

UNIVERSITY OF KWAZULU-NATAL

**The Impact of Tablet PCs on teaching, learning and student performance
at Richfield Graduate Institute of Technology**

By

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**A dissertation submitted in partial fulfilment of the requirements for the degree of
Master of Business Administration**

Graduate School of Business and Leadership

College of Law and Management Studies

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2017



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ACKNOWLEDGEMENTS

I wish to express my sincere appreciation and gratitude to the following individuals, without whose assistance, this study would not have been possible.

- I am particularly indebted to my supervisor, Dr Sachin Suknunan for his invaluable advice and scholarly guidance that has in the main contributed to the completion of this research. Special mention must be made of his thoroughness and his constant quest for the best.
- My sincere thanks are accorded to Prof Roshni Maharaj for her constant reminders to complete my work to the best of my ability and for being always available a sounding board.
- Richfield Graduate Institute of Technology for allowing me to conduct my study.
- The students and lecturers of Richfield Graduate Institute of Technology for participating in the study.
- My statistician, Deepak Singh for his expert input.

ACRONYMS AND ABBREVIATIONS

CHE	- Council on Higher Education
e-Book	- Electronic Book
e-Learning	- Electronic Learning
ICT	- Information and Communications Technology
IT	- Information Technology
NSP	- National Strategic Plan
OECD	- Organisation for Economic Co-operation and Development
PC	- Personal Computer
Richfield	- Richfield Graduate Institute of Technology
SA	- South Africa
TTF	- Task Technology Fit
USA	- United States of America

ABSTRACT

The use of the Tablet Personal Computer (PC) has seen a significant increase in usage since 2012 due to its increasing popularity and adoption globally. It has also seen an increase in popularity in usage in the Post-school Education. Whilst some research does exist in other countries and settings regarding the roles of Tablet PC usage, minimal studies of this nature have been conducted within South Africa. The aim of this study was to address this gap by investigating the role of the Tablet PC in an institution of higher learning in a South African context (Richfield Graduate Institute of Technology). Therefore, this study investigated the impact of the Tablet PC on teaching, learning and student academic performance at Richfield Graduate Institute of Technology with the intention of enhancing education delivery as such.

This study adopted both a quantitative and qualitative approach as a means to fully satisfy the research questions. The quantitative arm targeted the ‘student component’ in which a survey was administered online and students were asked to click on the link, which took them to the survey. The qualitative arm targeted the ‘teacher/lecturer component’ in which an interview schedule was used as the survey instrument. The quantitative study census population consisted of all Degree qualification students at the Richfield Pretoria cluster (483 students). With a confidence level of 95% and a confidence interval of 5%, the ideal target sample size was 214 out of the census population. The study obtained 169 responses, which resulted in a 79% response rate to sample. With reference to the qualitative study, 11 lecturers were selected from 26 lecturers through purposeful and convenient sampling.

The key findings in this study were that the teaching and learning processes are enhanced by the use of the Tablet PC. A further finding was that the Tablet PC improved the academic performance of students despite several barriers and challenges that do exist. Though these barriers did not significantly affect the teaching or learning processes, the study did make recommendations to address them. Some of the main recommendations for this study included that Richfield Graduate Institute conduct student workshops, that lectures create and share resources to facilitate the learning process, that additional recharge points be installed through the campuses, and that social media access be restricted on the Campus Wi-Fi during lectures. Direction for future research can include country-wide studies of this nature and/or studies across larger institutions such as universities.

TABLE OF CONTENTS

Description	Page
Title Page	i
Supervisor's Permission to Submit Form	ii
Declaration	iii
Acknowledgements	iv
Acronyms and Abbreviations	v
Abstract	vi
Table of Contents	vii
Appendices	xiii
List of Figures	xiv
List of Tables	xv

CHAPTER ONE

INTRODUCTION

1.1 Introduction	1
1.2 Statement of Problem and Background	1
1.3 Background	2
1.4 Research Question	3
1.5 Research Objective	3
1.6 Motivation for Study	3
1.7 Overview of Research Methodology	4
1.7.1 Approach	4
1.7.2 Location	4
1.7.3 Population and Sampling	4
1.7.4 Instrument Development	5
1.7.5 Data Collection	5
1.7.6 Data Analysis	6
1.8 Research Constraints	6
1.9 Organisation of the Study	6

1.10 Summary	7
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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction	8
2.2 Information Technology and Learning	8
2.3 The Advantages of the Tablet PC for Education	9
2.3.1 Definition of mobile learning	9
2.3.2 The Tablet PC and Personalised Learning	9
2.3.3 Collaboration, Communication and Creativity	10
2.4 The Impact of the Tablet PC on Enhancing the Teaching and Learning Process	12
2.4.1 Conventional Teaching	12
2.4.2 Infrastructure for Technology-based Teaching	13
2.4.3 Technology aiding Academic Staff and Students	13
2.4.4 Student Engagement, Independent Learning and Knowledge Creation	14
2.6 Impact of the Tablet PC on Learning Design	16
2.6.1 Innovation in classroom-based assessment	17
2.6.2 Advantages for Lecturers	17
2.6.3 Feedback	18
2.7 Impact of the Tablet PC on Students and Learning	18
2.7.1 Challenging Learning Environment	19
2.7.2 Reversal of Roles	19
2.7.3 Developing Independent Learning, Critical Thinking and Problem Solving Skills	20
2.8 Barriers and Challenges in the Use of Tablet PC's	21
2.8.1 Specific Issues and Challenges	22
2.8.1.1 Social Issues	22
2.8.1.2 Pedagogy Issues	23
2.8.1.3 Technological Issues	24
2.8.1.4 Effect on Teacher-Student Relationship	26

2.9 Theoretical Framework	27
2.9.1 Description and Applicability of the Task-Technology Fit Model to the study	29
2.9.1.1 Technology	29
2.9.2 Task-Technology Fit (TTF): impact on performance and utilisation of Tablet PC	29
2.9.2.1 Performance	30
2.9.2.2 Utilisation	30
2.10 Summary	31

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction	32
3.2 Research Question and Objectives	32
3.3 Research Design and Approach	32
3.3.1 Research Setting and Location	33
3.4 The Study Population and Sample	34
3.4.1 The Sampling Criteria	34
3.5 Data Collection	35
3.5.1 Data Collection Instrument	35
3.6 Instrument Construction	36
3.6.1 Survey Instrument	36
3.6.2 Interview Schedule	37
3.7 Data Collection Procedure and Administration of the Instruments	38
3.7.1 Quantitative Survey	38
3.7.2 Interviews	39
3.8 Reliability and Validity	39
3.8.1 Reliability	39
3.8.2 Validity	39
3.9. Pre-testing the Questionnaire	40

3.10 Ethical Considerations	40
3.11 Data Analysis	41
3.11.1 Quantitative Data Analysis	41
3.11.2 Qualitative Data Analysis	42
3.12 Elimination of Bias	42
3.13 Summary	42

CHAPTER FOUR

DESCRIPTIVE STATISTICS

4.1 Introduction	44
4.2 The Sample (Quantitative Study)	44
4.3 The Research Instrument	44
4.4 Reliability Statistics	44
4.5 Section A: Biographical Data	45
4.5.1 Gender	45
4.5.2 Age Group	45
4.5.3 Campus Details	46
4.5.4 Year of study	47
4.6 Section B: Task - Learning and the Tablet PC	47
4.6.1 Influence of the Tablet PC on learning	47
4.7 Section C: The Learning Fit	49
4.7.1 Influence of Tablet PC on learning styles	49
4.8 Section D: The Impact on Student Performance	50
4.8.1 Impact of Tablet PC on student performance	51
4.9 Section E: Usage and Barriers to Usage of the Tablet PC	52
4.10 Summary	54

CHAPTER FIVE

DETAILED ANALYSIS, DISCUSSION AND KEY FINDINGS

5.1 Introduction	55
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CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction	82
6.2 Problem Statement, Research Question, and Objectives of the Study	82
6.2.1 Problem Statement Overview	82
6.2.2 Research Questions	82
6.2.3 Objectives	83
6.3 Have the Research Questions Been Answered?	83
6.3.1 How Does the Tablet PC Influence Teaching?	83
6.3.2 How Does the Tablet PC Influence Learning?	83
6.3.3 How Does the Tablet PC Influence Academic Performance?	83
6.3.4 Applicability of the model	84
6.4 Did the Study Fulfil the Intended Objectives?	84
6.4.1 Objective 1: To investigate the impact of the Tablet PC on academic teaching at Richfield Graduate Institute of Technology.	84
6.4.2 Objective 2: To investigate the impact of the Tablet PC on academic learning at Richfield Graduate Institute of Technology.	84
6.4.3 Objective 3: To investigate if the Tablet PC influences student academic performance.	84
6.4.4 Objective 4: To identify the technological challenges/barriers related to Tablet PC adoption for teaching, learning and academic performance.	85
6.5 Recommendations Made by this Study	85
6.5.1 Recommendation 1: Student Workshops	85
6.5.2 Recommendation 2: Lecturer Content Preparation and Sharing of Resources	85
6.5.3 Recommendation 3: Battery Life and Recharge Points	86
6.5.4 Recommendation 4: Limiting Social Media Sites During Class Hours	86
6.5.5 Recommendation 5: Empowerment Students From Disadvantaged Backgrounds	86
6.6 Limitations	86

6.7 Directions for Future Researchers	87
6.8 Conclusion	87
REFERENCES	89
APPENDICES	
Annexure A: Instrument for the Quantitative Study	106
Annexure B: Instrument for the Qualitative Study	110
Annexure C: Informed Consent Letter for Quantitative Survey and Qualitative Interview participants	115
Annexure D: Ethical clearance from the University of KwaZulu-Natal	118
Annexure E: Gatekeeper Letter from Richfield Graduate Institute of Technology	119
Annexure F: Turn it in Report	120

LIST OF FIGURES

Name	Description	Page
Figure 1.1	Task-Technology Fit Model	5
Figure 2.1	Personalised Handwritten Feedback	18
Figure 2.2	Task-Technology Fit Model	27
Figure 2.3	Task-technology fit Model incorporating the Tablet PC and Learning Fit	28
Figure 2.4	Task-technology fit Model incorporating the Tablet PC and Teaching Fit	29
Figure 3.1	The Online Survey Process followed in this study	37
Figure 3.2	The PEACE Interview Model (Williamson, 2013)	38
Figure 4.1	Campus that respondents attended	46
Figure 4.2	Respondent's year of study	47
Figure 4.3	Influence of the Tablet PC on learning	48
Figure 4.4	The Learning Fit of the Tablet PC	49
Figure 4.5	Impact of Tablet PC on student performance	51
Figure 4.6	Usage and Barriers to Usage of the Tablet PC	53
Figure 5.1	Word Cloud analysis of the Qualitative Study feedback related to the questions on Heightened Performance of Students and Lecturers	67
Figure 5.2	Word Cloud analysis of the Qualitative Study feedback related to the questions on "Interactivity"	69
Figure 5.3	Word Cloud analysis of the Qualitative Study feedback related to the questions on Adaptation of Teaching and Learning Styles	71
Figure 5.4	Word Cloud analysis of the Qualitative Study feedback related to the questions on Barriers and Challenges	73
Figure 5.5	Task-Technology Fit Model	77
Figure 5.6	Task-Technology Fit Model incorporating the Tablet PC and the Learning Fit	79
Figure 5.7	Task-Technology Fit Model incorporating the Tablet PC and the Teaching Fit	80

LIST OF TABLES

Name	Description	Page
Table 4.1	Reliability Statistics	45
Table 4.2	Biographical Data – Gender of respondent	45
Table 4.3	Biographical Data - Age of respondent	46
Table 5.1	KMO and Bartlett's Test for the Quantitative Study	57
Table 5.2	Rotated Component Matrix for Section B of the Quantitative Study	57
Table 5.3	Rotated Component Matrix for Section C of the Quantitative Study	58
Table 5.4	Rotated Component Matrix for Section D of the Quantitative Study	58
Table 5.5	Summarised Correlations between the various sections of the Quantitative Study	60
Table 5.6	Correlation between Tablet PC impact on Learning and Learning fit of the Tablet PC in the Quantitative Study	61
Table 5.7	Correlation between Tablet PC impact on Learning and The Impact of Student Performance in the Quantitative Study	62
Table 5.8	Correlation between Learning fit of the Tablet PC and Impact on Student Performance in the Quantitative Study	63
Table 5.9	The profiles of lecturers interviewed	65

CHAPTER ONE

INTRODUCTION

1.1 Introduction

The effectiveness of technology in education has been a topic of much discussion since the emergence of mobile computing. A recent trend has seen Private Higher and Further Education Institutions in South Africa provide Tablet Personal Computers to their students upon registration. This study aims to examine the impact of the Tablet Computer dissemination on teaching, learning and student performance at Richfield Graduate Institute of technology. This chapter defines the research problem and background to the problem. It articulates the research questions together with the objectives of the study. In addition, this chapter presents a brief overview of the research methodology and outlines the content of each chapter.

1.2 Statement of Problem and Background

Whilst research exist in other countries and settings regarding the roles of technology usage in Post-school Education via the use of the Tablet Personal Computer (PC), minimal studies of this nature exist in South Africa. This study aims to address that gap by investigating the impact of the Tablet PC on teaching, learning and student performance at Richfield Graduate Institute of Technology. The key purpose of this study is to investigate the impact of the Tablet PC on teaching, learning and student academic performance in order to identify the barriers that may hamper successful performance. In 2012, Richfield Graduate Institute of Technology (Richfield) based in South Africa (SA) previously known as PC Training and Business College, had begun issuing Tablet PCs to all its learners on a yearly basis to improve the teaching and learning process at the institution. The effectiveness of this technology has yet to be fully understood and measured. Hence the need for this study. Learner surveys conducted by the institution from 2012 until 2014 show that there is improvement in student performance because of easier access to a greater pool of knowledge on demand. Research by Behnke et al. (2005), Heinrich (2012), and Burden (2012), had been done internationally to varying degrees of success in order to establish whether education delivered through the use of the Tablet PC is beneficial to the learner. In the main, evidence in these studies reveal a measure of improved student performance.

1.3 Background

There are several success stories of the use of technology in education globally, as depicted by Behnke et al. (2005), Burden (2012) and Heinrich (2012). Research by Behnke et al. (2005), done in the Massachusetts Institute of Technology in the United States of America (USA) concluded that the inclusion of the Tablet PC has a direct benefit on student academic performance to the point that even learners that would otherwise perform poorly, are now able to perform at a much better standard in their studies. Further to this, their study found that by using the Tablet PC that there was an increase in the effectiveness of the teaching and learning process primarily due to the ease of which content could be obtained and how quick feedback was given. (Behnke et al., 2005).

However, whilst these stories indicate a fair amount of success in this area it is also evident that there exist barriers to academic success when it comes to technology use in higher education. The barriers to innovation through technology are well documented. Karsenti and Fievez (2013) identify the following barriers and challenges:

- unreliable infrastructure,
- teacher attitudes and identities
- Student attitudes
- cost and economic factors,

As versatile as Tablet PCs are for learning, educators are still in the infancy stage of integrating them into their academic curricula. The most pressing problems are the cost factors and loading information onto the Tablet PC (OECD, 2013). In addition, once students have mastered the art of surfing the net, attention problems arise (Garavaglia and Ferrari, 2012). Educators need to focus on educating students in order to prevent them from preventing them from cyberbullying, viewing inappropriate content, getting distracted during lectures as well as physically breaking the Tablet PC (Garavaglia and Ferrari, 2012).

In light of the above studies done (of which more will be presented in the literature review) that outline the impact and barriers in other countries, it becomes imperative to examine this from a developing country context such as South Africa. According to the National Strategic Plan (NSP, 2012-2016), technology is being seen as a strategy to disseminate knowledge within the country as a means to redress past inequalities, and therefore, this study speaks

directly to that imperative. It is envisaged that the findings will attempt to contribute to enhancing the teaching and learning environment for students and lecturers at all Richfield campuses throughout South Africa and perhaps Higher Education as well.

1.4 Research Questions

In light of the above problem statement, the study will intend to answer the following research question:

How does the Tablet PC influence

- Teaching,
- Learning, and,
- Student academic performance,

at Richfield Graduate Institute of Technology?

1.5 Research Objectives

The objectives that will address the research question, which the study will attempt to fulfil are:

- To investigate the impact of the Tablet PC on academic teaching at Richfield Graduate Institute of Technology.
- To investigate the impact of the Tablet PC on academic learning at Richfield Graduate Institute of Technology.
- To investigate if the Tablet PC influences student academic performance.
- To identify the technological challenges/barriers related to Tablet PC adoption for teaching, learning and academic performance

1.6 Motivation for Study

The purpose of the study is to identify how the Tablet PC influences teaching, learning and academic performance. This purpose was influenced by the growth potential use of technology in education. It is hence necessary to conduct this study to determine the influence of Tablet PCs in education in a South African context seeing that many studies were primarily done abroad. In addition, whilst technology progresses swiftly into the future, barriers and challenges do still exist. Therefore, establishment of barriers to Tablet PC adoption is needed as this can then assist in plotting the trajectory of current and future

implementation. It is envisaged that the findings of this study will be positive and motivate students, lecturers and parents to invest in using the Tablet PC as a mode of instruction to enhance the work of students and facilitate the work of lecturers. In addition, the findings are seen to provide some reassurance to those students and academics who may have a reluctance to use technology that makes them refrain from using the Tablet PC. Furthermore, this study will provide clear-cut research evidence of the impact of the Tablet PC in an education setting which is currently lacking in South Africa.

1.7 Overview of Research Methodology

1.7.1 Approach

The study adopted a mixed-methods approach that entails both a quantitative and qualitative approach as a means to fully satisfy the research questions. The quantitative arm targeted the ‘student component’ (learning) whilst the qualitative arm targeted the ‘teacher/lecturer component’ (teaching).

1.7.2 Location

The researcher was based in Durban, KwaZulu-Natal (South Africa) and the study targeted the Pretoria Cluster of Richfield campuses in South Africa. These included:

- 13 Church Square, Pretoria
- 421 Church Street, Pretoria
- 287 Struben Street, Pretoria
- 169 Jacob Mare Street, Pretoria

1.7.3 Population and Sampling

The study adopted a census method approach. This method involves targeting an entire population. In light of this, all Degree qualification learners at the Richfield Pretoria Cluster were invited to take part in the quantitative arm of the study. This amounted to a target census population of 485. Out of this population, 169 students responded to the survey. This was seen as a positive response rate as if following a 95% confidence level and 5% confidence interval, the ideal sample would have been 214. This study obtained 169 responses which can be seen a 79% of the ideal sample.

For the qualitative arm, 11 Lecturers (Interviews) were targeted, for each discipline within the degree courses offered by Richfield, to participate in the qualitative study.

1.7.4 Instrument Development

A quantitative questionnaire was developed for the quantitative (student arm) of the study. Interviews were developed for the qualitative (lecturer) arm of the study. These instruments were used to analyse the effect of the Tablet PC on teaching and learning and student performance, which was underpinned by the Task-Technology Fit Model (Goodhue and Thompson, 1995).

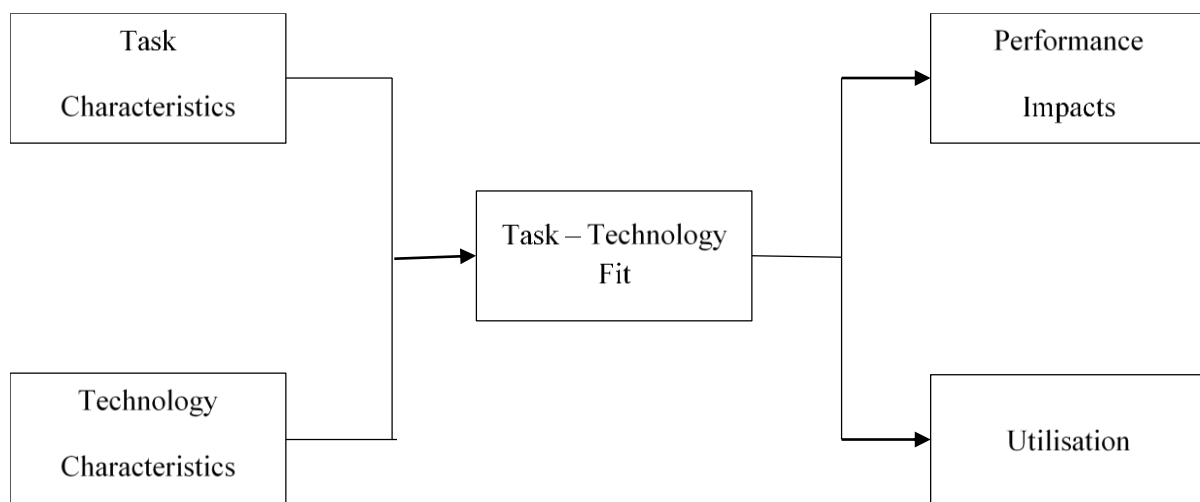


Figure 1.1: Task-Technology Fit Model (Goodhue and Thompson, 1995).

This study applied the Task-technology fit theory by Goodhue and Thompson (1995). This model developed a measure of task-technology fit that consists of 8 factors: quality, locatability, authorisation, compatibility, ease of use/training, production timeliness, systems reliability, and relationship with users. The questions of the questionnaire and interviews were built around the applicable (to this study) constructs of the model.

1.7.5 Data Collection

For the quantitative arm of the study, the questionnaire was administered electronically via a link to an electronic online survey system known as Survey Monkey. This was done over a period of two weeks.

For the qualitative arm (lecturers), physical interviews were conducted. This was done over a period of 1 week. Two lecturers were interviewed daily at times that were suitable to them. The interviews were recorded, thereafter transcripts were produced for analysis.

1.7.6 Data Analysis

For quantitative data, both descriptive and inferential statistics were done. The analysis was done with assistance from a professional statistician whom the researcher was working closely with.

The qualitative data was analysed through content analysis and word frequency tools. Themes were then formulated and discussed accordingly.

1.8 Research constraints

This research was subdued to constraints. These constraints are properly outlined in the conclusions chapter under limitations.

1.9 Organisation of the Study

This study is divided into 6 chapters as follows:

- **Chapter One:** Presents an introduction and background to the study. It outlines the problem statement, the research objectives and the questions the study seeks to answer. An overview of the research methodology that was used in this study is also covered in this chapter.
- **Chapter Two:** Provides a detailed presentation of the various existing literature on the subject area of the study, increasing the body of knowledge on the topic for both the reader and researcher. In addition, the framework that underpins this study is discussed.
- **Chapter Three:** This chapter details the research methodology. It is a detailed discussion of the methods, approaches and techniques used to fulfil the study. The chapter also outlines the data collection process. This chapter further describes the study area, sample and ethics of the study.
- **Chapter Four:** This chapter provides the preliminary (descriptive) statistics only, in the form of tables and charts.
- **Chapter Five:** This chapter presents the detailed analysis and discussion of both inferential quantitative and qualitative analysis.

