



Pedagogical Integration of Information and Communication Technology in Higher Education: A Case Study of Initial Teacher Education Programmes in Eswatini

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DECLARATION

I hereby solemnly declare that to the best of my knowledge and belief, the thesis titled “Pedagogical Integration of Information and Communication Technology in Higher Education: A Case Study of Initial Teacher Education Programmes in Eswatini” is my unaided work. It is submitted for the Doctor of Philosophy at the University of the Witwatersrand, Johannesburg. It has not been submitted to any other institution of higher learning for the awarding of any degree or qualification. In those instances, in which I have made use of either the published or unpublished works of other scholars, I have acknowledged the sources, both in the text and in the list of references appended to this thesis.

Fikile Nkambule

Signed: 

Date: 16 November 2020

DECLARATION ON RESEARCH ETHICS CLEARANCE

I, Fikile Sibongile Nkambule, student number **1171545**, hereby declare that I am fully aware of the University of the Witwatersrand Policy on Research Ethics and that I have taken every possible precaution to comply with the regulations pertaining to it. I have obtained an ethical clearance certificate from the University of the Witwatersrand Ethics Committee, for which the Protocol number is 2017ECE025D.

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DEDICATION

To my son Mpendulo Bonginkosi. Although you could not see me on my graduation, this work is all your efforts. I will dearly miss you my son for standing in whenever I needed it. The Heavens enjoy, Glory to God. To my son Lindani Mfanafuthi, and my lovely daughter Lungiswa Kuhle, thank you so much for the support. You have really been a blessing in my life, my precious gifts from the Lord. I love you all. I am all yours now.

ABSTRACT

Information and communication technologies (ICTs) have encroached in education systems and have become an integral part of the educational ecosystem. The ubiquitous access to ICT tools in higher education institutions (HEIs) impacts teaching and learning, and ICT is now a fundamental part of the knowledge society and the education system. This has resulted in new ways of teaching and learning in a complex digital environment. The issue of pedagogical integration of ICTs into teaching and learning has been debated internationally with the aim to offer guidance to teachers on how to effectively use these digital tools in the classroom.

This study sought to explore the pedagogical ICT integration practices among teacher educators in Initial Teacher Education (ITE) programmes at Eswatini HEIs. The technological, pedagogical and content knowledge (TPACK) framework, the unified theory of acceptance and use of technology model (UTAUT), and social constructionism theories were used to examine the ICT integration practices of teacher educators in ITE programmes.

The research was done following a case study design and three HEIs in Eswatini were part of the study. The data collection methods were survey questionnaires, semi-structured interviews, document analysis, and classroom observations. Teacher educators filled a survey with Likert-scale-type questionnaire. Heads of departments were interviewed and two teacher educators were observed in the three HEIs. The study followed a mixed methods approach by collecting both quantitative and qualitative data. Quantitative and qualitative data were independently analysed and merged at the interpretation stage by triangulating the results. Key themes were identified and continuous comparison was executed to analyse the questionnaire data and the interview data.

Major findings revealed the teacher educators' practices in ITE programmes in the HEIs and how curriculum structures affect the technological practices of teacher educators. The findings also revealed the barriers to ICT integration in HEIs and the perceptions of teacher educators on the educational value of ICT. The findings further revealed how

teacher education institutions create an enabling environment for the pedagogical integration of ICT.

Key words: ICT pedagogical integration, ICT affordances, TPACK framework, UTAUT

TABLE OF CONTENTS

DECLARATION	i
DECLARATION ON RESEARCH ETHICS CLEARANCE	ii
ACKNOWLEDGEMENTS	iii
DEDICATION.....	iv
ABSTRACT.....	v
TABLE OF CONTENTS	vii
LIST OF TABLES.....	xiv
LIST OF FIGURES	xv
APPENDICES.....	xvi
LIST OF ACRONYMS.....	xvii
CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY	1
1.1 Introduction	1
1.2 Background to the Study	3
1.2.1 The context of the study	3
1.2.2 ICT status in Initial Teacher Education in Eswatini	4
1.2.3 The Concept of ICT integration.....	6
1.3 Statement of the Problem	8
1.4 Rationale of the Study.....	9
1.5 Significance of the Study.....	11
1.6 Aim of the Study.....	13
1.7 Objectives of the Research	13
1.8 Research Questions.....	13
1.9 Definition of Terms	14
1.10 Organisation of the Thesis	15
1.11 Chapter Summary.....	17
CHAPTER 2: LITERATURE REVIEW	18
2.1 Introduction	18
2.2 ICT Practices in Teaching and Learning	19

2.3	ICT Affordances	24
2.3.1	Factors that influence engagement of affordances	27
2.4	Curriculum and ICT Integration	28
2.5	Teacher Educators' Perceptions of the Educational Value of ICT	31
2.6	Teacher Education Structures and ICT Integration	34
2.7	Barriers to the Use of ICTs.....	36
2.8	Chapter Summary	38
CHAPTER 3: THEORATICAL FRAMEWORK UNDERPINING THE STUDY		40
3.1	Introduction	40
3.2	Relevance of the Theories to the Study	40
3.3	Technological, Pedagogical and Content Knowledge (TPACK)	42
3.4	Social Constructionism.....	45
3.5	ICT Model: The Unified Theory of Acceptance and Use of Technology Model	47
3.6	Chapter Summary	50
CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY		51
4.1	Introduction	51
4.2	Philosophical Perspective	51
4.2.1	The Positivist paradigm	52
4.2.2	The Interpretivism paradigm	53
4.2.3	The Pragmatism paradigm	54
4.2.4	Justification of the use of pragmatism in the study	56
4.3	Research Approach	57
4.4	Research Design.....	59
4.5	Participants of the Study	60
4.6	Sampling Procedures and Sample Size	61
4.7	Data Collection Procedure	62
4.8	Development of the Data Collection Instruments	62
4.8.1	Questionnaire	62
4.8.2	Semi-structured interviews	63
4.8.3	Observation guide	64

4.8.4	Document analysis	64
4.9	Data Collection Instruments	64
4.9.1	Quantitative data: The questionnaire	64
4.9.2	Qualitative data.....	65
4.10	Data Analysis Procedures.....	67
4.10.1	Quantitative analysis	67
4.10.2	Qualitative analysis	68
4.11	Validity and Reliability	69
4.11.1	Validity.....	69
4.11.2	Reliability.....	70
4.12	Ethical Considerations	71
4.13	Chapter Summary.....	72
CHAPTER 5: QUANTITATIVE DATA PRESENTATION AND ANALYSIS		73
5.1	Introduction	73
5.2	Quantitative Data Analysis	74
5.2.1	Name of institutions	74
5.2.2	Age	74
5.2.3	Teaching experience	74
5.2.4	Teacher educators' gender.....	75
5.2.5	Highest academic qualification	75
5.2.6	ICT usage	76
5.2.7	Technological knowledge (TK)	76
5.2.8	Content knowledge (CK).....	79
5.2.9	Pedagogical knowledge (PK).....	81
5.2.10	Pedagogical content knowledge (PCK)	83
5.2.11	Technological content knowledge (TCK).....	85
5.2.12	Technological pedagogical knowledge (TPK)	87
5.2.13	Technological pedagogy and content knowledge (TPACK)	89
5.2.14	Teacher educators' perceptions	92
5.3	Chapter Summary	94

CHAPTER 6: QUALITATIVE DATA ANALYSIS	95
6.1 Introduction	95
6.2 Semi-structured Interviews.....	95
6.3 Pedagogical ICT Integration Practices	97
6.3.1 Converting learning content into digital format through PowerPoint presentations.....	97
6.3.2 Research	99
6.3.3 Online discussion	100
6.4 Unrevised Curriculum.....	101
6.5 Perceptions on the Educational Value of ICTs	103
6.5.1 Makes life easier/perceived usefulness	104
6.5.2 Communication.....	106
Teacher educators' lack of competency in the use of ICT	108
6.6 Structures for ICT Integration	110
6.6.1 Availability of ICT policies	110
6.6.2 Accessibility and connectivity	111
6.6.3 Professional development on ICT.....	113
6.6.4 ICT resources	115
6.6.5 Technical support	116
6.7 Classroom/Lesson Observations	117
6.7.1 Lesson observed: Mathematics Education	119
6.7.2 Lesson observed: Practical Art.....	120
6.7.3 Lesson observed: Special and Inclusive Education.....	121
6.7.4 Lesson observed: History	122
6.7.5 Lesson observed: Quantitative Research Methods	123
6.7.6 Lesson observed: Qualitative Research Methods	124
6.7.7 Classroom environments	125
6.8 Document Analysis	126
6.8.1 ICT policy goal.....	127
6.8.2 ICT policy objectives.....	127

6.8.3	Curriculum (course outlines).....	128
6.9	Chapter Summary	132
CHAPTER 7: DISCUSSION OF FINDINGS.....		133
7.1	Introduction	133
7.2	Pedagogical ICT Integration Practices	133
7.2.1	Converting learning content into digital format through PowerPoint presentations	135
7.2.2	Research	137
7.2.3	Online discussion	138
7.3	Unrevised Curriculum.....	139
7.4	Perceptions on the Educational Value of ICTs	141
7.4.1	Makes life easier.....	143
7.4.2	Communication.....	144
7.4.3	Teacher educators' lack of competency in ICT use	146
7.5	Structures for ICT Integration	148
7.5.1	Availability of ICT policies	148
7.5.2	Accessibility and connectivity	149
7.5.3	Professional development in ICT	150
7.5.4	ICT resources	151
7.5.5	Technical support	152
7.6	Synthesis of Findings	153
7.7	Chapter Summary	156
CHAPTER 8: SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION		157
8.1	Introduction	157
8.2	Summary of the Study.....	157
8.2.1	Research aim and objectives.....	157
8.2.2	Main research question and sub-questions	158
8.3	Summary of Methodology and Theoretical Framework.....	158
8.4	Summary of Findings	160

8.4.1	Pedagogical ICT integration practices	160
8.4.2	Unrevised curriculum	162
8.4.3	Perceptions of the educational value of ICTs	163
8.4.4	Teacher education structures enabling integration of ICT	164
8.5	Conclusions of the Study	166
8.5.1	Pedagogical ICT integration practices	166
8.5.2	Unrevised curriculum	168
8.5.3	Perceptions of the educational value of ICTs	168
8.5.4	Enabling structures for the integration of ICTs.....	170
8.6	Implications of the Findings.....	171
8.7	Limitations of the Study	172
8.8	Contribution of the Study.....	173
8.9	Recommendations of the Study	174
8.9.1	Recommendations for policy and practice	175
8.9.2	Institutional support	176
8.9.3	Accessibility and connectivity	176
8.10	Recommendations for Further Study	177
8.11	Chapter Summary.....	177
	REFERENCES	178
	APPENDIX A: CONSENT FORMS	194
	Appendix A.1: Teacher educator's Consent Form	194
	Appendix A.2: Dean of faculty or HoD Consent Form: Permission to audiotape.....	196
	Appendix A.3: Dean of Faculty or Head of Department (HoD) Consent Form: Permission to use the institution ICT Policy	197
	Appendix A.4: Student teacher's Consent Form	198
	APPENDIX B: TEACHER EDUCATOR'S QUESTIONNAIRE.....	199
	APPENDIX C: DEAN OF FACULTY OR HEAD OF DEPARTMENT (HoD) INTERVIEW GUIDE.....	205
	APPENDIX D: OBSERVATION GUIDE	207
	APPENDIX E: DOCUMENT ANALYSIS FORM/GUIDE.....	210

APPENDIX F: ETHICAL CLEARANCE CERTIFICATE.....	211
APPENDIX G: MoET CLEARANCE	212
APPENDIX H: LANUAGE EDITING CERTIFICATE	213

LIST OF TABLES

Table 5.1: Number of participant from each institution	74
Table 5.2: Age of respondents	74
Table 5.3: Teaching experience of the respondents	75
Table 5.4: Gender of teacher educator.....	75
Table 5.5: Highest academic qualification	76
Table 5.6: ICT usage.....	766
Table 5.7: Technological knowledge (TK)	78
Table 5.8: Content knowledge.....	80
Table 5.9: Pedagogical knowledge	82
Table 5.10: Pedagogical content knowledge (PCK)	84
Table 5.11: Technological content knowledge (TCK)	86
Table 5.12: Technological pedagogical knowledge (TPK).....	88
Table 5.13: Technological pedagogy and content knowledge (TPACK).....	90
Table 5.14: Teacher educators' perceptions measure	93
Table 6.1: Demographic characteristics by gender	96
Table 6.2: Themes and sub-themes.....	96
Table 6.3: Teacher educators' profiles	119

LIST OF FIGURES

Figure 1.1: A map of Eswatini	4
Figure 3.1: The TPACK framework and its knowledge components (adopted from Koehler & Mishra, 2009).....	43
Figure 3.2: The unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003)	49
Figure 4.1: Sequential explanatory mixed methods design (Creswell, 2009)	58

APPENDICES

APPENDIX A: CONSENT FORMS	194
Appendix A.1: Teacher educator's Consent Form	194
Appendix A.2: Dean of faculty or HoD Consent Form: Permission to audiotape.....	196
Appendix A.3: Dean of Faculty or Head of Department (HoD) Consent Form: Permission to use the institution ICT Policy	197
Appendix A.4: Student teacher's Consent Form	198
APPENDIX B: TEACHER EDUCATOR'S QUESTIONNAIRE	199
APPENDIX C: DEAN OF FACULTY OR HEAD OF DEPARTMENT (HoD) INTERVIEW GUIDE.....	205
APPENDIX D: OBSERVATION GUIDE	207
APPENDIX E: DOCUMENT ANALYSIS FORM/GUIDE.....	210
APPENDIX F: ETHICAL CLEARANCE CERTIFICATE.....	211
APPENDIX G: MoET CLEARANCE	212
APPENDIX H: LANGUAGE EDITING CERTIFICATE	213

LIST OF ACRONYMS

HEIs	Higher Education Institutions
HoD	Head of Department
HREC	Human Research Ethics Committee
ICTs	Information and Communication Technologies
IDE	Institute of Distance Education
ITE	Initial Teacher Education
KIE	Kigali Institute of Education
LCD	Liquid-Crystal Display
LMS	Learning Management System
M	Mean
MLMS	Moodle Learning Management System
MoET	Ministry of Education and Training
MPCU	Model of PC Utilisation
PCK	Pedagogical Content Knowledge
PE	Performance Expectancy
PK	Pedagogical knowledge
PPP	PowerPoint Presentations
SMS	Short Message Services
STD	Standard Deviation
TAM	Technology Acceptance Model
TCK	Technological Content Knowledge
TK	Technological Knowledge
TPACK	Technological Pedagogical and Content Knowledge

TPB	Theory of Planned Behaviour
TPK	Technological Pedagogical Knowledge
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNESWA	University of Eswatini
UTAUT	Unified Theory of Acceptance and Use of Technology
Wi-Fi	Wireless Fidelity

CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

Information and communication technology (ICT) is a very dynamic field, and over the years there has been a shift in the global trends from an industrial to an information knowledge-based society in which citizens need to be able to manage huge amounts of information that can be disclosed and processed with the help of ICTs (Voogt & Pelgrum, 2005). Norris, Brodnick, Lefrere, Gilmour and Baer (2012) argued that global society was undertaking an essential shift from the industrial age to the information age. For higher education, this translates into using ICT tools to meet the needs of this new age. According to Hutchings and Quinney (2015), this leads to a challenge for higher education institutions (HEIs) to survive and prosper in the 21st century as there are new sets of discourse that has emerged around institutions, leaving institutions to fulfil excess functions. This is a strategy for changing higher education to reform, enhance and readjust its functions within this complex, competitive climate (Hutchings & Quinney, 2015). For HEIs to respond successfully to the speed of change, they may need to redesign and reinvent their core business model while projecting for the future. This may entail shifting teacher educators' roles and pedagogical constraints from teacher-centred to student-centred, involving learning experiences and the development of critical thinking capacities (Mukerjee, 2014).

This study is contextualised in the higher education discipline. It is located within the paradigm of pedagogical integration of ICTs into HEIs in Initial Teacher Education (ITE) in Eswatini. The key question it sought to address is what the pedagogical ICT integration practices are among teacher educators in HEIs during ITE at Eswatini? In essence, the study explored the pedagogical ICT integration practices among teacher educators/lecturers in ITE programmes.

According to Nsibande (2014), researchers focus on the technological features of ICT when designing and developing educational settings without considering theoretical modalities, pedagogical values and instructional goals. This presumes that ICT tools can

become effective in teaching and learning when teacher educators use them with suitable pedagogical practices (Nsibande, 2014; Wright, 2010).

Pelgrum (2001) asserted that many governments have launched major programmes and invested substantial capital to support projects that implement ICT in education. When properly implemented, these initiatives are expected to support ICT-based teaching, which can transform students into active knowledge constructors. In 2000 the government of Swaziland realised that ICT literacy and skills must be provided in schools during the early stages of education, and to this effect it stated that literacy will be part of the curriculum in schools by 2009; all schools, Tinkhundla and chiefdoms to have libraries/information and learning resource centres by 2010 (Swaziland Government ICT policy, 2011).

This is to help students participate productively in the global and ever-changing world to which technology has brought irreversible changes (Su, 2009). ICT is perceived as a platform for creating an information intensive society (Augero, 2009; Touray, Salminen & Mursu, 2013; Walsham & Sahay, 2006), and is considered a catalyst for growth that can lead to the transformation of the economic, political, cultural, and social conditions in many developing countries (Touray et al., 2013). Bingimlas (2009) asserted that ICT is important in most organisations and businesses, and is perceived as a catalyst for development. Many employees in organisations use ICTs for communication and to search for information to share with each other as they do their work. Currently, because of Covid-19 pandemic, ICTs are also used to work from home to meet organisational expectations. Bingimlas (2009) further stated that ICT provides students with prospects to learn and manoeuvre in an information age. ICT affordances in education are numerous and include searching for information, sharing information, presenting information during teaching and learning, and communication.

The prevalence of ICT in schools is proof that children are growing up with ICT as they are exposed to it during their early years of life. Children are living in a digital world. In Eswatini, schools are equipped with ICT tools for teachers and learners to use in teaching and learning. Despite the prevalence of ICT in schools, very little is known about the practices, benefits and challenges of ICT pedagogical integration. Teacher educators are

becoming more concerned with teachers' integration of ICTs for instruction (Chai, koh & Tsai, 2013). This also applies to teacher educators in Eswatini. Although the study focused on HEIs, it is important to note that when teacher educators in teacher training institutions lag behind in the knowledge and use of ICTs, they will produce incompetent teachers who are unable to integrate ICT in their classrooms. Hence, there is a need for this study on ICT integration in HEIs in ITE so that teacher educators can pass their ICT integration skills to preservice teachers, who can then integrate ICTs in their classrooms in the future.

Universities or HEIs embrace ICTs to enable teaching and learning, including the use of mobile and digital technologies by students (Hutchings & Quinney, 2015). We are living in a digital world but Mukerjee (2014) argued that this digital world is innovating and changing at a fast pace, making it difficult for HEIs to meet the demands of change. Therefore, this study also assessed how institutions create enabling environments to develop ICT pedagogical integration practices. This may help teacher educators in their ICT pedagogical integration practices in their classrooms.

1.2 Background to the Study

1.2.1 The context of the study

Figure 1.1 shows that Eswatini is a landlocked country along the Southern African Plateau. Eswatini is bordered by South Africa in the north, west and south, and Mozambique in the east. According to the United Nations World Food Program (2013), Eswatini is categorised as a lower middle income country. Eswatini prioritises education, similar to most countries around the world (Nsibande, 2014). Like most middle income countries, Eswatini has a digital divide as infrastructure is limited. Connectivity and access to the internet is slow and, in some areas, inaccessible. This may prevent Swati citizens from accessing information, preventing the Swati people from keeping abreast with the latest innovations.



Figure 1.1: A map of Eswatini

1.2.2 ICT status in Initial Teacher Education in Eswatini

Teacher education in Eswatini has undergone a number of structural changes. In addition to government teacher training institutions, there are private teacher training institutions, which are new. The programmes in the HEIs are three years for a Diploma in Teaching, four years for a Bachelor of Education and Humanities, and one year for a Postgraduate Certificate in Education. The Swaziland Government ICT Policy (2011) stated that HEIs had to offer basic computer studies to incoming trainees in 2008. The Ministry of Education and Training (MoET) created ICT teacher educators' posts in all HEIs. The first group of trainees in ICTs graduated in 2010.

All HEIs have at least one computer laboratory that students use for both lectures and research. The computers in the laboratories are connected to the internet. The colleges and the universities in the country updated their curricula for ICT integration by, for example, introducing the Moodle learning management system (MLMS) that students and

teacher educators use to engage in discussions. The effects of the transformation in an information society involves global changes in higher education curricula. The most important reason for these changes are that students need to develop new competencies that are not addressed in the current curriculum (Voogt & Pelgrum, 2005). In Eswatini, HEIs that offer ICT education include the Southern Africa Nazarene University (SANU), the University of Eswatini (UNESWA) and William Pitcher Teacher Training College. The Eswatini College of Technology (ECOT) offers a Diploma in Computer Science. In these HEIs basic ICT is taught to all first and second year students, covering the basics of computing and Microsoft Office. The first ICT syllabus has since been revised by colleges to integrate ICT education. The syllabus covers the use of computers during instruction in the different subjects, but it still awaits approval from the Board of Affiliated Institutions of the UNESWA. As a result, ICT is not fully examinable in the colleges. The Faculty of Science and Engineering of UNESWA offers a Bachelor of Science degree with a major in Computer Science. Courses on information systems are also offered by the Faculty of Commerce. It is also mandatory for all first year students at UNESWA to take a Computer Foundation Course. UNESWA also introduced a programme to capacitate teachers in information technology to make sure the process of introducing computer education in schools is not interrupted.

Eswatini has embraced ICT in education policies such as the Education Sector Policy of 2011 and the ICT in Education Draft Policy of 2010, which is meant to embrace ICT integration into the curriculum to improve teaching and learning. In order to integrate ICT into the education system, the MoET implemented the following initiatives:

- A computer project funded by the Republic of China and Taiwan, implemented in 2000, that equipped schools with ICT equipment and other accessories.
- The Prevocational Programme that was developed with a loan from the African Development Bank to facilitate the teaching of information technology.
- The CISCO Academy Programme that was established in 2002 and teaches citizens about internet technologies.
- The Computer Education Trust set up in 1999 to provide ICT learning materials (Swaziland Government ICT Policy, 2011).

The Computer Education Trust was intended to facilitate the development of pedagogical materials and in-service training for all teachers in Eswatini. As changes may be easily accepted or rejected by teachers, this initiative may have had some barriers. According to Nsibande (2014), the Computer Education Trust was negotiating with the MoET to incorporate this initiative in their preservice teacher training programmes. It was a good initiative by the Computer Education Trust to focus on preservice teachers so that they complete their training with ICT skills they can use in their instructional processes. The MoET, in partnership with UNESCO, engaged in developing an ICT integration curriculum in higher education. This was envisioned to develop an ICT policy within the Ministry that will guide the development of an ICT curriculum in all levels of education. This can enhance the effective coordination of ICT integration initiatives, even in schools (Swaziland Government ICT Policy, 2011).

The effective integration of ICTs depends on teachers' ability and familiarity with ICT skills and knowledge. The introduction and effective use of computers by teachers and learners may transform their teaching and learning. ICT can offer teacher educators the possibility to motivate students and to support individualised learning by allowing students to search for new knowledge and share it among themselves and their teacher educators. This motivates them to learn as they are listened to and engage with peers. ICTs permit access to ever increasing banks of information both within and outside school. In order to have ICT literate teachers, HEIs must integrate ICTs in their curricula.

Even though government and HEIs have invested in ICT integration for teaching and learning, there is little evidence of the use of ICTs during instruction in ITE. This may be due to some barriers to ICT integration, such as inadequate ICT infrastructure, lack of ICT skills and curriculum overload (Ang'ondi, 2013). Other barriers to ICT integration are discussed in Chapter 2. The pedagogical integration of ICTs in HEIs in ITE were the focus of this study as it is a great worry for many educators (Wang & Woo, 2007).

1.2.3 The Concept of ICT integration

ICTs are tools such as computers, digital hardware and software applications and includes connectivity and access to the internet (Touray et al., 2013). According to Touray

et al. (2013), ICTs are used to access, gather, manipulate, present or communicate information. Ndlovu (2016) saw ICTs as various digital resources that can be used for teaching and learning. ICTs have various affordances that facilitate different ways of sourcing, storing and manipulating content in different representations, among other capabilities, to accomplish specific educational goals (Ndlovu, 2016).

According to Earle (2002), ICT integration can be complete as it combines essential systems. The integration of ICTs can take place in a curriculum, topic, and lesson (Wang & Woo, 2007). In ICT integration, educational components, such as content and pedagogy, intersect. In this study, ICT integration is defined as how technology is used to support instruction in teacher training institutions. Ertmer (2005) stated that ICT enhances the curriculum by achieving its authentic, complex goals, which means an improvement in pedagogy through the use of ICT tools.

This study adopted Wang's (2009) definition of ICT integration as a process of using any ICT to enhance instruction. According to Earle (2002), the availability of hardware and software does not guarantee ICT integration, which is why there are situations where ICT facilities are gathering dust. This means that the pedagogical design for effective use of ICT influence the effectiveness of learning (Wang, 2009).

ICT integration should be implemented in the classroom or in the knowledge we teach. Pedagogy means how we understand practice and apply it (Beetham & Sharpe, 2013). Pedagogy involves the guidance given by teacher educators to students as they engage in learning (Beetham & Sharpe, 2013), and involves teaching philosophies and other knowledge domains that influence what eventually happens in the classroom as teachers guide learners to learn (Shulman, 1987). Dron (2012) asserted that pedagogy covers what the teacher does in order to accomplish instructional processes. This study defines pedagogy as the practice of teacher educators as they apply the knowledge they teach to achieve their instructional goals during teaching and learning. Wang and Woo (2007, p. 149) perceived ICT pedagogical integration as "a process of using any ICT (including information resources on the web, multimedia programmes in CD-ROMS, learning objects, or other tools) to enhance student learning". The researcher believe that ICT can be used in curriculum planning, development, and presentation. Teacher educators must

use ICTs with pedagogy to teach students. For example, they must engage their students in class discussions using an ICT learning management system (LMS) where the students can discuss their work and solve problems to create new knowledge and skills. Using ICTs means that teaching and learning are not confined to the classroom but that it can take place anywhere and at any time convenient to the teacher educator and students.

1.3 Statement of the Problem

In recent years the government of Eswatini proposed that ICT literacy and skills must be accessible to all students. Their motivation may be that ICT is integral in all aspects of our lives, creates links among students and teachers, and facilitates access to knowledge (Dlamini & Dube, 2014). ICTs are part of our daily lives and a necessity in today's world that is driven by technology and knowledge. This led the government of Eswatini to acknowledge the significant role ICT can play in teaching and learning (The Kingdom of Swaziland Education and Training Sector Policy, 2011). As stated earlier, even though the government and HEIs have invested in ICT integration for teaching and learning, there is little evidence of the use of ICTs during instruction in ITE. This may be because most teachers in Eswatini lack technological pedagogical knowledge (TPK), that is, how to use particular technologies in teaching. TPK include how to teach content using ICTs to best support learners' needs and styles of learning. There is also little evidence that teacher training institutions in Eswatini are integrating ICTs across the curriculum. The assumption may be that teachers are ICT literate, forgetting that during their ITE and training they were not provided with an environment where ICTs were integrated during teaching.

Teaching and learning is a challenging task for many teachers (Chai, Koh, & Tsai, 2013), and therefore, modern technologies may offer a variety of ways to improve instruction (Bingimlas, 2009). ICTs should be used to improve teaching and learning as per the educational goals of the global world (UNESCO, 2005). ICTs are believed to revolutionise the teaching and learning process in universities and colleges (Bahati, 2010). Teachers need content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK) to teach effectively using ITCs as it encourages higher levels of cognitive

skills, promote information literacy, and nurture collaborative working practices (Koehler & Mishra, 2009). It is against this background that the researcher argue that there is a new requirement for teacher to be able to teach in the contemporary society where ICT is widely recognised as an enabling tool to facilitate cognitive development among learners.

The use of ICTs, especially computers for educational purposes, may seem threatening as teacher educators have limited knowledge in the use of ICTs in teaching, and they may feel intimidated to use ICTs before their students because they may not be tech savvy. That can make teacher educators and their faculty administrators reluctant to take the lead in using ICT for educational purposes. Access to ICT tools is often mistaken for ICT adoption and use (Govender, 2006). However, ICTs will not be used unless teacher educators have the competencies to infuse it into the curriculum (Baylor & Ritchie, 2002). Teacher educators can act as critical agents of change within the classroom, and therefore, must make the use of ICTs in their teaching a priority (Govender, 2006). Teacher educators' confidence and creativity in using ICTs can help develop the ICT competencies needed by teacher trainees.

