominant inhibiting factor for adopting smartphones as a learning tool by students. Using a Chi-square analysis to test the various hypothesis that were raised in the study, particularly the hypothesis listed below:

i. \( H_1 \): There is a significant association between performance expectation and student smartphone learning.

ii. \( H_2 \): there is a significant association between effort expectation and student Smartphone learning.

iii. \( H_3 \): there is a significant association between facilitation expectation and student Smartphone learning.

iv. \( H_4 \): there is a significant association between social expectation and student Smartphone learning.
v. H5: there is a significant association between lecturers’ role and student Smartphone learning.

It was observed that they all had significant statistical associations, especially as they all recorded P-values smaller than the critical significant level of 10%.

Concerning the last hypothesis, using an Ordinary Least Square (OLS) regression analysis, the study found that inhibiting factors partially moderated adoption factors such as Performance Expectancy; Effort Expectancy; and Facilitation Conditions as they all recorded P-values that were smaller than 10%. Consequently, the proposed conceptual framework was revised to reflect the factors that were found to be significant in modulating the adoption factors. The revised conceptual framework is as presented in the figure below:

**Figure 20: Revised Conceptual Framework for the Study**

**Adoption factors**

- SE
- LR
- FC
- PE
- EE

**Inhibitors**

- Connectivity
- Screen size
- Content format
- Intrusion

**Students’ Smartphone Learning**

*Source: Researcher’s own conceptualisation*
7.3 Conclusion

In conclusion, the study found significant statistical associations between all the smartphone adoption factors, i.e. performance expectancy, effort expectancy, social expectancy, facilitation conditions and students learning with smartphones. Similarly, the study found out that crucial to students resolving to use smartphones for learning is the role lecturers play. For instance, students were of the view that they would use smartphones to learn on condition that it granted them access to resources online put there by their lecturers. Last but not least, the study concludes that inhibiting factors moderate at least, the relationship between the adoption factors of performance expectancy; effort expectancy; facilitation conditions and students learning with smartphones.

7.4 Recommendations

Having noted the benefits smartphone learning has on students in literature, its adoption can be of great value not just to students, but to the University as well. On that basis, the study first recommends that, the University should constantly ensure that IT systems are most of the time compatible with all the generations of smartphones, especially as it is a key facilitation condition. Again, the study recommends that the University would provide students with resources that are necessary to enhance smartphone learning. Furthermore, from the analysis it was noted that lecturers play critical roles in students adopting smartphones for learning, hence, lecturers should ensure that their means of delivery considers the use of smart devices, and technology in general. On future studies into the area, the study recommends that future studies should consider examining smartphone learning in other contexts, i.e. other Universities, as well as carry out a comparative study among teaching institutions so as to amply inform authorities on how smartphone learning can be integrated into the learning activities of teaching institutions in Ghana.
REFERENCES


intention to use mobile payment. Computers in Human Behavior, 26(3), 310-322.


Kaba, B., & Touré, B. (2014). Understanding information and communication technology behavioral intention to use: Applying the UTAUT model to social networking site adoption by young people in a least developed country. Journal of the Association for Information Science and Technology, 65(8), 1662-1674.


APPENDICES

RESEARCH QUESTIONNAIRE

This research seeks to investigate smartphone and its impact on learning in university of Ghana. All information provided is solely for the purposes of academic research and will be treated confidentially. Please spare a few minutes of your time to complete this questionnaire.

SECTION A: DEMOGRAPHIC CHARACTERISTICS

1. Gender: Male [ ] Female [ ]
3. Educational level: Graduate [ ] Post-graduate [ ]
4. Do you have a smartphone: Yes [ ] No [ ]
5. In the past month, how many times did you use your smartphone to access educational resource from your university/department/lecturer?
   Never [ ] rarely [ ] often [ ] everyday [ ]
6. Do you use your smartphone for learning purpose? Yes [ ] I am not aware [ ] No [ ]
7. If you accessed educational resources what were the nature of these resources: (tick as many as apply)
   [ ] Tutorial sets [ ] Assignments [ ] supplementary lecture notes [ ] Journal articles
   [ ] Lecture Videos Others: please specify ..........................................................
8. I actively use smartphones to learn.
   Strongly Agree [ ] Agree [ ] Indifferent [ ] Disagree [ ] Strongly Disagree [ ]

SECTION B: RESEARCH CONSTRUCTS

Please indicate with a circle, tick, or a cross, which number most proximately, captures your response to the statements. Please remember, there are no right or wrong answers.
1 – Strongly disagree (SD), 2 – Disagree (D), 3 – Neutral (N), 4 – Agree (A), 5 – Strongly agree (SA)

<table>
<thead>
<tr>
<th>Performance Expectancy</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Using the Smartphone for learning improves my performance in my learning activities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2 Using the Smartphone for learning enhances my effectiveness on learning activities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3 Using the Smartphone in my learning activities increases my</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Productivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>4</td>
<td>I find Smartphone learning useful for my learning activities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effort expectancy</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Using Smartphones, it becomes easy for me to become skillful at learning</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>I find Smartphone learning easy</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>I find it easy to get my Smartphone to do what I want it to do during learning</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>I find it easy navigating e-learning sites using my Smartphone</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social expectancy</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Most of my colleagues use Smartphone in learning, and expect me to do same</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>People who influence my behaviour think that I Smartphone enhance learning</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>My school/faculty required that Smartphone be use in learning</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Facilitating conditions</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>My university/department/school provides me with resources necessary to enhance Smartphone learning</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>I have adequate knowledge to use Smartphone as a learning device</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>The university’s I.T systems are compatible with smart devices including Smartphones</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lecturers role</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>I would use Smartphone for learning if it was recommended to me by my lecturers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17</td>
<td>I would use Smartphone for learning if it grants access to academic resource put online by lecturers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18</td>
<td>I would use Smartphone if my lecturer tells me it can improve my</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>academic performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>19 I would use Smartphone for learning if my lecturers would respond to my queries on it</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20 I would use Smartphone for learning if my lecturer(s) consider it useful</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21 Lecturers in my Department have not been helpful in the use of smartphone as a learning tool</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

### Challenges

<table>
<thead>
<tr>
<th>Challenges</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Connectivity is not always stable</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21 The screen and key sizes make Smartphone uncomfortable for learning</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22 File/formats of contents sometimes do not support Smartphone browsing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23 The phone can freeze during important learning moments</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25 Intruding calls may come in during learning</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

### SECTION C: RECOMMENDATIONS

1. Please any other view on smart phone use for learning in the University of Ghana?

2. Any other recommendations?

University of Ghana http://ugspace.ug.edu.gh