- **Chapter Six:** This chapter concludes the study by articulating the findings and offering recommendations and direction for future users.

1.10 Summary

The key purpose of this study is to investigate the impact of the Tablet PC on teaching, learning and student academic performance and to identify the barriers that may hamper successful performance. Hence, this chapter introduced the study along with the research problem and background. The research problem informed the research questions, which determined the objectives of the study. Furthermore, the research methodology was outlined along with the theoretical framework. An overview of each chapter was also given. The next chapter delivers a detailed view of key literature pertaining to the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter will outline key literature related to the research subject and area of study. The major areas that were interrogated in this chapter are the impact of the Tablet PC on academic teaching, learning and performance as well as the challenges/barriers related to Tablet PC adoption. Past and current research that exists on the subject will be examined and used as a basis to support the primary study. In addition, the theoretical framework will be discussed along with other studies that have utilised the framework, hence showing its applicability to this study.

2.2 Information Technology and Learning

Many years of research and investment into Information Technology (IT), in various global spheres, have demonstrated benefits and enhancement. As per Graham, Woodfield, and Harrison (2013) one of these spheres includes the strategic use of IT for improving standards of education largely that the birth of digital learning occurred. As asserted by Laurillard (2012), the embedding of technology into learning and education will not end until it becomes a default enabling component of effective learning. It has long been argued and established that technology has the potential to act as a lever for pedagogical innovations (Law, 2008).

One such digital development was that of the Tablet PC in the lecture room. However, whilst research has conclusively shown the benefits of the use of the Tablet PC in the lecture halls, such as improved interaction, better lecture planning, and easier for learner self-study (Heinrich, 2012), the use of the Tablet PC is still limited in lecture halls and evidence of “digital technologies producing real transformational change remains elusive” as indicated by Luckin et al .(2011:45). The Information Technology (IT) (CHE, 2014) aims for education which focuses on reducing the rates of early school leaving and increasing the completion of tertiary education. Another target is to increase employment and this in turn relates to Information and Communications Technology (ICT) through the recognition of the imperative to develop e-skills and digital literacy through education and training (CHE, 2014).

2.3 The Advantages of the Tablet PC for Education

2.3.1 Definition of Mobile Learning

While the term Mobile Learning has different meanings, it essentially refers to a subset of educational technology that embraces distance education to facilitate learning across contexts through mobile devices (Mehdipour and Zerehkafi, 2013). Therefore, mobile learning is said to facilitate ubiquitous learning, anytime learning, anywhere learning through portable handheld devices (Mehdipour and Zerehkafi 2013). Learning can unfold in a variety of ways whereby people can use mobile devices to access educational resources, connect with others and/or create content, both inside and outside classrooms (Jones et al. 2013). Mobile learning also encompasses efforts to support broad educational goals such as the effective administration of school systems and improved communication between schools and families (Jones et al., 2013). Using the above information, one can define mobile learning as, any sort of learning that happens when the learner is not at a fixed and predetermined location or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies (Mehdipour and Zerehkafi, 2013). In addition to the level of price range and the usability of a Tablet PC, another important factor in the popularity of the Tablet PCs are their portability. Sha and Looi (2011) and Wong (2012) pointed out that this meant various forms of technology can be used both inside and outside the lecturer room while therefore allowing what is termed “anytime, anywhere learning”.

The technology that is embedded within the Tablet PC can be very intrinsic. The studies of Ifenthaler and Schweinbenz (2013) indicated that a range of tools such as simulations, cameras, eBooks, digital textbooks and online learner networks are available via Tablet PCs. The concept of using this advanced technology, anywhere and at any time is seen to be a ground-breaking advantage in not only education but society as well (Clark and Luckin, 2013). Wong (2012) argues that use of a Tablet PC of a portable nature facilitates students to continue education outside educational institutions that transcend the limitations of their immediate environment. A student will only require a Tablet PC and Wi-Fi connectivity, and if their cognitive abilities are advanced, they can master the art of independent learning.

2.3.2 The Tablet PC and Personalised Learning

The Tablet PC is shown to facilitate student access to learning content that is personalised for the student (Sha et al. 2011) and therefore enhance academic performance through the

development of cognitive skills (Groff, 2013). In addition, research abounds on the positive influences of the Tablet PC for teaching, learning and subsequent enhanced performance (Sha et al, 2011; Wong, 2012; Heinrich, 2012).

In addition, the ability for the student to continue learning outside the traditional lecture halls and classroom settings provide added support for independent learning and the motivation to continue learning and develop latent skills (Sha et al., 2011; Wong, 2012). Wong (2012) argued that by accessing Tablet PC technology, learners were able to create their own context of learning in terms of the ability to design their own context of “anywhere, anytime”, and how the learner feels they would be able to learn better, in order to allow learning becomes self-directed. In support of this contention, Tchoshanov (2013) posits that the emphasis should be on the use of technology to change the learning trajectory rather than replicate existing practices. This indicates that the Tablet PC can be used anywhere out of the lecture room to extend the classroom teaching thereby facilitating the ‘anytime, anywhere learning’ slogan (Vant Hooft, 2013; Wong, 2012). Because of the portable nature of the Tablet PC, it can be argued that by having the ability to access a personal device, this allows learnings to build a link between campus and their everyday lives, thereby bridging both the formal and informal learning contexts, and therefore not be restricted to any limitations imposed by their immediate environment (Syed, 2012; Wong, 2012).

2.3.3 Collaboration, Communication and Creativity

There are several other advantages of using the Tablet PC in the lecture halls such as increased collaboration, communication, creativity, critical thinking and problem solving (Voogt and Roblin, 2012). A high number of students that attend tertiary institutions are from disadvantaged backgrounds. Hence, getting them to socialise, communicate and collaborate can be an intensive task in itself apart from trying to enhance their cognitive and problem solving skills (Engelbrecht et al., 2012). It has been established through the studies by Ananiadou and Claro (2009) and Groff (2013) that the development of such skills can be enhanced through the use of such technology. The potential of technology to support increased collaboration and communication in and beyond the classroom was also recognised by Johnson, et al. (2009), particularly for constructivist approaches to learning and teaching. Chou and Block (2012) had examined the advantages and disadvantages that a one on one Tablet PC approach offered lecturers and students in a school in the United States of America (USA). Despite the sample size of the study being limited, it had identified various benefits

of using the Tablet PC in a learning such as greater interaction between users, use of applications to improve skills, and self-study using various online tools.

Furthermore, lecturers had reported seeing a positive effect on student engagement and it was revealed that that due to nature of the Tablet PCs, it required almost no preparation before they could be used in lecture environment, hence it resulted in more time for interactive lessons to take place that positively affected teaching and learning. However, the researchers argued that students and lecturers did require additional time and training in order to familiarise themselves with the Tablet PC and its functions (Chou and Block, 2012). From a practical point of view, this contention is clear as many students, lecturers and other academic staff take longer to acclimatise themselves to the advantages of the Tablet PC for educational purposes. There is evidence to state that some academics have a phobia for technology lending support to the study of Ertmer and Ottenbreit-Leftwich, (2013) on lecturer reluctance to implement and use technology. The main reasons for the phobia emanated from not being competent enough to use advanced technology such as the Tablet PC and be intimidated in the presence of students due to lack of knowledge on the utilisation of the Tablet PC.

Groff (2013) identified the following opportunities of how mobile technology can enhance capacity for improving learning, cognitive skills and communication.

- Some learning experiences are just impossible (or nearly so) without technology. For example, with new advancements in simulation technology, every student can have the chance to conduct the dissection of a pig's heart in a lecture setting. This would be something that would be very difficult if even possible for every school to conduct in reality (Groff, 2013).
- Distant communication, connection and collaboration - Groff (2013) illustrated how students in close proximity as well as those in distant proximity can communicate, collaborate and connect through Skype.

In summary the advantages of the Tablet PC for lecturers and teachers are:

- Enhances digital pedagogy and their digital competence of lecturers (Groff 2013).

- Creates more enthusiasm amongst lecturers regarding their pedagogical practices (Chou and Block, 2012; Cuban 2013).
- Frequent use of technology can improve communication skills and facilitate lecturer performance (Johnson,et al., 2009; Groff 2013).
- Encourages constructive research (Wong, 2012).
- Helps to provide immediate feedback in assessments (Cuban 2013).

However, whilst the Tablet PC lends itself to multifarious opportunities for advanced learning and communication, there is the possibility that students will spend more time on social media than focus on studies (Selwyn, 2014). This can be seen as a pitfall and disadvantage.

2.4 The Impact of the Tablet PC on Enhancing the Teaching and Learning Process

The field of education has undoubtedly been affected by ICT, which in turn has been a game-changer for teaching, learning and research (Voogt and Pareja Roblin, 2012). The advantages of the Tablet PC outlined above provide clear indication that ICT has the potential to accelerate, enrich, deepen skills and motivate and engage students. It further helps to relate educational experience to work practices and create economic viability for tomorrow's workers as well as strengthening teaching and facilitating a change in pedagogy (Fister and McCarthy, 2008; Cuban, 2013).

2.4.1 Conventional Teaching

Conventional teaching has emphasised academic content and lectures have taught through various means such as presentations and lectures that utilise various learning activities that are designed to gather as well as reproduce study material (Hase, 2011) This system still prevails today with limited attention towards developing questioning insight (Hase, 2011, Yeadon-Lee, 2015). In addition, the mode of delivery (lectures), lecturer preparation, timeframes and a loaded syllabus, language problems and the diversity of poorly prepared learners for Higher Education, leaves little time to implement the principles of technology-based education (CHE 2014).

According to Pedler et al. (2005) and more recently Skipton (2015), the principles of action-learning are closely intertwined with the advantages of using ICT in the lecture theatres.

According to Skipton (2015), action learning is immensely facilitated through the use of ICT because of the following principles:

- Requirement for action as a basis for learning
- Profound personal development resulting from reflection upon action
- Working with problems
- Problems being aimed personal development
- Action learners working in sets of peers to support and challenge each other
- The set for fresh questions- questioning takes primacy over expert knowledge

On the basis of the assumption that learning is lifelong and ongoing, even the use of ICT may still be difficult to apply because of the challenges that face the majority of higher education students and academics who invariably use the ‘chalk and talk’ method or read from the Tablet PC (CHE, 2014). There is minimal emancipatory learning that aims to empower students and increase their self-confidence (Hase, 2011). In the main the funnel shaped education still remains supreme (Hase, 2011).

2.4.2 Infrastructure for Technology-based Teaching

Tertiary institutions are now gearing themselves for contemporary settings in the form of theatre type lecture halls equipped with wireless networking technology and smart-boards where the lecturer is the facilitator rather than the instructor (Ertmer and Ottenbreit-Leftwich, 2013). This favours curricula that promote competency and performance. Despite the increased provision of technological infrastructure and resources which is aimed at facilitating more opportunities for classroom use, many teachers are still not using digital pedagogy (Ertmer and Ottenbreit-Leftwich, 2013). This can largely be attributed to teachers’ attitudes and beliefs towards pedagogy and technology (Ertmer and Ottenbreit-Leftwich, 2013).

2.4.3 Technology Aiding Academic Staff and Students

The integration of ICT can help aid teachers and students. A case in point is the introduction of online assessments through the use of the Tablet PC (Istance and Dumont, 2010). This can help to improve and develop the quality of education by providing curricular support in difficult subject areas. To achieve these objectives, teachers need to be involved in collaborative projects and development of intervention strategies, which would include the

use of ICT tools as strategic enablers for teaching and learning. According to Istance and Dumont (2010: 250), “the flexibilisation time-space accounted for by the integration of ICT into teaching and learning processes contributes to increase the interaction and reception of information. Such possibilities suggest changes in the communication models and the teaching and learning methods used by teachers, giving way to new scenarios which favour both individual and collaborative learning”. However, while the acquisition of information is facilitated, not all lecturers and teachers adapt easily to technology (Ertmer and Ottenbreit-Leftwich, 2013; Luckin, et al., 2011).

According to research by Cziko and Zhao (2001), in order for a lecturer to introduce the Tablet PC into the lecture room, there are three conditions that are required:

- Lecturers should believe that using the Tablet PC can be effective.
- Lecturers should believe by using the Tablet PC, it may create disruptions and harm.
- Lecturers should believe that they do have a control over the technology.

Research show that most lecturers do not make use of the potential of information, communication, and technology tools to impact on quality of teaching in the lecturer environments (Law, 2009; Luckin, et al., 2011). Ertmer and Ottenbreit-Leftwich, (2013) believed that reluctance on the part of lecturers to use the Tablet PC could arise as a result of them having little to no knowledge on how to utilise a Tablet PC. This situation may be applicable to the older generation of the academic fraternity who are ‘scared’ to use technology for fear of failure and for appearing incompetent before their students. It is for this reason that lecturers need to undergo extensive re-education and training (Zuber-Skerritt, 2015).

2.4.4 Student Engagement, Independent Learning and Knowledge Creation

Academic lecturers who made use of the Tablet PC found that there was significant improvement in all areas of student performance, interaction and communication lending support to the study of Voogt (2009), who found that teachers in South Africa using the Tablet PC regularly adopted a more student-centred approach which increased student independence leading to changes in student and teacher roles. In many instances, students became facilitators in terms of peer-teaching and peer-assessment as well as self-assessments (Fredriksson, et al., 2008; Crook et al., 2010). Therefore, it is evident that by using the Tablet

PC that it encourages and supports independent learning. Consequently, using information, communication and technology enhances the learning environment and also imparts motivation and enthusiasm in the learning process (Whitton, 2010). Adopting such an approach can encourage the willingness of students to work together and collaborate with each other to enable student centred learning in the lecture room rather than passively receiving knowledge (Strayer, 2012). In addition, it is imperative to reconsider learning environments in terms of curriculum redesign, training needs and capacity building for successful implementation of ICT (Zuber- Skerritt, 2015).

With reference to specific teaching and learning, the use of the Tablet PC advances knowledge creation, promotes feedback from students and supports collaboration and research (Whitton 2010). Lecturers were eager to share knowledge to show colleagues what they found and how they used it to innovate, create and encourage autonomy in the lecture rooms (Crook, et al., 2010; Duncan 2010; Wright, 2010). Lecturers can create an engaging learning experiences for their learners by using the Tablet PC to improve learning. This implies those lecturers' pre-plan lecturing content interspersed with digital presentations, visual clips and theoretical content. The Tablet PC promotes independent enquiry that is innovation that students enjoy (Crook et al., 2010). Ryan et al. (2010) found that lecturers who used multimodal text production resulted in:

- changing the roles of learners and teachers;
- improved literacy,
- collaboration,
- communication and
- digital literacy skills (Wikan et al., 2010).

Such innovation helped to foster and promote deeper insight and understanding of subject content and transfer of learning content. The success of the students only serves to increase the confidence levels of the lecturers and promote the requirement for a more facilitative teaching role (Rossing et al., 2012; Bocconi et al., 2012).

The above exposition reveals that Tablet PCs have been recognised as having positive influences on all stakeholders involved in the lecture room. They help in creating innovative ways to impart content that will engage in positive dialogue amongst students themselves as

well as between lecturers and students. In addition, the usage of Tablet PC is said to have improved the pace at which lectures progressed. Simultaneously, it became evident that there was need for additional lecturer room support as in the form of technicians (Tamin et al., 2011). As these technicians support lecturers and students, much valuable time is not lost trying to rectify technical problems. According to Tamin et al. (2011), this kind of support services emphasises the need for increasing the range of skills required by lecturers through staff development training. Accordingly, there is a strong indication in education that the Tablet PCs have potential to improve teaching and learning (Organisation for Economic Co-operation and Development, 2013).

2.6 Impact of the Tablet PC on Learning Design

With the advent of technology in teaching and learning as well as the use of Tablet PCs, it is becoming increasingly clear that learning design is growing (Clarke and Dede, 2009; Emin-Martinez, et al., 2014; Cviko, McKenney and Voogt, 2014). The learning design demands “subject knowledge, pedagogical theory, technological know-how, and practical experiences be revisited and redesigned in order to “engender innovation in all these areas” (Emin-Martinez et al., 2014:4). What is of significance is that the revised approaches to learning and teaching design should be suitable for all teachers and not just early adopters and those skilled in learning design (Dillenbourg and Jermann, 2010). Approaches should take account of the existing classroom environment and be flexible enough to accommodate teacher and student preferences. However, it may be argued that technology should adapt to teaching needs, not the other way around (Clarke and Dede, 2009). It is critical to ensure that bringing any new technology into the educational environment improves the provision of ICT resources, fits with the teaching needs of the faculty and students and, more importantly, has specific learning benefits (Clarke and Dede, 2009).

Personal ownership of mobile devices such as Tablet PCs is becoming increasingly common and predicted to have a significant impact on education in the medium term (Johnson et al, 2009). When teachers change their pedagogical approach, such technologies are used to support collaboration, inquiry or project-based learning, individualised and independent learning (Li, 2010; Li, et al., 2010; Vuorikari et al., 2011).

2.6.1 Innovation in Classroom-Based Assessment

It has been shown that use of the Tablet PC increased opportunities for formative, self-and peer-assessment (Clark-Wilson, 2009; Kimbell et al., 2009). When the Tablet PC was first introduced, it generated a lot of interest, enthusiasm and heightened levels of performance during actual lecture times. Little constructivist learning took place because of the novelty of the situation (Bannister, et al., 2010). However, in light of this, whilst pedagogical innovation is possible, at the inception it was difficult, as it required lecturers to engage in professional development, invest time and take a degree of risk (Penuel, 2006). Nevertheless, it has been established that peer-assessment through technology can lead to learning gains (Nicolaidou, 2013). However, teachers and students need further guidance on implementing peer-assessment and feedback effectively (Harris and Brown, 2013). The use of technology to facilitate peer tutoring, for example, through student-generated content, can be effective for the tutor and student (Wang, 2012; Topping, et al., 2013).

2.6.2 Advantages for Lecturers

Several studies revealed that there are numerous advantages of using the Tablet PC in teaching and learning (Laurillard, 2012; Akcaoglu and Koehler, 2014). Some relevant important findings were (Luckin et al, 2011 and Laurillard, 2012):

- reduction in preparing time of lectures,
- enhancing of the lecturing of various fields,
- enhancing of lecturer planning,
- ability to cover content that would previously been erased on a traditional blackboard,
- student motivation has improved since the introduction of Tablet PCs into the lecture room.

The Microsoft Corporation (2011) believed that lecturers now have a far greater scope of teaching utilities that are available to them than before. Lecturers can now access material, browse websites and share multimedia resources while in the lecture rooms. The Tablet PC has enhanced teaching and learning at a greater rate than was possible with the distribution of desktop computers in traditional classrooms. A report from Microsoft Corporation (2011: 2) stated that “learners and lecturers prefer to access online material at shorts bursts as opposed to continuous use.”

2.6.3 Feedback

Dekkers, Adams and Elliott (2011) stressed the importance of immediate feedback as an important part of the learning process and a reciprocal process through which the student and the lecturer are better able to participate in the learning process. As the Tablet PC allows the lecturer to write on the student's test, personalised handwritten feedback (Figure 2.1) can be provided promptly. This can ensure that students receive feedback whilst the content covered is still recent in their mind. Hence, in the event of errors or misunderstanding of content, the student is able to rectify it immediately. This allows the student to compare his incorrect attempt with the corrected version and also provides guidance as to the correct setting out for a solution (Harrison, Pidcock and Ward, 2009). In addition, it allows for deeper and critical thinking (Quinton and Smallbone, 2010).

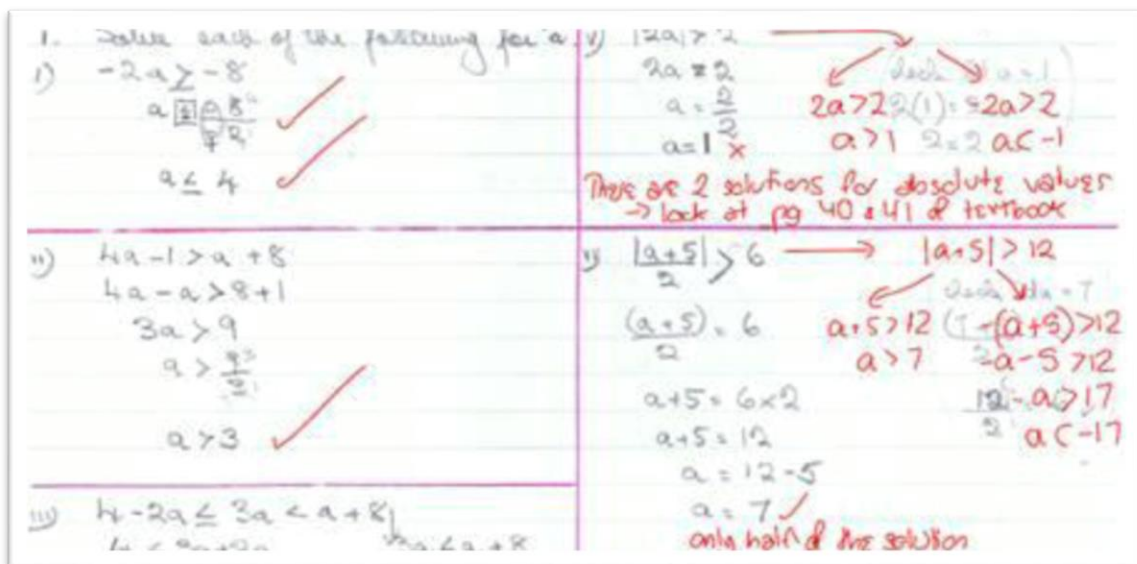


Figure 2.1: Personalised Handwritten Feedback (Source: Dekkers et al., 2011:4)

2.7 Impact of the Tablet PC on Students and Learning

The CHE's (2014) mandate in South African education included as a target, that there be increased employability and a life-long learning approach created by developing learners' digital competency. This also indicated a need to develop students' skills to the requirements of the 21st century, and learn generic skills that are important to the requirements of the workplace (Dede, 2010; Redecker et al., 2011; Toner, 2011). It is, therefore, important to consider how the use of the Tablet PC has affected learners and their learning experience.

2.7.1 Challenging Learning Environment

The use of the Tablet PC created classes that have become more appealing and this in turn “contributed to students’ critical thinking and development” (Quinton and Smallbone, 2010: 126). Studies by Groff (2013) have identified a range of learning strategies, some of which include, learners working in groups and learners creating products that represent what they are learning. These strategies can affect the way in which students interact with their learning content (Windschitl, 2002:137). Consequently, technology, combined with student-centred approaches offers increasing opportunities for students to adopt more active roles and contribute to their own education rather than passively receiving knowledge from their teacher. The findings from Wang (2014: 435) suggest using online research is effecting in the promotion of peer teaching and learning.