Eswatini as a signatory of the sustainable development goals is expected to adhere to the education sector, social pillar four of Vision 2030, which calls for globally competitive quality education and training. Social pillar four of Vision 2030 is transforming teacher training and partnerships with the private sector to develop ICT literacy among educators (Makhanu, 2010). This can be the key for ICT integration. As in most developing countries, the entire education system in Eswatini is characterised by the very low application of ICT. Makhanu (2010) further noted that most African countries have not yet integrated ICT into education; and in 2020 Eswatini is no different from most African countries.

1.4 Rationale of the Study

From literature reviewed for this study it is evident that most of the research about ICT integration into teaching and learning has been done in developed countries (Chai, Koh, & Tsai, 2013; Conole & Dyke, 2004; Montrieux et al., 2015; Roberts & Rees, 2014; Wang,

2009). Limited research has been conducted in developing countries like Eswatini. This provided the motivation to research the pedagogical integration of ICTs in three HEIs in Eswatini. ICT has the potential to transform pedagogical activities in the classroom and provide student teachers with a transformative learning experience. Although pedagogy does change with ICTs, the extent of this change is not clear from the literature reviewed in this study. However, teacher educators can use ICTs to teach concepts and guide students to engage in problem-solving, individually or in groups. According to Ndlovu (2016), ICT integration is the process of using any ICT to enhance student learning. The study was prompted by the limited research in developing countries like Eswatini on the pedagogical integration of ICTs, more especially in HEIs. The dearth of literature on pedagogical ICT integration is acknowledged as a knowledge gap in the literature reviewed for the studies.

As we are living in a technological skills-based society, ICT plays a major role in student skills motivation (Grabe & Grabe, 2007). ICT use is perceived as creating student-centred environments by motivating students as teachers sometimes learn from their students as they engage with ICTs. The students may also be motivated as they gain self-confidence through peer recognition as they demonstrate their ICT skills when collaborating with peers.

The use of ICT by teacher educators in HEIs can mean the use of ICT as a tool to support educational activities, which include skills for searching and assessing information and problem-solving (Meelissen & Drent, 2007). The study examined the ICT integration into course outlines of teacher educators or instructors who derive the content from their expertise in their various areas of knowledge (Nsibande, 2014); hence, the focus on ICT integration in HEIs during ITE. This study explored the ICT integration in the HEIs in Eswatini. It is hoped the ICT integration will enable prospective teachers to effectively function and be productive in their teaching and learning environments as they integrate ICTs in their teaching to prepare productive learners in today's society (Bingimlas, 2009).

HEIs must incorporate the use of ICTs for students to gain 21st Century skills, such as communication, creativity, collaboration, and critical thinking skills. According to Cassim (2010), 21st Century skills also include conceptualising, abstraction, generalisation,

problem-solving, and information processing. These skills are not new, but they are more easily gained with the use of ICT (Cassim, 2010). For instance, it is easier to communicate using ICTs because students can collaborate and critically discuss concepts using ICTs. The use of ICTs can help the new crop of teachers impart skills to pupils as they prepare them for future developments in ICT (Wang & Woo, 2007). This will also help student teachers to develop ICT competencies needed for the 21st Century and has great potential to enhance students' achievements (Bingimlas, 2009). We cannot refute the fact that ICT is part of our daily lives, and therefore, we must respond appropriately to the pace of change (Hutching & Quinney, 2015). This entails a shift to student-centred, immersed learning experiences where students use critical thinking (Hutching & Quinney, 2015).

Hutching and Quinney (2015) further stated that ICT as an educational tool improve the efficiency, accessibility and quality of the learning process, especially in developing countries. Dlodlu (2018) stated that ICT can improve the collection and sharing of information to assist institutions. This research generated knowledge that can inform education policy frameworks on the adoption and ICT integration in HEIs in ITE.

1.5 Significance of the Study

The study is significant in that it explored the pedagogical ICT integration practices among teacher educators in ITE programmes in Eswatini. The literature reviewed for the study showed that no study have been done in Eswatini that focused on pedagogical ICT integration in HEIs, making this study significant because it focuses on that subject across curricular in ITE. The study presented the ICT integration practices among teacher educators in HEIs in Eswatini. The use of ICT in teaching is a new requirement for teachers to be able to teach in the contemporary society where ICT is widely recognised as an enabling tool to facilitate cognitive development among students (Hutching & Quinney, 2015). Teacher educators' technological pedagogical and content knowledge (TPACK), that is, how to use technologies in teaching and learning processes, must be revived for teacher educators to teach efficiently and effectively in the 21st Century. According to Dlamini and Nkambule (2019) there is a gap between access to ICT and teachers' readiness to pedagogically integrate ICT tools into teaching. To close the gap

in the literature, the study explored the ICT practices of teacher educators in ITE programmes to ascertain how teacher educators integrate ICT. Thus, the study contribute to existing knowledge on ICT integration into teaching and learning in HEIs.

ICTs are necessary to educational development and should be integrated into the curricula, more especially into the pedagogical practices of teacher educators (Michael et al. 2016). Literature reviewed for the study indicated that studies tend to focus on technological skills acquisition rather than pedagogical ICT integration in teaching. This does not overlook the significance of ICT literacy among teacher educators, because ICT skills are important for teacher educators to effectively integrate ICT in teaching. ICTs can be used as tools that can reform education by enhancing pedagogical approaches in which students play an active role in student-centred pedagogies and teacher educators are facilitators of students' learning (Michael et al. 2016). ICT can enrich interactions among students and teacher educators and enhance engagement with content (Conole & Dyke, 2004; Dlamini & Nkambule, 2019). Teachers are a crucial element in the education reform, and the reform means that teacher educators must redefine their roles by stimulating students to work independently. Teacher educators must update their ICT skills and pedagogical knowledge (Michael et al. 2016). ICTs may eliminate the limitations of traditional approaches that promote rote learning among students. For example, traditionally students sit in a lecture and listen passively to the teacher educator who are reading from their note book and may move at a faster pace than the students, but ICTs allow the teacher educator to easily share notes with the students at a time convenient to them. There is need for teacher educators to shift from authoritarian strategies to student-centred strategies where students are engaged in active learning using ICTs.

There is lack of documented practices on the ICT integration in HEIs in Eswatini. Hence, this study addressed the pedagogical ICT integration in ITE programmes. This knowledge will enhance improvement in instructional methods and strategies for improving teaching and learning. Furthermore, findings arising from this study can support education specialists and all stakeholders to align with ICT integration.

Teacher educators' pedagogical challenges involve taking care of the needs of technology-savvy students and to integrate ICT into their programmes (Schneckenberg, 2009). This shows the significance of ICT integration despite the barriers affecting ICT integration in higher education in Eswatini. The study contribute information for future policies on the design and implementation of ICT integration initiatives in HEIs in Eswatini.

1.6 Aim of the Study

The aim of the research was to explore and identify the pedagogical ICT integration practices among teacher educators in ITE programmes. In the process it was ascertained how the current structure of the ITE curriculum affect ICT integration.

1.7 Objectives of the Research

The objectives of the study were to:

1. Examine the prevalent pedagogical ICT integration practices among teacher educators in ITE programmes.
2. Ascertain how the current structure of the ITE curriculum affects the classroom technological practices of teacher educators.
3. Examine teacher educators' perceptions of the educational value of ICT.
4. Determine the extent to which teacher education structures in HEIs create an enabling environment for the pedagogical integration of ICT.

1.8 Research Questions

The main research question that guided this study was:

What are the pedagogical ICT integration practices among teacher educators in Initial teacher education?

The sub-questions for this study were:

1. What are the ICT integration practices among teacher educators in ITE programmes?
2. How does the current structure of the ITE curriculum affect the classroom technology practices of teacher educators?

3. What are teacher educators' perceptions of the educational value of ICT?
4. To what extent does teacher education structures in HEIs create an enabling environment for the pedagogical integration of ICT?

1.9 Definition of Terms

Content knowledge: Subject matter knowledge taught to students, such as history, religious education, language, art, science, mathematics, and many more (Abbitt, 2011).

Curriculum: Covers all the learning experiences provided to students within teacher education institutions, both in classes and during out-of-class activities at the institution.

ICT access: The availability of ICT tools, including the internet, in HEIs to access information and knowledge (Pandita, Singh & Kumar, 2010).

ICT adoption: The process of acquiring and using technological tools. To adopt ICTs in teaching and learning, teacher educators must acquire ICT skills and knowledge to perform definite ICT tasks.

Information and communication technology (ICT): Different ICT tools and resources used to access, store, communicate, and manage information (Chabinga, 2015). ICTs include hardware and software like computers, printers, digital/video cameras, audio, projectors, the Internet, and Microsoft Office (Fu, 2013). These technologies have diverse affordances used to manipulate content in various forms of representations in order to accomplish specific educational goals (Ndlovu, 2016).

ICT integration: The effective use of ICTs during teaching and learning. ICTs are increasingly applied in instruction during teaching and learning (Fu, 2013).

ICT use: An individual or group of people accessing and using the affordances of ICTs. ICT use is the dissemination of knowledge by using videos, podcasts, simulations, and online discussions through social networks, chats, and virtual classrooms (Chetty, 2012).

Pedagogy: A method of instruction that involves imparting knowledge and competences. It is also “guidance-to-learn: learning in the context of teaching, and teaching that has learning as its goal” (Beetham & Sharpe, 2013, p. 2).

Pedagogical Content Knowledge (PCK): The transformation of the subject matter for teaching. According to Shulman (1987), this transformation occurs as the teacher interprets the subject matter in different ways to represent it and use instructional materials to address conceptions and students' prior knowledge (Koehler & Mishra, 2009).

Pedagogical Knowledge (PK): Knowledge of teaching methods, instructional planning, and the assessment of learning (Abbitt, 2011).

Technological Content Knowledge (TCK): Knowledge of the relationship between subject matter and technology (Abbitt, 2011). TCK is the interaction or intersection of technology and course competencies or content (Koehler, Mishra, Akcaoglu & Rosenberg, 2013).

Teacher educator (lecturer): Anyone who teaches students in HEIs.

Technology Knowledge (TK): Knowledge of technology for information processing, communication, problem-solving and the application of ICTs (Abbitt, 2011). TK is another type of teacher knowledge in the TPACK framework (Koehler et al. 2013).

Teaching and learning: In this study the two terms are used to denote pedagogic (teaching) practices. Teaching is therefore that which makes learning happen (Ndlovu, 2016).

Technological Pedagogical Knowledge (TPK): Knowledge of how teaching and learning can change when using ICTs (Koehler & Mishra, 2009). TPK is the relationship and interaction between technology and pedagogical practices (Koehler et al. 2013).

Technological Pedagogical and Content Knowledge (TPACK): Knowledge of the intersection between the knowledge domains of content, pedagogy and technology. TPACK is an understanding of the knowledge that a teacher educator must acquire for effective ICT integration (Alyyar & Fisser, 2019).

1.10 Organisation of the Thesis

The thesis comprises of six chapters and is organised as follows:

Chapter 1: Introduction and background to the study: The first chapter presents the introduction and background to the study and discusses a number of sub-topics such as the context of the study, ICT status in ITE in Eswatini and the concept of ICT integration, enabling the reader to understand the context of the study and the research problem. The chapter also outlines the rationale and significance of the study, the statement of the problem, the aim of the study, and the research objectives and questions, and give a summary of the chapter.

Chapter 2: Literature Review: The chapter discusses the literature reviewed on ICT integration in teaching and learning and is aligned to HEIs during ITE. It reviews the literature as per the research questions.

Chapter 3: Theoretical framework underpinning the study: This section deliberates on the theoretical framework underpinning the study. The study was informed by various concepts, definitions and existing knowledge to understand the ICT integration practices of teacher educators in HEIs in Eswatini.

Chapter 4: Research design and methodology: This chapter discusses the methods, techniques and procedures used in the study. The study was a case study that adopted a mixed methods approach using the pragmatist paradigm. It describes the theoretical framework and the philosophical perspective adopted in the study, followed by the research design, the study area, the target population, the sampling technique, the instruments and procedures for data collection, and data presentation and analysis.

Chapter 5: Data presentation and analysis: This chapter presents and analyses the quantitative data that were collected using the survey questionnaire to find out the extent of the pedagogical ICT integration practices among teacher educators in ITE programmes in HEIs in Eswatini. The analysis of data was done to address the objectives and research questions of the study.

Chapter 6: Qualitative data analysis: The chapter presents and analyses the qualitative data that were collected to discover the pedagogical ICT integration practices among teacher educators in ITE programmes in HEIs in Eswatini. The analysis of the data was done to address the objectives and research questions of the study.

Chapter 7: Discussion of findings: The chapter discusses the findings with reference to the related literature reviewed and the data that were collected.

Chapter 8: Summary of findings, recommendation and conclusion: This chapter presents a summary of the study. The chapter further concludes major findings of the study and makes recommendations.

1.11 Chapter Summary

The chapter provided an introduction and the background to the study. The background of the study covers the context of the study, ICT status in ITE in Eswatini and the concept of ICT integration. The chapter also presents the statement of the problem, and the rationale, significance, aims, objectives and research questions of the study. The definition of terms used in the study and the organisation of the thesis were presented.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter provides a synthesis of the literature reviewed on ICT integration in teaching and learning and is aligned to HEIs. It is a review of literature on the ICT integration practices in teaching and learning, explicating how ICT affordances contribute to teaching and learning. The reviewed literature also cover curriculum and ICT integration, the perception of teacher educators and teacher education structures, and it addresses the barriers to ICT integration. This literature review was guided by the research questions stated in section 1.8.

In recent years, the integration of ICT tools into education has been a priority in the education sector, especially to support teaching and learning (Chetty, 2012). Tuomi (2005) predicted that in coming years there will be a change in teaching practices as universities and colleges respond to global, technological and learning research trends. Researchers concurred that new conceptual models of education and technological revolutions (e.g. e-learning, blended learning, ICT integration, and the use of mobile devices) offer the prospect of transformative change in teaching and learning (Vajargah, Jahani & Azadmanesh, 2010). Though ICT is pervasive in education, it has not been instilled in the instructional practices (Arslan, 2013; Grabe & Grabe, 2007).

ICTs are seen as the perfect tools to revolutionise teaching and learning and to generate collaboration and conversation (Chabinga, 2015; Tinio, 2002). Chetty (2012) concurred that ICTs are used to foster rich collaborative environments that promote interactions between students, interactions between teacher educators and working together on the delivery of courses or programmes. This implies that teaching and learning practices should align and embrace the demands of the digital era or internet to realise the benefits of ICTs in the digital era (Chabinga, 2015). Tinio (2002) argued that by integrating ICT in teaching and learning, teachers can be fully equipped for the workforce. ICT integration involves the correct use of ICT resources and appropriate software in a programme or course to achieve the aims and objectives of the curriculum (Ghavifekr & Rosdy, 2015).

In Eswatini this can be realised if preservice teachers are capacitated with ICT integration skills during ITE programmes.

2.2 ICT Practices in Teaching and Learning

UNESCO's ICT Competency Framework for Teachers (2015) stressed that it is not enough for teacher educators to have ICT skills and use them to teach their students, they must also demonstrate these skills to students to allow them to collaborate, solve problems, and be creative so that they will be relevant in the knowledge-based society. ICT policies at national and institutional levels should provide answers to concerns pertaining to ICTs for education, including ICT integration across curricula. UNSECO highlighted the importance of developing ICT polices. The background paper from the Commonwealth of learning highlighted it as follows for HEIs:

National ICT policies should articulate a vision and a strategic framework for harnessing the potential of ICTs to address a country's development challenges. For the education sector it should provide a sense of focus and direction and spell out clearly how improving the ICT capacity of the education sector can help to address issues of access, equity and quality at all levels. Such a national policy should provide a framework that can be a basis for developing ICT policies by HEIs (UNESCO, 2009, p. 8).

Institutional HEIs ICT policies should reveal the vision of the national ICT policy because a national policy provides a foundational framework (Bahati, 2010; UNESCO, 2009). Policy formulation about e-education should discover how the policy can direct teacher educators and students to use ICTs in teaching and learning (Chabinga, 2015). This means that policy documents should be informative to all people in HEIs and should thus be available to all.

Pedagogy involves teaching, which includes the theories, beliefs, and policies that inform teaching (Zendah, 2017). Pedagogy may imply a philosophical background, but the concern in this study is the pedagogical integration of ICTs by teacher educators in teaching and learning. Teacher educators should help students use ICTs to improve learning and to acquire knowledge and apply it to real-world problems, creating

knowledge needed in society (UNESCO, 2015). ICTs can improve learning because learning is not confined to the four walls of the classroom anymore and can take place anytime and anywhere where students are guided by teacher educators in knowledge construction (Chetty, 2012). Pedagogies should be engaging, that is, they should be student-centred. Pedagogies should promote active learning, research-based learning and interactive engagement by promoting interaction among students and student-teacher interactions (Zendah, 2017). Therefore, pedagogies that promote engagement are concerned with how people learn and how curriculum delivery increases students' active engagement and knowledge (Zendah, 2017). ICT use can enrich the teaching styles in a lesson through the dissemination of knowledge with the use of videos, podcasts, simulations, and online discussions using social networks, chats, and virtual classrooms (Chetty, 2012).

Constructivist teacher educators are teacher educators who advocate for the construction of knowledge by their students rather than the transfer of knowledge, and they believe in using student-centred inquiry methods (Pitsoa & Maila, 2012). They realise that learning with ICTs facilitates a shift from teacher-centred learning to student-centred learning, and they explore new roles to refine their teaching practice by making students active participants in the construction of knowledge (Pitsoa & Maila, 2012). Constructivist teacher educators shift from being authoritarian, that is, being the only source of knowledge for students, to facilitators, which can be done with the use of ICTs (Montrieux et al. 2015). Constructivist teacher educators also believe that there is a need for digital didactics that involve delivering content using ICTs. These teachers prepare students for the changing world using ICTs. It can be argued that using ICT during classes supports constructivist approaches but that the use of ICTs does not automatically change the approaches to teaching. Learning with ICTs is more than turning learning activities digital, it is also about generating new contexts for students to learn using technologies to enhance knowledge construction and sharing and diffusing concepts (Montrieux et al. 2015). Through collaboration, students using ICTs can help each other and work together to better understand a concept.

Traditional pedagogy holds knowledge as something you possess and not a way of life; however, the integration of real-life lessons is key, and therefore, this study focused on

the integration of ICT into teaching and learning. This means that ICT challenges the traditional strategies and favours curricula that promote competency and performance and that are not only concerned with learning in classrooms but also with open learning through e-learning and the use of the internet (Chabinga, 2015; Purg, 2011). Students want a meaningful education that is applicable to real-life situations (Zendah, 2017). Traditional strategies are being replaced not only with new ways of acquiring information but also with new ways to use the information (Bahati, 2010). The emphasis should be on the active construction of knowledge by students and using that knowledge, and ICTs can play a crucial role in helping students be active in knowledge construction. As teacher educators teach using technology, technology can help students make sense of the tasks assigned to them (Bahati, 2010). For instance, students can collaborate in virtual environments to engage with given tasks or solve problems. Integrating ICT during classroom practices requires teacher educators to acquire new ICT and pedagogical skills. According to Fu (2013) teacher educators can direct students to access, select, organise and interpret acquired information. Fu (2013) further argued that teacher educators can also use ICTs in class activities in creative ways to create engaging, rewarding and more effective lessons. Teacher educators need skills to be able to transform their TPACK to effectively integrate ICT in their teaching strategies (Montrieux et al. 2015). However, it is acknowledged that most teacher educators integrate ICT to provide content in a digital format instead of enhancing learner-centred approaches (Montrieux et al. 2015). ICT should be used to exploit its creative potential, such as engaging students actively in knowledge production (Comi et al. 2017).

ICT aided education is an important requirement for higher education as it helps improve the teaching and learning process (Montrieux et al. 2015). Students can be actively involved in the learning process in ICT classrooms as they are guided by teacher educators who plan and engage the students on given tasks (Fu, 2013). Much of the information published today is available in digital form, and most of it is available on internet, which has revolutionised the ICT world (Pandita et al. 2010). Traditional classroom teaching is gradually being replaced by digital classroom teaching. Classroom lectures can be recorded and provided in digital form to seekers of information/students as and when needed (Pandita et al. 2010). Given that ICT enables students to access

information on their own, teacher educators' role must shift from being information providers to helping students manage and interpret information (UNESCO, 2015). To effectively integrate ICT tools into teaching and learning practices, teacher educators must go beyond learning how to use ICT and also change the way they teach (Keengwe et al. 2009). Stevenson (2008) agreed that the use of ICTs can transform teacher educator's pedagogies to be more collaborative and facilitative. Then they can help students construct knowledge, and ICT is used as an instructional tool to improve the learning environment. According to Fu (2013) ICT tends to expand access to education because it allows learning to occur anytime and anywhere. Fu (2013) further stated that virtual classrooms allow both students and teacher educators to interact with ease and convenience. Knowledge can be acquired using multiple resources such as video clips and audio sounds, to mention a few.

ICT integration should focus on pedagogy design to qualify how and why ICT is used in a particular way (Wang, 2009). Su (2009) also argued that ICT integration requires more than dealing with ICT alone and that it also includes the pedagogy that can enhance student learning. This means that ICT should be embedded in a pedagogy to assist the teaching and learning process. ICT and pedagogy should not be separated, and teacher educators should play their role by manipulating technology to gain from the integration of ICTs into their teaching strategies (Ndlovu, 2015). It is important to deal with ICT as part of pedagogy and not as a separate entity in teaching and learning, because although ICTs have invaded education, they cannot substitute the teacher. Teacher educators are seen as agents of change in this transformation (Ndlovu, 2015). Effective ICT integration into the teaching and learning process may engage students in their construction of knowledge and help students develop skills such as problem-solving in problem-based learning (Wang, 2009). This may result to students attaining higher order thinking skills (Lim & Tay, 2003).

In Eswatini, ICT integration can be of great help to preservice teachers because their pedagogy may improve from the traditional approach where teachers lecture students and students are passive listeners to student-centred pedagogies where students are engaged in the teaching and learning process. When using ICTs, both teacher educators and students engage in the use of ICTs to access, select, organise and interpret

information to generate new knowledge (Fu, 2013). According to Conole and Dyke (2004), this includes developments in online learning settings, research, and communication systems. Therefore, there is need for ICT training, especially on how to use ICT in teaching and learning. Pandita et al. (2010) asserted that ICT training have been an important element of Indian efforts to deploy technologies for education.

Bahati (2010) found that lecturers at Kigali Institute of Education (KIE) used ICT for academic purposes. Bahati (2010) stated that interviewed and surveyed lecturers use computers to convert content into digital formats using Microsoft Word and for research. They use the internet to refer students for research and for communication through emails. Lecturers, who are teacher educators in this study, refer students to a given website to search for information and for further reading. Students then use the information to have discussions and do their assignments. KIE lecturers use ICT to prepare for their teaching by structuring content and present it using PowerPoint, to illustrate content by adding pictures and videos taken from internet, and to add graphs and diagrams more quickly. ICT makes their work easier (Bahati, 2010).

In a study in Australia on students' use of mobile devices, Roberts and Rees (2014) found that students use their mobile devices for social activities like texting, Facebook, email, and use their laptops to take notes, do research and access slides. iPads are used to take notes, play games and access lecture slides.

In Israel, Shonfeld and Goldstein (2014) found that ICT are used to search for resources on the internet, communicate through email, and present information in digital format. The lecturers also use ICT to engage their students in inquiry-based activities, problem-solving and chats.

Haiping (2015) conducted a study on two Namibian university campuses to map students' smart phone use for academic purposes. The results revealed that mobile devices are mostly used to receive calls and send and receive text messages. They are also used for academic purposes to browse the internet and for social media such as Facebook and chatting services (WhatsApp). This calls for HEIs e-learning strategies to seriously consider digitising learning content for the easy sharing of information and searching for information from the internet (Haiping, 2015). Students use ubiquitous

ICTs to create personal learning environments to improve their learning skills (Looi et al. 2010). This is a call for teacher educators to make their students' learning a seamless experience both in class and out of class.

Comi et al. (2017) presented five ICT-related teaching practices in Italy. The first practice is using ICT for knowledge transmission, which involves using ICTs during teaching to present slides, videos, audio or websites (digital materials) and sharing files with students. The second practice is media education, where students are equipped with ICT skills that are not directly linked to course content, such as awareness of digital risks, evaluation of online content and netiquette in social media (privacy rules). The third practice is active involvement, which encompasses interactions among teacher educators, students and ICT devices, including using software and guiding students on how to source online information from the internet and synthesise it to address certain concepts comprehensively. The fourth practice is backstage activities, such as using ICT out of class to prepare notes and tests. Finally, ICT is used for communication using emails and social media (WhatsApp, Facebook and chats).

The insights from this literature review showed the researcher how Eswatini HEIs can be helped to reinforce the use of ICT in teaching and learning. As stated above, ICT can be used to access, select, organise and interpret information presented in a lecture. The technology should be used with pedagogy as content is presented to students for desired outcomes. This study also intends to emphasise that curricula should state which ICTs can be used for each lesson topic and how it can be used by both teacher educators and students.

2.3 ICT Affordances

This section looks at ICT affordances and how they contribute to teaching and learning. Affordances present a relational approach to understanding the way people use technology (Leonardi, 2013). ICT improves access to learning and the quality of teaching and learning in schools in South Africa (Department of Education, 2004). According to Fu (2013), ICTs can improve the quality of teaching and learning through autonomy, capability and creativity. Students can be autonomous when using ICT because they can

work by themselves and with their peers in groups as they engage with tasks assigned to them by their teacher educators. Students can collaborate using ICTs to build new knowledge. This can boost their confidence as they work on their own and learn from their mistakes and also learn from their peers. ICT also allows teacher educators to easily access information and easily create their teaching materials, allowing them to gain control over their course content. Students become capable when they gain confidence in the learning process to apply and transfer knowledge using ICT (Fu, 2013). Students can be creative when they discover multimedia tools to create materials through games, audio, and videos to address given tasks. The combination of autonomy, capability and creativity when using ICT can improve the quality of teaching and learning.

Conceptualising ICT affordances can enable teacher educators to adopt technology in teaching and improve their perception of digital technologies. Their ability to use ICT in teaching gives them the opportunity to accommodate diverse pedagogical approaches through various interactions (Dlamini & Nkambule, 2019). The dispersion of ICTs in the classroom is a prerequisite for new approaches to teaching and learning to accommodate diverse student experiences. Integrating ICTs in teaching and learning can help realise the potential of new ICTs to make classrooms dynamic spaces of learning.

Gibson (1986) was the first to use the term ‘affordance’ and defined it as “properties taken with reference to the observer” (p. 143). He believed these properties as perceived by the actor afford opportunities for action (Ndlovu, 2016). This means the actor’s consciousness of the affordances leads to action, and that leads to the technology becoming effective. McGrenere and Ho (2000) extended Gibson’s definition to include usability and usefulness. This study also consider ICT affordances as applicable in education and in connection with the opportunities that technologies bring into teaching and learning (Dlamini & Nkambule, 2019; Hammond, 2011).

Conole and Dyke (2004) analysed ICT affordances and came up with a taxonomy of affordances. The taxonomy of affordances comprises accessibility, diversity, speed of change, communication and collaboration, reflection, and immediacy. These affordances are explained below to show how they support teaching and learning, especially in HEIs, as per the focus of this study. This is aimed to contribute to “a more systematic application

of the use of ICT for learning and teaching” (Conole & Dyke, 2004, p. 114). The affordances are:

- **Accessibility:** ICT enables easy access to information by using various mechanisms. Online access is achieved through gateways, portals, websites, and knowledge networks (Ndlovu, 2015).
- **Speed of change:** ICT enables exceptional speed of access to vast amounts of information or resources that can be used during teaching and learning. This can compromise the quality of information gathered from unauthorised sources as students are engaged in research. It can also lessen reflective and critical thought among students (Ndlovu, 2015).
- **Immediacy:** ICT has increased the speed of receiving responses as information is exchanged through various platforms such as the internet and emails. Conole and Dyke (2004) posited that ICT can be used to solicit quick responses by manipulating online learning environments. This gives both teacher educators and students the opportunity to get prompt feedback.
- **Communication and collaboration:** Communication and collaboration using ICT have the potential to enrich engagement during teaching and learning. Conole and Dyke (2004) asserted that this affordance makes it easy to communicate and share information over distances. ICT permits the use of new forms of interchange and communication. ICT enables the development of online communities to communicate and share information through specialised discussion forums and chats. Group members become valuable to each other as they accomplish tasks together to contribute to the group’s goals. This process allows group members to construct and synthesise ideas. Group members can challenge or modify each other’s contributions, allowing the originator of the thought to develop or defend their submission. This leads to the collaboration of thoughts that may lead to knowledge construction for both teacher and students.
- **Diversity:** Conole & Dyke (2004) presented diversity as having the potential to offer teacher educators and students the opportunity to acquire information that can be used during teaching and learning. This affordance can be achieved by

accessing different websites that give access to subject experts (Conole & Dyke, 2004). Teaching and learning are holistic activities that work best when associated with other people's capabilities, local and beyond, to develop and establish conceptual understandings. To expose themselves to the experiences of others, teacher educators need to consult other experts when they face difficulties in their teaching experiences, (Conole & Dyke, 2004).