2.7.2 Reversal of Roles

The emphasis in a Tablet PC based lecture room shifted the pedagogical activity from the teacher to the student. The teacher became the guide while the student took charge of his/her own learning, research and questioning (Redecker et al., 2011; Johnson, 2014). Other benefits included:

- continual access to information and communication,
- increased collaboration among both students and students and teachers,
- increased motivation, improved quality of students’ and teachers’ presentations,
- more creativity, a greater variety of resources and types of learning material,
- development of both teachers’ and students’ IT skills, and a more personalised learning experience where students were able to work at their own pace.

Other practical benefits included a reduction in the use of paper and the ease of organising notes and other learning materials. In addition, classes became more appealing as students’ experience as sense of mastery and gain competence in solving problems (Akcaoglu and Koehler, 2014). This feeling of success serves to heighten motivation levels and encourage students to outdo their own performances. In other words, students compete with themselves as opposed to competing against their colleagues. This is supported by other studies such as Hillier, Beauchamp, and Whyte (2013), Pegrum, Oakley and Faulkner (2013), Perrotta et al., (2013) which showed teacher perceptions of the positive impact of technology use in the classroom on student motivation and engagement. Though, one of the main concerns around

introducing technology into colleges has been teachers' levels of knowledge and confidence. A survey of nearly 2,500 American teachers found that they were generally very positive about technology but there were concerns about mobile devices, the internet and social media (Purcell et al., 2013). These concerns centred on the capability and competence levels of teachers to use advanced technology in the presence of students.

The earlier studies of Gustafson (2002) and Lombardi (2007) lend strong support for the continuing use of the Tablet PC in education. They believed that technology-enabled lecturers to support authentic learning through facilitating greater access to resources and experts in the subject field, research and data collection, and communication and sharing of ideas (Luckin et al., 2011). According to Snell and Snell-Siddle (2013), enhanced Tablet PC communication and feedback can lead to greater student motivation and greater understanding of the learning process. West (2013) similarly argued that ongoing digital assessment can give students opportunities to reflect on their learning progress and therefore support greater student autonomy.

This type of lecture room interaction can only serve to enhance the students' and lecturers' total contribution and positive development in the teaching for learning process. This contention is supported by research studies of Tamim et al. (2011) and Cheung and Slavin (2013) on raising student achievement via the use of the Tablet PC. Their studies revealed that student achievement is heightened through the use of the Tablet PC and other technology. However, caution must be exercised at this juncture as there are several other factors that can also contribute to student success such as lecturer experience, subject matter and intelligent quotient of student among others (Means et al., 2009).

2.7.3 Developing Independent Learning, Critical Thinking and Problem Solving Skills

The development of 21st century skills, notably, independent learning, critical thinking, real problem solving and reflection, communication and collaboration, creativity and digital literacy, are facilitated through the constructive use of the Tablet PC in education (Lowther et al., 2012; Lombardi, 2007). Students show a keener sense of responsibility and enthusiasm when assigned tasks to complete. In some cases, the roles of students and lecturers are reversed depending largely on the subject matter. Students became peer assessors and tutors, teacher-trainers, co-designers of their learning and producers of knowledge (Hillier et al., 2013). Hence, it can be safely asserted that motivation and participation in classroom

activities increases performance and attainment standards for both students as well as lecturers through the use of the Tablet PC (Redecker et al., 2011; Johnson, 2014; Akcaoglu and Koehler, 2014).

2.8 Barriers and Challenges in the Use of Tablet PC's

The barriers to innovation through technology are well documented. According to Karsenti and Fievez (2013) some of these challenges include:

- unreliable infrastructure,
- teacher and student attitudes and identities,
- external factors,
- cost and economic factors,
- infrastructure

In some instances, these barriers to adoption have meant that the uptake of technologies to support teaching and learning may be low (Karsenti and Fievez, 2013; OECD, 2013). Therefore, institutions that are truly committed to innovation and change will have to develop a process designed to promote technology use by challenging lecturers and academics to rethink their practices and make them aware of a range of technological tools which could support their teaching for learning activities in addition to facing further challenges such as infrastructure and budget (El Grayor et al., 2011). However, it should be noted that repeated attempts to change classroom pedagogy through educational reforms have not been successful (Cuban, 2013). It would appear that the barriers and resistance to using technology in education outweigh the advantages and contributions of technology to education. The chief problems could emanate from the hybrid changes where lecturers engage in both student-centred and lecturer-centric modes of delivery (Cuban, 2013). Teachers need adequate support to update their methodologies, lecturing strategies and teaching materials in order to facilitate authentic learning experiences (Cranmer et al., 2013; Zuber- Skerritt, 2015).

A further challenge is the fact the Tablet PC and other devices have not been fully integrated into the education system for its positive impact to be fully visible (Karsenti and Fievez, 2013). As early as 2004, recommendations were made by researchers for providing support materials and facilitate resource use by lecturers (Borko, 2004) but to date there appears to be some resistance (de Jong, et al., 2012; Karsenti and Fievez, 2013). A study in Europe showed

that very few teachers use technology to support teaching and learning, other than for lesson preparation (OECD, 2013; Emin-Martinez et al., 2014). The use of technology in lessons with students is still limited with one out of five teachers rarely using digital tools during lesson time despite having the necessary and improved infrastructure (OECD, 2013).

Tablet PCs have been shown to raise challenges for teachers. This includes the need to find the appropriate balance between complete freedom and choice for learners, and the need to provide a framework to guide students (Heinrich, 2012). In this regard, Heinrich (2012) spoke of learning being liberated from the classroom with teachers and students working together to develop individual paths depending on individual student needs. Research at Longfield Academy (Heinrich, 2012) showed that certain subjects favoured the use of the iPads, notably English, Maths and Science. This was partly explained by the availability of suitable apps such as 3D graphing, e-books and online presentations. The iPads were used for a very wide range of activities but the three major areas were mind mapping, researching topics online and creating digital presentations and lecture content.

2.8.1 Specific Issues and Challenges

While some of the challenges and barriers have been mentioned earlier, this section focusses on specific issues and challenges in the following categories:

- Social Issues
- Pedagogy
- Technological
- Student-lecturer Relationship
- Cost and affordability
- Infrastructure and Internet access

2.8.1.1 Social Issues

A key challenge in implementing e-learning or use of technology for education is that most, if not all, software or applications' user interface (UI) are developed in a native language. This poses problems especially for second language speakers whose first language is not English. Therefore, teachers' require training to use the Tablet PC in English and they need assistance to develop applications and materials to be customised for their specific Tablet PC (Elias, 2011; Douch et al., 2010).

Furthermore, the cost factor creates additional barriers. For example, observational research at Richfield Graduate Institute of Technology (April 2014) shows that majority of its students belong to the disadvantaged groups. Hence to purchase Tablets PCs of the correct specifications is both a challenge and a barrier to educational opportunity.

In addition, there is the concern of data retention problems and an over-reliance on technology with the possibility of losing interest in text-reading activities (Sommerich et al., 2007; Elias, 2011). This challenge could result in students become isolated and not wanting to meet with peers. Even when they are with peers, they would be primarily distracted by the Tablet PC (Crescente and Lee, 2011). In some instances, the dropout rates among students can increase as they become over reliant on technology; simple communication becomes difficult and they find it very difficult to separate personal life from academic issues in the virtual world (Bugeja, 2007).

Absenteeism and loss of attention may occur as a result of incorrect attitudes towards learning. If the correct attitude is not promoted amongst students, they may abscond from lectures with the notion that they can catch up at a further time as all the information is in the Tablet PC. In addition, the lecturer has no guarantee that students are paying attention to him and reading the content or instead indulging in internet related activities such as social media (Garavaglia and Ferrari, 2012). Educators need to focus on how to prevent pupils from engaging in cyberbullying, looking at indecent content, becoming distracted in lessons and damaging the devices.

2.8.1.2 Pedagogy Issues

One of the major issues identified was the Mobile Device Management (MDM) of Tablet PCs within the classroom. Usually MDM is carried out and managed by IT staff, but in the case of colleges, access to manage students' Tablet PCs becomes the responsibility of the students themselves. This is further complicated by the fact that first-time users and those with a phobia for technology will be largely disadvantaged. Lecturers who are not MDM compliant will be in no position to assist students. In any event, where lecturers try to assist students, valuable lecture time is lost (Elias, 2011).

A further challenge exists in the need to scale and sustain innovative and effective projects (Brecko, Kampylis and Punie 2014). Innovation in education implies a change that brings

about a positive result in teaching and learning in specific contexts. Hence, lecturers and students, that are not mentally prepared to participate in collaboration activities and design study materials suited to their context, will lose out on harnessing the benefits of technology (Beetham, 2013).

Class control and monitoring students' activities of pose serious challenges, as students with the Tablet PC could be playing games, use social networking sites or just wasting classroom time by text messaging and or watching videos (Garavaglia and Ferrari, 2012). Though Tablet PCs allow students to learn at their own pace, some educators are worried about how to handle a classroom full of independent learners. Many educators expressed concern about monitoring students while they use their tablet. The biggest problem with the Tablet PCs is students using it for other purposes than those for learning (Sommerich et al., 2007; Elias, 2011).

Technology integration in education is lined with disruptions on one side and opportunities on the other. Technology teams work to bring useful technology into teaching, all with good intentions, only to encounter unwanted side effects such as distraction and disruption in the classroom (Enriquez, 2010, McCoy, 2013). The challenges loom large in classrooms with wireless connections, especially when universities give students ubiquitous Internet access and sometimes even the devices for such access (Bugeja, 2007; Enriquez, 2010; Syed, 2012).

Mobile phones and social media for instance, are considered distracting because of problems with ringing during class, cheating in tests/exams, multitasking, and the camera that comes with many phones can raise privacy issues as well (Elias, 2011). Similar complaints might also be made about laptops in the classroom. Laptops occasionally make sounds if students have forgotten to turn off the volume and the laptop screens can become walls between students and professors. Students performing multiple tasks like instant messaging and Facebook status updating are also blamed for distracting other students from concentrating on the lectures or classroom discussions (Bugeja, 2007; Syed, 2012, McCoy, 2013).

2.8.1.3 Technological Issues

The main issue in implementing the Tablet PC for e-Learning in a classroom environment is the implementation of a reliable, sustainable and expandable wireless network infrastructure (Douch et al., 2010). The old infrastructure constituted only of wired local area network

(LAN). Hence, in order to use Tablet PCs in lecture halls, there was a need to increase Wi-Fi connectivity. Another challenge was to make compliance and governance policy for battery charging and maintenance of Tablet PCs. Students carry their study materials preloaded in their Tablet PCs, hence, they have to be fully charged before entering into classroom to avoid the batteries running flat and/or 'dying out' completely which is similar to leaving a textbook at home (Douch et al., 2010).

Students have identified some drawbacks of bringing iPads into the classroom, such as the difficulty of taking notes. The auto-correct typing function can create very interesting passages as well as frustrations (Syed, 2012).

Technical faults with technological equipment are likely to lead to lower levels of technology use by teachers. Recurring faults and the expectation of faults occurring during teaching sessions are likely to reduce teacher confidence and cause teachers to avoid using the technology in future lessons (Pelgrum, 2001). The lack of available technical support is also likely to lead to teachers avoiding ICT for fear of a fault occurring that cannot be easily rectified (Pelgrum, 2001). With a lack of skills training, lecturers and teachers may experience a greater degree of anxiety about possible technical problems as they would have less of an understanding of how to avoid or solve such problems independently (Crescente and Lee, 2011). According to Sommerich et al. (2007), students using the Tablet PC were found to experience discomfort in not only the eyes, but also the shoulder due to lugging the Tablet PC around neck. Students and lecturers experienced discomforts in the upper and lower back areas due to the sitting posture, as well as wrist aches and headaches.

Other technological challenges arise as a result of the following (Crescente and Lee, 2011; Elias 2011):

- Connectivity
- Battery life
- Screen size and key size
- Meeting required bandwidth for nonstop/fast streaming
- Number of file/asset formats supported by a specific device
- Content security or copyright issue from authoring group
- Multiple standards, multiple screen sizes, multiple operating systems

- Reworking existing e-Learning materials for mobile platforms
- Limited memory
- Continual improvement of obsolete features in technology

2.8.1.4 Effect on Teacher-Student Relationship

Enriquez (2010) in studying the Interactive Learning Network found that immediate assessment was a favourable feature in increasing learning efficiency. The Tablet PC concept allows lecturers this facility. However, while it may look good on paper, the system may in fact not work as required (Enriquez, 2010). The relationship between the teacher and the student may also be strained due to the loss of communication between student and teacher. Also, when students interact with a machine instead of another human being (teacher), they may lose more than the teacher-student bond such as interpersonal skills, reliance on search engines for information as well as being distracted in class by the Tablet PC (Crescente and Lee, 2011). Consequently, some lecturers and teachers do not agree that technology should be used in their context due to large classes with many students, limited skills among staff and students, slow internet and power cuts. Several primary factors inhibiting student-initiated interaction in large classes ranged from feedback lag, student apprehension, and single speaker paradigm (Dufresne et al., 1996).

Student-instructor interaction is vital to student learning, but soliciting student feedback in large, university-level lecture classes is also challenging. As universities serve more students and face tighter resource constraints, these large lectures are likely to persist, necessitating innovative approaches to large class challenges (Bocconi et al., 2013). A very significant determinant of teachers' levels of engagement in ICT is their level of confidence in using the technology. In a study involving 209 university students at Indiana University (USA) who used iPads in their classes participated in a survey exploring their perceptions of Tablet PCs use (Rossing et al., 2012). The study highlighted the individual differences between students in using the devices and revealed that while some found the devices very helpful, others found them to be a distraction or difficult to take notes on. The study also emphasised the important role of the class instructor in carefully monitoring discipline and managing in-class activities to ensure constructive engagement.

In an attempt to communicate with the wider world, technology is all important as the most powerful vehicle of communication, knowledge and education (Bocconi et al., 2013). This brings us to the design of learning environment as it also affects teaching and learning at the micro-level by creating different learning experiences (Elias, 2011). Therefore, the content (known as digital learning resources) materials such as simulations, animations and digital textbooks that were delivered through the Tablet PC have made incredible inroads into the student’s minds strides in the last several decades. (Redecker et al., 2011, Wang, 2014).

The adoption and use of ICTs (in the form of the Tablet PC) in education has a positive impact on teaching, learning, and research. The overall literature suggests successful ICT integration in education because ICT can affect the delivery of education and enable wider access to the same. In addition, it increases flexibility so that learners can access education regardless of time and geographical barriers. It influences the way students are taught and how they learn. It provides a rich environment and motivation for teaching learning processes which have a profound impact on the process of learning in education by offering new possibilities for students and lecturers (Elias, 2011; OECD, 2013; Emin-Martinez et al., 2014).

2.9 Theoretical Framework

The theoretical framework of Goodhue and Thompson, (1995) is used to underpin this study as a means to also apply the model within the study context.

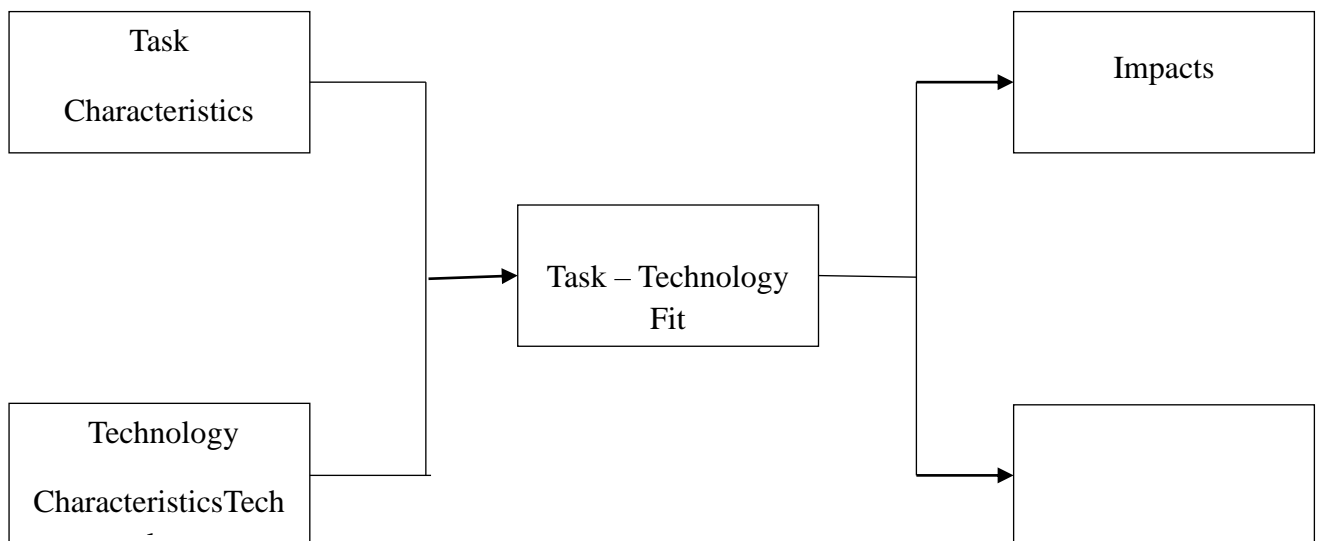


Figure 2.2: Task-Technology Fit Model (Goodhue and Thompson, 1995).

The theoretical lens used is the Task-Technology Fit theory (Goodhue and Thomson, 1995) argued that technology needs to be both willingly accepted and fit well with the users and their corresponding tasks to prove its effectiveness. This study adopts the Task-Technology Fit (TTF) perspective as it is an appropriate model to analyse adoption and behaviour use in relation to the Tablet PC in a specific context (Benbasat and Barki, 2007). The Task-Technology Fit (Goodhue and Thompson, 1995) has been widely applied in information systems research (Zhou, Lu, and Wang, 2010; Junglas, Abraham, and Watson, 2008).

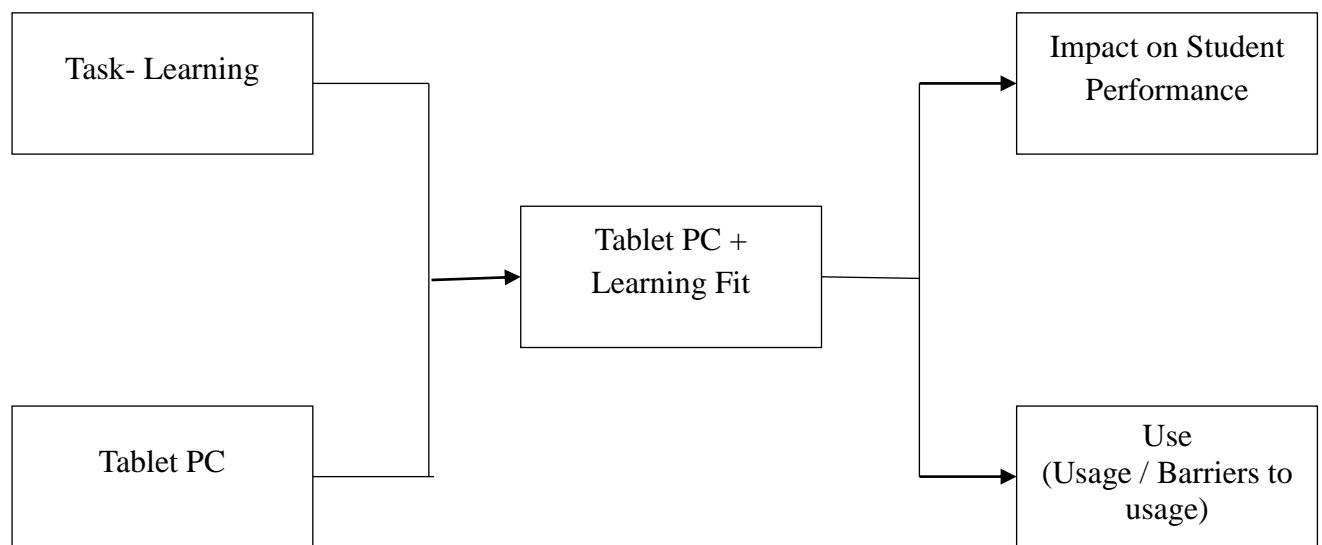


Figure 2.3: Task-Technology Fit Model incorporating the Tablet PC and Learning Fit

The Task-Technology Fit is an established theoretical framework in Information Systems research that enables the investigation of issues of fit of technology to tasks as well as performance (Lee, Cheng, and Cheng, 2007). It is therefore an appropriate framework for this study because this study seeks to understand how the Tablet PC has influenced both lecturer and student performance (Goodhue, Klein, and March, 2000) and altered user perception and behaviour.

From an education perspective, McGill, Klobas, and Renzi (2011) used the Task Technology Fit model to demonstrate that the better the fit of the apparatus to the skills of an instructor and the tasks that the instructor must complete, the more positive the impact. Following Goodhue and Thompson’s (1995) model, this research applies the model and looks at its applicability in relation to task (Teaching and Learning) and technology fit of the Tablet PC.

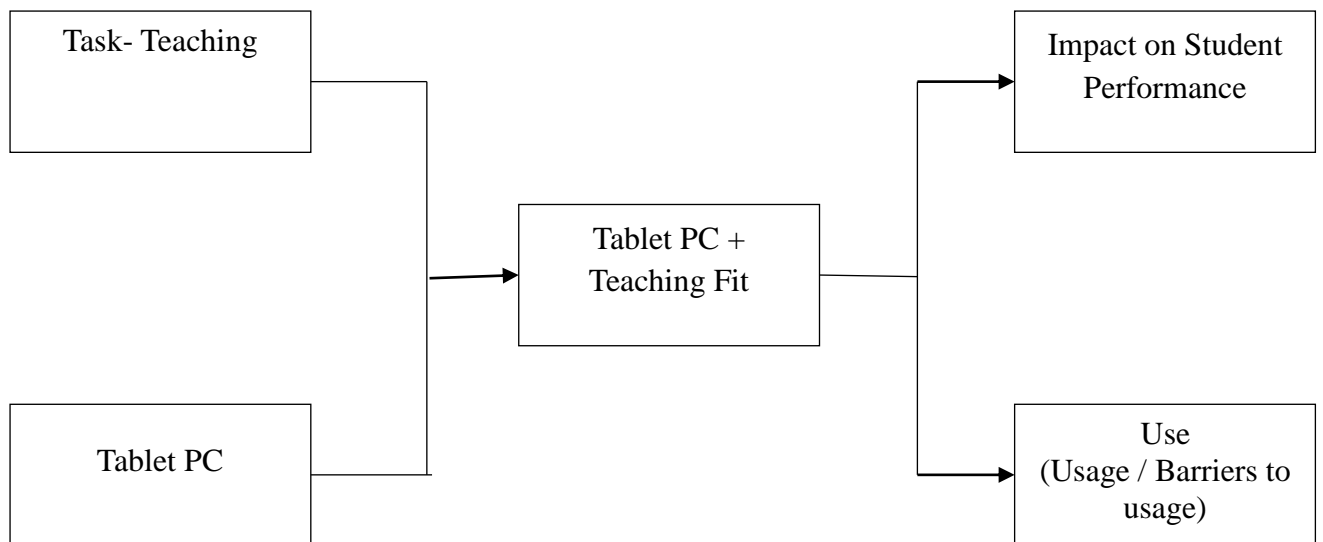


Figure 2.4: Task-Technology Fit Model incorporating the Tablet PC and Teaching Fit

The Task Technology Fit construct in this study is therefore, concerned with the extent to which technology meets task-related requirements and explores the relationship between individual tasks and technology fit profiles by using user-performance and technology utilisation at Richfield Graduate Institute of Technology.

2.9.1 Description and Applicability of the Task-Technology Fit Model to the study

2.9.1.1 Technology

Technology is a global phenomenon made up of hardware and software and is commonly used by academics in carrying out their teaching and research tasks (Luckin et al., 2011). The attributes of these technologies can affect usage and users' perception of the technology. The Task Technology Fit model considers the importance of fitting the functionality and attributes of technology used to the demands imposed by individual needs (Goodhue and Thompson 1995). With reference to the use of the Tablet PC, several research studies suggest that a better fit will improve perceived performance (Carswell and Venkatesh 2002; Goodhue 1998; McGill and Klobas 2009).

2.9.2 Task-Technology Fit (TTF): impact on performance and utilisation of Tablet PC

Goodhue and Thompson (1995) indicated that individuals' interactions with an Information System are often intertwined with their task-technology individual-adoption behaviours. This model was used by Teo (2008) to ascertain the attitudes of preservice teachers towards the use of computers. His findings clearly illustrate that when there is synergy between the tool

and the task (fit), the results are positive with heightened performance levels. This model is seen as applicable to the current study as a means of predicting if there will be a fit between task of teaching and learning and the Tablet PC technology.

2.9.2.1 Performance

High performance implies a high level of task-technology fit, and satisfaction with the IT (Goodhue and Thompson, 1995). In this study performance will refer to student academic performance through usage of the Tablet PC.

2.9.2.2 Utilisation

Goodhue and Thompson (1995) presented precursors of utilisation which included ‘beliefs’ of using a system. In the current research, utilisation is the use of Tablet PC by academics and students. The better the fit between the capabilities of the Tablet PC and the teaching and learning tasks of both the students and lecturers, the more positive the expected consequences and the user’s attitudes towards the Tablet PC.

Baas (2010) showed how Task-Technology Fit in the Workplace can affect employee satisfaction and productivity. Baas (2010) revealed that employees show increased satisfaction and productivity when the ICT tools they use exhibit a fit with their daily task portfolio. While there are differences in the capability of individuals, her study indicated that if ICT can be personalised, and if the tools exhibit characteristics which enable people to communicate and collaborate, higher levels of task can be achieved (Baas, 2010).

Another study that used the Task-Technology Fit Model by D’Ambra et al. (2013) found that by using the Task-Technology Fit Model to explore the interrelationships of e-books, together with costs and the information needs of academics, and the fit of technology to tasks as well as performance. Task-Technology Fit is the relationship between task requirements, individual abilities, and the functionality of the mobile device and its software. Similarly, Teo (2008) used this model to examine the attitudes of pre-service teachers towards the use of computers. Areas of focus were, liking of computers, perceived usefulness, perceived control and behavioural intention. The study found that where the tool was made to measure as in fit for purpose, the attitudes of teachers improved positively.

Overall, the researcher accepts this model as a possible application to the study. The model will be evaluated through the instrument of the study and the results will predict the outcome of the applicability of the model in relation to this study.

2.10 Summary

This chapter focused on the key literature that underpins the study. It defined the nature of the Tablet PC and its applicability to teaching and learning in a tertiary education setting. It highlighted the reasons on why it becomes imperative for educational authorities institutions to interrogate best practices related to educational technology as this can promote creativity, communication, interactively, constructive teach and learning and enhance academic performance. The barriers to proper implementation of Tablet PCs were also emphasised. A range of challenges have been identified and categorised into social, pedagogical, technological and relationship bearing challenges. The theoretical framework was also outlined along with its applicability to the current study. The next chapter focuses on the research methodology that was employed to collect the primary data.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research methodology employed to fulfil the study. The location, census population and respondents are described and explained. The study design is outlined along with the data collection methods and relevant instruments used to collect the data. Methods implemented to maintain validity and reliability of the instrument are presented. The alignment of the instruments to the frameworks is also shown. Data analysis techniques are also explained.

3.2 Research Question and Objectives

For recapitulation purposes, the research question of the study was:

How does the Tablet PC influence

- Teaching,
- Learning, and,
- Student academic performance,

at Richfield Graduate Institute of Technology?

The objectives of the study were:

- To investigate the impact of the Tablet PC on academic teaching at Richfield.
- To investigate the impact of the Tablet PC on academic learning at Richfield.
- To investigate if the Tablet PC influences student academic performance.
- To identify the technological challenges/barriers related to achieving enhanced academic success.

3.3 Research Design and Approach

The process of research design consists of turning the research questions into research projects. Saunders et al. (2009) and Babbie (2016) suggest that the research design can be classified into the following three principal categories:

- Exploratory;
- Explanatory; and
- Descriptive

An exploratory study is useful when there is a need to understand a problem and its nature (Saunders et al., 2009; Babbie, 2016). Exploratory research can be conducted into three main categories which are:

- The search for literature;
- Interviewing of key people in the subject matter; and
- Conducting focus group interviews

Exploratory research is initially broad, but narrows progressively as the research progresses whilst also flexible and adaptable to change (Saunders et al., 2009; Babbie, 2016).

Descriptive research can be the extension of an exploratory or an explanatory research. The objective of a descriptive research is to describe an event or situation (Saunders et al., 2009; Babbie, 2016). This study was both exploratory as well as descriptive. Hence, the study adopted a mixed research method.

Mixed methods research is a methodology for conducting research that involves collecting, analysing and integrating (or mixing) quantitative and qualitative research (and data) in a single study or a longitudinal programme of inquiry. The purpose of this form of research is that both qualitative and quantitative research, in combination, provide a better understanding of a research problem or issue than either research approach alone (Tashakkori and Teddlie, 2008).

Therefore, to better understand and analyse the research problem, a mixed method approach was employed. This took the form of questionnaires and interviews, which is described further down the chapter.

3.3.1 Research Setting and Location

Richfield Graduate Institute of Technology, was previously known as PC Training & Business College, is registered with the Department of Higher Education & Training as a Private Higher Education Institution. All Higher Education Qualifications are accredited by the Council on Higher Education and Registered on the National Qualifications Framework by the South African Qualifications Authority. The study was conducted at the Richfield Graduate Institute of Technology's Pretoria Cluster. Hence the study data originated from Pretoria (also known as Tshwane and situated in Gauteng, South Africa). The reason for

selecting this location is because the Pretoria cluster has an average enrolment of 3000 students per year split amongst higher education, further education and skills courses. This cluster provided contact education for certificates, diplomas, and degree qualifications.

3.4 The Study Population and Sample

According to White and McBurney (2013) a population is defined as all elements (individuals, objects and events) that meet the sample criteria for inclusion in a study. This study employed a census approach. A census is an investigation of all the individual elements that make up a population (Zikmund et al., 2013). This can be within a specific area and/or timeframe. The study census population consisted of all Degree qualification students at the Richfield Pretoria cluster (483 students). With a confidence level of 95% and a confidence interval of 5%, the ideal sample size was 214 out of the census population. The study had 169 responses that resulted in a 79% response rate to sample which was more than sufficient for strong analysis.

With reference to the qualitative approach, purposeful and convenient sampling of lecturers were done. A convenient sample consists of subjects included in the study because they happen to be in the right place at the right time (Sturwig and Stead, 2013). Purposeful sampling is a technique widely used in qualitative research for the identification and selection of information-rich cases for the most effective use of limited resources (Patton, 2002). This involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest (Creswell and Plano Clark, 2011). Convenient and purposeful sampling was used to select 11 lecturers from the 26 lecturers in the Pretoria Cluster.

3.4.1 The Sampling Criteria

In the main, purposeful sampling was used to select the lecturers for the interviews. According to this non-probability sampling technique, sample members are selected based on their knowledge, relationships and expertise regarding a research subject (Sturwig and Stead, 2013). Lecturers included in the sample were selected to meet specific criteria for added validity and reliability. These included the following. They should be:

- Lecturers at the campus following a specific programme
- mentally sound

- willing to participate
- 24 years or older
- of either sex or any race

In the current study, the sample members who were selected had a direct relationship with the students under investigation, and relevant work experience in the field of lecturing.

3.5 Data Collection

3.5.1 Data Collection Instrument

The study employed two methods of data collection due to it being a mixed-method study. Questionnaires were chosen for the quantitative component of the study whilst interviews were selected for the qualitative component.

- **Quantitative**

Data was collected with the aid of questionnaires to evaluate the students' knowledge and views in relation to the impact of Tablet PCs on student learning and performance at Richfield Graduate Institute of Technology.

A questionnaire was decided upon because of the following:

- It is used for large number of respondents
- It ensured a high response rate as the questionnaires were distributed to respondents to complete and were collected personally by the researcher within a timeframe
- It required less time and energy to administer
- It offered anonymity
- It offered less opportunity for bias.
- It was offered online
- Most of the items in the questionnaire were close-ended, which made it easier and quicker to complete

The survey was administered online and students were asked to click on the link which took them to the survey. They needed to follow the instructions on the screen to complete the survey.

- **Qualitative**

Data from qualitative studies describes the qualities or characteristics of something. You cannot easily reduce these descriptions to numbers as you can the findings from quantitative research. Qualitative research studies can provide you with details about human behaviour, emotion, and personality characteristics that quantitative studies cannot match. Therefore, Qualitative interviews were seen as ideal for drawing rich data from a relatively small sample of 11. An interview schedule was used as the survey instrument for the qualitative arm of the study. According to Bickman and Rog (2015), qualitative research simply requires a broader and less restrictive concept of design than the traditional approaches. According to Casell and Symon (2004), the goal of qualitative research interview is to see the research topic from the perspective of the interviewee and also to understand how and why they have come to this particular perspective. For the qualitative arm (lecturers), physical interviews were conducted. This was done over a period of 1 week. Two lecturers were interviewed daily at times that were suitable to them. The interviews were recorded, thereafter transcripts were produced for analysis. These were open-ended to allow for in-depth data collection.

3.6 Instrument Construction

3.6.1 Survey Instrument

The questionnaire was built around the research question and the objective of the study that was underpinned by the research model (Zikmund et al., 2013; Babbie, 2016). Based on the research questions of the study, the following information contributed to the construction of the instruments.

- **Questionnaire construction**

The questionnaire consisted of 6 sections and a total of 20 test items. Section A aimed at gaining demographic data only. This information could assist the researcher when interpreting the results. Section B aimed at determining the knowledge and views of students on Learning and the Tablet PC. Five-questions were posed using a 5-point Likert scaling (1= Strongly Agree, 5= Strongly Disagree).

Section C aimed at determining the Learning Fit of the Tablet PC. Seven questions were posed using a 5-point Likert scaling. Section D focused on the Impact of the Tablet PC on student performance. Seven questions were posed using a nominal scale of 1 to 5 (1= to a low

degree, 2= to some degree, 3= to an average degree, 4= to a high degree, 5= to a very high degree).

Section E required the respondents to select the options on Usage and Barriers to Usage of the Tablet PC. Respondents could select more than one option.

Instruction guidelines were attached to the questionnaires to guide the subjects as to whether to circle or tick the chosen response.

The following information guided the construction of the instrument:

- Use of simple, conversational language
- Leading and loaded questions were avoided
- All questions were specific and related to Research Questions and aim of study
- Questions were built around the constructs of the model used

The online survey process was as follows:

- The student would be sent an email advising them that the survey was available.
- The student would then be able to access the survey, however if the survey was closed or maximum participant limit reached, the student would not be able to continue.
- If the student had not taken the survey before, they would then go on to submit their results.
- The student would then receive a thank you screen with instructions on who to contact for further information
- The results were then converted into reports for use in this study.

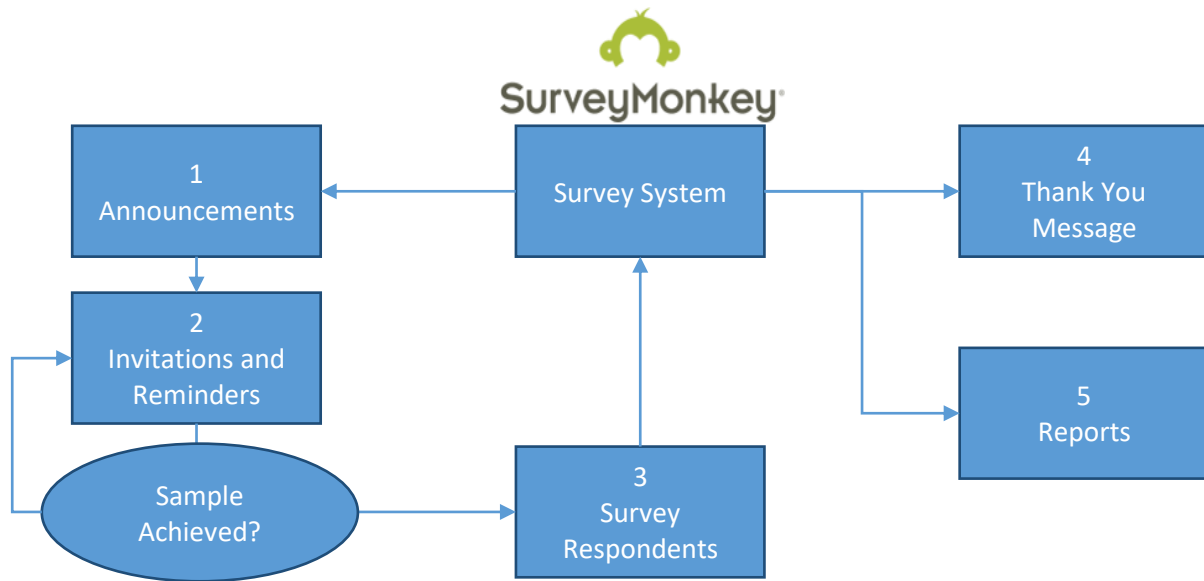


Figure 3.1: The Online Survey Process followed in this study

3.6.2 Interview Schedule

For the purposes of this research, in-depth interviews were also conducted. Interviews are personal and unstructured aimed to identify participants' emotions, feelings, and opinions regarding a particular research subject. The main advantage of personal interviews is that they involve personal and direct contact between interviewers and interviewees and this eliminates non-response rates (Sturwig and Stead, 2013). Unstructured interviews offer flexibility in terms of the flow of the interview, thereby leaving room for the generation of conclusions that were not initially meant to be derived regarding a research subject. However, there is the risk that the interview may deviate from the pre-specified research aims and objectives (Zikmund et al., 2013). As far as data collection tools were concerned, the research involved the use of semi-structured interviews whereby, certain questions were prepared for the researcher to guide the interview towards the satisfaction of the research objectives. However, additional questions were encountered during the interviews.

The PEACE interview model was used for the lecturer interviews. The PEACE interview model began as a model designed to train police officer on how to interview witnesses and suspects and had since been adapted and modified to be used in academic research (Williamson, 2013)

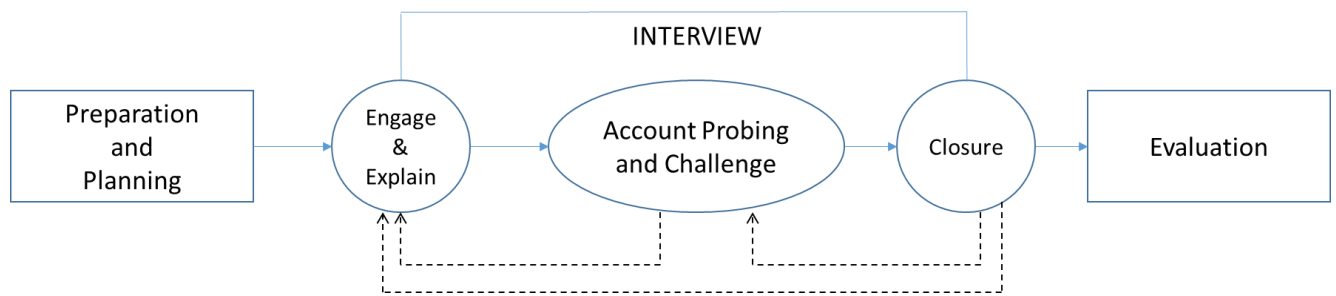


Figure 3.2: The PEACE Interview Model (Williamson, 2013)

3.7 Data Collection Procedure and Administration of the Instruments

3.7.1 Quantitative Survey

An online platform was used to administer the questionnaire and collect quantitative data. The online platform is known as ‘Survey Monkey’, which is a useful online tool for creating and administering surveys.

At the commencement of the questionnaire, a consent form was included on the first page. They could not proceed unless they consented. This is important especially for respondents that consented to participate in the study. All respondents were informed of the dates and times they could attempt the online questionnaire. The data collection process began on the 25th May 2016 and completed on 8th June 2016. The students had 2 weeks to attempt the survey. Since online questionnaires have lower response rates (Struwig and Stead, 2013), it was necessary to remind the campus managers to ensure that all students attempted the survey.

3.7.2 Interviews

The interviews were scheduled during the 3rd week of July 2016. All respondents were advised of the time and dates of the interviews. Special arrangements were made to interview the lecturers during the course of the week due to their normal lecturing loads. It should also be noted that all lecturers working at Richfield Graduate Institute of Technology need to comply with the requirements of the Council of Higher Education. 11 lecturers were interviewed because only 11 were available at the time of the study. All interviews were completed by 21 July 2016. All information was digitally recorded and transcribed thereafter.

3.8 Reliability and Validity

3.8.1 Reliability

White and McBurney (2013) refer to reliability as the degree of consistency with which an instrument measures the attribute that it is designed to measure and reproduces similar results when replicated at other times. Reliability can also be ensured by minimising sources of measurement error such as data collector bias. Data collector bias was minimised by the researcher being the only one to administer the instruments and standardising conditions such as exhibiting similar personal attributes to all respondents such as friendliness and support during the interviews. The physical and psychological environment in which qualitative data was collected was made comfortable for the respondent by ensuring privacy, confidentiality and general physical comfort.

3.8.2 Validity

The validity of an instrument is the degree to which an instrument measures what it is intended to measure (White and McBurney, 2013). Content validity refers to the extent to which an instrument represents the factors under study (White and McBurney, 2013). To achieve content validity, questionnaires were built primarily around the aim and research question of the study as well as the model. The questions were formulated in simple language for clarity and ease of understanding and clear instructions were given to the participants. For validation, the questionnaires were submitted to the supervisor and a professional statistician, and as a result, more questions were added to ensure higher representativeness. Rephrasing of some questions was done to clarify the questions and more appropriate alternative response choices were added to the closed-ended questions to provide for meaningful data analysis (Sturwig and Stead, 2013).

Not all the students approached to participate in the study completed the questionnaires.

3.9 Pre-Testing the Questionnaire

A pre-test refers to a trial administration of an instrument to identify flaws. When a questionnaire was used as a data-gathering instrument, it is necessary to determine whether questions and directions are clear to subjects and whether they understand what is required from them. This is referred to as the pre-testing of a questionnaire (White and McBurney, 2013; Zikmund et al., 2013). The researcher pre-tested the questionnaire with six respondents who were first year students at Richfield. These respondents did not form part of the target population. All of them answered the questions seamlessly and therefore, none of the questions was changed following the pre-test.

3.10 Ethical Considerations

Conducting research requires not only expertise and diligence but also honesty and integrity (Babbie, 2016; White and McBurney, 2013). This was done to recognise and protect the rights of human subjects. To render the study ethical, the rights to self-determination, anonymity, confidentiality and informed consent were observed. Ethical clearance was granted by the University of Kwazulu-Natal's Humanities and Social Sciences Research Ethics Committee on the 18th of April 2016 (Protocol reference number: HSS/0148/016M). Further to this written permission to conduct the research study was obtained from the Chief Academic Officer of Richfield Graduate Institute of Technology.

Informed consent forms were drawn up. The subjects were informed of their rights to voluntarily consent or decline to participate, and to withdraw participation at any given time without penalties or prejudice. Subjects were informed about the purpose of the study, the procedures that would be used to collect the data, and were assured that there were no potential risks or costs involved.

Anonymity and confidentiality were maintained throughout the study. Anonymity was ensured by not disclosing the participant's name on the questionnaire and research reports and detaching the written consent from the questionnaire. When subjects are promised confidentiality, it means that the information they provide will not be publicly reported in a way that identifies them (Sturwig and Stead, 2013). In this study, confidentiality was maintained by keeping the collected data confidential and not revealing the subjects' identities when reporting or publishing the study (Struwig and Stead). No identifying information was entered onto the questionnaires, and questionnaires were numerically labelled after data was collected. Subjects were treated as autonomous agents by informing them about the study and allowing them to voluntarily choose to participate or not.

Lastly, information was provided about the researcher in the event of further questions or complaints. Scientific honesty is regarded as a very important ethical responsibility when conducting research (Sturwig and Stead, 2013; Babbie, 2016). Dishonest conduct includes manipulation of design and methods, and retention or manipulation of data. The researcher tried to avoid any form of dishonesty by truthfully recording and coding the answers of all participants. Manipulation of data could not be done as an independent statistician entered the

coded data from the questionnaires into the SPSS computer software programme. The statistician produced the results independently of the researcher to avoid subjective collaboration.

3.11 Data Analysis

3.11.1 Quantitative Data Analysis

Post data collection, data was organised and analysed. For the quantitative data analysis, the researcher worked with a professional statistician that utilised SPSS 21 to provide a detailed analysis. The following techniques were used for a thorough and rich analysis:

- Reliability analysis – this is the degree to which the assessment tool (SPSS 21 in this study) is able to provide stable and consistent results (White and McBurney, 2013)
- Descriptive analysis (Frequency analysis) - these were presented in graphs, charts and tables.
- Exploratory factor analysis- is a statistical technique that is used to reduce data to a smaller set of summary variables and to explore the underlining theoretical structure of the phenomena. It is used to identify the structure of the relationship between the variable and the respondent (Babbie, 2016; White and McBurney, 2013).
- Chi-Square - this statistic was used to conduct a test for independence and ascertain whether there is a significant association between variables (Babbie, 2016).
- Correlations – a correlation measures the relationship between two variables and if an increase or decrease in one affects the other similarly. (White and McBurney, 2013).