- **Reflection:** ICT enables critical reflection that are enhanced as it engages users in online discussions for a longer time than is possible in face-to-face discussions (Conole & Dyke, 2004). Asynchronous technologies can be used in discussions to support teaching and learning activities (Ndlovu, 2016). Asynchronous technologies allow users to access and build on earlier online discussions and chats, which can help students to reflect on what was discussed and on their new knowledge. Teacher educators and students can critique and evaluate new knowledge that were taught and learnt.

2.3.1 Factors that influence engagement of affordances

It is crucial to understand what ICTs do to enrich teaching and learning experiences. According to Tondeur et al. (2011),

ICT allows us to create, collect, store and use knowledge and information; it enables us to connect with people and resources all over the world, to collaborate in the creation of knowledge and to distribute and benefit from knowledge products (p. 152).

Dlamini (2015) concurred that ICT is significant in information sharing, social platforms, virtual learning, and instructional delivery.

Teacher educators' use of ICTs should not be restricted to the actual affordance the ICT was designed for. They can use ICT hardware or software in a different way from what it was originally designed for (Ndlovu, 2016). This can be because of the teacher educators' perceptions, which play a key role in what the technology is used for (Ndlovu, 2016). This means that ICTs can be used differently by different users depending on the context or environment because they perceive its affordances differently.

Ndlovu (2016) asserted that teacher educators' past knowledge and experiences influence how they perceive technology. Perceptions are influenced by what the person knows (Webb, 2005). Limited knowledge about or experience with the ICT may lead to using the ICT inappropriately as users may be influenced by their perceptions of the ICT or by their needs. Although the degree of perceptual information and affordance may influence the use of an ICT, the urgency to satisfy a pedagogical need is likely to be the driving factor (Ndlovu, 2016; McGrenere & Ho, 2000). The teacher educator's and students' needs determine how the ICT should be used, regardless of the teacher educator's experiences with the ICT.

Boyle and Cook, (2004, p. 296) argued that ICT affordances can change "the habitat in which we live. The new habitat affords a new way of living". ICT may disrupt teaching practices in the classroom; therefore, transformative ways are needed to improve passive and content driven models teaching (Dlamini & Nkambule, 2019). Furthermore, ICT usage can disrupt classroom norms for better or worse. This is evident when the ICT prevents the teacher from paying attention to student's needs by converging on the affordances of the ICT rather than teaching for effectiveness (Ndlovu, 2016). This is crucial as it may compromise the value of teaching and learning. Conole and Dyke (2004, p. 302) argued that once unintended consequences are produced, there should be "creative and adaptive interaction with the environment". Incorporating TK and PCK skills are crucial for teacher educators' resourcefulness to rescue the situation. The combination of TK and PCK can "reveal and develop our human creativity and responsiveness and allow us to learn effectively and enjoyably" (Anderson & Dron, 2012, p. 2).

2.4 Curriculum and ICT Integration

This section of the literature review gives a synopsis of what research outlined on issues of curriculum and ICT integration. Curriculum is a broad term that can mean achieving specific educational goals and objectives; a course of study for students; a plan for implementing educational activities; an outline of a course programme; or a programme for experiences (Su, 2012). The experiences are learning experiential encounters that engage students inside or outside the classroom. Thus, the subject matter, actions of

teachers in the classroom, the actions of students, and the instructional materials can be facets of the experiential curriculum. This study adopts the definition of curriculum to mean all the experiences that take place in HEIs' programmes in Eswatini. This includes the course of study for students, course outlines and how educational activities, such as ICT integration, are implemented.

Nxumalo (2016) asserted that to change a curriculum, people who have direct or indirect influence on the curriculum must be involved. These people include policy makers, curriculum specialists, employers, teacher educators, and students. Relevant stakeholders must be consulted for their perceptions about the transformation and whether it is compatible with their traditions and ideologies and to tap into their past experiences to see how that may influence the change.

A curriculum should be up to date, relevant, integrative and consistent with societal norms and expectations (Zendah, 2017). Curriculum planning entails curriculum content, which includes needs of society, needs and interest of students, and cultural expectations. This is important because most curricula are planned with reference to specific aims based on what is considered a priority (Zendah, 2017). Curriculum content must be enhanced and reinforced by good delivery strategies, which may be achieved using ICT. According to Zendah (2017), ICT can be used to deliver curriculum content to students, to access content, to assess students' learning and to enable peer-to-peer and collaborative learning. This suggests that a good curriculum not only prescribes what should be taught and learnt in a course and in the stages of learning but also elucidates how the curriculum should be presented in the classroom where the learning takes place (Zendah, 2017).

The integration of technology in teaching and learning is key because ICT tools provide support to instructional methods for more feasible cooperative learning experiences for students as they engage with their curriculum content (Tomaro, 2018). Educational goals or objectives should guide the use of ICTs in HEIs, and this can be achieved when HEIs develop curriculum standards for technology integration. According to Tomaro (2018), curriculum standards should create clear expectations for the teacher educators and students as they interact with the content using ICT and also state how teacher educators can improve their instructional strategies. ICT should not replace teacher educators but

should be used as tools for a more effective pedagogy to attaining instructional objectives. Ghavifekr and Rosdy (2015) noted that ICTs are not replacements for teacher educators but tools needed to improve teaching and learning. Teacher educators should guide ICT integration in the curriculum, and are therefore facilitators. It is worth noting that ICTs do not have educational value as tools but gain value when teacher educators and students use it in the teaching and learning process (Ghavifekr & Rosdy, 2015). Teacher educators play an important role in the use and integration of ICT into the curriculum. According to Fu (2013) teacher educators can present their lessons to students using ICT and engage students to build new knowledge by searching, accessing, and selecting appropriate information from various sources, which should be interpreted and presented in discussion forums or chats. ICTs can be used as tools for students to solve problems by providing solutions to the problems in the learning process. This means that ICT integration is a process that entails proper planning for the integration process and use during instruction in the classroom. Students can benefit from ICT integration practices of their teacher educators for future use in their teaching (Arslan, 2013).

Chigona, Chigona and Davids, (2014) stated that in South Africa teacher educators are encouraged to use ICT to develop learning experiences across the curriculum. This is crucial because ICT integration exposes students to technologies and help them gain skills needed in the workforce, allowing them to make the best use of the technologies (Chigona et al. 2014). As part of the teaching and learning process in HEIs, curriculum and instruction must to be supported by technology (Arslan, 2013). As stated earlier, change is key in the process of ICT adoption into a curriculum (Arslan, 2013; Keengwe et al. 2009). The researcher argues that using ICT in specialty areas helps students learn the ICT skills with real tasks. This shows that technologies work best with content knowledge (what we teach) and pedagogical knowledge (how we teach), and therefore the TPACK framework was used in this study and discussed in Chapter 3. It is further argued that competences such as thinking skills, information accessing, evaluation, problem-solving and synthesising skills are better learnt using ICT (Bester & Brand, 2013; Department of Education, 2004). ICT cannot be a panacea for all education problems, but it can provide new possibilities to the teaching profession if integrated in the curriculum (Bester & Brand, 2013).

According to Bester and Brand (2013) curriculum instruction should be based on competences and skills to be demonstrated by students. Teacher educators are challenged to prepare graduates to effectively use technology as a learning tool, yet they may not have experienced learning in technology infused classrooms as students themselves (Arslan, 2013). This means that teacher educators had to learn using technology in their teaching by themselves, and therefore, some teacher educators do not use ICT in their teaching because they are computer-phobic (Sherman & Howard, 2012). Yet, it is necessary to pedagogically integrate ICT to accommodate the current students who use technologies in their daily lives in HEIs (Keengwe, 2007). This shows that teacher educators need support and training to disseminate ICT integration into their curricula in order to effectively integrate ICT.

2.5 Teacher Educators' Perceptions of the Educational Value of ICT

Teacher educators' perceptions of training may influence their pedagogical styles and ICT integration practices (Arslan, 2013). Their ICT integration seems to be influenced by their perceptions of ICT use in the classroom (Ndlovu, 2016). In addition, personal factors imbedded within a teacher educators' beliefs influence the instruction process (Ertmer, 2005), and this may influence their perceptions of the value of ICTs in education, which includes the way teacher educators generally integrate technology tools into their curriculum. Teacher educators' perceptions of the educational value of ICT while implementing the curriculum may influence their instructional practices and how students act as they perform instructional tasks.

Chabinga (2015) asserted that teacher educators' attitudes towards ICTs determine their success or failure at integrating ICTs. Al-Zaidiyeen, Mei and Fook, (2010) supported this idea by highlighting that there is a connection between teachers' attitudes and the use of ICTs. Teacher educators' confidence in the use of ICT may make them feel comfortable to use it in their teaching, and teachers who do not feel confident using ICT are unlikely to integrate it in their pedagogy (Chigona et al. 2014; Chigona & Chigona, 2010).

Three factors influence teacher educators' ICT use, namely perceptions of ICTs, confidence using ICTs, and attitudes towards ICTs (Bordios, 2016). Unless teacher

educators feel comfortable in using ICTs, they may not be prepared to use ICT for teaching and learning (Baylor & Ritchie, 2002). This implies that teacher educators should be drivers of their instructional practices through their positive perceptions of ICT use in order for them to be in a position to use ICT during instruction (Hismanoglu, 2012). Bahati (2010) stated that as teacher educators are key in the learning environment, they should embrace ICTs and integrate it in their learning environments. According to Arslan (2013) change can be hard and cannot happen without resistance. The implementation of ICTs may be characterised by fear of the unknown and its implications for the users.

Teacher educators are key to ICT integration innovation in HEIs. For that reason, their professional development with respect to pedagogy ICT integration is crucial (Bahati, 2010). The quality of teacher educators' competencies to use ICT pedagogically depends on their level of professional development (Bahati, 2010). Though Su (2009) argued that having enough ICT resources and ICT training do not guarantee ICT integration into teaching, these are key for ICT integration.

According to Bahati (2010), the following important competencies may be acquired and used by teacher educators for ICT integration:

- Using the internet to search for information and resources during class preparation;
- Using websites, for example, portals, web pages, and search engines, related to their specialty;
- Using PowerPoint presentations (PPP) to clarify concepts;
- Using ICT programmes developed for their area of specialty;
- Designing websites to support teaching;
- Using email and other communication forums;
- Helping students use ICT;
- Using collaborative working strategies promoted by ICT;
- Designing online tutorship to enhance learning; and
- Designing virtual activities (Bahati, 2010).

In South Africa, Department of Education (2007) provided clear directions to address the ICT-pedagogy training for teachers. The Guidelines for Teacher Training and Professional Development in ICT is based in the following three dimensions:

- “A pedagogical dimension, which entails using ICT to teach;
- A technical dimension, which includes selecting and using ICT appropriately; and
- A collaboration and networking dimension, which includes networks and collaborating with others to create and participate in communities of practice.”
(Department of Education, 2007, p. 2).

Harris (2002) explored inventive instructional practices in the United Kingdom (UK) and reported that ICTs have the potential to transform teacher educators’ instructional practices. This means that teacher educators can shift from being teacher-centred to student-centred in their instructional practices by using ICTs. According to Chabinga (2015), technology influences the education system in such a way that it can lead to the transformation of teaching practices. Fu (2013) asserted that the merits of ICT integration into teaching and learning include supporting teaching by facilitating access to course content, assisting students to access digital information, supporting student-centred and self-directed learning, and promoting creative and collaborative learning. Thus, it is crucial that ICT becomes part of the tools used in teaching and learning for improved classroom practices and engagement in the HEIs in Eswatini.

Fitzgerald (2005) in Chabinga (2015), suggested that teacher educators may avoid using ICT for teaching and learning because of their beliefs. According to Kvasny (2006) in Chabinga (2015), these beliefs relate to attitudes and behaviour regarding the interest and acceptance of ICTs. Positive perceptions of ICT use can enhance students’ learning. Teacher educators’ proficiency and how they perceive the usefulness of ITC can influence their use of ICT (Lai, 2015; McCallum, Jeffrey, and Kinshuk 2014).

In Belgium, teachers and students perceived the educational value of tablet devices as ease of use, accessing different learning materials, searching for information, taking pictures, integrating notes, and carrying less books in schoolbags (Montrieux et al. 2015). Montrieux et al. (2015) also reported that students and teachers said the advantages of

using tablet devices include encouraging collaboration among students and sharing information. Teachers and students used iMessage and Facebook and students created online networks and chat forums. These findings validate the educational potential of ICT tools, which include browsing the internet, working in groups, and using ICT to understand content. Teachers and students also remarked that tablet devices necessitates a shift in learning for which not all students were ready (Montrieux et al. 2015). This information is relevant to the study because it states the ICT integration practices of the teachers and students. It also elicits the perceptions held by the teachers in Belgium, which can help to understand teacher educators' perceptions when using ICTs.

2.6 Teacher Education Structures and ICT Integration

In HEIs in Eswatini, ICT is taught as a course and not as a tool to be used for teaching and learning across the curriculum. This may be because of the belief that ICT use fit more with courses like Science and Mathematics than other courses (Comi et al. 2017). It should be noted that Eswatini teacher educators are autonomous in their choice to use ICT-related practices. According to Comi et al. (2017), the freedom to choose ICT tools allows for variations across courses as teacher educators used ICTs to present content rather than to promote problem-solving and increase student interaction with subject matter through communication and collaboration with each other and the teacher educators. Hence, there is not yet a clear consensus about which courses benefit more from ICT use, and this makes it hard to detect which practices best suit each course (Comi et al. 2017). There is lack of ICT infrastructure in the Eswatini institutions because not all classrooms have computers, laptops, and overhead projectors to permeate the integration of ICTs it on teaching and learning. HEIs in Eswatini may need to design and implement their vision for ICT integration to improve the availability of ICT infrastructure as well as to offer relevant professional development programmes to in-service teacher educators on how to integrate ICT in their teaching and learning practices.

ICT integration into teaching and learning require teacher educators to acquire ICT skills in their instructional practices and to use technology as a learning tool. When HEIs administrators introduce ICT integration through vision and expertise, HEIs can improve their instructional use of ICT, which can enhance student learning as the students can

access new knowledge, discuss concepts and solve problems using ICT (Arslan, 2013). Given the literature on ICT integration that has been discussed in this chapter, HEIs must mobilise and motivate their teacher educators to engage actively in institutional innovations, especially ICT integration. It is very important that teacher education structures in institutions create an enabling environment for the pedagogical integration of ICTs.

Montrieux et al. (2015) argued that apart from the importance of the teacher, there are school-level variables stated in the e-capacity framework that can influence the ICT integration during teaching and learning. These school-level variables include “an ICT-support team, ICT infrastructure, teacher professional development” (Montrieux et al. 2015, p. 15), and an ICT coordinator who can lead the integration process by scaffolding teacher educators. This supports the claim that teachers’ knowledge and skills are key to the success of pedagogical ICT integration.

Apart from professionalisation, teachers need to familiarise themselves with new ICT tools. According to Montrieux et al. (2015), familiarisation is one of the five stages of Welliver’s instructional transformation model that helps to reflect the level of ICT use among teacher educators. The other four stages are utilisation, integration, reorientation and revolution. Although familiarisation with ICT tools is not adequate to make teacher educators integrate ICT into teaching and learning, it makes the teacher educator aware of ICT and its potential uses (Montrieux et al. 2015). The teacher educator can then think about how ICT can be used and integrated in teaching and learning.

Chabinga (2015) argued that lack of ICT access is an obstacle to attaining ICT skills and that administrators can help improve access to ICTs. HEIs’ administration can improve access to ICT by providing more ICTs so that teachers and students have enough ICTs. They can also improve access to a fast internet connection for easy access to the internet and to avoid disruptions during teaching and learning. Teacher education structures in HEIs plays an important role in ensuring ICT integration in the institutions. They are a catalyst for change for better implementations in the institutions and can ensure the effective integration of ICTs.

Arslan (2013) stated that the challenge facing HEIs is the execution of the change, which includes the need for institutions to evolve swiftly to sustain the change brought by the emergence of new technologies. According to Chabinga (2015), HEIs' administration should train in-service teacher educators in the use of ICT across various courses so that teacher educators can acquire the skills or competencies needed to teach with ICT. Developing an ICT policy that emphasises professional development of teacher educators "with much attention to digital didactics and material, may inspire teacher educator and students' appreciation of ICT tools' potential in education" (Montrieux et al. 2015, p. 15). The support of HEIs' administrators in Eswatini in the use of ICT in teaching and learning may give teacher educators the time to use technologies in teaching and to share their experiences with other teachers (Su, 2009).

2.7 Barriers to the Use of ICTs

Although the aim of the research was to explore the pedagogical ICT integration practices among teacher educators in ITE programmes, it is worth noting the barriers that teacher educators encounter when using ICTs during instruction. This section of the literature review examines the barriers or challenges encountered in integrating ICTs in teaching and learning according to research. Su (2009) asserted that although teachers are aware of the significance of ICT integration into teaching and learning, they face challenges when integrating technology into their curricula. Some of the barriers are resource related and others are the result of fundamental beliefs and processes of the education system (Su, 2009). Some teacher educators do not use ICT in their teaching since they are ICT-phobic (Sherman & Howard, 2012). They are not familiar with how to evaluate the use and role of ICT in teaching, and this hinders their eagerness and confidence to use ICTs. Mndzebele (2013) identified external and internal barriers of ICT integration in teaching and learning. These are lack of ICT knowledge and skills, shortage of time, not enough ICT resources, insufficient funds, low internet connectivity, and lack of maintenance of available ICTs. Teacher educators' ICT knowledge and skills are key for them to integrate ICTs in teaching and learning.

Ang'ondi (2013) conducted a study on teachers' attitudes towards and perceptions of the use of ICT in teaching and learning in Kenya and found that inadequate ICT infrastructure, lack of skills to use ICT and curriculum overload were challenges to ICT integration in schools. The teachers perceived the use of ICT to be an additional load to their already huge teaching load. The teachers also believed the curriculum is overloaded and therefore they have to find extra time to complete it (Ang'ondi, 2013). Curriculum overload can be curriculum expansion or overcrowding, which is normally due to including new items in the curriculum without considering the amount of content in relation to the time available for instruction. The teachers in Kenya felt they lacked the knowledge to use ICT, including the skills to sufficiently integrate ICT into teaching and learning. According to Comi et al. (2017), the lack of ICT knowledge can make teacher educators anxious, especially in situations where students' have more ICT knowledge than the teachers. ICT training on the pedagogical integration of ICT may help teacher educators' use specific practices.

External factors such as the number of students using an ICT in institutions' laboratory and lack of ICT policies in institutions also affect the use of ICT in institutions (Chigona et al. 2014). Similarly, institutional conditions such as insufficient infrastructure and no ICT coordinator can affect the integration of ICT into teaching and learning. Institutions must have enough infrastructure and ICT coordinators who can lead ICT implementation by scaffolding teacher educators (Montrieux et al. 2015). In addition to barriers such as lack of skills, support and training, Kundu and Nath (2018) mentioned lack of time, technical support and administrative support as barriers to using ICT in classrooms in India. To substantiate the issue of time, Gerlich and Wilson (2005) indicated that teacher educators who use ICT "held slightly more office hours per week than their peers" (p. 3). This is evidence that overtime is a major downside to teacher educators using technology (Hulbert & McBride, 2004).

Chabinga (2015) stated that access to ICT is another barrier to ICT use during teaching and learning. Lack of access to ICTs may be due to the unavailability of ICTs such as internet, which may be because of the digital divide. The digital divide is "the gap between people with access to ICT and those with limited or no access at all. It includes disparities in physical access to technology, resources, and digital skills" (Pandita, Singh & Kumar,

2010, p. 6). Yet, access to ICTs is part of Sustainable Development Goal 4 on quality education among the objectives set for 2020 (Chabinga, 2015). Easy access to technology is one of the prerequisites to having TK and “this is possible only when one can afford to have ICT resources to access information and knowledge to be used” (Pandita et al. 2010, p. 5). On the other hand, even when people are familiar with the technology and adequately literate to use it, the unavailability of technology still enforces the digital divide (Pandita et al. 2010). Despite being important, internet access is a challenge in rural schools in India because schools are charged high fees by internet providers and internet connectivity is slow (Kundu & Nath, 2018). Access to ICT resources is crucial for teacher educators to integrate ICT into their pedagogical practices because lack of access hinders the use of ICT. For ICT integration to be effective and successful, teacher educators and students must have access to ICT resources, which include an internet connection. Teacher educators in Eswatini also encounter these barriers as stated in literature.

ICT as an agent of change brings a paradigm shift to teaching and learning (Pandita et al. 2010). A paradigm shift means a change in innovations, and “these changes can be considered as evolutionary and are driven by the agents of change” (Pandita et al. 2010, p. 10). ICTs have revolutionised the world, and there is more and more dependency on ICTs to access and disseminate information. However, we have not yet reached the stage where we can emphatically say that ICT has become a universal phenomenon and that all people on the globe can access the information through ICTs (Pandita et al. 2010). This shows that ICTs have not only invaded all aspects of life but have also transformed communication between teacher educators and students in HEIs (Chabinga, 2015).

2.8 Chapter Summary

This chapter provided a synthesis of the literature reviewed on ICT integration in teaching and learning and focused on HEIs during ITE. The literature reviewed addressed the research questions of the study. The reviewed studies indicated the ICT practices in teaching and learning, ICT affordances in teaching and learning, and curriculum and ICT integration. The literature review further highlighted the perceptions of teacher educators

of the educational value of ICT and how education structures hinder and permits ICT integration. The studies also indicated the barriers to the use of ICTs.

CHAPTER 3: THEORATICAL FRAMEWORK UNDERPINNING THE STUDY

3.1 Introduction

This chapter discusses the theoretical framework underpinning the study. The study was informed by various concepts, definitions and existing knowledge in order to understand the ICT integration practices of teacher educators in HEIs in Eswatini. This was done to address the research problem and research questions of the study. This study used TPACK framework, the unified theory of acceptance and use of technology (UTAUT) model, and social constructionism theory as theoretical framework. The researcher beliefs that the TK of teacher educators can help inform teacher educators' practices in their classrooms, and therefore, TPACK was used as a theoretical framework for the study. Their pedagogic practices can be seen changing from traditional pedagogies to the use of ICTs in their teaching processes, which can lead to student involvement in the construction of knowledge. The unified theory of acceptance and use of technology (UTAUT) model was also used to investigate the pedagogical integration of ICTs in Higher education. UTAUT considers organisation system variables that may adversely impact the adoption of ICT in an institution, such as cost, training, and institution support (Dludlu, 2018).

3.2 Relevance of the Theories to the Study

The TPACK framework formed the backbone of this study as it helped discover and describe how TK is effected in practice. Teaching is a complex practice that involves working with different kinds of knowledge and happens in different settings. As teaching is done in different contexts, the TPACK framework explains that there must be access to rich, well-structured and integrated knowledge from various fields, including knowledge of subject matter or content, knowledge of pedagogy, and increasingly, ICT knowledge (Koehler et al. 2014). Koehler et al. (2014) stated that the TPACK framework helps us understand that this knowledge interacts with each other for effective teaching. The TPACK framework also helps us understand that ICTs have their own propensities, possibilities, affordances, and restrictions. The TPACK framework shows that social and contextual factors influence teacher educators' understanding of the connection between

content, pedagogy and technology in teaching and learning. This understanding leads to social constructionism, which originated in an endeavour to understand people's relationships with the nature of reality. This sociological theory explains the development of mutually constructed understandings of knowledge, meaning that the way people understand concepts shape others' understanding of those concepts (Andrews, 2012). Understandings are not developed separately within a person but are instead developed through experiences and interactions with other people. This links well with TPACK because the different forms of knowledge presented in TPACK, namely content, pedagogy, and technology knowledge, are socially constructed understandings. Teacher educators should continue to integrate these forms of knowledge rather than treating them as separate domains of knowledge. ICT integration, which is the focus of the study, requires a dynamic relationship between content, pedagogy and ICT (Mishra & Koehler, 2006). TPACK is a sufficient theory to explore or guide the ICT integration practices of teacher educators in the HEIs in Eswatini. Since 2006, TPACK has become one of the leading theories for ICT integration.

To understand the practices of teacher educators, the study used the social constructionism theory, which is a theory of learning, teaching and design (Xerou, Papadima-Sophocleous & Parmaxi, 2016). As teacher educators teach according to the TPACK theory, they have to teach it so that there is social interaction between students that can lead to the construction of meaning and reality. Social constructionism enables teacher educators to use student-centred teaching strategies and techniques. Xerou et al. (2016) argued that the role of teacher educators is to create collaborative, problem-solving environments for students using ICT. Teacher educators should engage students in group discussions using LMSs and encourage students to collaboratively interact with the ICT to solve problems.

The UTAUT was used in the interviews and was adopted because it explains ICT integration in any context and the subsequent behaviour. The context of this study was the pedagogical Integration of ICT in HEIs at Eswatini, a developing country. The variables that had a direct influence on behavioural intentions and usage were performance expectancy, effort expectancy, social influences, and facilitating conditions.

These variables were determinants of technology acceptance and integration (use behaviour), and they seemed adequate to understand the context of the study.

The use of TPACK framework, social constructionism and the UTAUT in this study showed that technology integration can be effective when used together with other forms of knowledge. These forms of knowledge include content, pedagogy, and technology knowledge. According to Mishra and Koehler (2006), TPACK help teacher educators to make connections between TK, pedagogical knowledge, and content knowledge. The researcher believes that students learn best when instruction is student-centred, which is why the social constructionism theory was used. This theory was used as a lens to view the pedagogical practices of teacher educators. The UTAUT was used because ICT integration is determined by other factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions.

3.3 Technological, Pedagogical and Content Knowledge (TPACK)

Teaching is a complicated practice that involves working with many kinds of specialised knowledge. The TPACK framework was introduced by Mishra and Koehler in 2006 and advocates for teacher educators to connect their understanding of content, pedagogy, and technology in teaching and learning (Koehler, Mishra, Kereluik, Shin & Graham, 2014). The complex and dynamic classroom contexts require teacher educators to constantly change their understanding of certain concepts. For teaching to be effective, there must be access to organised, integrated knowledge from different domains, including knowledge of subject matter/content, pedagogy, and increasingly, ICT (Koehler et al. 2014). According to Koehler and Mishra (2009), technologies have their own propensities, potentials, affordances, and constraints. Newer technologies seem to complicate teacher educators' use of ICTs. Most teacher educators have insufficient and inappropriate experiences to use ICTs for teaching (Koehler & Mishra, 2009). Yet the accessibility of ICT networked tools have the potential to transform the teaching and learning process.

Social and contextual factors also complicate teaching with technology. Many teachers qualified as professional educators at a time when educational technology was much less

develop than it is today. This has led to teachers being provided with basic or no training in technology integration. Acquiring knowledge-based skills can be challenging, particularly when the activities demand more time. For teacher educators to use new knowledge about ICT, it must be consistent with their existing pedagogical beliefs (Ertmer, 2005). Technology integration requires educators to accommodate the complexities of content, pedagogy and technology, which are key components of the TPACK framework. Figure 3.1 shows how the different types of knowledge interact in the TPACK framework.