3.11.2 Qualitative Data Analysis

Content analysis was done on data which was gathered from the interviews. This is the type of research whereby data gathered is categorised into themes and sub-themes to be able to be comparable (Zikmund et al., 2013). A main advantage of content analysis is that it helps in data collected being reduced and simplified, whilst at the same time producing results that may then be measured using quantitative techniques. Moreover, content analysis gives the ability to researchers to structure the qualitative data collected in a way that satisfies the

accomplishment of research objectives (Babbie, 2016). However, there is the risk for researchers to misinterpret the data gathered, thereby generating unreliable and/or bias conclusions (Sturwig and Stead, 2013; Zikmund et al., 2013).

For this study, the researcher did a full read and analysis of the interviews and outlined relevant themes. These were supported by ‘word/text clouds’ for added reliability and minimising of bias. Word clouds draw out the most frequently used words. These were done for all respondents’ collective response per interview question.

3.12 Elimination of Bias

While devising the data collection instruments, care was taken to formulate the questions in such a way that it was understood by every respondent. Furthermore, the instruments were written in English, and is the official language used by the institution. Finally the instruments made no discriminatory difference as regards to gender, race and/or physical condition (Babbie, 2016).

3.13 Summary

This chapter described the research methodology, including the population, response and, data collection instruments as well as strategies used to ensure the ethical standards, reliability and validity of the study. The researcher used a mixed method approach (quantitative and qualitative). Two instruments were administered to collect the relevant data. A Census method was employed for the quantitative component of the study which derived a sample of 169 respondents that answered the questionnaire. A convenient sample of 11 lecturers were used for the qualitative arm of the study. Consent was obtained from the subjects themselves before administration of instruments. Relevant analysis techniques were employed that were applicable to the datasets received. The next chapter presents the preliminary descriptive analysis only.

CHAPTER FOUR

DESCRIPTIVE STATISTICS

4.1 Introduction

This chapter presents only the preliminary descriptive statistics of the study relative to the data that was collected. This was done as a means to allow the reader to identify with the descriptive statistics before engaging with the more detailed inferential statistics. The statistics are generated primarily from the quantitative data collected from students in the Pretoria Cluster of Richfield Campuses. These are be presented in the form of graphs, tables and charts. This forms the preliminary analysis and informs and supports the inferential statistics in the next chapter.

4.2 The Sample (Quantitative Study)

The study census population consisted of all Degree qualification students at the Richfield Pretoria cluster (483 students). With a confidence level of 95% and a confidence interval of 5%, the ideal sample size was 214 out of the census population. The study had 169 responses, which resulted in a 79% response rate to sample. This was seen as a rich response rate and appropriate for strong analysis.

4.3 The Research Instrument

The research instrument for the Tablet PC consisted of 24 items. The questionnaire was divided into 5 sections, which measured various themes as illustrated below:

- a) Biographical information
- b) Task - Learning
- c) The Learning Fit
- d) Student Performance
- e) Usage and Barriers

4.4 Reliability Statistics

The two most important aspects of precision are reliability and validity (White and McBurney 2013). The reliability was computed by taking several measurements on the same subjects. A reliability coefficient of 0.70 or higher is considered as “acceptable”. The table below reflects the Cronbach’s alpha score for all the items that constituted the questionnaire.

		Number of Items	Cronbach's Alpha
B	Task - Learning and the Tablet PC	5 of 5	0.833851
C	The Learning Fit	7 of 7	0.843633
D	The Impact on Student Performance	7 of 7	0.906216

Table 4.1: Reliability Statistics

The reliability scores for all sections exceed the recommended Cronbach's alpha value. This indicates a degree of acceptable and consistent scoring for these sections of the research.

4.5 Section A: Biographical Data

This section summarises the biographical characteristics of the respondents.

4.5.1 Gender

The graphs below describe the overall gender distribution and age distribution.

Respondent	Gender	
	Male	Female
Count	65	104
%	38.5%	61.5%

Table 4.2: Biographical Data – Gender of respondent

Table 4.2 shows that ratio of males to females is approximately 2:3 (38.5%: 61.5%), hence majority of respondents were female. This was in line with the institutions registrations for the year.

4.5.2 Age Group

Table 4.3 provides the age group break-down of respondents.

Respondent Age		Total	% Total
Age (years)	15 - 19	78	46.2%
	20 - 24	80	47.3%
	25 - 29	9	5.3%
	30 - 34	2	1.2%
Total		169	100.0%

Table 4.3: Biographical Data - Age of respondent

Majority of the Student Sample was aged 15-19 and 20-24 which is in line with Richfield’s target demographic of students whom have just complete Matric and will be studying an undergraduate qualification for the first time.

4.5.3 Campus Details

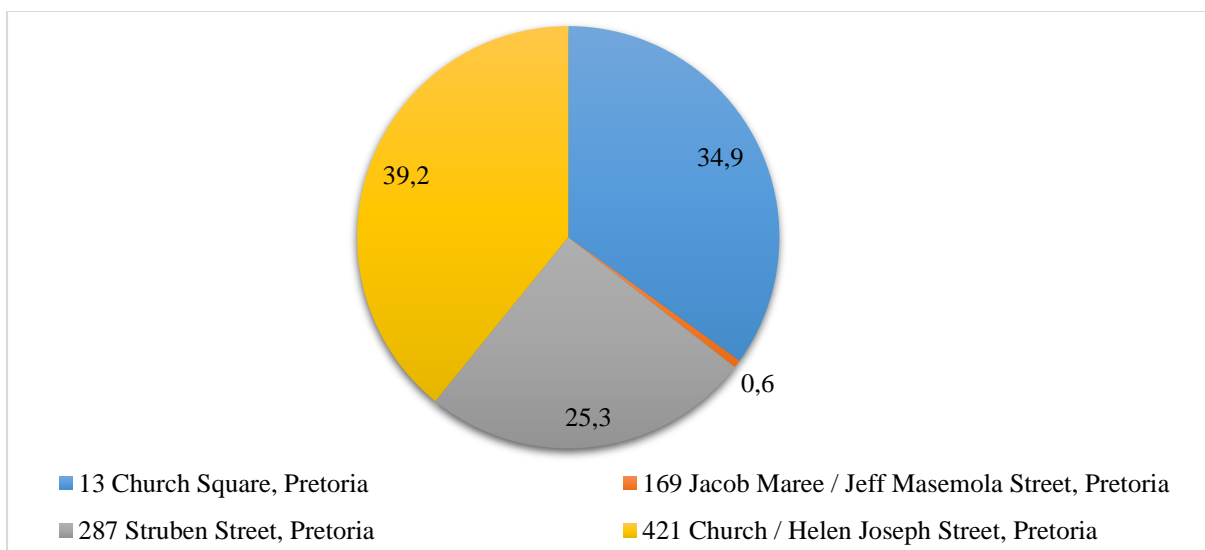


Figure 4.1: Campus that respondents attended

The majority of the respondents were from the Church Street, Church Square and Struben Street Campus. These are the larger Richfield Campuses based in the Pretoria Cluster.

4.5.4 Year of Study

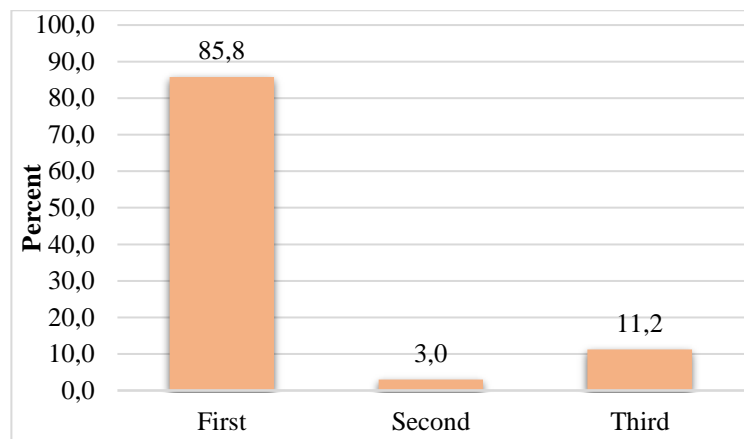


Figure 4.2: Respondent's year of study

The majority of respondents (85.8%) were in their first year of study. This is an interesting finding as most respondents in this category would be exposed to the Tablet PC technology for the first time and be able to provide insightful feedback. This was seen in the high reliability scores that were achieved. This finding is supported by the studies Sha et al.(2011) who believed that the Tablet PC facilitates access to personalised learning content for first time users and enhanced academic performance through the development of meta cognitive skills (Groff, 2013).

4.6 Section B: Task - Learning and the Tablet PC

This section deals with the influence of the Tablet PC on learning. It also relates to 'Learning task' as used in the Task-Technology Fit Model (Goodhue and Thompson, 1995). This section comprised of 5 questions which determined the way in which the Tablet PC influenced learning both in and out of the classroom.

4.6.1 Influence of the Tablet PC on Learning

The responses to the 5 questions posed in this section are represented in Figure 4.3

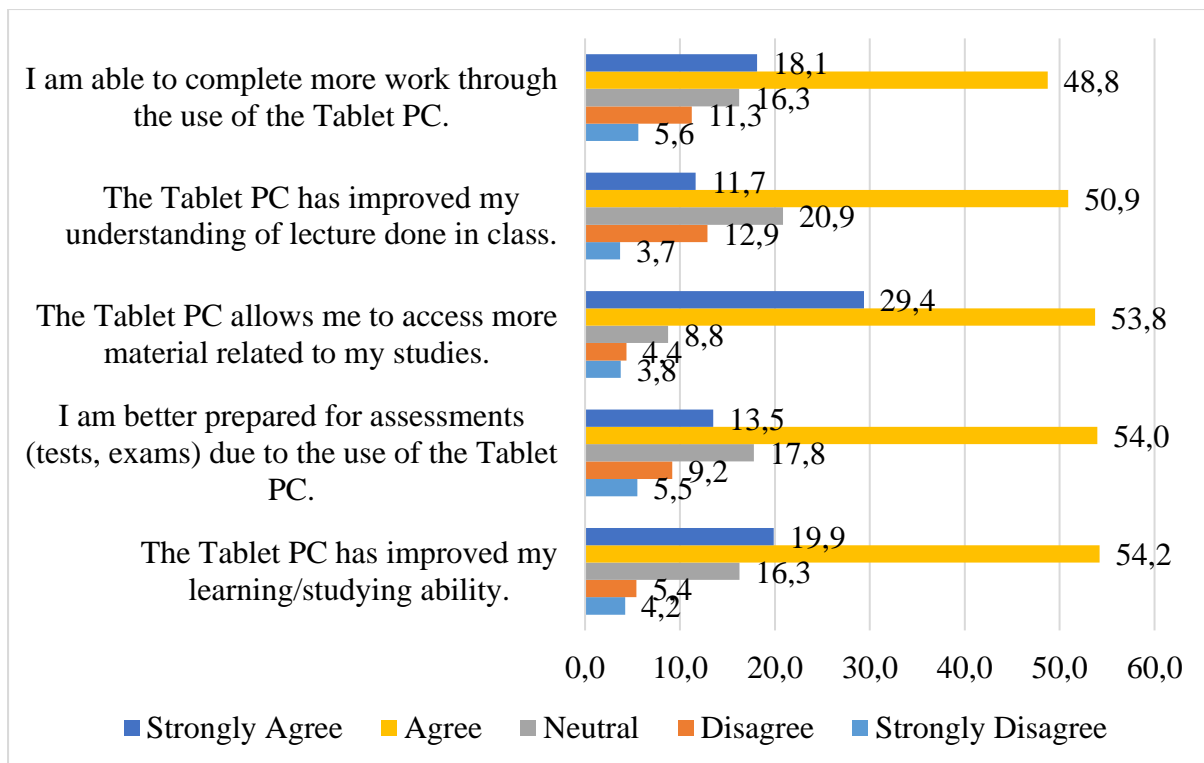


Figure 4.3: Influence of the Tablet PC on Learning

The results reflect that the majority of the students agreed that the Tablet PC has improved their ability to learn in areas such as:

- Improved preparation for tests and examinations (13.5% strongly agreed and 54.2% agreed)
- Access capabilities (29.45 strongly agreed and 53.8% agreed)
- Improved learning and studying abilities (19.9% strongly agreed and 54.2% agreed)
- Access to audio visual aids and subsequent understanding of lecturers (11.7% strongly agreed and 50.9% agreed).

The agreement levels for the section ranges from 62.6% to 82.4%. The lowest score (62.6%) was for statement 2: “I am better prepared for assessments (tests, exams) due to the use of the Tablet PC”. The highest score (82.4%) was for statement 3; “The Tablet PC allows me to access more material related to my studies”. The range of scores clearly illustrates that the Tablet PC positively affects the student’s learning capabilities. This finding concurs with the studies of Voogt et al. (2012) on the advantages of using the Tablet PC in the lecture halls. However, while there are several positive responses, of note is the average number of neutral responses, which range from 16.3% to 20.9%. It would appear that this uncertainty might be

attributed to the first learning experiences of students with technology, technology phobia as well as technology challenges (Syed, 2012; Crescente and Lee, 2011; Elias 2011).

4.7 Section C: The Learning Fit

This section deals with the learning fit of the Tablet PC. The questions gauged the way in which how the functions of the Tablet PC fits the purpose of the learning process of the students. Figure 4.4 reveals responses about the influence of the Tablet PC on their learning styles.

4.7.1 Influence of Tablet PC on Learning Styles

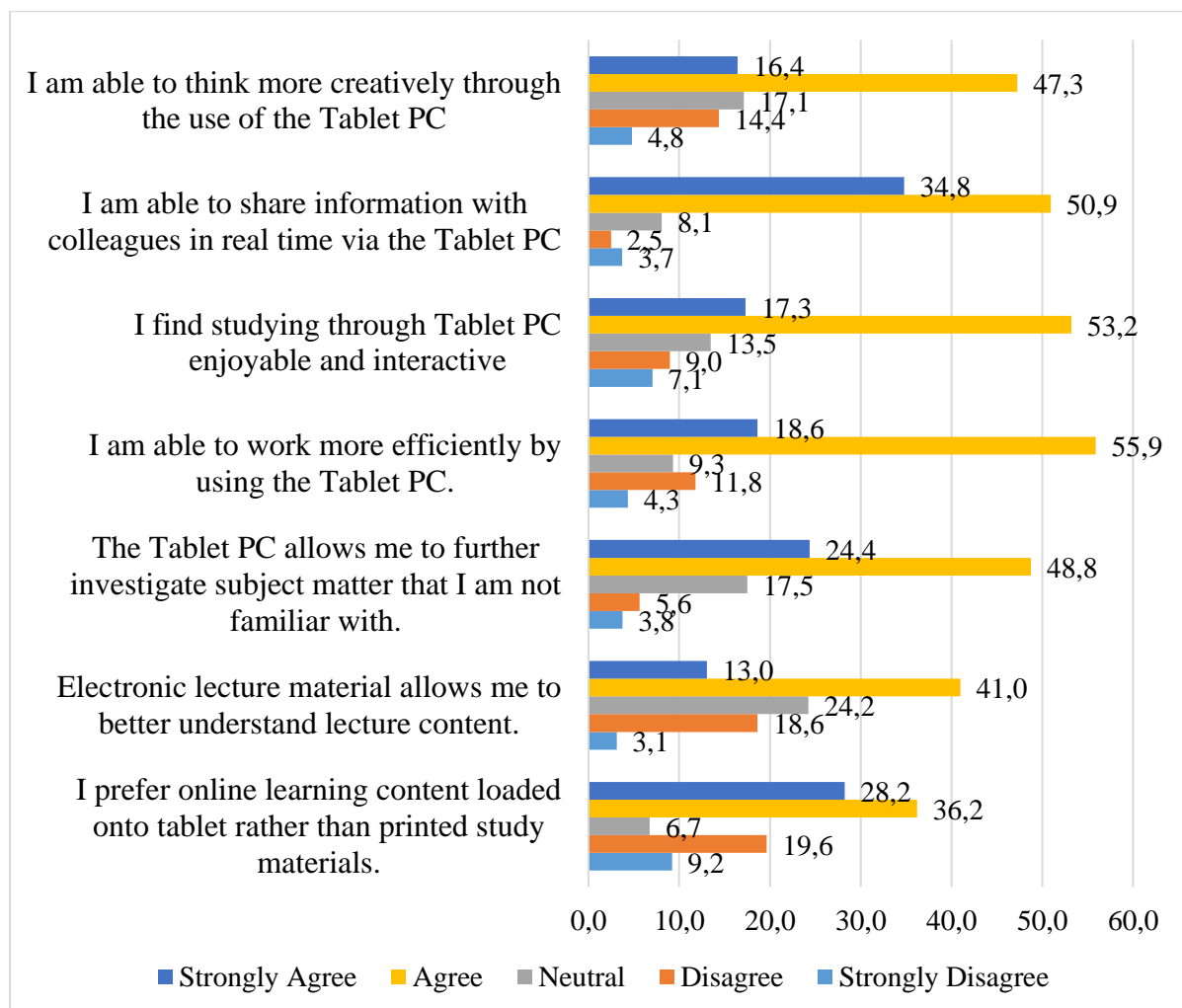


Figure 4.4: The Learning Fit of the Tablet PC

The results from Figure 4.4 reveal that the majority of the students agreed that the Tablet PC has positively influenced their learning styles especially when it came to:

- Creative thinking (16.4% strongly agreed and 47,3% agreed)

- Sharing knowledge and information (34.8% strongly agreed and 50.95% agreed)
- Enjoyable experience (18.65% strongly agreed and 53.2% agreed)
- Enhanced efficiency (18.6% strongly agreed and 55.9% agreed)
- Research (24.8% strongly agreed and 48.8% agreed)
- Online learning content (28.2% strongly agreed and 36.2% agreed)

The current findings illustrate that the Tablet PC does have positive influences on the student's learning styles in terms of creating enjoyable experiences and stimulating creative thinking. This finding concurs with the studies of Lowther et al. (2012) and Voogt et al. (2012) who found that critical thinking, creativity and problem solving were enhanced through the use of the Tablet PC. Students also agreed that the Tablet PC not only enhances research capabilities and efficiency but also promotes sharing of knowledge amongst peers and lecturers. This finding lends strong support for multi-modal learning experiences as opposed to the traditional learning experiences (Hase, 2011). The overall positive findings concur with the studies of Groff (2013) who identified that the Tablet PC encouraged several types of learning strategies to promote student engagement and communication through group work and collaboration.

4.8 Section D: The Impact on Student Performance

This section deals with the Impact of the Tablet PC on Student Performance. Six questions were identified as being suitable to ascertain the views of students regarding the impact of the Tablet PC on their performance. The findings are illustrated in Figure 4.5

4.8.1 Impact of Tablet PC on Student Performance

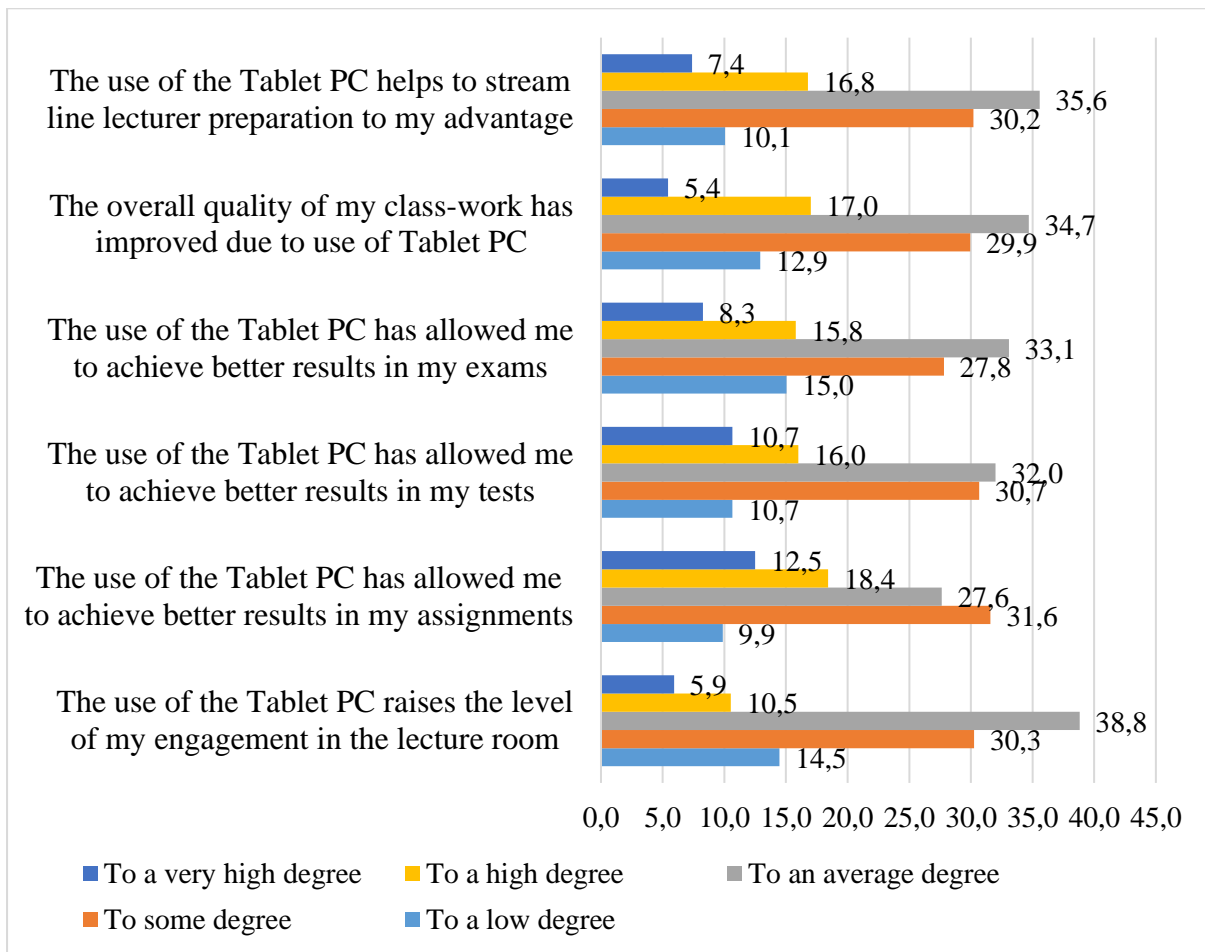


Figure 4.5: Impact of Tablet PC on student performance

Figure 4.5 reveals that the responses of the majority of the students centred on average suggesting that not all students had similar positive experiences with the Tablet PC in the lecturer room.