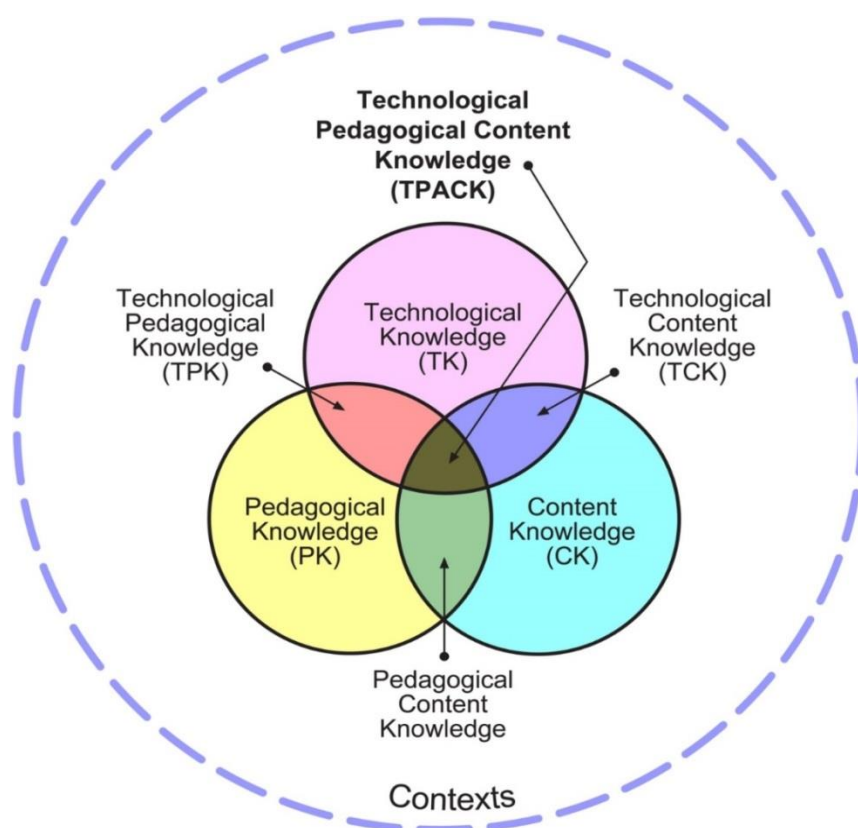


Figure 3.1: The TPACK framework and its knowledge components (adopted from Koehler & Mishra, 2009).

The TPACK theory extends Shulman's (1987) notion of PCK, which is knowledge of how to combine pedagogical practices and content to include educational technology. According to Shulman (1987), teaching requires the transformation of knowledge from a variety of domains. He presented the following seven categories of knowledge: Content knowledge, which means what the teacher anticipates to teach; pedagogical knowledge; knowledge of the curriculum; PCK; learner knowledge; educational contexts; and ends,

purposes, and values and their theoretical grounds. He emphasised the prominence of an amalgamation of these knowledge domains and that teachers must be able to reason soundly about what they are teaching. According to Koehler, Mishra, Akcaoglu, and Rosenberg (2013), TK is another type of teacher knowledge in the TPACK framework. TK is an understanding of how to use ICT in educational contexts, for instance, in pedagogical tasks such as research, communication, and media creation (Koehler et al. 2013). TPK is the relationship and interaction between technology and pedagogical practices. TCK is the interaction or intersection of technology and course competencies or content (Koehler et al. 2013).

TPACK is an understanding of the knowledge that a teacher educator must acquire for effective ICT integration (Alyyar & Fisser, 2019). Teacher educators' knowledge should move from only subject matter knowledge, or content knowledge, to TK. This means that teacher educators should move from ICT literacy to understanding ICT broadly and applying it productively at work on daily basis to recognise ICT potentials. This is referred to by Koehler, Mishra, Kereluik, Shin and Graham (2014) as fluency of information technology. Teaching with technology is sometimes difficult because teacher educators have to select appropriate ICTs for specific pedagogical goals and practices (Koehler et al. 2013), and therefore, the TPACK framework suggests an intersection in pedagogy, content and technology knowledge. Teaching successfully with ICT requires continually creating, maintaining and re-establishing a balance among content, pedagogy and technology components (Koehler, Mishra, Kereluik, Shin & Graham, 2014).

The TPACK framework states that ICT integration is part of the knowledge that teachers need to consider when teaching. Koehler et al. (2014) further argued that TPACK seeks to help develop techniques to discern how ICT knowledge is applied in practice. This framework emphasises the interaction of teacher educators' understanding of content, pedagogy and technology for effective teaching (Koehler et al. 2014).

Based on the advantages TPACK provides to teachers, the research has adopted this framework to explore the pedagogical practices among teacher educators in ITE programmes. The TPACK framework have the potential to promote research, professional development and teachers' use of technology. It helps address a complex

phenomenon like ICT integration in ways responsive to inquiry and growth (Koehler et al. 2014). It also permits researchers and teacher educators to move from treating ICT as an 'add-on' to focusing on the connections between the knowledge domains (Koehler et al. 2014). TPACK depicts the role that knowledge about technology and its use can play in teaching and learning. The theory outlines how content and pedagogy form a foundation for effective teaching with technology. In teaching and learning processes the technology must be used together with the pedagogy to present content or knowledge to students.

3.4 Social Constructionism

Andrews (2012) noted that social constructionism was coined in an endeavour to understand people's relationships with the nature of reality. It originates from sociology and is linked with the era of qualitative research (Andrews, 2012). Charmaz (2006) used the terms constructivism and social constructionism interchangeably and incorporated them under the generic term 'constructivism'. Social constructionism was developed by Berger and Luckmann (1991). Social constructionism professes to make no ontological claims and is confined to the social construction of knowledge (Berger & Luckmann, 1991). This sociological theory observes how jointly constructed understandings are created by people in everyday life. People shape each other's understanding through experiences and interactions (Andrews, 2012). This makes each person's reality unique as people construct and justify their reality through their social experiences with others.

Social constructionists view knowledge as constructed. They consider concepts to be constructed rather than discovered, and they relate to what is real in the world. Social constructionism encourages student-centred teaching where students engage with peers, have discussions and draw conclusions. According to Berger and Luckmann (1991), reality is understood socially and is the subjective experience of everyday life or how the world is understood rather than its objective reality. As people interact with the social world and with each other, they develop concepts and representations of their actions resulting in routinisation and habitualisation (Andrews, 2012; Galbin, 2014). This means that any frequently repeated actions develop into a pattern that can be imitated as roles by the actors (Andrews, 2012). Therefore, when teacher educators integrate ICTs into their teaching processes, resulting in the frequent use of ICTs, this can become a pattern

or routine in HEIs and can be cultivated in the preservice teachers, who are likely to promote ICT integration in teaching and learning in schools. Human beings can learn and change through time as they have choice and positive perceptions (Andrews, 2012).

Papert (1999) believed that knowledge is actively constructed by students as they relate with their world, and hence, students should be engaged hands-on in their learning. This can best be done by using ICTs during teaching and learning. This does not mean that the use of ICT is a panacea for educational problems, but pedagogically integrated ICT can help in students' construction of knowledge. Thus, social constructionism advocates for a student-centred approach to teaching, emphasising students' interest and needs.

The main criticism levelled against social constructionism is that it is anti-realist by in denying that the nature of knowledge (epistemology) is a direct perception of the nature of reality (ontology) (Craib, 1997). Some researchers even critique social constructionism as not recognising an objective reality (Andrews, 2012; Craib, 1997; Sismondo, 1993). In practice, social constructionists recognise reality and maintain that the meaning of reality is socially constructed.

It is worth noting that learning today is less about passively accepting other people's ideas without scrutiny than it is about actively voicing one's own ideas and exchange ideas with others (Ackerman, 1996). ICTs can enable students to interact among themselves or with their teacher educator, who facilitates the teaching and learning process. Students can collaborate in groups, hold discussions with each other, solve problems and prepare presentations using the ICTs. Ackerman (1996) claimed that projecting our views is crucial as we learn from one another. Expressing ideas makes them tangible and easy to share, which helps when communicating with others.

Knowledge is viewed as basically situated and needs to be understood from the situations in which it is constructed and represented. This means that through personal experiences knowledge and the world are both constructed within specific contexts and in peoples' minds through ICTs (Papert, 1999). This is proof of the dynamics of change, and was essential for this study as the researcher explored how the teacher educators in different courses are pedagogically integrating ICTs into their teaching. Papert (1999) also stated that ICTs in education are viewed as a medium of information and as a medium of

construction. Medium of information makes it necessary to obtain essential information and skills, while medium of construction entails being able to generate and construct knowledge (Chabinga, 2015). Thus ICTs are seen as playing an important role in transforming teaching and learning practices.

Teacher educators in HEIs in Eswatini use constructionism to integrate ICT by coordinating with each other through social interactions on how to integrate ICT in their practices. Teaching practices are externalised by sharing their experiences about ICT use in teaching and learning in various courses (Galbin, 2014). Teacher educators internalised the use of ICT as part of the tools to use in their practices and shaped their beliefs about the use of ICT in teaching and learning. Constructionism helped the integration of ICTs by encouraging the use of student-centred teaching methods where students are engaged in the construction of knowledge by working collaboratively using ICTs. Teacher educators engage students in online discussions to do given tasks.

3.5 ICT Model: The Unified Theory of Acceptance and Use of Technology Model

According to Venkatesh, Thong and Xu (2012) the UTAUT is the most cited theory in ICT integration studies and was developed by reviewing eight models that explain ICT usage. Venkatesh, Morris and Davis (2003) cited in Dlodlu (2018) used eight user acceptance and motivation models to recommend the UTAUT. These models are:

1. The technology acceptance model (TAM),
2. The theory of reasoned action by Ajzen and Fishbein (1980),
3. The motivational model (Venkatesh et al., 2012),
4. The theory of planned behaviour (TPB) by Ajzen (1991),
5. A combination of TPB/TAM by Taylor and Todd (1995),
6. The model of PC utilisation (MPCU) by Venkatesh et al. (2012)
7. The innovation diffusion theory by Rogers (2003), and
8. The social cognitive theory by Bandura (2005).

Upon review, Venkatesh et al. (2003, p. 35) reported that the prior models had the following five limitations:

1. The technology studied were individual-oriented and not organisational technology;
2. Participants in these studies were students;
3. The studies looked at acceptance or rejection of usage decisions so individuals' reactions were retrospective;
4. The measurement was in general cross-sectional; and
5. The studies were conducted in voluntary usage settings, making it difficult to generalise results to mandatory settings.

Venkatesh et al. (2012) linked the eight models in the conducted studies to four different organisations where people were introduced to a new ICT in the workplace to measure actual usage behaviour. The variables that have a direct influence on behavioural intentions and usage are performance expectancy, effort expectancy, social influence, and facilitating conditions. The relationships between these variables are shown in Figure 3.2.

This study was guided by the UTAUT to determine factors that contribute to the pedagogical integration of ICTs in teaching and learning in HEIs in Eswatini. The UTAUT was adopted because it explains ICT integration in any context and the subsequent behaviour. The context for this study was the pedagogical integration of ICT in HEIs in Eswatini, a developing country. The UTAUT suggests that the following four variables are factors of technology acceptance and integration (use behaviour): (1) performance expectancy, (2) effort expectancy, (3) social influence and (4) facilitating conditions. The UTAUT also suggests that the effects of these four variables are moderated by four moderating factors, namely (1) age, (2) gender, (3) experience and (4) voluntariness of use. This study did not pay attention to the moderating factors but focused on the four variables of the UTAUT as they were enough to understand the context of the study above. As stated above, these variables were found to have a direct influence on behavioural intentions and usage (Venkatesh et al. 2012).

Venkatesh et al. (2003) stated that the UTAUT explains 70% of the variance in usage intention of ICT, which is greater than the eight previous models and their extensions. Akbar (2013) suggested that although the UTAUT has been successfully applied in a

variety of contexts, continuing to examine it in new contexts will support its validity. Hence, the theory was tried in the Eswatini higher education context.

Tibenderana, Ikoja-Odongo and Wokadala (2010) noted that the UTAUT theory is a combination of eight models of ICT acceptance and use. Thus using UTAUT was similar to using all the eight technology models presented above in this study. The UTAUT is believed to be more accurate than any other technology acceptance models in evaluating and predicting technology acceptance (Taiwo & Downe, 2013). The UTAUT theory can be used to capture users' first perception changes with continued use of ICT (Akbar, 2013). It is on this strength that the UTAUT was selected as another theoretical framework to guide the study to identify determinants of ICT integration in teaching in HEIs in Eswatini. The UTAUT is presented diagrammatically in Figure 3.2.

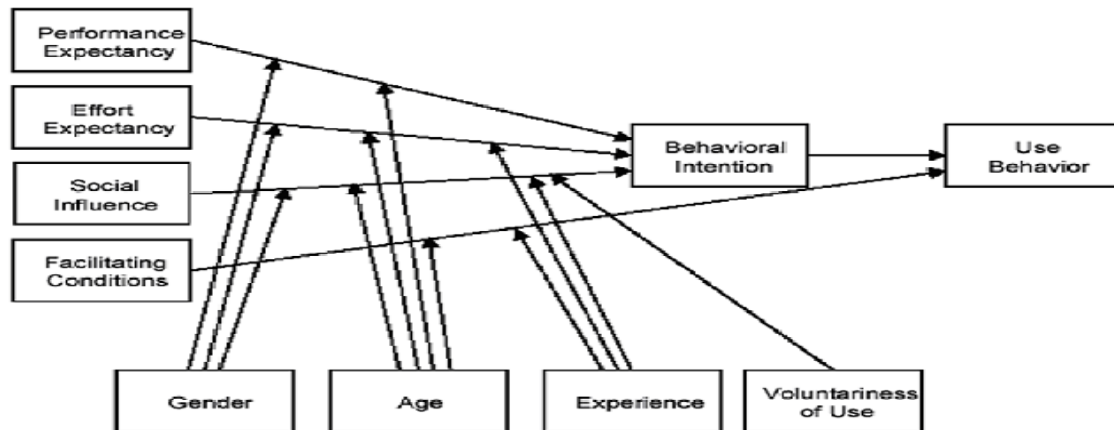


Figure 3.2: The unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003)

The four variables in the UTAUT can be explained as follows:

- **Performance expectancy** is the degree to which an individual believes that using the technology will attain gains in job performance. Performance expectancy constructs are (1) perceived usefulness (TAM), (2) combined TAM-TPB, (3) extrinsic motivation, (4) job-fit (MPCU), (5) relative advantage diffusion of innovation theory, and (6) outcome expectancy (social cognitive theory) (Dludlu, 2018). Performance expectancy in each model is the strongest

predictor of intention and is significant to measure both voluntary and mandatory settings.

- **Effort expectancy** is the degree of ease related to the use of technology. The constructs in the other models addressing effort expectancy are perceived ease of use (TAM), and complexity (diffusion of innovation theory and MPCU; Venkatesh et al. 2003).
- **Social influence** is the extent to which a user perceives that important others believe they should use the new technology (Dludlu, 2018). Dludlu (2018) stated that similar constructs are represented in the existing models in the form of subjective norms (theory of reasoned action, TAM2, TPB, and combined TAM-TPB), social factors (MPCU), and image (diffusion of innovation theory).
- **Facilitating conditions** is the extent to which ICT users believes that an institution and technical infrastructure exist to support use of the technology (Dludlu, 2018). This definition is represented with three constructs in existing models, namely perceived behavioural control (TPB/decomposed theory of planned behaviour and combined TAM-TPB), facilitating conditions (MPCU), and compatibility (Venkatesh et al. 2003).

3.6 Chapter Summary

This chapter deliberated on the theoretical framework and models that were used in the study. These were the TPACK framework, social constructionism and the UTAUT. The chapter also established the relevance of the theories and models used for the study. The TPACK framework explains that there must be access to rich, well-structured and integrated knowledge from various fields, including knowledge of subject matter/content, knowledge of pedagogy and ICT knowledge. Social constructionism view knowledge as constructed and encourages student-centred teaching where students engage with peers, have discussions and draw conclusions. The UTAUT was adopted because it explains ICT integration in any context and the subsequent behaviour.

CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

4.1 Introduction

This chapter presents the research method and procedures used in the study. It describes the philosophical perspective used in the study. It also presents the research design, the study area, the target population, the sampling technique, the instruments used for data collection and procedure, and how the data was presented and analysed.

4.2 Philosophical Perspective

Research philosophies or paradigms are belief systems or worldviews that guide the researcher to understand the ontology (nature of reality) and the epistemology (nature of knowledge) for the investigation in fundamental ways (Nxumalo, 2016). A paradigm defines the nature of the researcher's analysis along with the reality, knowledge and methodological assumptions encompassing systems of interrelated practice (Creswell, 2014; Zendah, 2017). The assumptions influences the standards and procedures used in a study and the way in which results are interpreted (Creswell, 2014; Zendah, 2017). A paradigm can be established assumptions around major aspects of reality, which can result in a specific worldview (Maree, 2007). The philosophical insights of research paradigms make it a crucial frame of reference for any study and to understand the world (Babbie, 2012). This is shown in different styles of beliefs and practices regulating inquiry in a field of study by providing lenses, frames and processes to accomplish investigations (Bogdan & Biklen, 2007; Zendah, 2017).

Paradigms portray our understanding of the world and are a principle to interpret reality in a study. They represent people's beliefs or assumptions (Cohen, Manion & Morrison, 2011). Cohen et al. (2011) posited that ontological assumptions represent the reality of what is being studied. Nxumalo (2016, p. 77) explained it as follows: "epistemological assumptions deal with the bases or source of knowledge, forms and nature of knowledge, how knowledge can be found, how it can be passed on to other people, and whether it can be constructed, acquired or experienced". A paradigm helps to clarify a research design as it is a scheme of organising researchers' views of a phenomenon under study.

Research paradigms include positivism, post-positivism, critical theory, constructivism, pragmatism and interpretivism. Positivist researchers use a quantitative approach as they maintain that an objective reality is quantifiable. Interpretivists, on the other hand, engage in the qualitative approach. They collect data and analyse it with conceptions that reality is manifold and open to empirical inquiry (Zendah, 2017). Interpretivists believe that knowledge is determined through social construction.

Creswell (2003) believed that the researcher's knowledge in pragmatism arises from actions, situations, and consequences. The researcher adopted pragmatism as a philosophical foundation or paradigm for the study. Pragmatism offers a different worldview to that of positivists and constructivists. Pragmatists use both quantitative, qualitative methods and mixed methods to collect and analyse data to get a better understanding and adequate insights (Zendah, 2017). The paradigmatic position depends on the researcher's epistemological positions, ontological stance, the axiological stance underpinning the research, and the methodological positions (Creswell, 2012). It emphasises the research problem and the results of the research (Creswell & Plano Clark, 2011).

The following subsections discuss positivism and interpretivism. It describes their principles and explains their ontological, epistemological, and methodological positions. The two paradigms' intentions are unified in pragmatic research (Zendah, 2017).

4.2.1 The Positivist paradigm

The positivist paradigm upholds absolute principles and prediction, stiff rules of logic, measurement and truth. Positivists' ontological position is that truth is an objective reality established using scientific methods. Truth and reality are obtained through research by collecting numerical data (Milman, 2012). Zendah (2017) asserted that truth and reality are free of the researcher's observations. Research is based in natural sciences using techniques offering the best framework for studying the social environment (Scotland, 2012, Zendah, 2017). Positivists argue that reality is objective, and can be described and explained precisely with the use of symbols. Brown (2014) asserted that positivists assume that patterns of cause and effect can be measured and can help to envisage and

control natural phenomena. This can be done using measurements to enumerate these patterns to moderate the variance (or uncertainty) (Zendah, 2017). Positivists' epistemological stance is that knowledge is scientific, and truth and reality are inapprehensible. The researcher's position is objective, and adopts a non-participant role to the inquiry. The entire truth for inquiry is obtained from using the correct data collection instruments (Zendah, 2017). It is argued that to come up with absolute truth for inquiry an objective researcher must have the right data-gathering tools (Zendah, 2017). Positivists' understanding can be generalised because it is time and context free (Zendah, 2017).

Their axiological position is that for knowledge to be objective it must be value-free. This means that researchers use objective data collection methods to come out with value-free results. The positivists methodology lies in experimentation, coupled with confirmatory analysis and quantitative analysis (Zendah, 2017). Positivists are deductive in nature and test theories. Brown (2014) held a different view and argued that positivism uses both deductive and inductive approaches. Zendah (2017) further argued that positivism places the nature of reality at the top of an inquiry and methodology at the bottom.

This paradigm was not solely used in this research as the research involved interacting with people. It sought to examine the practices of teacher educators when using ICTs in teaching. The ontological, epistemological stance was not inclined only to scientific inquiry. The methods used to collect data were both objective and subjective and not purely experimental.

4.2.2 The Interpretivism paradigm

The interpretivism paradigm is referred to as a constructivist or humanistic paradigm. The object of inquiry is treated holistically (Zendah, 2017). The interpretivists' paradigm helps to understand and interpret human behaviour rather than to generalise causes and effects (Brown, 2014). It explores why actions lead to a pattern of behaviour. According to Silverman (2013), the researcher deepens the investigation to understand and interpret the phenomenon under study. This was done for the researcher to understand meanings and subjective experiences that are time and context bound (Zendah, 2017).

Interpretivists uphold the classical hermeneutics' view to engage in deep thought as hidden meaning is achieved. Their research begins with individuals to discover their understanding of the world around them. The researcher-participant relationship is key in this paradigm, and the relationship helps to uncover deeper meaning (Mustafa, 2011). This may lead to researchers inductively developing a theory of meaning. The paradigm describes how people feel by interpreting their daily experiences and their behaviours to discover reality (Rubin & Babbie, 2015). Their ontological position is based on their belief that reality is multiple and relative (Wright & Losekoot, 2012).

Interpretivists differ from positivists, who have rigid structural frameworks, by embracing personal and flexible research structures to capture meaning in human interaction and make sense of their reality (Zendah, 2017). Their epistemological position is constructivist, which is that knowledge is inter-subjective rather than objective (Mustafa, 2011). They perceive that knowledge is created through social interaction processes to create meaning (Mustafa, 2011). The interpretivist researcher has to be exposed to new knowledge throughout the study (Zendah, 2017). The researcher and participants should jointly work together as they use qualitative methods. Their axiological position holds that values are innate. Values influence the researcher's choice of paradigm, methods of inquiry and presentation of findings (Brown, 2014; Zendah, 2017).

4.2.3 The Pragmatism paradigm

Kalolo (2015) asserted that pragmatism is an action-oriented (practical) paradigm. This implies that pragmatists show practicality, prudence, compromise and a clear model in dealing with problems (Zendah, 2017). Pragmatism is a broad research paradigm that extends to diverse areas, including knowledge, language and principles (Goldkuhl, 2012). Pragmatism is a philosophical approach not devoted to any system of philosophy or reality (Creswell, 2009). Its ontological stance relates to actions, changes and constructive knowledge drawn from inductive and deductive reasoning (Zendah, 2017). Pragmatists argue that humans are acting in a changing world, and hence, their actions evolve with time (Goldkuhl, 2012).

Some of the assumptions held by pragmatist include that they do not see the world as an absolute unity. Pragmatists believe in peoples' conceptions of the world and the reality in the world, meaning that they hold both internal and external reality. Pragmatism allows researchers to be free when considering how to go about the research. The paradigm allows researchers to select methods and procedures of research that best meet their aims. According to Maree (2007) pragmatism justifies the use of various methods in a study.

Creswell and Plano Clark (2011) stated that pragmatism posits a different worldview to that of positivism and interpretivism as it focuses on the problem to be researched and the results of the research. The researcher is free of practical restrictions enacted by the "forced choice dichotomy between positivism and constructivism, and researchers do not have to be prisoners of a particular approach or technique" (Creswell & Plano Clark, 2011, p. 27). Pragmatism provided the best grounds to examine and explain the phenomenon investigated in the current study. According to Onwuegbuzie et al. (2009), meanings and truth are firmly decided from our experiences and beliefs in the world. This includes applying practical effects by projecting on future developments and engaging practically through observations to come out with results (Onwuegbuzie et al. 2009). This study rested in the practical experiences of belief by observing what happens in institutions of higher learning during teacher training with regard to pedagogical ICT integration during teaching and learning.

Epistemologically, knowledge does not portray reality to pragmatists, but the construction of knowledge is key to accomplish existence and portray how people interact in the world (Hall, 2013). Pragmatist advocate for practical knowledge to improve practice. The paradigm addresses various types of knowledge, such as stating guidelines to be followed, revealing standards, and proposing opportunities (Goldkuhl, 2012). It is not restricted to explanations like positivists or understanding that is key to interpretivists. The pragmatist epistemological stance justifies their rationale of combining methods. Pragmatist argues that people's actions in the world are inhibited by what entails reality in the world, and our conceptions are based on how we interpret our experiences in the world (Goldkuhl, 2012). They view knowledge and truth as subjected to change over time (Zendah, 2017). Pragmatists believe research is restricted to a particular period and

should be revised in future contexts (Hall, 2013; Mertens, 2015). They believe that values are significant when interpreting research results by using subjective and objective reasoning (Zendah, 2017). Researchers may develop good working relations with the informants or respondents suitable to understanding the phenomenon being studied.

Onwuegbuzie et al. (2009) argued that pragmatism clarifies how research methods can be mixed to address research questions. Pragmatists believe that quantitative and qualitative techniques are similar in certain standards and can be combined (Zendah, 2017). The researcher used both approaches to understand the problem in this study. The study philosophically underpinned the mixed methods approach as it is attuned to the pragmatism philosophy (Maree, 2007). The main focus was the research problem and various methods were used to collect data to address the problem as pragmatists see the research problem as essential in a study (Creswell, 2009).

4.2.4 Justification of the use of pragmatism in the study

This study adopted the pragmatism paradigm as it permits mixing research methods and makes it possible to select the appropriate methods to address the problem (Bryman, 2015). To address the problem, this paradigm suggests practicality, compromise, and using one's own discretion with clear objectives. The researcher examined the pedagogical ICT integration practices among teacher educators and their perceptions of the educational value of ICTs to gain an understanding of the problem. The questions further sought to ascertain how the current structure of the curriculum in institutions of higher learning during ITE affects the classroom technological practices of lecturers with regard to ICT integration. Creswell and Plano Clark (2011) argued that research questions are crucial to determine the researcher's position in research.

Pragmatism can be used to address the 'what' and 'how' research questions based on the intended consequences of the research. The research questions in this study were mixed with 'why' and 'how' questions. Pragmatists' perceptions of concepts may vary in different settings and their views may differ as they interpret the world (Zendah, 2017). In this study, pragmatism offered the researcher an opportunity to explore the pedagogical ICT integration practices among teacher educators in ITE programmes. The researcher

opted for the mixed methods approach so that both quantitative and qualitative methods' expectations could be used in the study. Qualitative and quantitative data was mixed to avoid bias as both approaches have limitations, and hence, they should be used together to complement the other's deficiencies (Onwuegbuzie & Leech, 2007). Mixed methods are believed to enhance the validity and credibility of the findings of a study (Hesse-Biber & Griffin, 2014; McMillan & Schumacher, 2010). The mixed methods design provides understandings that may be impossible to attain when the two approaches are used autonomously.

The researcher adopted some ideologies used to conduct mixed methods research as revealed by Onwuegbuzie et al. (2009). These include triangulation, which is using different data collection methods. This was done through questionnaires, face-to-face interviews (semi-structured), document analysis and observations. Another ideology used is complementarities, which is trying to elaborate, illustrate and clarify findings from one method with findings from another method. This was done through method triangulation, which is triangulation done to obtain and harmonise data on the same topic in order to understand the research problem (Creswell & Plano Clark, 2011). The third ideology is development, which includes using the findings from one method to help inform the other method. Quantitative data gathered through questionnaires was used to inform qualitative data from the interviews by asking questions left out in the questionnaires and reinforcing others in the interviews to address the problem. Lastly, the researcher used expansion, which encompasses expanding the breadth of the research by using various techniques. The researcher used quantitative and qualitative strategies to examine the pedagogical ICT integration practices among teacher educators and to respond to the study's research questions.

4.3 Research Approach

The study used a mixed methods approach that combines qualitative and quantitative approaches (Terrell, 2012; Onwuegbuzie & Leech, 2007). Creswell (2009) indicated that mixed methods are used together in the research and this can be done in any part of the study, including during data collection, analysis, and interpretation. Methodology designs can be purely quantitative, qualitative or mixed methods, and should address the research

questions of the study. Mixed methods studies can be used to address the deficiencies of using only one research design (Creswell, 2012). Onwuegbuzie and Leech (2007) agreed that qualitative and quantitative methods should be used together to complement one another in their deficiencies. Social scientists affirm that to understand a problem, more methods of inquiry should be used (Terrell, 2012). Mixed methods design can substantiate data and provide more answers to research questions than when a single approach is used.

According to Fraenkel, Wallen and Hyun (2012), there are three designs of mixed methods, namely explanatory design, exploratory design, and triangulation design. The researcher in this study opted for the explanatory and triangulation designs. Triangulation reinforces the research findings as the same thing is seen from different angles and is confirmed through the use of more than one method (Zendah, 2017). Triangulation “implies that the results of an investigation employing a method associated with one research strategy are cross-checked against the result associated with other research strategies” (Bryman & Bell, 2011, p. 631).

This study used the explanatory sequential design as a procedure for the mixed methods. This was also used to explain the quantitative results, which were conducted as a first phase, and to collect and analyse the follow-up qualitative data as the second phase (Creswell, 2009). Figure 4.1 shows the steps of the sequential explanatory mixed methods design.

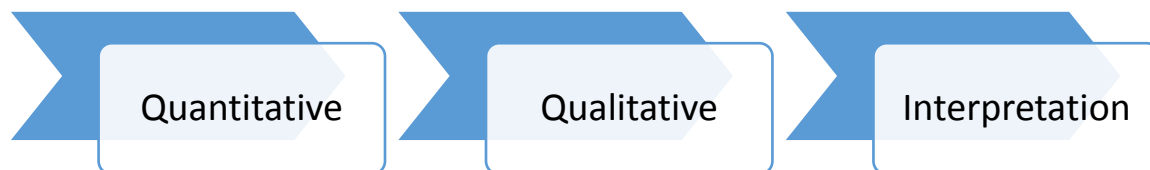


Figure 4.1: Sequential explanatory mixed methods design (Creswell, 2009)

4.4 Research Design

This research adopted a case study research design. This design allows a thorough investigation of circumstances, and findings can be related to similar settings (Zendah, 2017). This research design allows individuals or group of people, programmes and events to be deliberately and deeply investigated for a specific period of time, and this enabled the researcher to examine the pedagogical ICT integration practices of teacher educators in three HEIs in Eswatini (Zendah, 2017; Yin, 2009; McMillan & Schumacher, 2001). Research participants are studied in their usual environments to allow for a thorough analysis of the problem using various methods of data collecting methods (Baxter & Jack, 2008).

A case study is an in-depth exploration of a specific case in its context to create knowledge (Yin, 2009). In this study, it was an investigation of pedagogical integration of ICT in the three selected HEIs in Eswatini. A case study can also be conducted in an institution, classroom, or a country, or it can be appropriate for understanding a program (Rule & John, 2011). Since the aim of the study was to explore the pedagogical ICT integration practices among teacher educators in ITE programmes, which was the phenomenon, and the case was the three HEIs in Eswatini, the case study research design was suitable to be used in the study.

Moreover, a case study permits the triangulation of various methods and is evidence-led (Zendah, 2017). A case study also promotes an experiential inquiry to study current issues like ICT integration in real-life settings (Yin, 2009). The researcher gained knowledge of teacher educators' practices in ITE programmes and gained an understanding of their perceptions of the educational value of ICTs in the institutions.

A case study design allowed the researcher to use multiple research methods to collect and analyse data to discover much about the phenomenon under study (Baxter & Jack, 2008). The researcher collected data in the participants' contexts. She went to the HEIs and collected data using varied methods of data collection. The case study used in this research was a collective-case design as three HEIs participated in the study (Yin, 2009). This was ideal to gain in-depth knowledge from the findings deriving from each of the three HEIs, which were analysed collectively. Data was collected at all institutions at the

same time. For instance, for phase 1 the questionnaire was distributed to the three institutions at the same time and collected and analysed at the same time.

This encouraged the researcher to reflect on the similarity and the uniqueness of the cases across the three HEIs and that supported “theoretical reflection on the findings” (Bryman & Bell, 2011, p. 63). The case study design was used to explore the pedagogical integration of ICTs and more was revealed about teacher educators’ practices in ITE programmes (Nxumalo, 2016). Case studies also encourage teamwork as researcher and participants work together to accomplish the task. Participants cooperate with the researcher in order for more knowledge to be gained in the study (Baxter & Jack, 2008). Teacher educators opened up to the researcher as they related their experiences and expressed their views on ICT integration in teaching and learning.

Though case studies are helpful, Nxumalo (2016) indicated that they are deficient as they focus on single case and not on the wider population, and their findings are not comprehensive enough to understand other cases. The researcher concur with Nxumalo (2016) that though case study’s results cannot be generalised, they can be used in related settings. Hence, the case study design was used in the study on the grounds that the findings could be used in related settings.

4.5 Participants of the Study

Participants are the population of the study or people who possess characteristics of the data the researcher is investigating (Nxumalo, 2016). It is people with characteristics required for the study, that is, characteristics emanating from the sampling criteria recognised by the researcher (Cohen & Manion, 2000). The participants of this study were teacher educators (N = 87) who teach the different courses at the HEIs during ITE, and Heads of Departments (HoDs) (N = 9; three HoDs per institution who teach and also HoDs in the institutions). The number of HEIs and participants were few to make them easy to manage and make the research practical. The participants were competent teacher educators who helped with valid information. The teacher educators, and HoDs were qualified experts in their disciplines.

4.6 Sampling Procedures and Sample Size

According to Zendah (2017), sampling is a statistical practice concerned with the selection of a part of the population to get knowledge about the whole population. In quantitative research this is done to make predictions based on statistical inference (Bamberger, 2012). Participants were selected to take part in the research on the ground that they would provide information relevant to the research (Yin, 2013). Sampling in mixed method research includes the selection of cases for research using both probability and non-probability sampling (Zendah, 2017). According to Onwuegbuzie and Collins (2007), the use of purposive sampling is more prevalent in mixed methods research.

The HEIs, participants, and respondents who took part in the study were selected using purposive sampling, also known as non-probability sampling. Cohen and Manion (2000, p. 99) defined purposive sampling as a “method whereby the researcher has deliberately or purposely selected a particular section of the population to include or exclude from the sample”.

In this study, the researcher purposively chose the HEIs and participants for the study. In the qualitative sample, the researcher hand-picked the cases to be included in the sample based on their characteristics and because they are knowledgeable and experienced in teaching in HEIs (Cohen et al. 2011). In the quantitative sample the researcher gave all teacher educators at the sampled HEIs the survey questionnaire to complete, thus no sampling was done. Teacher educators were selected to respond in the survey questionnaire as they teach in the sampled HEIs. This was done to meet some limitations of a purposive sample and to give participants (teacher educators) equal chances of being selected to participate in the study (Nxumalo, 2016). A purposive sample represent a specific sector of the wider population, for instance, 87 teacher educators teaching preservice teachers during ITE programmes and 09 HoDs or Deans in the Faculty of Education in the three HEIs in Eswatini. The two teacher educators observed per institution were chosen purposively and for convenience as they agreed to be observed. Participants were chosen to take part in the study as they agreed to be competent with ICT integration in teaching (Rule & John, 2011). The three selected HEIs were given pseudonyms, KaMlungu, Etiveni and Mkhuluzi, to protect their identities in accordance

with ethical considerations (Nxumalo, 2016). All three HEIs are in the Manzini region and were close to the researcher's workplace and residence. This made it convenient for the researcher to collect data using the data collection methods used in the study.

4.7 Data Collection Procedure

The study was descriptive and presented settings in relation to the research problem. This entailed collecting data to address research questions (Dludlu, 2018). A case study includes using various data-gathering tools to gain knowledge and understanding of the problem being studied (McMillan & Schumacher, 2010). The researcher collected data using survey questionnaires, observations, semi-structured interviews, and document analysis as data-gathering tools. The data collection process was done in two phases. Phase 1 was the collection of quantitative data through questionnaires administered to all teacher educators in the three HEIs that were part of the study. The data collection instruments' development were guided by the research objectives and questions, literature, the TPACK framework, the constructionism theory and the UTAUT model. The questionnaire measured the ICT integration practices and the teacher educators' perceptions of the educational value of ICTs. Phase 2 was the collection of qualitative data and was done using interviews followed by observations and document analysis, which were done concurrently. This is permitted in pragmatism, as stated earlier, because it permits mixing research methods and flexibility in selecting appropriate methods to address the research problem.

4.8 Development of the Data Collection Instruments

4.8.1 Questionnaire

The questionnaire development was guided by the research questions and objectives, literature, and the theoretical framework following the constructs of the TPACK framework. The questionnaire had four sections (Sections A–D). Section A was the demographic information and asked respondents about their institution, age, teaching experience, gender, and highest qualification. Section B was on uses of technologies and participants were asked to highlight the technology and state the use. This was intended

to get more information on the ICTs used in the institutions for teaching and learning and on the availability of resources. Section B addressed the fourth research question. Section C asked the respondents to state the pedagogical ICT integration practices through TPACK measures. The variables measured were TK, content knowledge, pedagogical knowledge, PCK, TCK, TPK and TPACK. These variables answered the first and the second research questions and objectives of the study, which directly addresses the main research question of the study presented in section 1.8. Section D measured teacher educators' perceptions about the educational value of ICTs. This section answered the third research question of the study. The variables in the questionnaire are presented in Chapter 5 and are merged to the themes in Chapter 7.

4.8.2 Semi-structured interviews

The semi-structured interview guide was guided by the objectives, research questions, literature, the UTAUT and social constructionism. The research questions and objectives, the theoretical framework and the UTAUT guided the development of the items for discussion.

The instrument had an introductory section where the researcher introduced herself and thanked the participants willing to participate in the study. The participants were assured of confidentiality.

The interview guide contained 15 questions asked to participants. The four determinant factors for ICT integration stated in the UTAUT were addressed by the interview questions; these are performance expectancy, effort expectancy, social influence, and facilitating conditions. Question 1, 2, and 4 addressed the first research objective and question, and it measured the performance expectancy and effort expectancy of the HoDs. Question 8 and 9 answered the second research question and addressed the second objective of the study (facilitating conditions, performance expectancy, and social influence). Question 5 addressed the third research question (performance expectancy, effort expectancy and social influence). The other questions in the interview guide addressed the fourth research question and measured facilitating conditions. The

interview guide addressed the determinant factors for ICT integration, which were performance expectancy, effort expectancy, social influence and facilitating conditions.

4.8.3 Observation guide

The observation guide development was also guided by the research questions and objectives, literature, and the theoretical framework of the study. The instrument had five sections, which were demographic information, technology used by the teacher educators, the teacher educators' pedagogical orientation, how the teacher educators used technology in teaching and learning, and the teacher educators' TPACK. The observation guide was used to observe the practices of teacher educators as they integrate ICT in teaching and learning. The observation guide was aimed at addressing the main and first research question of the study. It was student-centred, which means it was framed in social constructionist perspective, the TPACK framework and the UTAUT.

4.8.4 Document analysis

The document analysis form or guide was developed to map the views of policy and curriculum (course outlines) concerning the pedagogical integration of ICTs in teaching and learning in HEIs. The development of the instrument was informed by the research questions, especially the second research question. It explored how the structure of the curriculum in ITE affects the classroom technology practices of teacher educators. Its development was also based in literature and the theoretical framework.

The instrument highlighted the type of document, such as policy, course title, code, goals, aims and objectives, methods of inquiry, teaching strategies, document description and contents of ICT integration. It also gave a brief summary of the document.

4.9 Data Collection Instruments

4.9.1 Quantitative data: The questionnaire

The questionnaire was used to gather quantitative data. A questionnaire has been chosen since it is best at collecting data about what people know, feel and want (Mundia, 2001). The reliability of a questionnaire has been endorsed by Cohen and Manion (2000), who

said that it is the most frequently used descriptive method in research. Its frequent use or popularity is indicative of its reliability. The questionnaire helped the researcher do an in-depth analysis of the pedagogic ICT integration practices in three HEIs in Eswatini. The questionnaire was designed to have closed question for the teacher educators, as closed questions help create frequencies responsive to statistical treatment and analysis (Cohen et al. 2011). The items in the questionnaire were rated using a five-point Likert scale, indicating the extent of ICT integration practices by the teacher educators. The five-point Likert scale had the following options: *strongly disagree*, *disagree*, *neither agree/disagree*, *agree*, *strongly agree*.

The researcher administered the questionnaire manually to the teacher educators in the three HEIs. The return rate was high, and 87 respondents returned completed and usable questionnaires to the researcher. Despite the disadvantages of using questionnaires, which include that respondents are not forced to give information or to return them, they have the advantage of covering a wider population. The respondents were asked to consent to partake in the questionnaire's completion. Respondents were required to complete all parts of the questionnaire, but if they were unable to, their questionnaires were still considered. The researcher collected the questionnaires after a month because the respondents asked to be given enough time because of their busy schedules.

4.9.2 Qualitative data

Creswell (2009) expressed that qualitative research is based on how participants interpret the issue at hand. This involves asking comprehensive questions. Qualitative data collected is mainly in words. It is then described and analysed to come up with themes.

4.9.2.1 Interviews

Nine HoDs or Deans of Faculty participated in the semi-structured interviews. The participants were given pseudonyms to protect their identities in accordance with ethical considerations (Nxumalo, 2016). The interviews were used to collect qualitative data and to provide the information necessary to respond to the research questions (Boyce & Neale, 2006). Interviews are essential to examine people's beliefs. The researcher explained the phenomenon under study to the interviewees before starting the interview.

A digital recorder was used for audio recordings to capture the responses accurately and for future reference. An interview guide was used, and it was only shown to the participants during the interviews to prevent them from planning answers beforehand. The researcher also took notes of key things said during the interviews. This follows a suggestion by Maree (2007) that recording the interview is crucial as the notes help to review responses and can help to probe for further clarity. The participants were asked to consent to the recordings. The interviews were conducted in the participants' offices and took 40 minutes per interview session.

4.9.2.2 Document analysis

The researcher analysed documents relevant to the study. It is worth noting that the documents were reliable property of the institutions and that they provided vital information for the study. These documents were ICT policies or strategic plans in the HEIs and the curricula in the form of the course outlines followed in the various courses during ITE. The documents were purposively selected by following four criteria for quality documents, which are authenticity, credibility, representativeness and meaning (Zendah, 2017). The information gathered from the documents' analysis verified the questionnaire and interview data. Document analysis allows for reliability checks and the replication of studies (Zendah, 2017). The procedures followed to review the documents were skimming through the documents to become familiar with the contents, searching for categories addressing ICT integration, and ascertaining what was expected of HEIs and teacher educators in the implementation of ICT integration in the curriculum (Zendah, 2017).

4.9.2.3 Observation

Observations were used to observe participants' behaviours in their lecture rooms or classrooms and all the events that took place during lectures (Cohen et al. 2011). This helped the research understand what necessitates ICT integration practices among teacher educators in ITE programmes in the HEIs. This was achieved by observing six lessons (lectures) in the three HEIs that is, two lessons or lectures by two teacher educators were observed in each institution. These teacher educators were selected

purposively and they agreed to be observed. During the observations, the teacher educators were teaching in their normal way and the researcher observed and made sense of how technology was used in the lesson. Each lesson observation lasted for the duration of the lesson, which is on average an hour, but the time varied from institution to institution. To control the limitations of using observations, which include behaviour changes in the participants, the researcher asked the teacher educators to inform the students about the observation prior to the observation so that they were aware that they were being observed. The researcher was a “non-participant observer” (Creswell, 2012, p. 212) in the classrooms to prevent interfering with activities in the class.

Data generated during the observation process were recorded in the observation schedule as observation notes and were used during the data analysis. Data were manually coded, and teacher educators were given pseudonyms for confidentiality. According to Nxumalo (2016), observation help to discover whether participants behave in the way they claim to behave. As the researcher observed the lessons, she was able to describe authentic situations as ICTs were integrated during the teaching and learning process.

4.10 Data Analysis Procedures

Data analysis is when the researcher organises and presents the gathered data to respond to the research questions by identifying themes that are used to interpret the data (Merriam, 2009). In this systematic process, data were selected, categorised, compared and interpreted to provide explanations of the phenomenon of interest, which is pedagogic ICT integration practices in HEIs. The researcher read and re-read the data to familiarise herself with it and to understand the data so that emerging themes could be identified. The data was then described, classified and interpreted (Nxumalo, 2016).

4.10.1 Quantitative analysis

Data attained from the questionnaires were analysed using descriptive statistical methods. Descriptive statistics were used to summarise and interpret the quantitative data to describe the findings from the respondents. The data were organised and prepared for analysis using the Statistical Package for Social Sciences (SPSS) Version

20.0 and was presented using tables (Dludlu, 2018). As the data was organised and prepared for analysis, missing data were excluded. Data were analysed using descriptive statistics, such as frequencies, percentages, means and standard deviations. This was done to help elicit the degree to which ICT is pedagogically integrated in the HEIs. The results were interpreted.

4.10.2 Qualitative analysis

Arslan (2013) presented a number of data analysis procedure that are used in qualitative research, and they included content analysis. According to Mundia (2001), content analysis is a data analysis technique that is appropriate for qualitative research, especially when the researcher used interviews, observations, transcripts and documentaries. Content analysis was used in this study to analyse the data gathered from the interviews, observations and document analysis. Fraenkel and Wallen (2009) asserted that content analysis permits the study of human behaviour by analysing their actions. In this study content analysis helped understand the practices of teacher educators when integrating ICTs in teaching and learning.

Creswell (2014) advanced four stages in analysis, namely organising the data; reviewing all the information several times to understand what it contains as a whole; identifying general categories or themes; and summarising the data in tables. The researcher listened to the interview recordings for some time to familiarise herself with the data. After listening, the data from recordings were written down. All data gathered from the interviews, observations, and document analysis were read many times for the researcher to become familiar with the data. This also helped to revise the transcript in order to capture what was missed during transcription. The researcher described the data, classified it, understood it, and interpreted it, and this resulted in the emergence of themes that were used to give details about how teacher educators pedagogically integrate ICTs in HEIs during ITE programmes (Nxumalo, 2016).

The transcriptions were categorised according to the research questions. Themes and sub-themes emerged from the text or categories that addressed the research questions. The data were then coded according to the developed themes, which were analysed by

making inferences and interpretation of statements, and summarised as opinions and suggestions, where applicable. According to McMillan and Schumacher (2010), coding means giving descriptive terms to subject matter so that topics that come up under the codes are grouped together. The researcher noted unique words, phrases and non-verbal cues expressed by participants shown in the transcript. The researcher compared the themes from observations and document analysis and merged them with the themes that emerged from the interviews. This was done for interpretation and discussion purposes. The analysis helped define the extent to which the research questions were addressed.

4.11 Validity and Reliability

4.11.1 Validity

Validity observes the extent to which results from data-gathering instruments permit researchers to come up with justified conclusions about the study because reliable instruments are expected to offer consistent results. Validity helps determine whether the research truly measures what it intended to measure (Dludlu, 2018). The questionnaire was subjected to scrutiny by the researcher's supervisors and by experts in educational research to guarantee external and content validity, clarity and relevance to the study of the instrument before administration. The researcher also presented research writings during PhD research meetings for students to review the interpretation of the data and provide feedback, and she gave her work to colleagues to review and provide feedback.

The researcher rephrased the interview questions to ensure the validity of the responses. Although the interviews were scheduled to last for 40 minutes, the researcher spent an hour after interview looking at the classrooms and the ICT tools used for teaching and learning to see how they are structured to enable ICT integration. This is referred to as 'spending prolonged time in the field' (Creswell, 2009, p. 192; Nxumalo, 2016) or having a 'prolonged engagement' (Mundia, 2001, p. 148). This helped the researcher gain a clear understanding of the phenomenon being studied. Data were collected from participants in their own settings, ensuring the accuracy of the gathered information (Creswell, 2009; Nxumalo, 2016). The researcher also did more than one observation (Nxumalo, 2016).

The two observations per institution helped ensure better opinions about and understanding of the phenomenon under study (Nxumalo, 2016).

The researcher used data triangulation to enhance data validity. Triangulation is using more than one method or source of data in a study and involves using different sources and methods to collect data (Guion, Diehl & McDonald, 2011). Triangulation is vital to strengthen and verify the research findings because the same thing is seen from different perspectives, confirming or challenging the findings of one method with those of another. According to Bryman and Bell (2011, p. 631), this “implies that the results of an investigation employing a method associated with one research strategy are cross-checked against the result associated with other research strategies”. In this research data were collected from teacher educators and their HoDs. The outcomes from the four data collection methods (questionnaires, interviews, observations, and document analysis) used in the study were interpreted to be true. The information collected from the triangulated data collection instruments was compared and similar information ensured data validity (Guion et al. 2011; Nxumalo, 2016).

4.11.2 Reliability

Reliability is the extent to which results are consistent over time and whether the results of a study can be reproduced using a similar methodology (Dludlu, 2018). It is worth noting that reliability in quantitative research refers to the replicability of the processes and yielding the same results; however, in qualitative research the essence of reliability lies with the consistency of the results (Babbie, 2012; Zendah, 2017). Nsibande (2014) clarified that reliability as a social construct ensures that the results of a study are seen as trustworthy for other researchers to accept and rely upon in their own work. Experts were given the instruments to check their reliability. To ensure reliability, the researcher triangulated both the quantitative and the qualitative data (Nsibande, 2014).

The trustworthiness of data in qualitative research was assessed through its credibility, dependability, conformability and transferability. This study relied heavily on the data collected in the interviews, observations and document analysis. Method triangulation and frequent debriefings between the researcher and her supervisors for feedback ensured

credibility in this research. The number of HEIs involved in the study was significant and acceptable for the results to be transferable because three out of six HEIs in Eswatini were included and these three HEIs were government sponsored. A thick description of the phenomenon under study also ensured transferability. To ensure the dependability of findings, the researcher adequately explained the research design and its implications (Zendah, 2017). The researcher made sure that the data collection instruments corresponded with the research question (Nxumalo, 2016). To ensure that the findings represent the views of the participants and their perceptions (conformability), the researcher gave the participants the opportunity to listen to the audio after the interviews (Nxumalo, 2016).

4.12 Ethical Considerations

The researcher complied with the ethical requirements and got clearance from the Human Research Ethics Committee of the University of the Witwatersrand in Johannesburg in Gauteng Province, South Africa (see Appendix F). The researcher also applied for and got clearance from the Director of the MoET in Eswatini, which was addressed to the Regional Education Officers and the administrators of the three institutions that participated in the study (see Appendix G). The director wrote letters to the different institutions asking for permission for the researcher to conduct the study, highlighting the purpose of the study and how data would be collected in the institutions using questionnaires, interviews, observations and document analysis. Since this study research dealt with human beings, the researcher sought the consent of all participants with a consent form (see Appendix A). The consent form outlined the nature of the data collection and the purpose for which the data would be used (Chabinga, 2015). This was presented to the participants and selected institutions. Creswell (2009) asserted that it is ethical that participants sign a consent form to show they consent to take part in the study. This was done to show respect to the participants and to protect them from any danger, which the ethics process makes possible (Nsibande, 2014). Ethics was supported with credibility and integrity as the researcher dealt with the participants. For the research to be valid, the researcher engaged with the participants in an ethically acceptable manner by informing them that the Human Research Ethics Committee(s) and the MoET

approved the research. The researcher informed the respondents and participants about the purpose and importance of participating in the study and outlined the expectations of them. She was accountable for the data collected as she was to keep the records.

Participants were assured that all information given would be treated as confidential. The consent letters had specific statements of confidentiality and anonymity that declared that records would be kept confidential. To ensure anonymity, participants' names were not used anywhere in the study. Their participation was voluntary, and they could withdraw from participating at any time without fear of prejudice (Creswell, 2009). They were free not to answer any questions they did not feel comfortable answering. It was highlighted that if the results of this study were published, the data would be presented in group form and individual participants would not be identified. To respect the privacy and individuality of all participants, pseudonyms were used to hide their identity.

4.13 Chapter Summary

The chapter presented the methods and techniques used in the study. It described the philosophical perspective used in the study. Pragmatist assumptions were discussed based on their epistemological, ontological and methodological understandings. The research design, study area, target population and sampling technique were also discussed. The instruments and procedures for data collection used in the study were presented. The research instruments were questionnaires, semi-structured interviews, document analysis and observations. Data analysis procedures and ethical considerations were discussed.

CHAPTER 5: QUANTITATIVE DATA PRESENTATION AND ANALYSIS

5.1 Introduction

This chapter presents and analyses the quantitative data that were collected through the survey questionnaire to discover the pedagogical ICT integration practices among teacher educators in ITE programmes in HEIs in Eswatini. The data analysis was done to address the objectives and research questions of the study. The sub-questions were:

1. What are the ICT integration practices among teacher educators in ITE programmes?
2. How does the current structure of the ITE curriculum affect the classroom technology practices of teacher educators?
3. What are teacher educators' perceptions of the educational value of ICT?
4. To what extent does teacher education structures in HEIs create an enabling environment for the pedagogical integration of ICT?

The quantitative data were collected from 87 teacher educators in the participating HEIs in Eswatini. Data were collected through a survey questionnaire, which was directed to teacher educators to collect quantitative data. The questionnaire consisted of a five-point Likert scale with the options *strongly disagree*, *disagree*, *neither agree/disagree*, *agree*, *strongly agree*. Data was calculated in means of frequencies, percentages, means and standard deviations (STD). The mean and STD were calculated for the entire scale for each variable using SPSS. Means and STD were calculated for each item to establish which items were more positive or negative (Zendah, 2017). A mean above or equal to 3 indicates that respondents agree or were positive toward the statement. A small STD (less than 1.5) indicates homogeneity of the respondents or that the respondents were positive toward the statement. The number of respondents to each questionnaire item varied because of non-responses to certain items. This resulted in the value of N changing (see Tables 5.2 and 5.5 as examples). The results describe the phenomenon being investigated, which was the pedagogical ICT integration practices of teacher educators in ITE programmes in HEIs in Eswatini.

5.2 Quantitative Data Analysis

5.2.1 Name of institutions

The HEIs were given the pseudonyms Etiveni, KaMlungu and Mkhuluzi. Table 5.1 shows that 41.3% (n = 36) of the respondents were from KaMlungu, 29.8% (n = 26) were from Etiveni, 28.7% (n = 25) were from Mkhuluzi.

Table 5.1: Number of participant from each institution

Name of institution	No. of teacher educators	Percentage (%)
Etiveni	26	29.8
KaMlungu	36	41.3
Mkhuluzi	25	28.7
Total	87	100

5.2.2 Age

Of the population, 75.9% (n = 66) responded to this question. Table 5.2 indicates that the most prevalent age group of the respondents is 41–50 years (n = 29, 43.9%), followed by the age group 50 years and above (n = 22, 33.3%), and lastly, the age group 40 years and below (n = 15, 22.71%).

Table 5.2: Age of respondents

Age (n = 66)	Frequency (F)	%
40 years and below	15	22.7
41–50 years	29	43.9
50 years and above	22	33.3

5.2.3 Teaching experience

The results in Table 5.3 shows that most teacher educators/lecturers in the HEIs were experienced and had 21–30 years of teaching experience (n = 29, 39.7%). These were followed by teacher educators who had 11–20 years of teaching experience (n = 26, 35.6%). Those who had 10 years and less teaching experience constituted 15.1%

(n = 11), followed by teacher educators who had 31–40 years of teaching experience (n = 7, 9.6%). Only 73 (83.9%) teacher educators responded to this question.

Table 5.3: Teaching experience of the respondents

Teaching Experience (n = 73)	F	%
1–10 years	11	15.1
11–20 years	26	35.6
21–30 years	29	39.7
31–40 years	7	9.6

5.2.4 Teacher educators' gender

The results showed in Table 5.4 revealed that 64% (n = 55) of the respondents were female and 36% (n = 31) were male. The results suggest that teaching in HEIs in the Kingdom of Eswatini is dominated by females. Eighty-six (98.8%) people responded to this questions.

Table 5.4: Gender of teacher educator

Gender (n = 86)	F	%
Female	55	64.0
Male	31	36.0

5.2.5 Highest academic qualification

Eighty-five (97.7%) people responded to this question. The results in Table 5.5 show that most of the respondents hold a master's degree (n = 57, 67.1%). These were followed by teacher educators holding a Doctor of Philosophy degree (PhD; n = 19, 22.4%), those who had a first degree (n = 07, 8.2%), and lastly those with an honours degree (n = 02, 2.4%). The results show that the teacher educators are professionals in their respective fields of study.

Table 5.5: Highest academic qualification

Degree (n = 85)	F	%
First degree	7	8.2
Honours	2	2.4
Master's	57	67.1
PhD	19	22.4

5.2.6 ICT usage

The results in Table 5.6 indicate that most respondents were using the following ICT gadgets: Laptop (n = 82, 94.3%), computer (n = 81, 93.1%) and smart phone (n = 69, 79.3%). The results also revealed that most teacher educators were not using the following ICT gadgets: Programmable calculator (n = 78, 89.7%), iPad (n = 70, 80.5%) and tablet (n = 54, 62.1%).