The responses to ‘very high degree’ and to ‘high degree’ categories are ranked below:

- Achieve better results in assignments (30.9% agree)
- Achieve better results in tests (26.7% agree)
- Stream lecturer preparation (24.2% agree)
- Achieve better results in exams (24.1% agree)
- Improve quality of class work (22.4% agree)
- Raises levels of engagement (16.4% agree)

Their preferences (to an average and to some degree) are ranked as follows:

- Raises levels of engagement (69.8%)
- Stream lecturer preparation (65.8%)
- Improve quality of class work (64.6%)
- Achieve better results in tests (62.7%)
- Achieve better results in exams (60.9%)
- Achieve better results in assignments (59.8)

Overall, the results show that the Tablet PC does have a positive influence on academic performance. However, while some of the results are positive, the percentage number of responses of that ‘to a high degree’ are lower than those in the ‘average to some degree’ categories. This could be attributed to the different learning styles of students, their attitudes towards technology and the teacher as well as their attitude towards their studies. This finding supports the studies of Beetham (2013) who stressed that lecturers and students need to be mentally prepared to participate in collaboration activities otherwise they will lose out on harnessing the benefits of technology. Furthermore, these finding supports the studies of El Grayor, et al. (2011) and Cuban (2013) who asserted that lecturers have to rethink their teaching practices when using technological tools more especially during student-centered and lecturer-centered modes of delivery.

An interesting finding is that majority of students ranked “raises level of engagement” highly in the “average to some degree” categories and low in “very high to high” categories. In all probability this statement could have been incorrectly interpreted by the students to mean engagement with the Tablet PC rather than engagement with the lecturer/students. This interpretation is in line with the views of Garavaglia and Ferrari (2012) who found students could spend far more time playing games, using social networking sites or just wasting classroom time by text messaging and or watching videos.

4.9 Section E: Usage and Barriers to Usage of the Tablet PC

A total of 10 questions were posed to ascertain the students’ attitudes towards the use of the Tablet PC and any resulting barriers.

Studies such as Garavaglia and Ferrari (2012); McCoy (2013); Enriquez (2010), and Pelgrum (2001) have shown that barriers do exist when it comes to adoption and implementation of

the Tablet PC in education. This study is no exception and has similarly discovered barriers as well. Figure 4.6 alludes to such barriers.

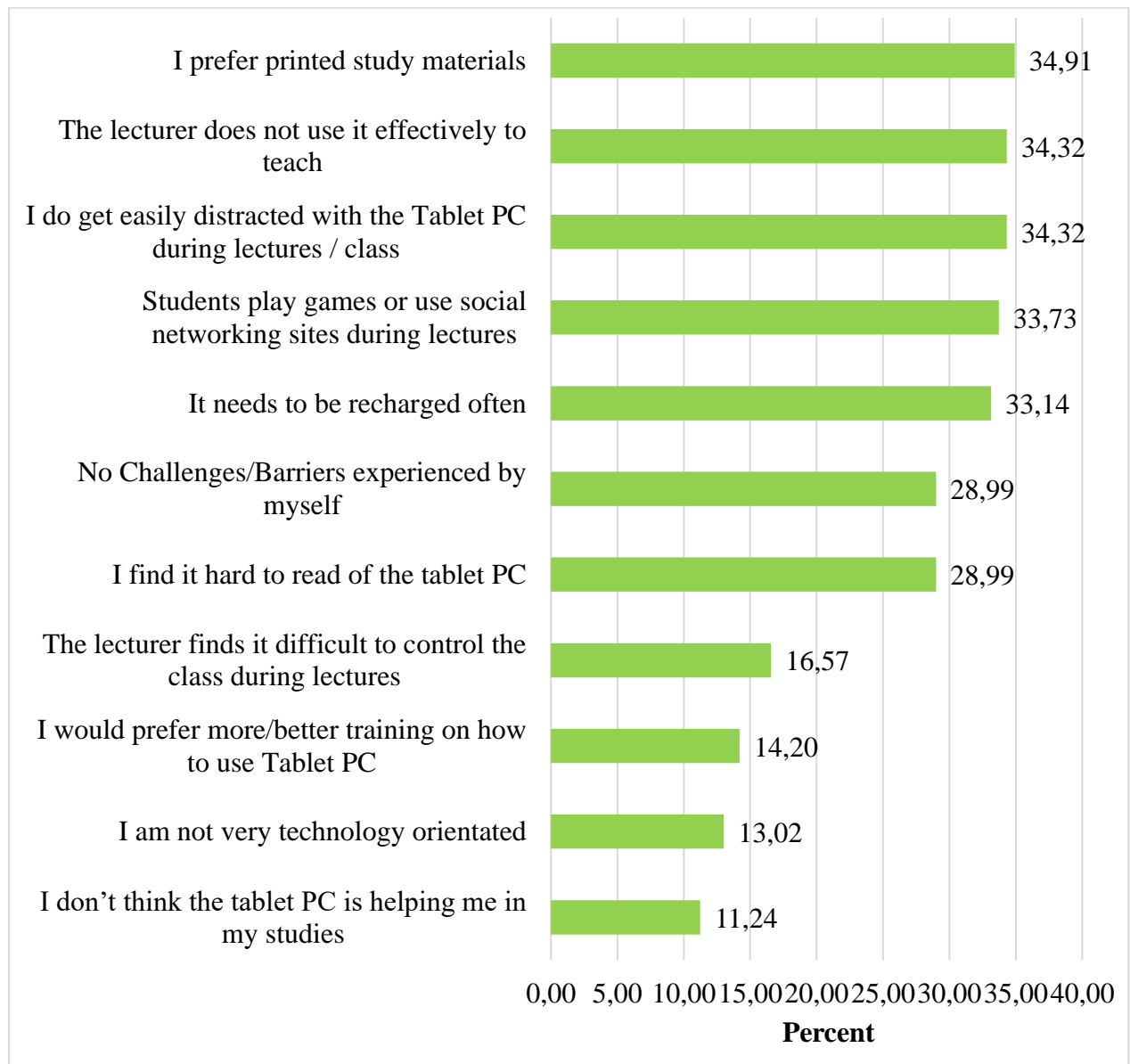


Figure 4.6: Usage and Barriers to Usage of the Tablet PC

Figure 4.6 reveals that, in the main, students experienced several barriers that impacted upon their performance and experiences. The 5 major barriers are ranked as follows:

- Preference for printed study materials (34.91%)
- Lecturer's competence levels (34.32%)
- Distraction (34.32%)
- Attention on games /surfing net (33.73)

- Recharge (33.4%)

An interesting finding is that 28.99% of the respondents experienced no challenges. This could be attributed to the possibility that they many are technologically well-informed, skilled and motivated students and eager to participate in lecture room activities. This finding is in line with the views of Johnson, (2014) and Akcaoglu and Koehler(2014) as they indicated that participation in classroom activities increases performance and attainment standards through the use of the Tablet PC. The findings by Akcaoglu and Koehler (2014) indicate that the keys barriers affecting Tablet PC usage and adoption are those that relate to the lack/hesitance of ability to transition from printed to online materials. Lecturer's competence levels are being noticed by students and they feel that lecturers may not be competent enough themselves. This finding supports the views of Pelgrum (2001) and Johnson (2014) are that lecturers who experienced constant failures in adapting to the Tablet PC will have lower levels of confidence to positively engage with students thereby unintentionally creating barriers and resistance to change. The issues of distraction remains evident due to the nature of technology that can present such challenges. This finding supports the studies of Johnson (2014) and Garavaglia and Ferrari (2012) who identified that students were distracted by the novelty of the Tablet PC and all that it had to offer.

4.10 Summary

This chapter highlighted preliminary findings from quantitative responses of the study. The findings were informative and presented a descriptive view of the results. These were also supported by other studies. These findings will now be taken to the next level in the next chapter as we delve deeper into the qualitative statistics though techniques such as factor analysis, chi-square and correlations and provide deeper discussions. Furthermore, the qualitative analysis will also be detailed and discussed.

CHAPTER 5

DETAILED ANALYSIS, DISCUSSION AND KEY FINDINGS

5.1 Introduction

This chapter presents a detailed analysis and discussion of both the quantitative and qualitative data collected during the primary research. The quantitative analysis and discussion will be presented first followed by the qualitative analysis and discussion. The quantitative analysis builds from the previous chapter, which demonstrated the descriptive statistics only, and will present the inferential techniques, such as factor analysis, chi-square analysis and correlations in this chapter. The qualitative analysis encompassed content and thematic analysis in which key themes are derived and presented. These are then integrated in the final section of this chapter whereby the key findings of the study supported by the mixed method approach are revealed. The findings in relation to the theoretical model that underpinned the study will also be presented.

5.2 Research Questions and Objectives

For recapping purposes, this study undertook to answer the primary research question of:

How does the Tablet PC influence

- Teaching,
- Learning, and,
- Student academic performance at Richfield Graduate Institute of Technology

The objectives that addressed the research question were:

- To investigate the impact of the Tablet PC on academic teaching at Richfield Graduate Institute of Technology.
- To investigate the impact of the Tablet PC on academic learning at Richfield Graduate Institute of Technology.
- To investigate if the Tablet PC influences student academic performance.
- To identify the technological challenges/barriers related to Tablet PC adoption for teaching, learning and academic performance

5.3 Quantitative Study Discussion

5.3.1 Factor Analysis

Factor analysis is a statistical technique whereby the main goal is data reduction (McDonald, 2014). This technique was used in the quantitative component in order to represent a number of questions with a smaller number of hypothetical factors. In this study, factor analysis was used to establish whether the various measures/variables (Section B, C, and D of the quantitative instrument), did measure the same concepts as a means of establishing factors.

5.3.1.1 Kaiser-Meyer-Olkin and Bartlett's Test

The Kaiser-Meyer-Olkin (KMO) Test measures whether the data obtained is suitable for Factor Analysis. The matrix tables (Table 5.1, 5.2, and 5.3) is preceded by a summarised table that reflects the results of KMO and Bartlett's Test. The requirement is that Kaiser-Meyer-Olkin Measure of Sampling Adequacy should be greater than 0.50 and Bartlett's Test of Sphericity less than 0.05 (Beavers et al., 2013).

		Kaiser-Meyer-Olkin Measure of Sampling Adequacy	Bartlett's Test of Sphericity		
			Approx. Chi-Square	df	Sig.
B	Task - Learning and the Tablet PC	0.851	266.307	10	0.000
C	The Learning Fit	0.851	373.233	21	0.000
D	The Impact on Student Performance	0.890	414.897	21	0.000

Table 5.1: KMO and Bartlett's Test for the Quantitative Study

With reference to Table 5.1, all the conditions are satisfied for factor analysis. That is, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy value should be greater than 0.500 and the Bartlett's Test of Sphericity significance value should be less than 0.05.

5.3.1.2 Rotated Component Matrix

The rotated component matrix contains estimates of the correlations between each of the variables and the estimated components.

Rotated Component Matrix for Tablet PC impact on Learning	
Section B: Tablet PC impact on Learning	Component
	1
The Tablet PC has improved my learning/studying ability.	0.805
I am better prepared for assessments (tests, exams) due to the use of the Tablet PC.	0.719
The Tablet PC allows me to access more material related to my studies.	0.791
The Tablet PC has improved my understanding of lecture done in class.	0.785
I am able to complete more work through the use of the Tablet PC.	0.784

Table 5.2: Rotated Component Matrix for Section B of the Quantitative Study

The statements in Table 5.2 that constituted Section B loaded perfectly along a single component. This implies that the statements that constituted these sections perfectly measured what it set out to measure. This indicates that Section B had interrelated statements.

Rotated Component Matrix for The Tablet PC and the Learning fit		
Section C: The Tablet PC and the Learning fit	Component	
	1	2
I prefer online learning content loaded onto tablet rather than printed study materials.	0.262	0.818
Electronic lecture material allows me to better understand lecture content.	0.109	0.862
The Tablet PC allows me to further investigate subject matter that I am not familiar with.	0.773	0.153
I am able to work more efficiently by using the Tablet PC.	0.832	0.291
I find studying through Tablet PC enjoyable and interactive	0.614	0.434
I am able to share information with colleagues in real time via the Tablet PC	0.824	0.016
I am able to think more creatively through the use of the Tablet PC	0.720	0.343

Table 5.3: Rotated Component Matrix for Section C of the Quantitative Study

It is noted that the variables in Table 5.3 that constituted Section C loaded along 2 components. This means that respondents viewed the variables differently within Section C. Within Section C, the splits are colour coded yellow and green. The components highlighted in green can hence be seen as a separate theme such as ‘study materials’, whereas the

components highlighted in yellow can be seen as a theme of ‘the students’ use of the Tablet PC.’

Rotated Component Matrix for The Impact of Student Performance	
Section D: The Impact of Student Performance	Component
	1
The use of the Tablet PC raises the level of my engagement in the lecture room	0.824
The use of the Tablet PC has allowed me to achieve better results in my assignments	0.772
The use of the Tablet PC has allowed me to achieve better results in my tests	0.839
The use of the Tablet PC has allowed me to achieve better results in my exams	0.819
The overall quality of my class-work has improved due to use of Tablet PC	0.772
The use of the Tablet PC helps to stream line lecturer preparation to my advantage	0.829
The software available allows me to synchronize with the respective lesson and interact with the materials in real time	0.746

Table 5.4: Rotated Component Matrix for Section D of the Quantitative Study

The statements in Table 5.4 that constituted Section D loaded perfectly along a single component. This implies that the statements that constituted these sections perfectly measured what it set out to measure. This indicates that sections D have interrelated statements.

5.3.2 Chi-Square Hypothesis Testing

Chi square test was performed to determine whether there was a statistically significant relationship between the biographical and questionnaire variables.

There was a relationship between ‘Campus’ and the ‘Tablet PC improving understanding of lecture done in class’ with a significance level of ‘0.36’. This can be attributed to the Degree campuses having superior infrastructure such as faster Wi-Fi access and greater usage of the Learner Management System, Moodle. Istance and Dumont (2010) found that the flexibilisation of time and space accounted for by the integration of ICT into teaching and learning processes contributed to an increase in interaction and reception of information for students and lecturers.. A relationship was found between the ‘age’ of the learner and ‘the ability of the learner to work efficiently using the Tablet PC’ with a significance of ‘.031’.

The variable relating to ‘The use of the Tablet PC raises the level of my engagement in the lecture room’ had a significance level of .009 to ‘Age Group’ and .004 to the ‘Year of Study’. This finding concurs with the research done by Whitton (2010) where he found that the use of ICT not only enhances the learning environment but also improves motivation and enthusiasm in the learning process. Further, this finding lends strong support to the study of Voogt (2009) in that academic lecturers who made use of the Tablet PC found that there was significant improvement in all areas of student performance, interaction and communication.

These findings were supported by the relationship between a student being able to ‘share information’ and ‘the year of study’ with a significance level ‘.002’. This finding supports the research by Whitton (2010) that the use of the Tablet PC advances knowledge creation, promotes feedback from students and supports collaboration and research. As the student progresses from first year through to their final year of study, the students were found to share more information as they need to undertake more research thus increasing self-study processes anywhere and at any time. Crook et al. (2010) also found that students enjoyed learning and that the Tablet PC allowed independent research.

5.3.3 Correlations

A correlation is a statistical technique that shows if and how strongly a pair of variables are related to each other (Cohen et al., 2013).

Summarised Correlations between the questionnaire sections of the Quantitative Study					
			Section B	Section C	Section D
Spearman's rho	Section B	Correlation Coefficient	1.000		
		Sig. (2-tailed)	.		
		N	166		
	Section C	Correlation Coefficient	.595**	1.000	
		Sig. (2-tailed)	.000	.	
		N	162	165	
	Section D	Correlation Coefficient	.297**	.231**	1.000
		Sig. (2-tailed)	.000	.004	.
		N	157	157	158
**. Correlation is significant at the 0.01 level (2-tailed).					

Table 5.5: Summarised Correlations between the various sections of the Quantitative Study

Table 5.5 shows the summarised correlations between Sections B (Tablet PC impact on Learning), Section C (The Learning Fit of Tablet PC), and D (The Impact of Student Performance) of the quantitative component. There is a directly proportional relationship between each section and, therefore, this can imply that an increase in one will mean an increase in the other.

5.3.3.1 Correlation between Tablet PC impact on Learning and Learning fit

<p>Tablet PC impact on Learning</p> <ul style="list-style-type: none"> • The Tablet PC has improved my learning/studying ability. • I am better prepared for assessments (tests, exams) due to the use of the Tablet PC. • The Tablet PC allows me to access more material related to my studies. • The Tablet PC has improved my understanding of lecture done in class. • I am able to complete more work through the use of the Tablet PC. 	<p>.595** (P<0.01)</p>	<p>The Learning Fit of Tablet PC</p> <ul style="list-style-type: none"> • I prefer online learning content loaded onto tablet rather than printed study materials. • Electronic lecture material allows me to better understand lecture content. • The Tablet PC allows me to further investigate subject matter that I am not familiar with. • I am able to work more efficiently by using the Tablet PC. • I find studying through Tablet PC enjoyable and interactive • I am able to share information with colleagues in real time via the Tablet PC • I am able to think more creatively through the use of the Tablet PC
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Table 5.6: Correlation between Tablet PC impact on Learning and Learning fit of the Tablet PC in the Quantitative Study

Table 5.6 shows that the impact on Learning and Learning fit have a correlation of 0.595“P<0.01”. There seems to be a directly proportional relationship between these variables (listed under each). This means that an increase in one can imply an increase in the other. This shows that the more the Tablet PC positively affects the learning process (as per variables listed), the stronger the learning fit of the Tablet PC will be (as per variables listed). This correlation is supported the frequency results in Section 4.6.1 (Figure 4.3), in which 83.2% of students agreed that they felt that their learning and studying ability has improved due to use of the Tablet PC. This is in line with the findings of Sha et al. (2011) who found that the Table PC facilitates enhanced academic performance through development of cognitive skills.

5.3.3.2 Correlation between Tablet PC impact on Learning and The Impact of Student Performance

<p>Tablet PC impact on Learning</p> <ul style="list-style-type: none"> • The Tablet PC has improved my learning/studying ability. • I am better prepared for assessments (tests, exams) due to the use of the Tablet PC. • The Tablet PC allows me to access more material related to my studies. • The Tablet PC has improved my understanding of lecture done in class. • I am able to complete more work through the use of the Tablet PC. 	<p>.297** (P<0.01)</p>	<p>The Impact of Student Performance</p> <ul style="list-style-type: none"> • The use of the Tablet PC raises the level of my engagement in the lecture room • The use of the Tablet PC has allowed me to achieve better results in my assignments • The use of the Tablet PC has allowed me to achieve better results in my tests • The use of the Tablet PC has allowed me to achieve better results in my exams • The overall quality of my class-work has improved due to use of Tablet PC • The use of the Tablet PC helps to stream line lecturer preparation to my advantage • The software available allows me to synchronize with the respective lesson and interact with the materials in real time
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Table 5.7: Correlation between Tablet PC impact on Learning and The Impact of Student Performance in the Quantitative Study

Table 5.7 shows that Sections B, Tablet PC impact on Learning, and Section D, The Impact of Student Performance, have a correlation of 0.297 (P<0.01) whereby there is a directly proportional relationship between the Tablet PC’s impact on Learning and Student Performance. Therefore, this can imply that an increase in one will mean an increase in the other. This shows that the greater the Tablet PC’s impact on the learning process (as per

variables listed), the great student performance will be (as per variables listed). This correlation is supported the frequency results from Section 4.6.1 (Figure 4.3) in which 87% of students felt that by using the Tablet PC, that their quality of class work has improved. This correlation is in line by the findings of Wong (2012) and Sha et al. (2011) who found that the Tablet PC enhances performance in teaching and learning.

5.3.3.3 Correlation between Learning fit of the Tablet PC and Impact on Student Performance

<p>The Learning Fit of Tablet PC</p> <ul style="list-style-type: none"> • I prefer online learning content loaded onto tablet rather than printed study materials. • Electronic lecture material allows me to better understand lecture content. • The Tablet PC allows me to further investigate subject matter that I am not familiar with. • I am able to work more efficiently by using the Tablet PC. • I find studying through Tablet PC enjoyable and interactive • I am able to share information with colleagues in real time via the Tablet PC • I am able to think more creatively through the use of the Tablet PC 	<p>.231** (P<0.01)</p>	<p>The Impact on Student Performance.</p> <ul style="list-style-type: none"> • The use of the Tablet PC raises the level of my engagement in the lecture room • The use of the Tablet PC has allowed me to achieve better results in my assignments • The use of the Tablet PC has allowed me to achieve better results in my tests • The use of the Tablet PC has allowed me to achieve better results in my exams • The overall quality of my class-work has improved due to use of Tablet PC • The use of the Tablet PC helps to stream line lecturer preparation to my advantage • The software available allows me to synchronize with the respective lesson and interact with the materials in real time
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Table 5.8: Correlation between Learning fit of the Tablet PC and Impact on Student Performance in the Quantitative Study

Table 5.8 shows that the Learning fit of the Tablet PC and the Impact on Student Performance had a correlation of 0.231 'P<0.01'. There is a directly proportional relationship between these sections and this can imply that the impact on student performance will increase if the Tablet PC fits the learning needs of the student. Strayer (2012) stated that adopting such an approach could encourage the willingness of students to work together and engage in active and student-centred learning in the classroom rather than passively receiving knowledge.

The section provided an analysis and discussion of the inferential quantitative statistics. The following section will detail the qualitative analysis and discussion

5.4 Qualitative Study Findings

This section of the study comprises the analysis of the data collected through the interviews. 11 lecturers were selected through purposeful sampling for the interview. The lecturers identified for the interview sessions were all involved in lecturing to the students with the aid of the Tablet PC. Hence, they were best suited to provide authentic responses during the interviews. Table 5.9 presents the profiles of lecturers selected for the interviews.

5.4.1 Lecturer profile

Interviewer Number	Job Description	Functional Roles	Number of Years in your Role?
1	Lecturer	Lecturing Students	4 to 6 Years
2	Senior Lecturer	Lecturing Students, planning, recording videos and setting exam papers.	5 Years
3	Senior Lecturer	Lecturing Students, planning timetables and ICAS.	6 Years
4	Lecturer	Lecturing Students and marking scripts	6 Years
5	Senior Lecturer	Lecturing, planning lecture material, and engaging research.	6 Years
6	Senior Lecturer	Lecturing/supporting Students. Planning and contributing to research.	5 Years
7	Senior Lecturer	Lecturing Students. Planning and recording videos.	5 Years
8	Lecturer	Lecturing, planning lectures.	1 Year
9	Lecturer	Involved in Estate functions, lecturing.	2Years
10	Lecturer	Lecturing Students, materials, recording videos, engaging in research.	2 Years
11	Lecturer	Lecturers, interaction with students, assignments marking.	4 Months

Table 5.9: The profiles of lecturers interviewed

Table 5.9 reveals that the majority of lecturers (7) have between 4 to 6 years of lecturing experience; two lecturers have two years of experience, while one lecturer has only 1 year of experience. The lecturer with the least amount of experience is relatively new and has only 4 months of experience at the time of the interview. Of these lecturers, five occupy senior lectureship positions. The remaining six occupy lecture positions. It was envisaged that the varying years of experience of lecturers would be an added advantage when discussing the positive and negative benefits of the Tablet PC in the lecture halls.