Table 5.6: ICT usage

ICT	N	Yes		No	
		F	%	F	%
Smart phone	87	69	79.3	18	20.7
Tablet	87	33	37.9	54	62.1
iPad	87	17	19.5	70	80.5
Laptop	87	82	94.3	5	5.7
Computer	87	81	93.1	6	6.9
Programmable calculator	87	9	10.3	78	89.7

5.2.7 Technological knowledge (TK)

Table 5.7 shows that the respondents strongly agreed on TK regarding the following: Able to send an email with an attachment (n = 75, 86.2%, M = 4.74, STD = 0.80); able to use a printer (n = 70, 81.4%, M = 3.78, STD = 1.19); able to use a search engine (n = 61, 70.1%, M = 4.44, STD = 0.93); and able to use a projector (n = 59, 67.8%, M = 4.58, STD = 0.70). The mean (M) scores above 3 in these results show that the respondents strongly agreed on TK, and as the STD was less than 1.5, it is more believable. The value of the mean is high (<3) and the STD is low (>1.5), indicating that the respondents were

able to send an email with an attachment and use search engines, a printer and a projector. The results also revealed that respondents disagreed on TK regarding the following: Creating own website ($n = 31$, 36.5%, $M = 3.49$, $STD = 1.11$); learning new software programmes on their own ($n = 15$, 17.2%, $M = 4.60$, $STD = 0.74$); and use a picture editing program ($n = 10$, 11.6%, $M = 4.51$, $STD = 0.70$). The results also show that the teacher educators' TK was not good in terms of creating websites and learning new software programmes on their own. Based on the results this mean that the teacher educators need training in this regard or to learn from other teacher educators who are knowledgeable in these areas.

Table 5.7: Technological knowledge

Variables	N	SD		D		NAD		A		SA		M	STD
		F	%	F	%	F	%	F	%	F	%		
1. Able to send an email with an attachment	87	2	2.3	2	2.3	1	1.1	7	8	75	86.2	4.74	0.80
2. Able to use a search engine to find current information on the topic that I need	87	1	1.1	1	1.1	4	4.6	20	23	61	70.1	4.44	0.93
3. Able to learn new software programs on my own	87	4	4.6	15	17.2	17	19.5	36	41.4	15	17.2	4.60	0.74
4. Able to create my own website	85	9	10.6	31	36.5	17	20	18	20.7	10	11.5	3.49	1.11
5. Able to communicate through internet tools (e.g., emails, MSN Messenger)	85	2	2.3	1	1.2	2	2.3	28	32.6	53	61.6	2.87	1.21
6. Able to use a picture editing program (e.g. Paint)	86	4	4.7	10	11.6	18	20.7	23	26.7	31	36	4.51	0.70
7. Able to save data into a digital medium (e.g., Flash Card, CD, DVD)	85	-	-	2	2.4	4	4.7	22	25.9	57	67.1	4.58	0.81
8. Able to use a printer	86	-	-	-	-	-	-	16	18.6	70	81.4	3.78	1.19
9. Able to use a projector	87	2	2.3			2	2.3	24	27.6	59	67.8	4.58	0.70
10. Able to use a scanner	85	4	4.7	2	2.3	2	2.3	25	29.4	52	61.2	4.81	0.39
11. Able to use a digital camera	85	3	3.5	2	2.4	7	8.2	26	30.6	47	55.3	4.59	0.76
12. Able to use a smart phone	86	2	2.3	-	-	4	4.7	23	26.7	57	66.3	4.4	1.00
13. Able to use a tablet	84	1	1.2	4	4.8	8	9.5	21	25	50	59.5	4.32	0.98
14. Able to use an iPad	84	-	-	9	10.7	13	15.5	19	22.6	43	51.2	4.55	0.79

Rating scale: SD = Strongly disagree, D = Disagree, NAD = Neither agree/disagree, A = Agree, SA = Strongly agree, M = Mean, STD = Standard deviation

5.2.8 Content knowledge (CK)

The results in Table 5.8 reveal that the respondents strongly agreed that as part of their practices they know how to develop class activities that are meaningful to students ($n = 51$, 59.3%, $M = 4.52$, $STD = 0.70$), that they know how to develop projects that are meaningful to students ($n = 38$, 44.2%, $M = 4.29$, $STD = 0.76$), and that they are familiar with recent developments and applications in their various courses ($n = 38$, 44.2%, $M = 4.09$, $STD = 0.90$). The results also revealed that respondents engage in research using ICTs by using up-to-date resources (e.g., books and journals) in their courses ($n = 36$, 41.9%, $M = 4.21$, $STD = 0.80$). The mean and STD scores prove that respondents agreed with the constructs measured and the results showed that their content knowledge was high as custodians of the curriculum in higher education. However, Table 5.8 shows that a few respondents disagreed that as part of their practices they keep up to date with conferences and activities in their area of specialisation ($n = 06$, 7.1%, $M = 3.77$, $STD = 1.03$). The mean and STD scores show that the respondents disagreed with attending conferences. This may have some implications for the teacher educators' knowledge as they do not interact with other professionals in their fields of study during conferences to gain new knowledge.

Table 5.8: Content knowledge

Variables	N	SD		D		NAD		A		SA		M	STD
		F	%	F	%	F	%	F	%	F	%		
15. Can develop class activities that are meaningful to students	86	1	1.2	1	1.2	1	1.2	32	37.2	51	59.3	4.52	0.70
16. Can develop projects that are meaningful to students	86	-	-	3	3.5	7	8.1	38	44.2	38	44.2	4.29	0.76
18. Familiar with recent developments and applications in my course	86	1	1.2	4	4.7	12	14	38	4.2	31	36	4.09	0.90
19. Use up-to-date resources (books, online journals) in my course	86	1	1.2	-	-	14	16.3	36	41.9	35	40.7	4.21	0.80
20. Up to date with conferences and activities in area of specialisation	84	3	3.6	6	7.1	20	23.8	33	39.3	22	26.2	3.77	1.03

Rating scale: SD = Strongly disagree, D = Disagree, NAD = Neither agree/disagree, A = Agree, SA = Strongly agree, M = Mean, STD = Standard deviation

5.2.9 Pedagogical knowledge (PK)

The results in Table 5.9 show that teacher educators strongly agreed on pedagogical knowledge regarding the following: Able to assess student performance in their courses ($n = 47$, 55.3%, $M = 4.46$, $STD = 0.72$); able to adapt teaching based on what students currently understand or do not understand ($n = 41$, 47.7%, $M = 4.35$, $STD = 0.73$); and able to use a wide range of teaching approaches in a classroom setting using ICTs ($n = 41$, 47.7%, $M = 4.40$, $STD = 0.69$). The mean and STD show that the respondents agreed that they use different methods of teaching to integrate ICTs in teaching and learning. Table 5.9 also shows some respondents were neutral in the pedagogical knowledge of being able to using a wide range of different learning theories in a classroom setting ($n = 9$, 10.5%). This shows that the respondents were not certain of their pedagogical knowledge in terms of using different learning theories in their teaching. The researcher observed that the teacher educators used the constructivist teaching and learning theory in their classrooms.

Table 5.9: Pedagogical knowledge

Variables	N	SD		D		NAD		A		SA		M	STD
		F	%	F	%	F	%	F	%	F	%		
21. Able to assess student performance in my course	85	1	1.2	-	-	5	5.9	32	37.6	47	55.3	4.46	0.72
22. Able to adapt my teaching based on what students currently understand or do not understand	86	-	-	2	2.3	7	8.1	36	41.9	41	47.7	4.35	0.73
23. Able to adapt my teaching styles to suit students' styles	86	1	1.2	-	-	9	10.5	40	46.5	36	41.9	4.28	0.75
24. Able to use a wide range of teaching approaches in a classroom setting	86	1	1.2	-	-	4	4.7	40	46.5	41	47.7	4.40	0.69
25. Able to use a wide range of different learning theories in a classroom setting	86	-	-	1	1.2	9	10.5	48	55.8	28	32.6	4.20	0.67

Rating scale: SD = Strongly disagree, D = Disagree, NAD = Neither agree/disagree, A = Agree, SA = Strongly agree, M = Mean, STD = Standard deviation

5.2.10 Pedagogical content knowledge (PCK)

The results of the study showed in Table 5.10 revealed that the respondents strongly agreed on PCK regarding the following: Able to develop assessment strategies and tools ($n = 35$, 41.2%, $M = 4.25$, $STD = 0.74$) and able to select effective teaching approaches to guide student thinking and learning ($n = 34$, 40.0%, $M = 4.32$, $STD = 0.86$). Table 5.10 also shows that respondents agreed on PCK regarding the following: Being able to integrate ICTs into their teaching ($n = 40$, 47.1%, $M = 3.98$, $STD = 0.86$) and being able to select appropriate and effective teaching strategies for their content area ($n = 45$, 52.9%, $M = 4.28$, $STD = 0.70$). The mean above 3 and STD of less than 1.5 indicated that the respondents strongly agreed on these PCK constructs, and therefore they selected appropriate strategies for their content when using ICT in teaching.

Table 5.10: Pedagogical content knowledge

Variables	N	SD		D		NAD		A		SA		M	STD
		F	%	F	%	F	%	F	%	F	%		
26. Able to select effective teaching approaches that guide student thinking and learning	85	-	-	1	1.2	5	5.9	45	52.9	34	40	4.32	0.64
27. Able to select appropriate and effective teaching strategies for my content area	85	1	1.2	-	-	6	7.1	45	52.9	33	38.8	4.28	0.70
28. Able to develop assessment strategies and tools	85	-	-	1	1.2	12	14.1	37	43.5	35	41.2	4.25	0.74
29. Able to integrate ICTs in my teaching	85	1	1.1	3	3.5	17	20	40	47.1	24	28.2	3.98	0.86

Rating scale: SD = Strongly disagree, D = Disagree, NAD = Neither agree/disagree, A = Agree, SA = Strongly agree, M = Mean, STD = Standard deviation

5.2.11 Technological content knowledge (TCK)

The results in Table 5.11 reveal that teacher educators agreed on TCK regarding the following: Having knowledge about technologies to use for student learning ($n = 49$, 56.3%, $M = 3.97$, $STD = 0.84$) and being able to use technologies in their teaching to easily achieve the learning outcomes of lessons ($n = 43$, 49.4%, $M = 3.87$, $STD = 0.97$). The mean and STD show that teacher educators' TCK was good and they agreed that they used technologies with ease to achieve learning outcomes. This indicates the homogeneity of the respondents. The results in Table 5.11 also reveal that the respondents disagreed on TCK regarding the following: Being able to develop class activities involving use of instructional technologies ($n = 8$, 9.2%, $M = 3.67$, $STD = 1.01$) and facilitate equitable access to technology resources for students' learning ($n = 7$, 8.0%, $M = 3.47$, $STD = 0.94$).

Table 5.11: Technological content knowledge

Variables	N	SD		D		NAD		A		SA		M	STD
		F	%	F	%	F	%	F	%	F	%		
30. Have knowledge about technologies that I can use for students' learning	87	1	1.1	5	5.7	11	12.6	49	56.3	21	24.1	3.97	0.84
31. Can facilitate equitable access to technology resources for students' learning	87	3	3.4	7	8	34	39.1	32	36.8	11	12.6	3.47	0.94
32. Able to develop class activities involving use of instructional technologies	87	3	3.4	8	9.2	20	23	36	41.4	20	23	3.71	1.03
33. Able to develop projects involving use of instructional technologies	86	4	4.7	5	5.8	23	26.7	37	43	17	19.8	3.67	1.01
34. Able to use technologies in my teaching to easily achieve the learning outcomes of my lesson	87	3	3.4	5	5.7	14	16.1	43	49.4	22	25.3	3.87	0.97

Rating scale: SD = Strongly disagree, D = Disagree, NAD = Neither agree/disagree, A = Agree, SA = Strongly agree, M = Mean, STD = Standard deviation

5.2.12 Technological pedagogical knowledge (TPK)

The results in Table 5.12 show that teacher educators agreed on TPK regarding the following: Being able to use technologies to motivate students ($n = 47$, 56.0%, $M = 4.31$, $STD = 1.04$) and choosing technologies that enhance the teaching approaches for a lesson ($n = 41$, 47.7%, $M = 3.65$, $STD = 0.97$). The mean for these showed that teacher educators agreed on TPK, and based on the STD scores, the results are more believable. This means that teacher educators' TPK include motivating students and choosing appropriate ICTs for teaching. The results also revealed that respondents disagreed on TPK regarding the following: Being able to manage a technology-rich classroom effectively ($n = 8$, 9.4%, $M = 3.46$, $STD = 1.03$) and evaluating the appropriateness of a new technology for teaching and learning ($n = 6$, 7.0%, $M = 3.45$, $STD = 1.04$). The mean and STD revealed that teacher educators agreed that they were unable to manage their teaching in a technology-rich classroom and that they cannot evaluate how appropriate new technologies are for teaching and learning.

Table 5.12: Technological pedagogical knowledge

Variables	N	SD		D		NAD		A		SA		M	STD
		F	%	F	%	F	%	F	%	F	%		
35. Choose technologies (ICTs) that enhance the teaching approaches for a lesson.	86	3	3.5	7	8.1	21	24.4	41	47.7	14	16.3	3.65	0.97
36. Able to use technology to support learner-centred strategies that address the diverse needs of students	86	5	5.8	6	7	22	25.6	37	43	16	18.6	3.62	1.05
37. Able manage a technology-rich classroom effectively.	85	5	5.9	8	9.4	26	30.6	35	41.2	11	12.9	3.46	1.03
38. Able to evaluate the appropriateness of a new technology for teaching and learning	86	6	7	6	7	28	32.6	35	40.7	11	12.8	3.45	1.04
39. Able to use technologies to motivate students	84	5	6	3	3.6	16	19	47	56	13	15.5	4.31	1.05

Rating scale: SD = Strongly disagree, D = Disagree, NAD = Neither agree/disagree, A = Agree, SA = Strongly agree, M = Mean, STD = Standard deviation

5.2.13 Technological pedagogy and content knowledge (TPACK)

The results in Table 5.13 show that most respondents agreed on TPACK regarding the following: Being able to integrate appropriate instructional methods and ICTs that help to teach their content effectively ($n = 49$, 57.6%, $M = 3.78$, $STD = 0.85$); being able to appropriately combine content, technologies and teaching approaches ($n = 47$, 55.3%, $M = 3.78$, $STD = 0.90$); and able to evaluate and reflect on the effective use of ICTs to enhance teaching and learning ($n = 43$, 49.4%, $M = 3.51$, $STD = 0.99$). The mean and STD showed that the teacher educators agreed on their TPACK constructs, for example, that they combined content, technologies and teaching approaches in teaching and learning. However the results in Table 5.13 also indicate that some respondents disagreed on TPACK regarding the following: Being a leader in spreading the use of technological innovations in their institution ($n = 20$, 23.0%, $M = 3.07$, $STD = 1.04$) and being able to apply appropriate ICTs to reflect on assessment results and communicate results ($n = 7$, 8.2%, $M = 4.01$, $STD = 4.51$). The mean and STD revealed that teacher educators agreed that their TPACK is not so strong that they can use their skills to help others integrate ICTs in teaching and learning, and the STD showed that their TPACK is questionable.

Table 5.13: Technological pedagogy and content knowledge

Variables	N	SD		D		NAD		A		SA		M	STD
		F	%	F	%	F	%	F	%	F	%		
40. Able to appropriately combine content, technologies and teaching approaches in my teaching	85	1	1.2	9	10.6	13	15.3	47	55.3	15	17.6	3.78	0.90
41. Able to integrate appropriate instructional methods and ICTs that help to teach my content effectively	85	1	1.2	7	8.2	15	17.6	49	57.6	13	15.3	3.78	0.85
42. Able to facilitate a technology-enhanced experiences that encourage all students to develop higher order thinking skills	86	6	7	3	3.5	29	33.7	36	41.9	12	14	3.52	1.01
43. Able to apply appropriate ICTs to assess all students' learning	86	5	5.8	5	5.8	29	33.7	33	38.4	14	16.3	3.53	1.03
44. Able to apply appropriate ICTs to reflect on the assessment results and communicate these results	85	4	4.7	7	8.2	27	31.8	33	38.8	14	16.5	4.01	4.51
45. Able to evaluate and reflect on the effective use of ICTs to enhance teaching and learning	87	5	5.7	7	8	23	26.4	43	49.4	9	10.3	3.51	0.99
46. Able to use ICTs to communicate and collaborate with students, colleagues and the larger community.	86	2	2.3	6	7	15	17.4	39	45.3	24	27.9	3.90	0.97
47. Take advantage of the new, emerging digital age ICTs to improve on my practices in	87	4	4.6	14	16.1	23	26.4	30	34.5	16	18.4	3.46	1.11

Variables	N	SD		D		NAD		A		SA		M	STD
		F	%	F	%	F	%	F	%	F	%		
promoting students' creativity and learning													
48. A leader in spreading the use of technological innovations in my teaching community	87	5	5.7	20	23	35	40.2	18	20.7	9	10.3	3.07	1.04

Rating scale: SD = Strongly disagree, D = Disagree, NAD = Neither agree/disagree, A = Agree, SA = Strongly agree, M = Mean, STD = Standard deviation

5.2.14 Teacher educators' perceptions

The results in Table 5.14 show that respondents agreed on the following perceptions: When they use technologies, they feel in control of their teaching ($n = 44$, 51.2%, $M = 3.99$, $STD = 0.83$); when using technologies, they feel a sense of achievement ($n = 46$, 54.1%, $M = 4.15$, $STD = 0.73$); when they use technologies, their work is more interesting ($n = 44$, 51.8%, $M = 4.20$, $STD = 0.74$); and when they use technologies, their work is more effective ($n = 44$, 51.8%, $M = 4.08$, $STD = 0.76$). The mean above 3.0 and STD below 1.0 indicated that the teacher educators were in total agreement with their perceptions that integrating ICTs makes them feel in control of their teaching and improves their work. The results in Table 5.14 also indicate that respondents disagreed on the following perceptions: When they use technologies, they feel tired and exhausted ($n = 31$, 36.9%, $M = 1.95$, $STD = 0.94$); using technologies in their classes is frustrating ($n = 29$, 34.1%, $M = 1.93$, $STD = 0.99$); and when they use technologies, they always ask for advice from their colleagues ($n = 17$, 20.0%, $M = 2.83$, $STD = 1.23$).

Table 5.14: Teacher educators' perceptions measure

Variables	N	SD		D		NAD		A		SA		M	STD
		F	%	F	%	F	%	F	%	F	%		
1. Feel in control of my teaching when using ICTs	86	1	1.2	3	3.5	15	17.4	44	51.2	23	26.7	3.99	0.83
2. Feel a sense of achievement when using ICTs	85	1	1.2	-	-	11	12.9	46	54.1	27	31.8	4.15	0.73
3. Work more interesting when using ICTs	85	1	1.2	-	-	10	11.8	44	51.8	30	35.3	4.20	0.74
4. Motivated to use ICTs in my class	85	2	2.4	5	5.9	16	18.8	34	40	28	32.9	3.95	0.99
5. Work is more effective when using ICTs	85	1	1.2	-	-	15	17.6	44	51.8	25	29.4	4.08	0.76
7. Feel tired and exhausted when using ICTs	84	32	38.1	31	36.9	14	16.7	7	8.3	-	-	1.95	0.94
8. Not afraid of using ICTs in my class	84	3	3.6	14	16.7	9	10.7	29	34.5	29	34.5	3.80	1.19
9. Using ICTs in my class is frustrating	85	35	41.2	29	34.1	14	16.5	6	7.1	1	1.2	1.93	0.99
10. Get a lot of satisfaction from using technologies in my class	85	2	2.4	4	4.7	14	16.5	35	41.2	30	35.3	4.02	0.96
11. Ask for advice from colleagues when using ICTs	85	16	18.8	17	20	19	22.4	28	32.9	5	5.9	2.87	1.23

Rating scale: SD = Strongly disagree, D = Disagree, NAD = Neither agree/disagree, A = Agree, SA = Strongly agree, M = Mean, STD = Standard deviation

5.3 Chapter Summary

This chapter presented and analysed the quantitative data that were collected to discover the pedagogical ICT integration practices among teacher educators in ITE programmes in HEIs in Eswatini. The data were presented according to the various constructs of the TPACK framework, namely TK, , , PCK, TCK, TPK and TPACK, and lastly, the perceptions of teacher educators were presented. Data were presented using frequencies, percentages, means and STDs.

CHAPTER 6: QUALITATIVE DATA ANALYSIS

6.1 Introduction

The chapter presents and analyses the qualitative data that were collected to discover the pedagogical ICT integration practices among teacher educators in ITE programmes in HEIs in Eswatini. The data analysis was done to address the objectives and research questions of the study, as stated previously. Data were collected using semi-structured interviews, observations, and document analysis. Nine HoDs took part in the semi-structured interviews and generated qualitative data. Two teacher educators from each HEIs (therefore, six in total) were observed for one lesson each, and documents such as ICT policies and course outlines were analysed. The participants were selected using a purposive sample for their convenience because they agreed to be interviewed and observed. The qualitative data findings were used to provide further explanations of teacher educators' ICT integration practices in the three participating HEIs.

6.2 Semi-structured Interviews

The semi-structured interview participants were HoDs (n = 09) from the three participating HEIs. They were interviewed individually. The researcher used an interview guide (prepared questions) and allowed for flexibility of responses in order to draw as much data from the interviewees as possible. The interview responses are in italics to show the participants' exact words and are followed by a discussion based on these direct quotations.

The HEIs were given the pseudonyms Etiveni, KaMlungu, and Mkhuluzi. Table 6.1 shows the semi-structured interview participants' gender.

Table 6.1: Demographic characteristics by gender

Institution	Variable	Characteristic	F	%
Etiveni	Gender	Male	1	11
		Female	2	22
KaMlungu		Male	0	0
		Female	3	33
Mkhuluzi		Male	1	11
		Female	2	22

The qualitative data analysis was done using thematic content analysis (Merriam, 2009; Mundia, 2001). The researcher listened to the audio recorded during the interviews and transcribed the responses. The themes and sub-themes emerged after reading through all the responses from the interviewees and addresses the research questions. The themes and sub-themes deals with how teacher educators, especially HoDs, integrate ICTs and how they provide enabling structures for ICT integration during teaching and learning in their institutions. The emergent themes and sub-themes are presented in Table 6.2.

Table 6.2: Themes and sub-themes

	Theme	Sub-theme
1.	Pedagogical ICT integration practices (sub-question 1)	1.1 Converting learning content into digital format through PPP
		1.2 Research
		1.3 Online discussions
2.	Unrevised Curriculum (sub-question 2)	
3.	Perceptions on the educational value of ICT (sub-question 3)	3.1 Makes life easier/perceived usefulness
		3.2 Communication
		3.3Teacher educators' lack of competency in using ICT

	Theme	Sub-theme
4.	Enabling structures for the integration of ICTs (sub-question 4)	4.1 Availability of ICT policy
		4.2 Accessibility and connectivity
		4.3 Professional development
		4.4 ICT resources
		4.5 Technical support

6.3 Pedagogical ICT Integration Practices

Research question 1: What are the ICT integration practices among teacher educators in ITE programmes?

This theme addresses the pedagogical ICT integration practices of teacher educators during instruction in their ITE programmes in line with the first research question of the study. The data reflects what was narrated by the teacher educators during interviews about the phenomenon. The findings revealed that teacher educators' ICT practices during ITE programmes improved their performance expectancy, a component of the UTAUT. The participants were of the view that ICT integration in teaching facilitates an improvement in job performance; hence, ICT is usefulness as a delivery strategy of their course content through PPP, research, online discussions, online teaching and sharing of information, and the paradigm shift in traditional pedagogies.

Pedagogical ICT integration practices were identified under the following sub-themes: Converting content to digital format, research, and online discussions. Each of these will be described in detail in the following subsections and substantiated with verbatims.

6.3.1 Converting learning content into digital format through PowerPoint presentations

The participants stated that they use PPPs during lectures. This is done to shift from traditional strategies of chalk and talk. Most participants said they used liquid-crystal display (LCD) projectors for the presentation of lesson content in class during teaching. For instance, Thulile stated that ICT makes her work easy because she just prepare slides during her planning for the lesson to present to her students during instruction. She said:

It helps it makes my work easy because I can prepare, for example, slides, and then it saves time because I have noticed that here in the institution there is the chalk and talk strategies. When I use ICT, I just prepare my slides prior and then go present my work to my students.

Nozizwe also use PPPs to present slides and explain concepts to students. She used videos and audio for students to watch and listen to for illustrations. She engaged her students in discussions and collaborative learning. This is how she expressed herself:

I beam at the wall and then I explain. Let students listen to the video or audio and the lecturer explain. The students are engaged in discussions, i.e. collaborative learning.

Majaha stated that he uses computers for preparing lectures, preparing slides, and recording marks. He said:

I make preparations for lectures and recording marks. I would say, that is what I normally use the computer for. Yes, it does, in the sense that with research where there is unavailability of resources in the library, I am able to use the internet and also do other things in preparing slides for lectures and other things I would say.

Nkosini also acknowledged that she sometimes used ICTs for PPP. She commented:

We sometimes use PPPs.

The responses highlight the role of ICT integration in HEIs in Eswatini in developing content and delivering it in digital format during teaching using numerous ICTs. Traditional pedagogies can be re-contextualised with the use of ICTs in teaching and learning. Teacher educators can audio and video record class sessions online and send notes, journal articles and relevant links to students online. These sentiments were shared by the participants in the study. For instance, Takhile stated that the use of ICT in teaching saves her time because she prepares presentation slides and send them to her students as notes. She stated:

When I teach, the time I take lecturing without the use of ICT will be longer than the time I take now with the use of ICT, because we now have a smart board so

life is easy. Yes, I just prepare presentations, and I'm able to even send whatever PowerPoint presentations to the students. I send it to the students after the presentations.

6.3.2 Research

Most participants use ICTs for research purposes. The participants make their students do research and also source information from different resources such as e-books and journal articles to facilitate discussions. The internet is used for research and information searches to reinforce concepts in the various courses/programmes. For instance, Nkosini reported that she gives her students assignments and assigns them to Google journals to read and respond to questions. She also searches for journals on the internet and distributes articles to students to read and respond to assignments. She emphasised:

I give them an assignment and let them Google for some journals to ensure that when responding they use. I sometimes give them the journals to read, and sometimes I set tests based on certain journals. I want the students to look for those journals, read in order to respond to assignments given. Even the students you can refer them to some of the sites where they can get them. It also helps me in researching and also prepare lessons using ICT.

Majaha stated that he encourages his students to engage in enquiry-based learning, where they search for information before or during lectures. He said he poses questions for his students to respond to, and if they do not know the correct response, they must search for the answer on their smartphones. He said:

I would say I encourage students to engage on enquiry on their selves. Enquiry on finding the information themselves prior or during the lecture. Say here is a question posed, yet they don't have clear responses, I encourage them to use their phones sometimes to find out for the answer and give feedback there and there. With research where there is unavailability of resources in the library, I am able to use the internet and also do other things in preparing slides for lecturers.

Tenkhozi also stated that she uses ICT to gather information for research. She stated:

We also use it to gather information from Google when doing research.

6.3.3 Online discussion

Online discussions is when students and their teacher educators used chat platforms. MLMS are used to engage students in online discussions or chats. They debate issues online. Some teacher educators in the HEIs upload materials or discussion questions on Moodle for students to read and engage with in discussions. Chat platforms facilitates and enabled students to engage in group discussions. Students can connect and take part in the discussions regardless of location, which is why most participants in the study said that students continued with the discussions out of class. This is also of great importance to teacher educators as they can give instant feedback to students about their understanding of concepts (Bath & Burke, 2010). Mlungu commented:

Like for instance, in my situation I give my students some notes, like I can ask them to get into groups and access the notes online in their smart phones in order to assist them in their discussions. Because I can send a journal article online, or whatever resources, I think it will be necessary for that particular discussion. So that often helps them to facilitate the discussions in terms of the resources they need for that discussion. Sometimes as I was saying about the chatting online, I can send a discussion topic/question online and they can respond to it electronically, and debate issues online. So that even if we have a discussion in class, they can take the discussion outside of the class into the learning management system platform, i.e. the Moodle. Through Moodle learning management systems platform which students can use to chat with other students in the group as well as send questions cause they can chat in real times, or they can chat like post questions and you can respond at any particular time, or anyone in the group can respond at any particular time. And sometimes, especially with master's students, I normally use email and they send their drafts, and I make my comments as it through track changes and I send it back to them and we communicate through emails and on rare occasions through telephone or mobile phone.

Some participants mentioned using social media platforms like WhatsApp as part of sharing information with students. Students can also chat among themselves or have group chats via WhatsApp. Thulile reported that she uses software like Geogebra to help students understand difficult concepts. She explained:

I have tried to use Geogebra. I've introduced them to softwares like Geogebra: How to use Geogebra and how it helped students to understand concepts that are difficult. I have also supervised students who has used Geogebra in circle properties at high school. I have also tried to introduce Dropbox, where they can send, share assignments, and send their assignments even to a friend to review. In that way I am trying to show that internet is not just for WhatsApp, you can use it further to do more work.

Mlungu pointed out that students can use WhatsApp and Facebook to send information to their colleagues. He said:

Those who have emails, they can use WhatsApp and some Facebook and so on. What they often do is that they download the stuff on Moodle and then they send it through WhatsApp. They prefer WhatsApp than the learning management site which we have in the university...

6.4 Unrevised Curriculum

Research question 2: How does the current structure of the ITE curriculum affect the classroom technology practices of teacher educators?

Some participants highlighted the need to revise their curricula to incorporate ICT integration strategies for the preservice teachers. ICT integration should be part of preservice training for teachers to effectively integrate ICTs in their teaching. Tenkhosi pointed out that their curricula have not been revised to integrate ICT and that teacher educators only use ICT as they perceived its affordance on their own. For instance, they use the projector to beam slides or notes on the smart board for the students. Only teacher educators who teach ICT as a programme use ICT on a daily basis in the institution. She said:

Our curriculum has not been revised for such a long time. The people who are using technology is because they have interest to use it, just using it for their own good. Otherwise the curriculum has not been revised to integrate ICT. Apart from the subjects that are, because we have a subject for ICT Those are the people who are using it as part of their daily practice. The others they are using it because they like using it. One thing I have noticed is that most lecturers are using the projector. They want smart board from the admin. Students are now using ICT. They are moving with the trends.

Temusa stated that the curriculum does not really integrate ICT tools. Pedagogically there is no mention of which kinds of ICT tools should be used in a programme and even per topic, especially in the fulltime mode of teaching. However, the Institute of Distance Education (IDE) uses Moodle and emphasises blended learning. She said:

Our curriculum is that it does not really integrate ICT tools, more especially in the fulltime mode. At least IDE where they sometimes put emphasis on the use of things such as Moodle, things such as blended learning and staff like that, but with this one which we are currently using, there is no integration of these ICTs, which I think affects our use of ICTs a great deal.

Nozizwe also highlighted that the curriculum does not enforce the use of ICT in teaching and learning as there is no policy. She pointed out:

It [curriculum] doesn't enforce but it just allows. There is nothing that enforces as there is no policy...

Takhile stated that the curriculum for educational technology course still teach about old media and technologies, like overhead projectors. Yet students' interest is in digital media like PowerPoint projectors. This affects the use of technologies in class. When responding during the interview she said:

For instance, we are talking about educational technology course, sometimes you are expected to teach the media and old technologies, like overhead projector. Students want to use PPP; no one use an overhead projector, but they have to be taught that because it's what they will find in the schools.

Thulile responded by stating that the curriculum is designed by the teacher educators. They are in a better position to draft and include all the components they think should be included in the curriculum or course content. They interpret the curriculum by drafting their plans of what they will do or include in their lessons to make them interesting. She said:

To me curriculum, you are the one who is supposed to talk to the curriculum, because it lists, do this and this, then how it interprets the curriculum. It does encourage use of ICT, but remember you are the one who will decide that in order for me to make the lesson interesting I must add this, include this and that. And if you believe in ICT it becomes easy.

6.5 Perceptions on the Educational Value of ICTs

Research question 3: What are teacher educators' perceptions of the educational value of ICT?

This theme addressed the performance expectancy, effort expectancy, social influence and facilitating conditions of teacher educators as part of the components of the UTAUT. Teaching is seen as a conversation between teacher educators and students, and knowledge is constructed as students learn. Shulman (1987) and Ndlovu (2016) argued that teachers' beliefs or what they embrace about their practice directs their actions in the teaching process. Teacher educators' perceptions may impact the degree to which they integrate ICTs.

The participants' value for ICTs (digital technologies) was based on its affordance to deliver content and retrieve information, which permits easy access to information, making life easier. The immediacy of ICTs over traditional pedagogies like talk and chalk was given credit. The participants perceived ICTs as making life easy as ICTs are used to access information through the internet, for information processing, and for information sharing and storage. For example, Nozizwe perceived ICTs to have educational value as they are used for information processing, storage and access to the internet. She said:

On the educational value, oh they do have a value as they are used for information processing, information storage and even access to the internet. So they do have a value.

Mlungu perceived ICT to be useful to improve teaching, especially by using online platforms, and for easy access to information as most information is retrieved electronically online. It is also cheaper for students to retrieve information from the internet than to photocopy documents or journal articles. He said:

I think it's a very useful tool to improve teaching, especially because most of the information now is online and can be retrieved electronically. And I think not only is it useful in terms of access, in the sense that I said that most information is available online, but it is also cheap as well because I find that those students who prefer hard copies where they photocopy material they spend more money than students who just download a document or a journal article into their laptop or smart phones, so it's very, very useful.

Thulile felt that the use of ICT improves her work; hence, it improves her performance expectancy as it permits more time for interaction with students as she does not write but just refers students to the PPP. She said:

It will improve my work because it gives me more time to interact with the students. I spend my own time preparing for the PPP in class then, now it's time for the learner-teacher interaction because I am not writing but I'm just referring to the work I've prepared prior.

6.5.1 Makes life easier/perceived usefulness

ICT tools were perceived by the teacher educators to make their life easier as they do their work. They said they work at a faster pace when they use ICTs. For instance, Takhile commented that ICT makes life easier and faster and improves the quality of education. She further said that the time she takes when teaching using the lecture method with ICT is less than when lecturing without using ICT. For instance, she prepares PPPs and can send it to students. She said:

... so really, there is that paradigm shift to ICT. So we say so because it has made life easy, life faster and improved the quality of education, you know. True it does; it does. I mean, for instance, when I teach, the time I take lecturing without the use of ICT will be longer than the time I take now with the use of ICT, because we now have a smart board so life is easy. Yes, I just prepare presentations and I'm able to even send whatever PowerPoint presentations to the students, I send it to the students after the presentations.

Tenkhosi concurred that ICTs increase the coverage of work and that it helps in accessing information for research. She said:

So, it also helps us to get information, especially when we are doing research [i.e. searching for information in the internet to use in class, and doing projects for academic purposes] and when helping our students with research [information search for content to use in class and information for their projects], there it does facilitate. You are able to cover much work when using ICTs than when you are manual.

Majaha also perceived ICT to be very important in the modern age as it makes life easier and makes the work of teacher educators easier as they access information through the internet and share that information. He stated:

Well, my view is that ICT is very important in this modern age because it makes the work of a lecturer much easier. It's now easier to access information through the internet and also dispense information through the use of ICT to a larger group at once. I could just summarise by saying: it makes our work much easier.

Nkosini noted that ICT permits easy access to information through the use of the internet. ICT also makes it easier to handle, store and transfer information than in the past. She said:

Gone are the times where you carry a lot of books; now you just carry an iPad and send the documents. They're easier to read wherever you are. You are able to access as long as you have internet.

6.5.2 Communication

The participants presented another educational value for ICTs: It affords communication. This makes enriched learning through engagement and collaboration among students possible. New technologies have the potential to create new forms of dialogue and communication among teacher educators and among students and their teacher educators. The participants highlighted that ICTs help develop online discussion forums and chats. It is good for information sharing among students and teacher educators. It was reported that examiners, part-time teacher educators, tutors and moderators send information and comments to students online without physically travelling to the HEIs. This is in line with social constructionism, which acknowledges that we collaborate as social beings. Nkosini stated that she uses ICTs such as emails frequently to communicate with part-time lecturers. She sends them timetables, work schedules, and meeting dates through emails and WhatsApp. The part-time lecturers, and external moderators also send work using ICTs. She remarked:

I just use it on fulltime basis, whenever there is something to convey to the lecturers because we have part-time lecturers. As HoD sometimes I go online, email them the timetables, work schedules, and even communicate on meetings, when to have a meeting, correspond through WhatsApp, through emails. Even if there is some work they are to submit/bring, they send it through if far away. I am able to get what I want on time. External moderators, some of them are far outside of the country, we communicate, we send the exams, and they bring the feedback through internet. So I think really ICT is so much of value. Without it you are left behind. [She laughed].

Takhile pointed out that when sharing information with members of her department using ICT, she just forwards the message at once. She further highlighted that technology is also used to communicate with students when they teach. During micro-teaching, teacher educators sit in a separate room and monitor students teaching in the other room. She had this to say:

... when I send, I send the same message to everybody. For instance, when I want to send it to members of the department or when I want to forward information from administration, I just forward the information and send. We have this technology in the education lab, where we are able to communicate with students when they do their teaching. We sit on the other side, in the other room, we are able to communicate, we listen, we see and we are able to communicate when we are using the technology.

Mlungu explained that he communicates with his students through emails as well as MLMS. He said his students can use the MLMS platform to chat or have discussions among themselves and to pose questions for discussions among themselves or to the teacher educator. He further said that he uses emails when students send their work and he gives his comments. He noted that he rarely communicates through telephone or mobile phone:

Communicating through emails as well as Moodle learning management systems platform which students can use to chat with other students in the group as well as send questions because they can chat in real times, or they can chat like post questions and you can respond at any particular time or anyone in the group can respond at any particular time. And sometimes, especially with master's students, I normally use email and they send their drafts and I make my comments as it through track changes, and I send it back to them, and we communicate through emails and on rare occasions through telephone or mobile phone. I send the notes by chapter, and sometimes not even the whole chapter. I also communicate with the students through emails and also group emails (chats) in Moodle, and when I'm communicating with my colleagues as well I normally use emails as well, rarely maybe telephone, but we mainly use emails because there're normally documents which needs to be read, so I need to make attachments and so on.

Thulile highlighted that she communicates with her students through emails and through short message services (SMS) using cell phones. Students are given work using ICTs and they resend using the computer. She explained:

Always, I communicate with my students using ICTs, emails, for examples, SMSs using cell phones, and I also sent work for my students using ICTs, and the students also resend their work using the computers technologies.

Though communication was seen as an affordance accorded by ICT, Nozizwe perceived ICT to hinder students from concentrating on what teacher educators say during lectures as students shift their focus from the teacher educator to the ICT. She commented:

Use of ICT during class, it's actually, it is worth using at some point, but there are instances where they lose concentration on what you are saying, but they will just look at what is casted on the wall for them. So it is ok, but there is a disadvantage, sometimes they don't listen to what the lecturer is saying but they just listen to, they just look at the wall. They pay attention to the ICT and not pay attention to their lecturer.

Teacher educators' lack of competency in the use of ICT

Participants perceived teacher educators' inability to use ICT tools in teaching as a barrier to ICT integration in the HEIs. They pointed out that those who are competent in the use of ICTs in teaching perform better in their teaching, improving their performance expectancy. The participants stressed that they find it easy to share information with other lecturers and their students. However, the inability to use ICTs in class or even as part of instruction during teaching often leads to teacher educators becoming reluctant to use ICTs in their classes. This has serious implications for the preservice teachers who may not be empowered to use ICT tools in their teaching because they were not exposed to ICTs being integrated by their teacher educators at preservice teacher training during ITE. Temusa perceived ICT tools to be very useful in education, but said that some teacher educators lack knowledge of how to use them during instruction. She said:

Well I think it is a very useful tool. It is very useful, but then the only thing that could be lacking to some of us is that we lack knowledge of how we can go about making use of it, more especially when we are doing our teaching. We are not comfortable to making use of it for our instruction, really we don't know how to make use of these ICT gadgets for our instruction.

Tenkhozi said that ICT tools are very useful and have an educational value. She said the only challenge faced by teacher educators is that they do not use ICTs fully, that is, use the ICT tools to their fullest capacity. She perceived that the teacher educators in the institution are not tech savvy, and hence, they fail to use them efficiently during instruction. She had this to say:

I think ICT is a very useful tool. In fact, I think the only challenge is that we don't fully use these things. Otherwise, if we were able to use the ICTs to their fullest capacity, we wouldn't be even going to class. We would be using it maybe for online teaching things like that. We would be expanding our programmes through the ICTs. Then I think one challenge that we have is that we are not all versatile when it comes to it, and most of our staff members I may say they are not people who are born after computers. Most of them see them as a monster. They are failing to use them to make teaching and learning efficiently. Otherwise, these are good mechanisms for us. In fact, they are to facilitate autonomy and independence you might find that you don't need to come to class on daily basis to conduct your lessons.

Takhile stated that teacher educators have learnt ICT on their own, and though they may sometimes want to integrate ICT, they find that their capabilities are limited. Sometimes she asks students to help with ICT usage as they were born during the technological age, and hence, are tech savvy. This is what she said:

And the fact that we have learnt, as lecturers we have learnt ICT on our feet. So sometimes you want to do that but the capabilities are limited on the use. But at times I ask the students to help as they were born during the computers time. You know when you learn something at your old age, you choose what you want to understand and whatever that I don't want to understand I close the chapter. But when it comes to implementation and sometimes when you want to use that what you closed the chapter on that's when I ask the students to help...

6.6 Structures for ICT Integration

Research question 4: To what extent does teacher education structures in HEIs create an enabling environment for the pedagogical integration of ICT?

6.6.1 Availability of ICT policies

Most participants stated that the lack of policy in their institutions for the integration of ICT is a hurdle to ICT integration in teaching and learning. They said that there is nothing compelling teacher educators to use ICTs. Teacher educators use ICT in their teaching at their own discretion. Government policies do not compel or reinforce the integration of ICT during teaching and learning, yet policies should share very clear expectations for students and teacher educators in HEIs so that the performance expectancy of teacher educators can be easily monitored. Nsibande (2014) noted that Eswatini does not have a national policy that addresses science, technology and innovations, which affects ICT development in the country. Tenkhosi had this to say:

There is nothing compelling the use of ICT. I think general government policy is not compelling people to use ICT, so it's like ICT is an accessory. It's just a by-the-way thing, not something enforced. There is no accountability to it, nothing compelling. I cannot hold somebody accountable for not using ICT as a supervisor. And the fact that there is little support in terms of education, so even if you are a supervisor, you can't hold somebody accountable if you are not providing the support to that individual.

Nozizwe also felt that the lack of policy means there is nothing enforcing ICT usage by teacher educators. She said:

... there is nothing that enforces because there is no policy. You can use, and even if you don't use ICTs, it is still ok. Hmm. I'm not sure about a plan. Policies? No, I have never heard of that.

Temusa also confirmed that she had never seen any ICT policy in the institution. She said she had not seen a policy document but she knows there is a policy. She said:

I'm told that there is a policy, even though there isn't much emphasis this side where we are because we are based on the fulltime teaching mode but such emphasis is given more especially in the IDE mode. But as to whether I have had the opportunity to actually touch the policy and read through that policy document: No. I never had that opportunity to do that. But I do know for a fact that such a policy does exist.

Only two participants, Takhile and Nkosini, stated that they have a policy. They said in their departments they have a course and modules on ICT and an ICT department responsible for connectivity in the institutions. This is what Takhile said:

Hmm, I wouldn't talk on behalf of other departments, but in this department we just had a course on ICT and teaching and learning. Yes, so it's in the policy because we have that course. You will have a copy of my course description/outline.

Nkosini pointed out that they have the ICT department who check connectivity and create ICT centres, and they are directed by the policy. She had this to say:

Yes, we do. Yes, because we have the ICT department, which is responsible and the head office institution. They are the one who come around to check if everybody has access to internet, even students they make ICT centres for them so the policy for them. They issue coverage ways on which they spend their tariffs, how many minutes is given. There is so much covered in the policy. And we also have modules, which we teach on ICT. It is tested and examined and the like. So we do have a policy.

6.6.2 Accessibility and connectivity

Leadership at institutional level must be aware of the benefits of ICTs and ensure that the necessary infrastructure is available to ensure accessibility and connectivity. The participants in this case study cited accessibility and connectivity as a barrier to ICT pedagogical integration in HEIs. In Eswatini, information access is restricted to the availability of resources and technological infrastructure for e-learning (Nsibande, 2014). Lack of finances is a contributing factor in the digital divide, and hence, accessibility and connectivity become a deterrent to ICT integration in the HEIs in Eswatini. The

participants in the study stated that the internet and Wireless Fidelity (Wi-Fi) connections are very slow in the institutions; this might be because of the weak bandwidth and slow speed. This is a problem that affects developing countries like Eswatini. Connectivity is a barrier to ICT integration and use. Bandwidth and connectivity restrictions makes downloading web contents for e-learning slow in Bangladesh (Mahmud, 2010), which is similar to the situation in Eswatini HEIs. Participants highlighted that inaccessibility and limited resources, especially the ICTs, hinder teacher educators from effectively integrating ICTs in their institution during teaching. Connectivity was viewed as one of the critical factors to improve ICT integration in the HEIs; hence, the participants felt there is need to increase the Wi-Fi coverage as there is no internet access in some places and classes in the institutions. Mlungu commented:

The poor Wi-Fi connection, the Wi-Fi connection is very weak. So if we had Wi-Fi connection in all the classrooms, it would make things easier because we ask students to use smart phones or tablets, but the Wi-Fi is not connected. You can receive the Wi-Fi in some of the classrooms but not all of them.

Njabu also highlighted that connectivity is a challenge to the integration of ICT in teaching and learning. She said:

The first barrier that we have is that we don't have enough computers for all the students. Secondly, students are depending on the Wi-Fi. The Wi-Fi most of the time is slow, and sometimes is not even there and the students cannot access it.

On the same note, Temusa emphasised that the unavailability of Wi-Fi is a barrier to ICT integration:

And of course the students' inability to access some of these ICTs, whereas I have already pointed out. Whereas it is common knowledge that we do have Wi-Fi and also that our gadgets are connected to internet, but at times the internet is not there. There are also those areas where we know the Wi-Fi is inaccessible.

Temusa further pointed out that their ICTs are connected to the internet, but the problem with their internet and Wi-Fi is that it loses connectivity frequently. Students have to move around to areas where they can connect to the internet. She said:

Yes they are, but the only problem with our internet is that it goes on and off. Same goes with the Wi-Fi. There are other sections of the university where you find that the Wi-Fi is inaccessible. As a result, you find that some students have to go in areas where they know that the Wi-Fi is accessible for them to be able to access it. But for lecturers, since we are always in our offices, you find that we are unable to access the Wi-Fi.

Nozizwe said:

Its connectivity. Even if you can have ICT but if you are not connected it really doesn't help.

Takhile alluded to the fact that connectivity is key to improving ICT integration. She said:

It's never enough: More facilities. We do have the Wi-Fi, but we have to also increase the coverage of the Wi-Fi because in some classes we cannot access the internet because of the limited coverage for all people to have access. But they do try almost all the blocks have a spot.

6.6.3 Professional development on ICT

Participants emphasised that there is a need for in-service ICT training where they can be capacitated on how best to integrate ICTs in teaching. They felt their ICT knowledge was not sufficient for them to effectively integrate ICTs in their teaching and that the training they have received was not enough. For instance, Temusa felt that they had not received enough training on how to use ICTs during instruction in teaching and learning. She stated that even though there was training from the IDE, the training courses were not regular and the workshops they sometimes received were short. They did not gain much from them on how to use ICT tools pedagogically. She stated that they need to be afforded enough time to practice their acquired skills or knowledge. She said:

Our inability to make use of it. Most of us have not been trained that much, such that we are comfortable to making use of it for our instruction... I wouldn't say that the training we get is regular. Even though in IDE we are sometimes called now and again to receive workshops. But again one challenge with those workshops is

that they are normally short. You come out of that without having gained much with how you can go about using these tools. I feel the trainings are not enough. I feel that we have to be given more time to practice what we are expected to do, or practice what we have been trained on. I kind of feel we should be trained a bit more so that you know, when you make use of something you have to be confident, more especially since that we as lecturers we have to make use of at times in front of our students.

Thulile revealed that involving teacher educators and getting their opinions about ICT integration is key for ICT integration to go smoothly in the institutions. The institutions have to organise workshops as part of professional development strategies for teacher educators on the pedagogical integration of ICT. She said:

Training the lecturers, you train them make sure that you involve them. You find out their opinions about this ICT integration. I think others can safely say, I can't do that. The only way to be aware of somebody's view is to involve that person. We should have to organise workshops. People need to be pushed to do something.

The participants felt that if ICT is to be integrated in all departments during teaching and learning, professional ICT development should be provided for all teacher educators and not only for those in the ICT department. Nkosini had this to say:

Not there, trainings are not there. They just train the ICT department. The administration is telling us to integrate ICT in our teaching, presentation, lecturers, but how do you do if you are not on board yourself. How do you do that? So these are issues that need to be taken care of. Next week we will have a workshop where will be workshop on inquiry-based learning, where you integrate ICT and so on and so on. Probably there is something we will gain, but staff development on ICT issues is just behind. That's all I can say.

Some participants pointed out that they were trained once or twice on ICT integration in teaching but have never attempted to use the acquired knowledge and skills. For

instance, Temusa was trained once or twice on MLMS and blended learning, but has not made an attempt to use ICT in her teaching. She said:

Yes, we were trained once or twice on Moodle and once or twice in blended learning. But if you can ask me what all this is about, I will be lying if I say I know. I haven't tried to use it in my teaching. Nor have I ever made an attempt to use blended learning, but I was trained for both.

The researcher observed that institutions need to monitor their initiatives to ensure implementation. A policy on the professional development of lecturers on ICT integration in teaching and learning is necessary to ensure implementation and for easy monitoring.

6.6.4 ICT resources

The participants noted that facilitating conditions in the HEIs to support ICT integration in teaching are limited. They highlighted that there are limited resources in the HEIs in terms of human resources, infrastructure, ICT equipment, and maintenance. The participants who are part of the administration in the HEIs stated that there are not enough computer laboratories for the students in the institutions, there are insufficient projectors, and ICT tools are generally inadequate in the HEIs. Takhile highlighted that there are too few PowerPoint projectors for teacher educators to use during instruction:

Like I've said, we have PP Projectors. They are not enough because the number of students are increasing. You find that we go to class at the same time, 3–4 of us, so we would want to use the same projector. They are not enough. Sometimes the internet would let us down. You will prepare a lesson and find that the internet is very slow.

Nkosini also pointed out that her institution has insufficient resources in terms of infrastructure, ICT tools, technical assistance, and internet connectivity. She stated:

Ok, in our institution it can be the insufficient resources. The lab, it accommodates 50 students and right now we have 200 students, and when taking them to the lab, you need to split the class to 4 in order to teach ICT. We need to get technological machinery. We as lecturers we always scramble for projectors. We run around

trying to share three projectors that we have. The barriers we have are the service providers. We have several of them, especially EPTC [Eswatini Posts and Telecommunication], in our case. Sometimes it is too slow. The Wi-Fi is too slow when the students are around.

Nozizwe also highlighted that resources in the institutions are limited. She stated that the tools and infrastructure are not adequate for use by both teacher educators and students. She said:

It is the limited resources, meaning the computers that are available are few for the students. The centres/classrooms are promoting use of ICT, but not all lecture rooms have computers. Even not all lecture rooms have LCD or projectors.

Participants also commented that the general maintenance of the ICT tools was expensive, and hence, a hindrance to ICT integration in teaching and learning. Tenkhosi indicated that maintenance of the ICT tools and setting up the infrastructure in the institution is expensive and that government funding is not enough for institutions to be able to fund the projects. She said:

The other part is the costs associated with maintaining the ICT, like you have to subscribe for the internet. Securing the equipment it's a little bit expensive. Having the infrastructure, the laboratories for the students etc., the setting up of all these things, they are quite but expensive, more especially because government funding has gone down in higher education institutions. So we cannot fund them.

6.6.5 Technical support

Some participants reported that technical support is a barrier to ICT integration in the institutions. They revealed that technical assistance is mostly provided by the ICT teacher educators in the institutions. This means that ICT teacher educators with full workloads have to offer assistance to teacher educators during their free time and when they are available, rendering the service inadequate to sustain ICT integration in teaching in the HEIs. Majaha, for instance, pointed out that there is a lack of technical support as institutions sometimes owe money to the service providers. The ICT tools breakdown and are not easy to fix. He said:

... sometimes the institution financially is not stable because you would find that some of the machines, like computers and printers, breakdown or malfunction, and you find that the companies responsible for the maintenance of these machines are owed money by the institution, so they suspend their services and only resume their services when they are fully paid.

Tenkhosi similarly shared that technical support is a barrier to ICT integration in the institution. She pointed out that they do not have a technician to help them when they encounter problems. She stated that they do not have the post of a technician because the government did not approve their request as they seem not to understand the need for a technician in the institution. She said:

One thing that I have seen, which is a barrier to us is technical support. We do not have a technician on the ground, so that if we have a problem right now somebody just come to help you/us. And that one is an issue of the way we get posts, the bureaucracy, the rules/procedures that we follow. We have been trying to get a technician through the Ministry of ICT department, so it's very difficult. It's even difficult to get the post because they don't understand why we need it. Although we have made an effort, though they become very expensive because you need to hire company that will offer the service. It becomes expensive, and you will end up avoiding using those services. We don't have a technician on the ground.

Temusa also appealed for technical support to assist in ICT integration, especially when a teacher educator is baffled. She said:

Appeal for support, so that when you get stuck when trying to use these ICTs or when one tries to integrate, there can be someone to consult on how to go about this.

6.7 Classroom/Lesson Observations

This section provides the data, data analysis and data presentation of the classroom observations to answer the following research question:

1. What are the ICT integration practices among teacher educators in ITE programmes?

An observation guide was generated for the classroom observations (see Appendix D). The indicators reflected in the observation tool helped the researcher note the pedagogic practices during the classroom observations. The indicators contained in the tool were teacher educators' pedagogical orientation; technologies used by teacher educators and how they are used in teaching and learning; and teacher educators' TPACK.

The participants were selected purposively as they said they were integrating ICTs in their teaching when asked. Each participant gave permission for the researcher to observe one of their classes. While in the classrooms, the researcher was a non-participant observer. This study used this research method to explore the ICT integration practices of teacher educators in teaching and learning. Two teacher educators from each of the three institutions were observed once, which makes a total of six observations.

Data gathered during the observations was noted down in the observation schedule as observation notes to be used later when analysing the data for this study. Data were manually coded, and teacher educators were given pseudonyms for confidentiality. Observations helped ascertain the teacher educators' behaviour and whether they do what they say they do. As the researcher observed the lessons, she managed to describe authentic situations as ICTs were integrated during the teaching and when students learn. The observations allowed the researcher to determine the teaching practices applied when using ICTs to disseminate information to students (Nsibande, 2014). The observation data confirmed data from the survey questionnaire and semi-structured interviews. The researcher explored how teacher educators participated in teaching and learning while ICTs are used with traditional pedagogies. Table 6.3 outlines the descriptions of the teacher educators who were observed.

Table 6.3: Teacher educators' profiles

Teacher Educator pseudonyms + qualification	Course taught	Topic Taught	Institution	Hardware used for teaching	Software and source of teaching material	Display platform
1. Pitsoe (PhD)	Mathematics Secondary Teachers Diploma (STD 2)	Functions for data storage	KaMlungu	Laptop, scientific calculator, overhead projector, smartphones	PPP slides (designed by teacher educator)	Installed smart board
2. Nono (M.Ed)	Practical Art Primary Teachers Diploma (PTD 1)	Elements of design: Mixing colours	KaMlungu	Laptop, overhead projector	PPP slides (designed by students)	The wall
3. Njabu (M.Ed)	PTD 2	Categories of visual impairment	Mkhuluzi	Laptop, overhead projector	PPP slides (designed by teacher educator)	Installed whiteboard
4. Majaha (M.Ed)	Bachelor of Education (B.Ed.) 2	Sources of history	Mkhuluzi	Laptop, overhead projector	PPP slides (designed by teacher educator)	Installed whiteboard
5. Sethu (PhD)	Master of Education (M.Ed)	Research designs	Etiveni	Laptop, overhead projector	PPP slides (designed by teacher educator)	Installed whiteboard
6. Mbuso (PhD)	Post Graduate Certificate in Education	Kind of sources & structure of a literature review	Etiveni	Laptop, overhead projector, smart phones, tablets	PPP slides & MS Word document (designed by teacher educator)	Installed whiteboard

The detailed observations are presented in the following subsections.

6.7.1 Lesson observed: Mathematics Education

Class: STD year 2

Topic: Functions for data storage

ICT used: Laptop, smart board and overhead projector

Qualifications: PhD in Science Education

6.7.1.1 Teacher educator's description

Pitsoe is a Mathematics teacher educator at KaMlungu. He used a laptop that belonged to him, an overhead projector and a smart board for presentations and to make additions to his notes. He used the laptop for research as he searched for information and asked the students to do so on their smart phones during the lesson. A calculator was used for calculations, and students were shown how to fill data in their calculators. He emphasised the three keys they had to punch on their calculators to store the data.

6.7.1.2 Lesson overview

The pedagogies Pitsoe used during his lesson were class discussions, a little bit of lecturing, modelling, and drill and practice. Pitsoe used the technological tools without making mistakes. He chose technologies that enhanced the teaching strategies for the lesson. The technologies were used to support learner-centred strategies that addressed the diverse needs of the students. This was seen when the students had to put projected data into their calculators and punch the three keys to store the data. He used the technology to communicate and collaborate with the students in a way that merged content, technologies and teaching approaches in his teaching. The teacher educator demonstrated that knowledge should be transferred. The teaching and learning process was collaborative and interactive; hence, knowledge construction was evident. Pitsoe directed his students to the appropriate learning outcomes and goals using the technology.