5.4.2 Data Analysis and Interpretation

The data from the qualitative study was divided into sections and thereafter each processed into a word cloud using 'Wordle' (online word cloud tool). Word clouds were run multiple times, whereby all responses per question were plugged into the Wordle cloud tool which generated the most frequent and common words for each question. These were key in the formulation of these themes and sub-themes. In addition to word clouds, the data was manually coded and deconstructed (Lee, 1999) according to the following themes as identified from the Qualitative Study:

- Theme 1: Heightened performance of Students and Lecturers
- Theme 2: Adaptation of learning and teaching styles
- Theme 3: Barriers and challenges to effective classroom interaction

5.4.2.1 Theme 1: Heightened Performance of Students and Lecturers



Figure 5.1: Word Cloud analysis of the Qualitative Study feedback related to the questions on Heightened Performance of Students and Lecturers

The overall findings illustrate that lecturers have adapted to the use of the Tablet PC and find that after initial adjustments and grasping the new technology, the Tablet PC improved and facilitated their preparation and lecturing performance. Richfield Graduate Institute of Technology had rolled out various initiatives in order to train staff on how to utilise the Tablet PC, including workshops and hands-on training sessions. Further to this, Richfield issued all lecturers with a Tablet PC during the first year of adoption resulting in many lecturers learning how to use the Tablet PC by self-study. Due to the mass adoption of the Tablet PCs and various initiatives taken by Richfield, many of the respondents felt that their level of performance and teaching styles have improved.

The above assertions are supported by the views of the Respondents 5, 7, 9, and 11:

- Respondent 5:

“The tablet has actually improved the way of learning, and delivering the course because right now when you prepare, you prepare in most cases using slides after that you go to the

class and demonstrate via projectors and then students will get to engage at any particular level at the same time viewing at the power points slides via the tablets”

“they’ve got access to Wi-Fi you can go to those sites that gives you access to download books online, besides that they can read those particular books on a soft copy even at home at their own space at their own time, as compared to when they brought hard copy from the library and they must return the book within the number of certain hours if not days so that limits their time on reading.”

- Respondent 7:

“I think it has improved because it makes it easy for them to study, instead of carrying hard copies, everything is combined into one so they don’t have to be carrying a lot of things, which is quite easy for them so they can have their tablets everywhere”

- Respondent 9:

“but overall yes they have performed”

- Respondent 11:

“the tablet has been very handy especially in the environment of technology because we appreciate that education is changing from the traditional ways of lecturing to the modern ways. Therefore, it has basically simplified my preparation for lecturing and has improved in terms of interaction with students at the click of a button. I, can access all the information that I need even in my preparations as opposed to traditional method of lecturing study guide, everything is packaged in one place and it’s basically the way you manoeuvre with the tablet.”

Teachers reported seeing increased student engagement and felt that the Tablet PCs needed little preparation before they could be used in lessons. It offered more quality time for actual teaching thereby positively affecting teaching and learning. These positive responses concur with the studies of Voogt et al.(2012) showed that the use of technology in the lecture halls is a game-changer for teaching, learning and research.

Furthermore, this theme was informed by the subtheme of Student Interaction. This subtheme is detailed in the next section.

- Interviewee 7:

“the learner’s knowledge of the subject, has improved opposed to the old talk and chalk. The tablet has improved really because using the tablet first is good because it allows the learner to improve their technology skills and all the technical skills”.

- Interviewee 8:

“there is greater interactivity between lectures and students by use of the Tablet PC, because in most cases the students they come with knowledge of what is the content of what we are going to do during that day and through those notes that they have and the ones that we are going to do. It has a great impact which is which is positive.”

- Interviewee 9:

“the sharing of information is easy either by email or by technological term that is used to disseminate the information so as a result its quite easy to reach each and every student using the tablet”

- Interviewee 11:

“there is basically great interactions and I believe the institution can also make a tablet easily available to all the lecturers for improved interaction.”

What is of significance in these responses is the recognition by the lecturers that the Tablet PC had definitely improved interaction amongst students and between students and lecturers as well as students engaging with the internet. Consequently, lecturers recognised the need to change their approaches to teaching and learning for maximum engagement with the Tablet PC. This finding is supported by the studies of Dillenbourg and Jermann(2010) that focussed on the need to revise approaches to learning and teaching design for all teachers and not just early adopters and those skilled in learning design. The findings also emphasised various academic activities that show improvement such as research, assignments and note taking. The studies of Perrotta et al. (2013) and Sha et al. (2011) on student motivation and engagement support the study findings whereby the use of the Tablet PC strongly motivated student performance.

- more personalised learning experience

To corroborate the above, some of the comments offered by the lecturers were:

- Interviewee 8:

“the Tablet PC changed the way I lecture to students and prepare for student lectures”

- Interviewee 11:

“So it has simplified my preparation for lecturing and has improved in terms of interaction with students at the click of a button. Students contribute to the actual teaching process”

To lend further support, the information in Figure 5.3 illustrates the student and the Tablet PC as the major game players in the teaching-learning situation. This finding lends further support to the studies of Voogt et al.(2012). What is significant is that the words in Figure 5.3 display positive connotations, thereby promoting the image of the Tablet PC as a positive learning device.

5.4.2.4 Theme 3: Barriers and Challenges

Results show that barriers and challenges do exist that impact on adoption and utilisation of the Tablet PC. In the interviews with the lecturers, it is illustrated that while they and the students benefitted from the introduction of the Tablet PC, they were mindful of the challenges.

- Listening to music instead of focusing on the lecture
- Wi-Fi and Data usage problems
- Change in social skills due to usage of the Tablet PC
- Students lack of concentration due to the distractions available on the Tablet PC
- Change in learning behaviour of learners

These are supported by the following responses:

- Interviewee 2:

“the challenges are that students are lacking concentration knowing that if they don’t attend they have study guides, videos, even if they missed the class they can watch the video so most of them tend to bunk, not that they don’t want to attend or they at home but they are in the library accessing Wi-Fi. Another problem is that they will be recording you while you are teaching”.

- Interviewee 7:

“he’s seen many problematic issues with regards to learners paying attention, so if I tell them I want you guys to go to this link, I will find some learners going to YouTube or Facebook. There are with some learners you really need to follow them and see what they are doing because some instead of opening the link they will be opening their own personal pages, so that is why we need to control whenever we teaching them using a tablet”.

- Interviewee 9:

“Students normally over rely on the tablet, they don’t read more information, and they don’t research more they take up the subject as being presented by the modules in the tablet. That’s the challenge that we have. We have to encourage them to read more over and above the tablet”

- Interviewee 10:

“I am giving my honest opinion, interaction is disturbed...”

- Interviewee 11:

“when you lecturing and a student because they have a tablet and there is Wi-Fi then they’ll be interested on social platforms, but that aspect is not a challenge, it just needs you as a

lecturer to maintain and emphasize discipline, and they this time we are focusing on the lecture, no Facebook or WhatsApp so those are the challenges”

In the main, all responses focussed on the attention levels of the student that was compromised. It would be some time before lecturers and teachers can get used to the idea of working with the Tablet PC. This view is supported by the research studies of Karsenti and Fievez (2013) and the OECD (2013) which emphasised that these barriers to adoption in support of teaching and learning is time consuming and dependent upon the attitudes of students and lecturers. While this may be so, it is noteworthy that these problems and challenges can be overcome with discipline and control measures (OECD, 2013).

5.5 Key Findings to the Study

The key findings are presented under the specific focus areas of each research questions.

5.5.1 The Tablet PC and Teaching

The study finds that the teaching process is enhanced with the use of the Tablet PC. As shown in Section 5.3.3, the use of the Tablet PC enhanced teaching mainly in the following ways:

- Better preparation for lectures
- Access to content
- Student Interaction

5.5.2 The Tablet PC and Learning

Results showed that lecturers alluded to the positive impact of the Tablet PC on student engagement and improved quality of assignments. These findings show in Figure 4.4 in Chapter 4, Section 4.7.1, whereby students’ responses showed that the Tablet PC motivated them to improve their research capabilities as well as the quality of their assignments. This additional research enhanced their performance in tests and examinations. It was also shown that the use of the Tablet PC was an enjoyable experience and assisted the lecturers in cases where students were absent and not coping with work by providing a means of communication out of the classroom and the ability to self-study at home. The preloaded material was indeed a positive factor as seen in the positive correlation.

5.5.3 The Tablet PC and Academic Performance

It was shown that the Tablet PC definitely improved academic performance of student. Of significance was the heightened level of student engagement in relation to being better prepared for assessment such as tests and exams as shown in the correlation identified in Table 5.7. However, Figure 4.5 in Chapter 4 reveals that not all students had similar positive experiences with the Tablet PC. As alluded to by academic staff, that during lectures, it was difficult to monitor student attention, as many of them were busy using the internet or watching videos and this was seen as distraction to academic work. This can be seen as a probability of why the improvement of academic performance through the Tablet PC varied from average to above average.

5.5.4 Challenges to Tablet PC adoption

Despite the positive aspects of the using the Tablet PC, the following barriers and challenges were identified:

- Student become distracted due to usage of social media platforms
- Listening to music instead of focusing on the lecture
- Wi-Fi availability
- Cost of Mobile Data
- Lack of concentration due to the distractions available on the Tablet PC
- Change in learning behaviour of learners

5.6 Application of the Task Technology Fit Model

This Task Technology Fit Model (Goodhue and Thompson, 1995) was the most appropriate fit for this study as it focussed on all the dimensions of the research area and questions.

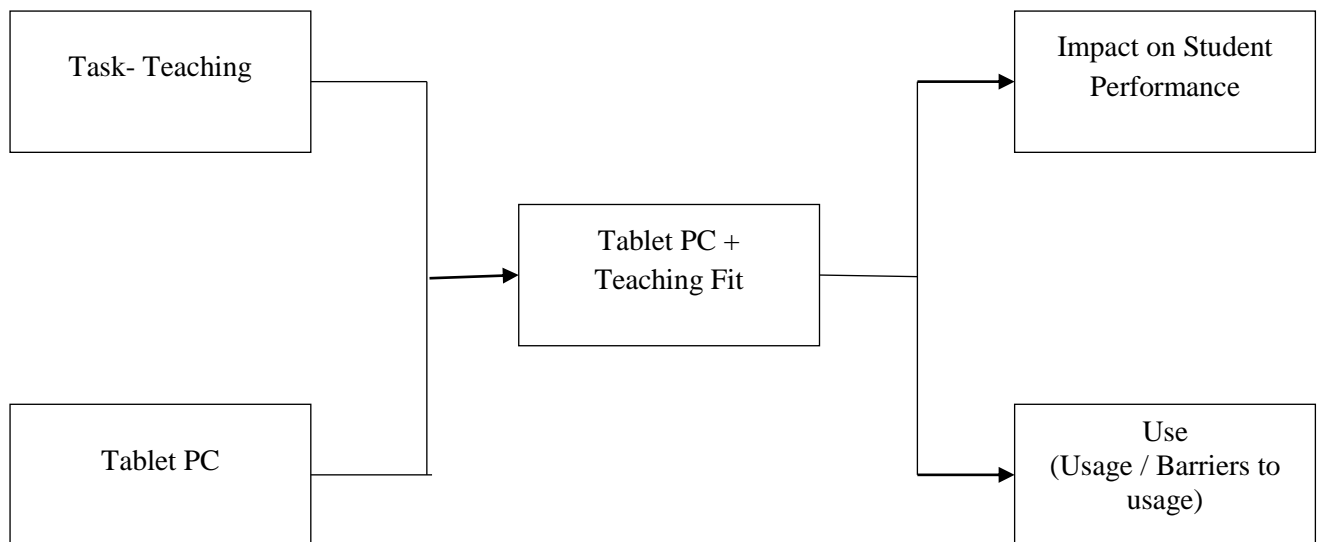


Figure 5.6: Task-Technology Fit Model (Goodhue and Thompson, 1995)

The findings of this study show that the Tablet PC has a positive influence on students and lecturers from a teaching and learning perspective. The lecturers' feedback showed that they were satisfied with the design and output processes of the Tablet PC.

In Table 4.3 (Section 4.5.2), there was an agreement rate of 71.4% that the Tablet PC has improved the learning and studying ability of the students. There was also a positive correlation in Table 5.7 that the student is able to complete more work with the Tablet PC and that the Tablet PC has positively influenced the ability of students to improve their work output (Learning Fit). In the opinion of the students the Tablet PC, enhanced their learning and studying habits.

In Table 4.6, there were high levels of agreement that the Tablet PC allowed students to investigate subject matter that they were not familiar with. This was supported by the positive correlation in Table 4.6 that the Tablet PC allowed students access to more study material and that it allowed students to further investigate subject matter that they are not familiar with (Impact on Student Performance). This shows that by using the Tablet PC, students are able to engage in self-study on work that they are unfamiliar with as seen in section 5.3.3.

The Task-Technology Fit Model is found to be applicable from a learning perspective. It is shown that the Tablet PC does enhance the Learning process as depicted by results that relate to the Learning fit of the Tablet PC. This in turn has a positive impact on the Learning (71%

of students agreed that they are able to work more efficiently by using the Tablet PC in Figure 4.3 in Section 4.6.1. The positive impact on learning leads to enhance academic performance (66.9% of students agreed that the Tablet PC assisted them in achieving better exam marks in Figure 4.5 of Section 4.8.1). In addition, a key finding to the model involves the correlations that were shown between:

- Learning Fit and Tablet PC Impact on learning (Correlation of '0.231' in Table 5.6)
- Tablet PC Impact on learning and Performance (Correlation of '0.297' in Table 5.5)

These show that there is a directly proportional relationship between these constructs. However, barriers should also be noted and strategies should be develop mend to address and mitigate these barriers

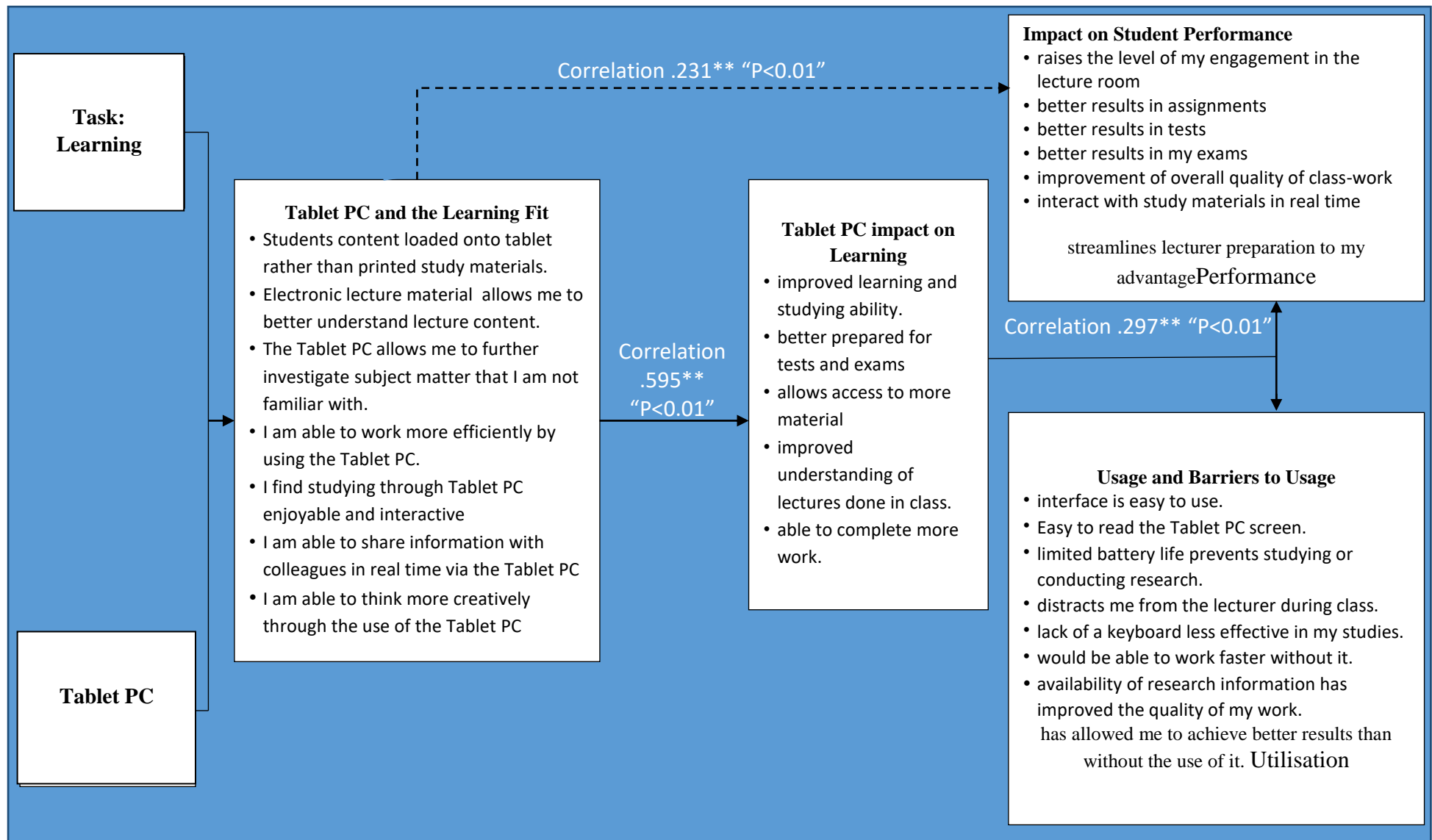


Figure 5.7: Task-Technology Fit Model incorporating the Tablet PC and the Learning Fit

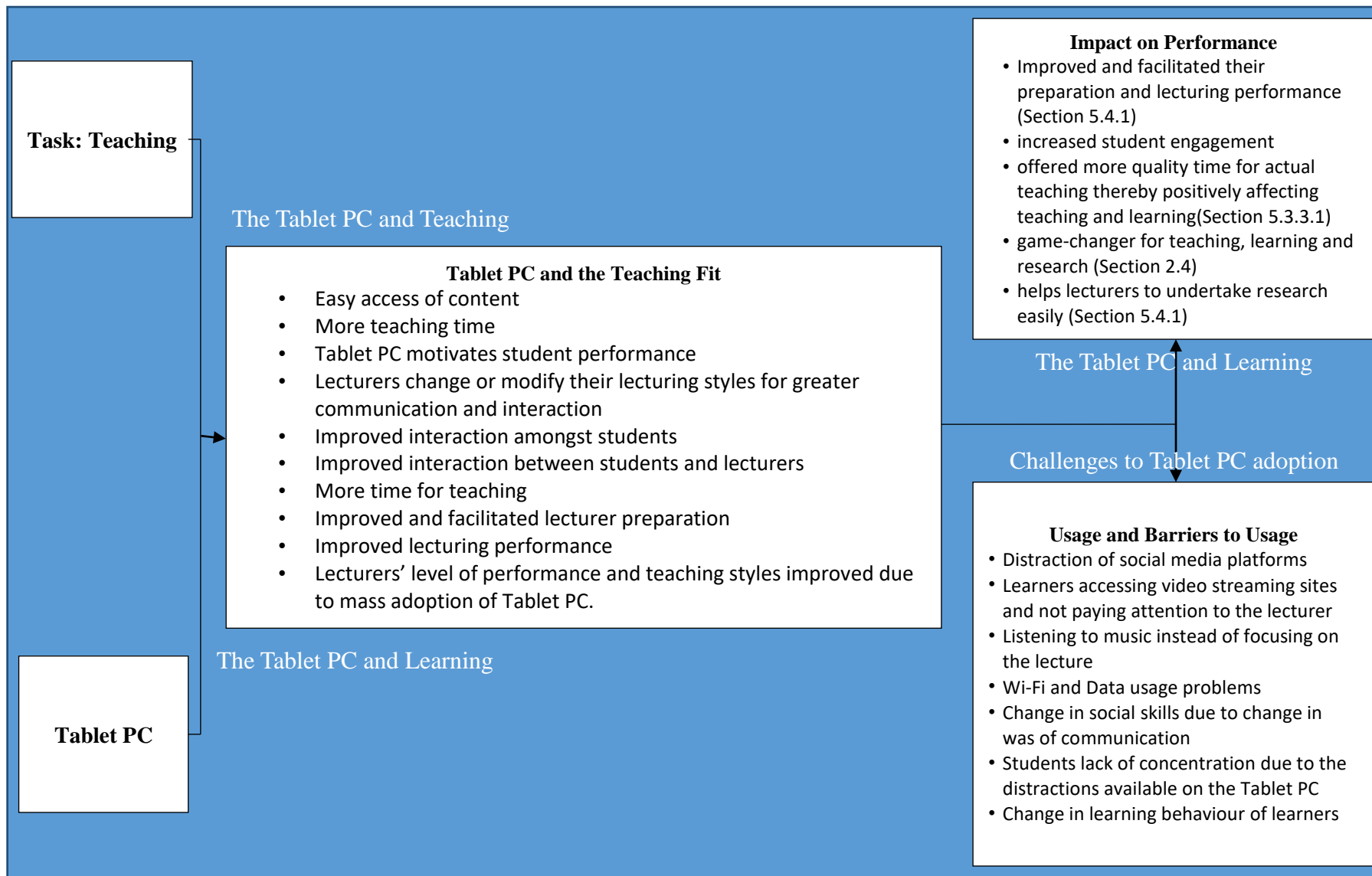


Figure 5.8: Task-Technology Fit Model incorporating the Tablet PC and the Teaching Fit

By organising the Task-technology Fit Model into technological, individual task, utilisation factors and performance factors, it was possible to arrive at Figure 5.4 and Figure 5.5, which integrates the study and the Model used for the qualitative and quantitative studies respectively.

Using both descriptive and inferential statistics, the preliminary findings confirmed significant positive impact of task, technology, and individual characteristics on the Task Technology Fit Model (Goodhue and Thompson, 1995) for student performance, lecturer performance as well as in different academic settings.

The Task Technology Fit Model (Goodhue and Thompson, 1995) is therefore found to be applicable to this study and can be used to predict the outcome of the Tablet PC implementation and adoption to teaching, learning and academic performance at Richfield Institute of Technology and/or another similar institution. It is therefore, important that Richfield Graduate Institute of Technology focus on investing in IT tools that fit the task portfolios of both students and academics. These findings can be used to improve the experience that lecturers and students have while utilising the Tablet PC.

5.7 Summary

This chapter presented the detailed analysis and discussion for the quantitative and qualitative components of the study. The quantitative approach involved inferential statistics whilst a thematic approach was adopted for presenting the qualitative data. Generally, the responses of the lecturers and students were positive although they were mindful of the challenges encountered with the use of the Tablet PC. Some of the key findings identified in this chapter were that the teaching and learning process was enhanced by the use of the Tablet PC. In addition, the Tablet PC improved the academic performance of students to some degree. There were several barriers and challenges identified with the use of the Tablet PC however, this did not impact significantly on the teaching or learning process. The majority of the students and lecturers highlighted the importance of using the Tablet PC during the lecturing and teaching processes. This is indicative of the need to enhance technology provisions at Richfield Graduate Institute of Technology. The Task Technology fit model was found to be applicable to this study and can be used as a means to predict outcomes of the Table PC adoption at the institution. The next chapter presents the conclusions and recommendations of the study.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter concludes the research and draws the study to a close. It starts by briefly revisiting the problem statement, research questions and objectives. It then confirms if the research questions have been answered and objectives fulfilled. This is followed by key recommendations and direction for future researchers.

6.2 Problem Statement, Research Question, and Objectives of the Study

6.2.1 Problem Statement Overview

The role of Information Technology in various sectors of the world is vastly researched. One such sector is that of education and the role of technology therein. Whilst the role and utilisation of technology in Post-school education has been significantly researched in developed countries, developing countries such as South Africa are still emerging in research regarding such utilisation of technology in the lecture room. This study intended to address this issue and provide research –based evidence from a large private tertiary institution setting. The purpose of this research study was primarily to investigate the impact of the Tablet PC on teaching, learning and academic performance of students at Richfield Graduate Institute of Technology. It further sought to identify the barriers that may hamper successful performance.

6.2.2 Research Questions

The overarching research question for this study was:

How does the Tablet PC influence

- teaching,
- learning, and,
- student academic performance

at Richfield Graduate Institute of Technology?

6.2.3 Objectives

The objectives that addressed the research question were:

- To investigate the impact of the Tablet PC on academic teaching at Richfield Graduate Institute of Technology.
- To investigate the impact of the Tablet PC on academic learning at Richfield Graduate Institute of Technology.
- To investigate if the Tablet PC influences student academic performance.
- To identify the technological challenges/barriers related to Tablet PC adoption for teaching, learning and academic performance

6.3 Have the Research Questions Been Answered?

6.3.1 How Does the Tablet PC Influence Teaching?

This question has been answered conclusively. It is shown that the Tablet PC influences teaching in positive ways. It enhances teaching by raising the levels of engagement with lecturers because the Tablet PC allows greater interaction between lecturer and students. The Tablet PC can be described as an interactive tool. The additional, preloaded study materials on the Tablet PC raised the levels of engagement between both lecturers and students. The key findings identified for the Tablet PC and its effects on teaching were shown in Chapter 5, Section 5.6.1.

6.3.2 How Does the Tablet PC Influence Learning?

This question has been answered conclusively. It is shown that the Tablet PC influences learning in a positive way. A major contributing factor to this was the pre loading of study content on the Tablet PC as it facilitated self-study at home and whilst travelling to and from campus. The key findings identified for the Tablet PC and its effects on learning were identified in Chapter 5, Section 5.6.2.

6.3.3 How Does the Tablet PC Influence Academic Performance?

This question has been answered conclusively. It is shown that the Tablet PC has improved academic performance of the students at Richfield Graduate Institute of Technology. Results of the study showed that students felt that their assignments, tests, and exam marks improved due to the use of the Tablet PC despite the barriers such as distraction by social media and browsing the internet for non-academic

purposes. The key findings identified for the Tablet PC and its effects on academic performance were identified in Chapter 5, Section 5.5.3.

6.3.4 Applicability of the Model

The Task Technology Fit model (Goodhue and Thompson, 1995) is seen to be acceptable and applicable to the study. The study found, through correlation analysis, that the Tablet PC and the learning fit can have a positive impact on learning which in turn enhances academic performance. Therefore, the model can be seen as applicable to guide the implementation and adoption of the Tablet PC within a private tertiary institution. Proper testing of the model would, however, need to be done via a larger study. The applicability of the Task Technology Fit model to this study was identified in Chapter 5, Section 5.6.

6.4 Did the Study Fulfil the Intended Objectives?

6.4.1 Objective 1: To investigate the impact of the Tablet PC on academic teaching at Richfield Graduate Institute of Technology.

The study has fulfilled this objective and determined the impact of the Tablet PC on the teaching process. The Tablet PC was seen to have a positive impact on the teaching process mainly in relation to lectures being able to prepare better for their lectures, providing access to more content, and providing better interaction between lecturers and students.

6.4.2 Objective 2: To investigate the impact of the Tablet PC on academic learning at Richfield Graduate Institute of Technology.

The findings of the study has fulfilled this objective and concluded that the Tablet PC enhanced the learning process mainly in terms of improved learning and studying abilities, interactivity and engagement, improved preparation for tests and examinations, and access capabilities.

6.4.3 Objective 3: To investigate if the Tablet PC influences student academic performance.

The study succeeded in achieving this objective and found that the Tablet PC did influence academic performance in relation to raising levels of engagement, improving quality of class work and contributing to better results in tests, assignments and examinations.

6.4.4 Objective 4: To identify the technological challenges/barriers related to Tablet PC adoption for teaching, learning and academic performance.

This objective was fulfilled and barriers were discovered. They are applicable to various issues that may hamper progress. The major barriers are outlined below:

- Distractions caused by the Tablet PC (games and social media) such as battery life of the Tablet PC
- Student preference for printed study materials
- Lecturers' competence levels

6.5 Recommendations Made by This Study

In view of the above findings, the following recommendations are offered:

6.5.1 Recommendation 1: Student Workshops

It is recommended that training workshops on student management and discipline in the use of the Tablet PC be hosted to educate both students. From Section E of the Quantitative Study, Figure 4.6, many students were concerned about the lecturers' competence level in using the Tablet PC. Hence students preference for printed study materials. If both the student and lecturer are aware of the information and the useful benefits of the Tablet PC, these barriers could possibly be eliminated.

6.5.2 Recommendation 2: Lecturer Content Preparation and Sharing of Resources

It is recommended that the lecturers create and share various sources of research and content related to the topic of the applicable lesson. This recommendation emerges from the findings in Section B of the quantitative study that had the lowest level of agreement in relation to the Tablet PC having improved understanding of lectures done in class. Students enjoy learning and the independent enquiry which the innovative use of Tablet PCs promotes. However, the relationship between the lecturer and the student may also be strained due to the loss of communication between student and lecturer. It is recommended that the Moodle Learner Management System used by Richfield Graduate Institute of Technology be enhanced to include student and lecturer communication functionality.

6.5.3 Recommendation 3: Battery Life and Recharge Points

One of the major barriers highlighted was the battery life and recharging of Tablet PCs that resulted in some learners being unable to participate in a lesson or make reference to study resources. It is recommended that Richfield install additional charging points within the classroom to facilitate charging batteries during lectures when required. Further to this, the learners need to be advised of additional interventions that can be taken to prevent their Tablet PC being drained during a lecture such as:

- Charging the Tablet PC fully before a lesson
- Acquiring a power bank which would allow for charging of the Table PC at any time
- Using the Table PC on Energy Saving Mode to maximise battery life

6.5.4 Recommendation 4: Limiting Social Media Sites during class hours

Another major barrier that was highlighted by lectures during the interviews was student distraction caused by social media and other applications on the Tablet PCs during lecture time. A solution to this problem, could be that the social media platforms be blocked on the free Wi-Fi services at Richfield Graduate Institute of Technology Campuses during lecture times and only be allowed during the learners lunch session and after hours. While this may not completely resolve the barrier because learners use their own mobile data, it would greatly reduce the number of learners accessing social media platforms during lectures.

6.5.5 Recommendation 5: Empowerment students from disadvantaged backgrounds

In order to empower students coming from disadvantaged backgrounds and/or students that are still accustomed to printed material a fully-fledged workshop or training on Tablet PCs and their adoption should be done during the orientation programme at the commencement of the academic year. A refresher workshop can also be done at the beginning of each semester so that students would be able to pick up new skills and techniques to use the Tablet PC more effectively.

6.6 Limitations

As it is for every study, this research had the following limitations:

- While every care was taken to simplify the language used for total comprehension, it is not clear if all students interpreted the test items as intended because English is not the first

language for the majority of the students at Richfield.

- The study targeted only Degree qualifying students
- Students that responded seemed to be mainly first-year students and can be seen as not representative of students in other years-of study. The study was done at one cluster only, other clusters may reflect different results
- The feedback was based on human responses which could be subject to factors such as stress, anxiety, moods and/or feedback for the sake of answering the questions.

6.7 Directions for Future Researchers

- A countrywide study in South Africa at other private or public educational institutions can inform results from a countrywide perspective.
- A study open to all ranges of qualifications, such as Diplomas, Certificates, Vocational Training, and even Basic Education may yield informative results on the effects of the Tablet PC within different levels of education within South Africa.
- A comparative study between other universities and Private Higher Education Providers may bring to light additional findings that this study was limited by focusing only on Richfield Graduate Institute of Technology.
- Researchers can evaluate various policies in higher education institutions that focus on the integration of new and upcoming technologies basing some of their assumptions on the positive impact that the Tablet PC technology has had on Richfield since its initial rollout based on this study.

6.8 Conclusion

This chapter drew the study to a close. It provided a recapitulation of the problem statement, research questions and objectives of the study. The study is shown to have answered the research questions and fulfilled the objectives that it intended to do. Specifically the findings indicate that the Tablet PC does in fact enhance teaching, learning and academic performance at Richfield Graduate Institute of Technology. While the emphasis is on enhanced performance, other positives also emanated from the study such as improved communication between students and lecturers. In addition facilities offered by the Tablet PC enhanced and encouraged communication and engagement between peers as well as students and lecturers. This was made possible by providing access to a greater array of study content.

In addition, the Tablet PC promoted the concept of ‘study anytime, anywhere’. On the negative side, it has been established that several barriers do exist such as browsing the internet, watching YouTube videos, and social media utilisation during lectures. These are not unsurmountable problems and with some training, they can be minimised. Several recommendations are provided to improve the adoption and use of the Tablet PC such as training, workshops and measure of controlled use. Future studies can include countrywide studies within private institutions and can target larger institutions such as universities.

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APPENDICES

Annexure A: Instrument for the Quantitative Study

Instrument: The impact of Tablet PCs on teaching, learning and student performance at Richfield Graduate Institute of Technology

You are hereby invited to participate in a research study entitled “The impact of Tablet PCs on teaching, learning and student performance at Richfield Graduate Institute of Technology”. This study is being conducted by Zane Ramnundlall, from the Graduate School of Business and Leadership at the University of KwaZulu-Natal as part of his research for his Master of Business Administration (MBA) dissertation.

There are no risks involved should you decide to participate in this research study and there will be no costs incurred to you as a participant.

This survey is anonymous and will not require your name and/or any other personal identifying details. Should the data be published, no individual information will be disclosed.

Your participation in this study is voluntary. By completing and submitting this survey, you are voluntarily agreeing to participate. You are free to decline to answer any particular question you do not wish to answer for any reason. The questionnaire will take about 10 minutes to complete.

If you have any questions about the study, please contact Zane Ramnundlall, zr@richfield.ac.za, 082 415 4873.

Section A (Please complete the below fields)

Demographics:

Age	
Gender	
Campus	
Year of Study	

Section B (Please click on the relevant option)

Task - Learning and the Tablet PC

	Item	Strongly Agree	Agree-	No Comment	Disagree	Strongly Disagree
1	The Tablet PC has improved my learning/studying ability.					
2	I am better prepared for assessments (tests, exams) due to the use of the Tablet PC.					
3	The Tablet PC allows me to access more material related to my studies.					
4	The Tablet PC has improved my understanding of lecture done in class.					
5	I am able to complete more work through the use of the Tablet PC.					

Section C (Please click on the relevant option)

The Learning Fit

	Item	Strongly Agree	Agree	No Comment	Disagree	Strongly Disagree
6	I prefer online learning content loaded onto tablet rather than printed study materials.					
7	Electronic lecture material allows me to better understand lecture content.					

8	The Tablet PC allows me to further investigate subject matter that I am not familiar with.					
9	I am able to work more efficiently by using the Tablet PC.					
10	I find studying through Tablet PC enjoyable and interactive					
11	I am able to share information with colleagues in real time via the Tablet PC					
12	I am able to think more creatively through the use of the Tablet PC					

Section D (Please click on the relevant option)

The Impact on Student Performance

On a scale of 1 to 5 (1= to a low degree, 2= to some degree, 3= to an average degree, 4= to a high degree, 5= to a very high degree), please rate yourself on the following questions

	Item	1 (to a low degree)	2 (to some degree)	3 (to an average degree)	4 (to a high degree)	5 (to a very high degree)	No comment
13	The use of the Tablet PC raises the level of my engagement in the lecture room						
14	The use of the Tablet PC has allowed me to achieve better results in my assignments						
15	The use of the Tablet PC has allowed me to achieve better results in my tests						
16	The use of the Tablet PC has allowed me to achieve better results in my exams						
17	The overall quality of my class-work has improved due to use of Tablet PC						
18	The use of the Tablet PC helps to stream line lecturer preparation to my advantage						
19	The software available allows me to synchronize						

with the respective lesson and interact with the materials in real time							
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Usage and Barriers to Usage of the Tablet PC

20. What are some of the challenges/barriers you have experienced / noticed using the Tablet PC: Please tick appropriate box (you may tick more than one option)

I do get easily distracted with the Tablet PC during lectures / class	
I find it hard to read of the tablet PC	
I prefer printed study materials	
I am not very technology orientated	
I would prefer more/better training on how to use Tablet PC	
I don't think the tablet PC is helping me in my studies	
It needs to be recharged often	
The lecturer does not use it effectively to teach	
The lecturer finds it difficult to control the class during lectures	
Students play games or use social networking sites during lectures	
No Challenges/Barriers experienced by myself	
Other state:	

Annexure B: Instrument for the Qualitative Study

INTERVIEW SCHEDULE

The impact of Tablet PCs on teaching, learning and student performance at Richfield Graduate Institute of Technology

Thank you for agreeing to participate in this research. Please be assured that any information provided will be held in the strictest confidence. With your permission, I will record the interview and will submit a transcript for your approval afterwards. If you request that the information you provide should not be attributed to you, your wishes will be respected. Data collected for the purpose of research will not be used for any other purpose without obtaining your permission for any alternative or additional use.

The following research focused on **The impact of Tablet PCs on teaching, learning and student performance at Richfield Graduate Institute of Technology**. The research will investigate the impact of the Tablet PC on teaching, learning and student academic performance in order to identify the barriers that may hamper successful performance.

Research question:

- How does the Tablet PC influence teaching, learning and student academic performance at Richfield Graduate Institute of Technology.

The objectives of the interview will be:

- To investigate the impact of the Tablet PC on academic teaching at Richfield Graduate Institute of Technology.
- To investigate the impact of the Tablet PC on academic learning at Richfield Graduate Institute of Technology.
- To investigate if the Tablet PC influences student academic performance.
- To identify the technological challenges/barriers related to Tablet PC adoption for teaching, learning and academic performance

Your participation in this research is appreciated.

Zane Ramnundlall

January 2016

zr@richfield.ac.za

082 415 4873

031 304 9340

Interview Questions (Guidelines)

DEMOGRAPHICS

1. Job description

Lecturer	
Junior lecturer	
Senior lecturer	
Campus manager/lecturer	

2. What are your main functional roles?

Lecturing to students	
Planning lecture materials	
Recording videos for lectures	
Engage in research for in-house publication and lectures	

3. How long have you been in the above role?

0-3 years	
4-6 years	
7-10years	
>10 Years	

Interview Questions (Broad-based)

1. How has the Tablet PC changed the way you lecture to students/ prepare for Student Lectures?

Objective of Question	Expected answer
This question will hopefully elicit responses to show a difference between the traditional chalk and talk method and the use of technology	<ul style="list-style-type: none"> - More research required in chalk and talk method; research available at a click of a button on Tablet Pc - Less use of chalkboard with Tablet PC - Limited writing, storage and use of paper - Problematic issues with Tablet PC – discipline and class control - Teaching abilities have improved

2. Is there a greater interactivity between the lecturer and student by use of the Tablet PC? Elaborate with examples

Objective of Question	Expected answer
This question will elicit responses that reveal the nature of interaction during Tablet PC based teaching.	<ul style="list-style-type: none"> - Yes and no - Yes when students pay attention, No when students surf the net - Maintaining control is a problem - The responses will require further probing to ascertain reasons thereof

3. What is your opinion of the concept of the Tablet PC as an enabler of education at Richfield? Are you comfortable with the features presented by the Table PC etc?

Objective of Question	Expected answer
These two questions will enlighten the researcher on the views held by lecturers on the value of the Tablet PC.	<ul style="list-style-type: none"> - Both positive and negative responses are expected - The responses will require further probing to ascertain reasons thereof

4. What are the challenges you experience during the use of the Tablet PC?

Objective of Question	Expected answer
This question will assist in identifying the challenges lecturers experience during the planning, preparation and execution of lectures	<ul style="list-style-type: none"> - Both positive and negative responses with reference to : Planning, preparing and presenting lectures will be expected - Lecturers will focus on issues related to students, wifi connectivity, attention span, time, bunking lectures etc. - Further probing will be necessary

5. Has student performance improved since the advent and use of the tablet PC?

Objective of Question	Expected answer
This question will focus on the level of performance whether there has been an improvement or not	<ul style="list-style-type: none"> - Both positive and negative answers are expected - Generally the performance has improved in term of knowledge subjects but when it comes to the numerate subjects the level of performance is consistent with the traditional

	<p>talk and chalk method of teaching</p> <ul style="list-style-type: none">-Easier to track at risk learners and provide support- More convenient for students to catch up on missed work-Negative side is students tend to bunk lectures
--	--

Annexure C: Informed Consent Letter for Quantitative Survey and Qualitative Interview participants

Informed Consent Letter

UNIVERSITY OF KWAZULU-NATAL
Graduate School of Business and Leadership

Dear Respondent,

MBA Research Project/Dissertation

Researcher: Mr. Zane Ramnundlall (+27 31 304 9340)

Supervisor: Dr. S. Suknunan (+27 31 260 7057)

Co-Supervisor: Prof. R. Maharaj (+27 31 304 9340)

Research Office: Ms. P. Ximba (+27 31 260 3587)

I, **Zane Ramnundlall (Student Number:212 561966)**, an MBA student at the **Graduate School of Business and Leadership**, of the University of KwaZulu-Natal invites you to participate in a research study entitled: **The Impact of Tablet PCs on teaching, learning and student performance at Richfield Graduate Institute of Technology**. The aim of this study is to:

- To investigate the impact of the Tablet PC on academic teaching at Richfield Graduate Institute of Technology.
- To investigate the impact of the Tablet PC on academic learning at Richfield Graduate Institute of Technology.
- To investigate if the Tablet PC influences student academic performance.
- To identify the technological challenges/barriers related to Tablet PC adoption for teaching, learning and academic performance

Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in

this survey/focus group. Confidentiality and anonymity of records identifying you as a participant will be maintained by the **Graduate School of Business and Leadership, UKZN**.

If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me or my supervisor/s at the numbers listed above.

The survey should take you about 10 minutes to complete. I hope you will take the time to complete this survey.

Sincerely,

Zane Ramnundlall (Investigator)

Investigator's signature: _____ Date : _____

.....

University Stamp

This page is to be retained by participant

UNIVERSITY OF KWAZULU-NATAL
Graduate School of Business and Leadership

MBA Research Project/Dissertation

Researcher: Mr. Zane Ramnundlall (+27 31 304 9340)

Supervisor: Dr. S. Suknunan (+27 31 260 7057)

Co-Supervisor: Prof. R. Maharaj (+27 31 304 9340)

Research Office: Ms. P. Ximba (+27 31 260 3587)

CONSENT

I..... (full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

SIGNATURE OF PARTICIPANT

DATE

.....

.....

This page to be retained by the Participant

Annexure D: Ethical clearance from the University of Kwazulu-Natal



18 April 2016

Mr Zane Ramnundlall (212561966)
Graduate School of Business & Leadership
Westville Campus

Dear Mr Ramnundlall,

Protocol reference number: HSS/0148/016M

Project title: The Impact of Tablet PCs on teaching, learning and student performance at Richfield Graduate Institute of Technology

Full Approval – Expedited Application

In response to your application received on 10 February 2016, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

Please note: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
Dr Shenuka Singh (Chair)

/ms

Cc Supervisor: Dr S Suknunan and Professor R Maharaj
Cc Academic Leader Research: Dr Muhammad Hoque
Cc School Administrator: Ms Zarina Bullyraj

Humanities & Social Sciences Research Ethics Committee

Dr Shenuka Singh (Chair)

Westville Campus, Govan Mbeki Building

Postal Address: Private Bag X54001, Durban 4000

Telephone: +27 (0) 31 260 3587/8350/4557 Facsimile: +27 (0) 31 260 4609 Email: xjenhao@ukzn.ac.za / soymean@ukzn.ac.za / mobunso@ukzn.ac.za

Website: www.ukzn.ac.za

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Annexure E: Gatekeeper Letter from Richfield Graduate Institute of Technology



Richfield Graduate Institute of Technology (Pty)Ltd
Reg No. : 2000/000752/07

RICHFIELD
GRADUATE INSTITUTE OF TECHNOLOGY

Main Campus
292 Anton Lembede (Smith) Street
Durban, 4001, South Africa
Private Bag X23
Umhlanga Rocks, 4320
Tel : +27 31 304 9340
Fax : +27 31 306 7936
Email: info@richfield.ac.za
www.richfield.ac.za

20th January 2016

Dear UKZN Ethics Committee

Zane Ramundlall is an employee at Richfield Graduate Institute of Technology. He will conduct his Master's dissertation project on "The Impact of Tablet PCs on teaching, learning and student performance at Richfield Graduate Institute of Technology" during the period of July 2015 until December 2016 for which he will conduct a learner survey, and lecturer interviews within the Pretoria Cluster of Richfield Graduate Institute of Technology.

I understand that the study involves the collection of data from organizational records and that all information collected from the lecturers and students will be done with duly informed consent from the participating individuals and that these individuals can refuse participation with no negative consequences for said individual. I understand that this project involves accessing personnel information from current and/or former students of the organization and that all such data will be provided to the researcher with all personally identifying information, removed so that the data cannot be traced to any individual.

I support the conduct of this research in this organization.

Sincerely



Dr Muni Kooblal
Deputy Vice Chancellor: Academic Registry & Student Affairs
Richfield Graduate Institute of Technology

Annexure F: Turn it in Report

The Impact of Tablet PCs on teaching, learning and student performance at Richfield Graduate Institute of Technolog

ORIGINALITY REPORT

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Word count: 22070

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