6.7.2 Lesson observed: Practical Art

Programme: B.Ed. Primary year 1

Topic: Elements of design: Mixing colours

ICT use: Laptop and overhead projector

Qualifications: Master of Education (M.Ed.) in Primary Education

6.7.2.1 Teacher educator's description

Nono is a Practical Art teacher educator at KaMlungu. She has not received any basic computer skills training but has learnt from observing others and asking colleagues and friends whenever she needs help. Her educational value of ICT is based on its affordance to deliver and display content.

6.7.2.2 Lesson overview

Nono used a laptop and a projector for presentations during the lesson. A group of four students made a presentation using the laptop to project slides on the wall. Nono was facilitating the class discussion, making comments, and at times lecturing the students. Nono and her students displayed competency using ICT to enhance teaching and learning as they used technology with confidence. The technology used enhanced the class discussion and the question-and-answer method as approaches used for teaching the lesson. The ICT integration shown by Nono was minimal as she used the laptop and projector for the presentation of slides, and the classroom was not a technologically rich environment as there were no ICTs visible except the two mentioned above; nevertheless, ICT was used in this lesson. The integration was only because of the teacher educator's belief in the educational value of ICT, and she was not compelled to use ICT in her teaching.

6.7.3 Lesson observed: Special and Inclusive Education

Programme: B.Ed. year 2

Topic: Visual Impairment

ICT use: Laptop and overhead projector

Qualifications: Master of Education (M.Ed) in Primary Education

6.7.3.1 Teacher educator's description

Njabu is a special and inclusive education teacher educator at Mkhuluzi. She has received some basic computer skills training. Her perceptions on the integration of ICTs

in pedagogy are the affordances of digital technologies to enrich teaching and learning in content delivery and research.

6.7.3.2 Lesson overview

Njabu used a projector for lesson presentation and a laptop for an internet search and to prepare slides for use during presentations. Njabu used a cell phone for web searching and lesson presentation using audio recordings, which were sent to students through WhatsApp. Njabu also used the desktop computer to search for information on the internet and downloaded some audio visuals from YouTube that were used during teaching and learning. The researcher observed Njabu using the ICTs (cell phone, computer, audios, and videos, PP projector) to integrate ICTs in her teaching. Njabu was able to select ICTs that enhanced her teaching methods, that is, the lecture, discussion and modelling. Njabu used the technologies to enhance student-centred approaches to address the diverse needs of the students. She was able to integrate appropriate instructional methods and technologies into teaching, and technologies were used to present content using methods of teaching that were appropriate for the lesson. Njabu integrated ICTs in her teaching as she used technology or digital age communication resources to promote student participation in learning. She engaged her students in knowledge construction as they were taking part in a group discussion to discuss their intervention concerning visual impairment based on the causes and characteristics of visual impairment.

6.7.4 Lesson observed: History

Programme: B.Ed. year 2

Topic: Sources of history

ICT use: Laptop and overhead projector

Qualifications: Master of Arts (M.A.) in History

6.7.4.1 Teacher educator's description

Majaha is a History teacher educator at Mkhuluzi. He had received basic computer skills training. He perceived ICT to be of great importance in research and information sharing with his colleagues and students.

6.7.4.2 Lesson overview

In his lesson Majaha used a computer and a laptop for research and an overhead projector for a PPP during the lesson. He lectured the students as he was reading the notes from the projected slides and making additional comments, and the students were passive and making notes in their notebooks. Although the classroom was not technologically rich with only the laptop and overhead projector, he was able to turn content to digital format (typing content in the technology) using Microsoft Word. He then referred his students to an online journal that they were to read in their own time to prepare for a discussion in the next lesson. Students were seen searching for the journal on their cell phones to be sure of what it entailed. Majaha opened the journal on his laptop and beamed the first page on the white board for the students to see the authors and what it looked like.

6.7.5 Lesson observed: Quantitative Research Methods

Programme: M.Ed.

Topic: Research designs

ICT use: Laptop and overhead projector

Qualifications: PhD

6.7.5.1 Teacher educator's description

Sethu teaches Scientific Research at Etiveni. He taught quantitative research methods to Master of Education students.

6.7.5.2 Lesson overview

Sethu used an overhead projector, a laptop, a smart board and a flash drive for the PPP. Sethu was lecturing as he was projecting the slides. The technology used enhanced the lecture method as a teaching approach for the lesson. The ICT in this lesson were used for the PPP. The classroom was not a technologically rich environment since the students had no computers and were not even encouraged to use their smart phones to search for information. Sethu also used the green board and chalk to conduct the teaching and learning session, which is part of the traditional pedagogical practices of teacher educators. Sethu was not facilitating the teaching and learning process; his class was teacher-centred, which is against the constructivist approaches that advocate for student-centred pedagogies. The students were passive recipients taking notes from the projected slides and the additional notes written on the chalk board during class time. There was no collaboration between Sethu and the students or among the students, and hence, knowledge construction was at stake.

6.7.6 Lesson observed: Qualitative Research Methods

Programme: Post Graduate Certificate in Education

Topic: Kind of sources and structure of a literature review

ICT use: Laptop and overhead projector, overhead projector, smart phones, tablets

Qualifications: PhD

6.7.6.1 Teacher educator's description

Mbuso teaches qualitative research methods at Etiveni. He taught Post Graduate Certificate in Education students.

6.7.6.2 Lesson overview

Mbuso used a laptop to read his prepared notes and to upload documents and send it to students through MLMS; a whiteboard for a PPP and to write some points; and told his students to use their smart phones and tablets to search for information on the internet

and for a certain journal article. Mbuso engaged students to read the journal article from their tablets and smart phones on the types of sources in research. The students were also engaged in discussions about peer reviewed journals, primary sources, authored books (secondary sources) and websites such as Google and Wikipedia. The teacher educator asked questions and the students searched for answers on their smart phones and tablets.

Mbuso integrated ICTs into his teaching. He chose ICTs that enhanced the teaching methods for the lesson, which were lecture, discussions and the Socratic method (question-and-answer method). Mbuso was able to manage a technology-rich classroom effectively, and he facilitated the teaching and learning process. Outside class, Mbuso also used technology to communicate and collaborate with students through Moodle chats, emails, WhatsApp, and phone calls.

6.7.7 Classroom environments

The researcher observed that the classrooms comprised pre-arranged desks. Most teacher educators stood at the front of their classes in front of their students, which may be common during lectures. The teacher educators went over the slides that contained notes presented in PPPs. The teaching methods, for example, lecture and demonstration methods “stimulated a talk-listen, question-answer kind of behaviour between instructor and students, which effectively draws a line between the instructor and students” (Perreira, 2012, p. 197).

Most teacher educators were also chairing class discussions and asking the students questions. That put them in a dominant position, which goes against the student-centred active learning encouraged by the constructionist approach (Nsibande, 2014). Students became passive listeners to their teacher educator and took notes.

The researcher observed that the teacher educators uploaded notes to the students before or after class through Moodle and emails for students to access and discuss during class (Nsibande, 2014). According to Maphanga (2012, p. 3), “the concepts ‘online’ and Moodle are two distinct phenomena in educational technology; ‘online’ being an approach

used in taking courses to students and Moodle being the tool used to convey content and facilitate online interaction”.

It can be argued that posting content such as lecture notes on the web or the availability of ICT infrastructure do not depict e-learning. On the contrary, e-learning involves the development of learning materials and student activities into course appropriate learning pathways to produce desired experiences in students (Nsibande, 2014), but ICT integration is evident when notes are uploaded on the web, as content is converted to digital format. Tinio (2002) described e-learning as a process where students use ICTs to communicate with one another and their teacher educators and also to access learning materials.

6.8 Document Analysis

This section examines the policy component of Eswatini to try and map the views of the National Education and Training Sector Policy concerning the pedagogical integration of ICTs in teaching and learning, especially in HEIs. It is hoped that the relationship between and within teacher practices and policy frameworks can show ways to close the gaps that seem to exist between policy and policy implementation (Ndlovu, 2016). The curriculum structure in the form of course outlines was also analysed to ascertain if the documents are adequate for the integration of ICT in ITE programmes. The course outlines were purposively sampled from teacher educators who were part of the study population.

This data analysis intended to answer the following research question: How does the current structure of the curriculum in ITE affect classroom technology practices of teacher educators/lecturers?

The policy that was interpreted and analysed in this study is the Government of the Kingdom of Eswatini MoET National Education and Training Sector Policy (2018). The policy and its goals are presented. The policy states that ICT is key to the fulfilment of its national goals. It presents ICT as a vital tool to enhance teaching and learning throughout the education and training sector. It is also used for management and administration of education and training. ICT plays an important role in the expansion of 21st Century skills. The MoET is to facilitate enabling environments for the “use of ICT in all education and

training establishments by digitisation of information relating to curricula, mobile learning, e-learning, e-assessment and e-governance” (The Government of the Kingdom of Eswatini Ministry of Education and Training Sector Policy, (2018, p. 26).

6.8.1 ICT policy goal

The goal of this policy is that ICT should be used as a tool for the teaching and learning of knowledge and skills throughout the education and the training sector for blended learning as well as for management and administration purposes.

6.8.2 ICT policy objectives

The following objectives are some of the objectives of the ICT policy that pertains to the study:

- To enable teachers to use ICT in the teaching and learning of their respective subjects (ICT integration);
- To encourage students to develop the knowledge and skills required to use a range of ICTs effectively;
- To ensure ICT equipment is safely stored, maintained and timeously repaired; and
- To ensure free internet is available in all education and training establishments.

The Education Sector Policy states that as part of its strategic framework it intends to introduce blended learning areas and support capacity strengthening for teachers in ICT. According to the Education Sector Policy, curriculum is all the learning experiences provided for students in and out of school. This includes course of study, syllabus, textbooks and assessment guidelines. This responds to the 2030 Agenda Sustainable Development Goals, Targets and Indicator 4, which is to ensure inclusive and equitable quality education and to promote lifelong learning opportunities for all (Chabinga, 2015).

6.8.3 Curriculum (course outlines)

In the analysis of the curriculum (course outlines), the researcher stated the course title, the course code and highlighted what the curriculum stresses (curriculum content, goals/aims and objectives), methods of inquiry, and teaching strategies.

6.8.3.1 Course title: Curriculum Studies in Religious Education, Theory and Practice 1

Course Code: EDC 275

Course Description: The description of this course is to introduce students to theoretical and practical approaches to teaching Religious Education at secondary school level in Eswatini.

The course content or topics include lesson planning, teaching and learning strategies and an introduction to other key teaching tools such as ICT. This section is appropriate for the study as it touches on the integration of ICTs as key teaching tools to enhance teaching and learning strategies.

The course further introduces students to a wider range of teaching and learning approaches. The professional studies aspect of the course considers issues such as classroom management as teachers teach their students. The mode of delivery in this course is blended learning. The course outline, that is, the course description, course outcomes, course content and suggested resources are online. Most activities and assessments for each topic are online or happen during face-to-face interactions. This section is also appropriate to the study as it promotes blended learning, which is a mixture of online teaching using ICT and face-to-face interactions.

The main goal of the course is that upon completion students should have acquired the relevant theoretical knowledge and have developed the professional skills to teach Religious Education at secondary school level. There are six goals or aims, and goals 5 and 6 are relevant to the study as they touch on the pedagogical integration of ICT in HEIs. Goal 5 requires students to reflect on the theory and practice of Religious Education in its varied contexts. The students are expected to design and construct a scheme of

work and lesson plan that is part of official books in schools. They are also to construct lesson aims and objectives. Goal 6 is for students to demonstrate the ability to integrate ICT as they prepare for classroom practice. These objectives are presented as follows in the curriculum:

1. To describe the principles of choosing effective teaching tools for effective and efficient implementation of Religious Education lessons; and
2. To explain how each teaching tool can be used in the implementation of a lesson in a Religious Education class or lesson.

The instructional strategies for the course are lecture (face-to-face), reading of teaching materials, research, e-activities, assignments and discussion forums with the use of MLMS.

The information given in the course outline (curriculum) provides teacher educators with a body of knowledge they should work with as they integrate ICTs into teaching and learning.

6.8.3.2 Course title: Educational Research

Course code: EFM 515

Course description: This course introduces students to issues, principles, concepts and various research methodologies used in educational research with the objective that by the end of the course they will be able to carry out research. Students are also introduced to elementary statistics (mostly descriptive statistics), which are essential in conducting research.

The course content in this course/curriculum is presented and covers foundations of research, where students learn about research and its functions. The course goes into detail to uncover what research entails, for instance, touching on issues of the research problem, literature review and all components of educational research. Students are also taught how to formulate a research proposal and to undertake a research study.

The curriculum does not specify clearly how ICT will be used. Although the curriculum does not specify the integration of ICT, the fact that the researcher observed this course

and interviewed the teacher educator makes it probable that in this course there is pedagogical integration of ICTs in teaching and learning. For instance, during the observation, students were engaged on their laptops, smart phones and tablets where they searched for information on the internet and they were also engaged in class discussions. They even used MLMS to post their reactions to the lecturer and to other group members. The teacher educator presented and demonstrated the expertise/skills to be worked on and then the students were given time to practice and develop their skills. It would be proper, therefore, for the curriculum to specify how a course should be taught and the ICTs that should be used in that course as it is a road map on how activities should be carried out in the course.

6.8.3.3 Course title: Bachelor of Education (Special and Inclusive Education Visual Impairment)

Course code: BED VI-511 (Year 3)

Course description: This course was designed for students who are studying Visual Impairment towards a Bachelor of Education Degree in Special and Inclusive Education. The students are expected to engage a self-directed learning, which is a hallmark of independent study. It is not yet clear how the students are engaged in the independent study.

The course aims are to consolidate students' understanding of conceptual issues of visual impairment, what visual impairment entails and the conceptualisation of tactile work (Braille configurations and diagrams). The curriculum does not mention the use of ICT. It is not clearly stated how visual impairment students acquire the content they put into braille for learners with visual impairment.

6.8.3.4 Course title: Faculty of Education Course Outline for History

Course code: SSR 101

Course description: The course content is highlighted in the course outline. The course content includes a careful examination of the question: What is history? Various theories of studying history, oral traditions, and archaeology are emphasised. The materials or text

books students are required to read are stated. The approaches to teaching are not stated. It is therefore not explicit what pedagogic aspects need to be engaged for students to learn in this course. There is no mention of ICT in this course as the curriculum does not even suggest websites for students to read as part of reference materials, and hence, the assumption that students might be engaged in research as History is a factual course. For instance, part of the course topics is on historical facts, and recommending websites where students can get information would make it easier for students to identify meaningful and relevant resources (Ndlovu, 2016). Though a detailed content coverage is provided, the skills to be developed are not stated. Teacher educators “also need to give students opportunities where they can practice skills like working collaboratively and individually” using ICTs (Ndlovu, 2016, p. 224).

6.8.3.5 Course title: Art and Crafts

Course code: ATP 302

Course description: Art and Crafts is a practical subject, but the non-practical or academic elements serve to generate an awareness of the value and purpose of the arts and crafts activity.

The aim of the course is to produce teachers who are aware of the importance of arts and crafts and how it fits into the educational system and who have the skills to teach Practical Art at primary school level.

The following objective of the course is relevant to this study:

- To expose students to basic art and crafts theory and practice, and train them in a wide variety of basic techniques, materials, tools and equipment, and thus, equip them to adequately and effectively handle the subject at primary school level.

The course content includes an introduction to art history, research on local arts and crafts works, and students being engaged in the production of products that can help solve societal problems using arts and crafts designs. Students are taught marketing strategies for their arts and crafts products. They are also engaged in practical work.

The methodology in this course is based on lectures, demonstrations, group discussions, micro-teaching, field work, research, and project work. There is no mention of ICT in this course as the curriculum does not even suggest websites for students to read as part of reference materials, and hence, the assumption that students will use ICTs as they engage in research and as they learn about marketing strategies and engage in practicals.

The data showed that the HEIs in Eswatini integrate ICT in teaching and learning. The gap is that the curricula (course outlines) do not specify which ICTs should be used for each topic. The technology and the pedagogies need to be clearly stated and in line with course content. The professional development of teacher educators has a gap because it focuses on the adoption of ICT in teaching not on how to pedagogically integrate ICT in teaching and learning. This can be addressed by training the teacher educators on how to integrate ICT in their pedagogy during teaching. The content should inform the pedagogy and the ICT used in the class.

6.9 Chapter Summary

This chapter presented and analysed data that were collected to discover the pedagogical ICT integration practices among teacher educators in ITE programmes in HEIs in Eswatini. The data analysis was done to respond to the objectives and research questions of the study. The quantitative data from the questionnaire were presented as phase1 in Chapter 5 and the qualitative data from semi-structured interviews, classroom observations, and documents analysis were presented as phase 2 in this chapter.

CHAPTER 7: DISCUSSION OF FINDINGS

7.1 Introduction

This chapter presents a discussion of the findings of the study that was carried out to explore the pedagogical ICT integration practices among teacher educators in ITE programmes in HEIs in Eswatini. The study was done in three HEIs. The literature reviewed helped the researcher to get an understanding of the teacher educators' knowledge of ICT integration in teaching and learning. This was done by comparing existing knowledge from the reviewed literature with the findings of the study. The questionnaire helped to source information from teacher educators on how they integrate ICT in their instructions. The semi-structured interviews also aided in sourcing the required information through the teacher educators' experiences and perceptions of how ICT is pedagogically integrated into their teaching and learning processes. The classroom observations enabled the researcher the opportunity to observe the ICT integration practices of teacher educators.

The research findings are discussed thematically according to the themes that emerged during the data analysis. This process was based on the literature reviewed for the study to establish the link between existing knowledge and new knowledge.

7.2 Pedagogical ICT Integration Practices

Research Question 1: What are the ICT integration practices among teacher educators in ITE programmes?

The survey questionnaire findings indicated that most respondents were using the following ICT gadgets for teaching and learning processes: Laptop, computer, smart phone, smartboards and projectors. This may be because these gadgets were provided by the institutions. These gadgets were used for teaching and learning during the observed lessons.

The findings on TK revealed that the respondents were able to send an email with an attachment, use a printer, use a search engine to find current information on the topic or course content, use a projector, and project prepared slides or content. This shows that

teacher educators use digital technologies for planning, preparation, and presentation of lessons.

The respondents strongly agreed on TK regarding sending an email with an attachment, using a printer, using a search engine to find current information on the topic or course content, and using a projector to project prepared slides or content. TK might not guarantee pedagogical integration of ICTs, but it is a starting point for ICT integration during instruction. The study also discovered that teacher educators agreed on TCK regarding having knowledge of technologies to use for student learning and being able to use ICTs for teaching to easily achieve the learning outcomes of lessons. The TCK of the teacher educators was persuaded by the teacher educators' perceptions that ICT improves their performance expectancy and effort expectancy. This was based on the affordance of ICTs to easily achieve the learning outcomes of lessons, which was based on their perceptions and experiences with the ICTs. However, they did not specify how ICT helps them to easily achieve the learning outcomes of lessons. The findings of the study corroborate the educational potential of these ICTs, which entails a shift in teaching and learning (Montrieux et al., 2015).

The findings of the study revealed that with regard to content knowledge respondents strongly agreed that as part of their practices they know how to develop class activities that are meaningful to students using ICTs and how to develop projects that are meaningful to students. The respondents indicated that they follow recent developments and applications in their various courses. This showed that the teacher educators were custodians of their curriculum in their various areas of expertise.

The findings on pedagogical knowledge revealed that teacher educators used different teaching methodologies in the classrooms using ICTs. This is in line with Ndlovu (2016) assertion that ICT and pedagogy should not be separated but that teacher educators should play their role by manipulating technology to gain much from their use of ICTs in their teaching strategies. The findings of the study also revealed that the respondents agreed on PCK regarding being able to use ICTs in their teaching. The TPK of the teacher educators was shown by their capability to select and use ICTs to help enrich teaching methods for a lesson. This is in line with assertions by Zendah (2017) that the integration

of ICT can help enrich the teaching approaches for a lesson. It can be asked how ICT integration can enrich the teaching methods used in a lesson since ICTs are just tools. This can be achieved by properly harnessing the ICT affordances to improve the teaching methods used for teaching and learning processes.

The findings of the study exposed that most respondents agreed on TPACK regarding integrating appropriate instructional methods and ICTs that help to effectively teach their content effectively and to appropriately combine content, ICTs and instructional strategies. The teacher educators' TPACK also enabled them to evaluate and reflect on using ICTs effectively to enrich teaching and learning. Ndlovu (2016) also found that it is essential for teacher educators to create learning environments with ICTs that promote students' construction of knowledge and understanding of various concepts. The findings also concur with the TPACK framework, which stresses the association or intersection among teacher educators' understanding of content, pedagogy and technology and how these understandings intermingle with one another to yield effective teaching (Koehler et al. 2014).

The interview findings revealed that teacher educators' ICT practices during ITE programmes improve their performance expectancy, a component of the UTAUT. The participants were of the view that ICT integration in teaching facilitates an improvement in job performance, and hence, ICTs are useful as a delivery strategy for their course content through PPPs, research, online discussions, online teaching and information sharing, shifting the paradigm from traditional pedagogies.

As highlighted earlier, pedagogical ICT integration practices were identified under the following sub-themes: Converting content into digital format in the form of PPPs, which include the use of audio, videos and Microsoft Word; research; and online discussions. Each of these are discussed in detail in the following subsections.

7.2.1 Converting learning content into digital format through PowerPoint presentations

The findings of the study revealed that teacher educators use ICT for PPPs during teaching; this is done to shift from the traditional strategies of chalk and talk. Most

participants used LCD projectors for the presentation of lesson content during teaching. The teacher educators also used audio and videos that are projected and sent to students. Thulile, for instance, stated that ICT makes her work easier because she prepares slides when planning her lesson to present to her students and that it saves time. During lesson observations the teacher educators tried to avoid the chalk and talk strategies by using ICTs, mostly PPPs.

The teacher educators also stated that they would take longer lecturing without the use of ICTs than when using ICTs; thus the use of ICTs saves them time. The smartboard makes life easier because teacher educators prepare PowerPoint slides and send them to their students as notes after the lesson presentation. The teacher educators do not need to spend time writing notes on the chalk board because notes are prepared once using ICTs, saved, and can be retrieved and shared with students when necessary. For instance, the teacher educators no longer dictate notes but send the notes to the students through emails and WhatsApp. The students engage with the content as it is presented to them, and they can read it instead of just listening to the lecture, and this saves time. The findings of the study also concur with Bahati (2010) findings that ICTs make teaching preparation easier and that PowerPoint slides help improve work while preparing for classes.

The teacher educators' practices also entailed using PPPs to present slides on the wall and explaining concepts to students. Videos and audio provided students with illustrations and explanations of new concepts. Participants engaged students in discussions and collaborative learning. According to the social constructionist theory, the social interaction of students with content lead to the construction of meaning and reality. Bahati (2010) also stated that as teacher educators teach using technology, ICT can be broadly used to help students understand allocated tasks and learn what is appropriate to them. He also pointed out that ICT-based resources help in the effective and enriched illustration of content by including pictures and videos taken from internet and improved precision of graphs and diagrams compared to when it is drawn manually. In line with the findings, Pandita et al. (2010) alluded that classroom lectures can be recorded and provided in digital form to students as and when needed.

The participants stated that they use computers when preparing lectures, preparing slides, and recording marks. They stated that to search for information they use the internet and then they prepare slides for PPPs. They also revealed that sometimes they use ICTs for PPPs. Bahati (2010) also found that lecturers at KIE used ICT for academic purposes. Interviewed and surveyed lecturers used computers to prepare lecture notes and exams, process students' examination results, and type research papers. The responses highlight the role of ICT integration in developing content and delivering it in digital format during teaching. Teacher educators can use audio or video to record class sessions online and send notes, journal articles and relevant links to students online. These sentiments were also shared by the participants in the study. ICTs enable teacher educators to diversify their teaching methods to provide students more opportunities to be involved in the teaching and learning process. The benefits of ICTs do not automatically happened because ICT tools are available but depend on how the teacher educators select and integrate ICT in teaching. Although creating digital learning activities is crucial when learning with ICT, it is also important to create contexts for learning using new ICTs in integrated and meaningful ways for the production of knowledge and the diffusion of information (Montrieux et al. 2015). ICTs allow students to work together on projects, sharing their knowledge and experiences to collaboratively solve problems.

7.2.2 Research

The participants in this study revealed that they use ICTs for research. The participants made their students research and source information from different resources such as e-books and journal articles to facilitate discussions. The internet is used for research or for information searches to reinforce concepts in the various course programmes. These findings were also shared by respondents who revealed that they engage in research using ICTs by searching and using up-to-date resources (e-books and journals) in their courses. For example, Tenkhosi acknowledged that she uses ICT to gather information by searching Google during research. Bahati (2010) also found that the internet was used to search for teaching materials and that lecturers ask students to do further reading by researching on the internet.

Nkosini, for instance, reported that she gives her students assignments where they have to use Google to find journals on given sites and read these articles and respond to questions. She also searches for journals on the internet and distributes these to students to read and respond to assignments. In addition, she sets tests based on journal articles assigned to the students. ICTs helped her research and prepare for lessons. UNESCO (2015) argued that ICTs can enable students to access information on their own; hence, teacher educators' roles have shifted from being information providers to helping students manage and interpret information. In line with these findings, in KIE Bahati (2010) found that lecturers referred students to web sites presenting detailed information on their assignments in their various courses. They asked students to search for information on websites and then discuss it in the classroom. Students were provided with websites where they source information that help them in their coursework. The participants in the current study stated that they encourage their students to engage in enquiry-based learning where they search for information before or during lectures. The teacher educators posed questions for students to respond to, and if they did not know the correct answer, they had to search for the answer on their smartphones. Students gave prompt feedback after using their smartphones to find the answer. Stevenson (2008) concurred that through the use of ICTs teacher educators' pedagogies can be reformed from being authoritarian to being collaborative and facilitative as they teach and as students learn.

7.2.3 Online discussion

The findings showed that online discussion platforms are used by students and teacher educators, especially MLMS, where students engage in online discussions or chats. The students also debate issues online. Some teacher educators in the HEIs upload materials or discussion questions on Moodle for students to read and engage in discussions. Chats help students collaborate as a community as they interact as a group. Students can connect and participate in the discussions regardless of their location, which is why most participants in the study revealed that students can continue the discussions in and out of class. Conole and Dyke (2004) found that ICTs facilitate growth in the selection of resources to support learning and research through specified gateways, portals and resource providers, which include a rapidly increasing number of online learning systems.

This entails communication structures, such as email, discussion boards, and synchronous chats; and assessment tools, including integrated learning settings such as Blackboard and WebCT.

The findings revealed that Mlungu sends online notes to his students' smart phones, such as journal articles and resources to facilitate discussions. He sends a discussion topic or question online and students can respond to it electronically and debate issues online. Class discussions are even done outside the classroom using MLMS. The students use MLMS to chat with other students and teacher educators, posting questions and responding online. The teacher educators also respond online through MLMS and emails. These findings are in line with Roberts and Rees's (2014) findings that students use their mobile phones for various activities during learning, including note taking, looking up lecture concepts online, accessing lecture slides, and using Facebook and email.

In this study some participants pointed out that they use social media platforms like WhatsApp to share information with students. Students can also chat among themselves or have group chats via WhatsApp. Thulile, for instance, commented that she uses software such as Geogebra to help students understand difficult mathematical concepts. Mlungu highlighted that students can use WhatsApp and Facebook to send information to their colleagues. Concurring with these findings, Haiping (2015) revealed that in two universities in Namibia students mostly used Facebook to socialise and WhatsApp for academic purposes.

7.3 Unrevised Curriculum

Research Question 2: How does the current structure of the ITE curriculum affect the classroom technology practices of teacher educators?

The findings of the study revealed that participants thought it is necessary to revise their curricula to incorporate ICT integrative strategies for the preservice teachers. They felt that ICT integration should be part of teacher training to help introduce preservice teachers to integrating ICTs into their teaching experiences. Tenkhosi, for instance, pointed out that their curricula had not been revised to integrate ICTs and that teacher educators only used ICTs as they perceived the affordance of the ICT and of their own

volition. For instance, they use the projector to beam slides or notes onto the smart board for the students, converting the content to digital format. Only teacher educators who teach ICT as a course use ICT on a daily basis in the institution. As part of moving with trends, students use ICTs to access information and notes from their teacher educators. Dlodlu (2018) concluded that it is envisaged that teachers' positive attitudes toward ICT integration in their practices are likely to translate to the daily use of ICT during teaching and learning.

The participants alluded that the curricula do not really integrate ICT tools. The document analysis findings revealed that pedagogically there is no mention in the course outlines of which ICT tools should be used in the programmes or per topic, especially in the fulltime mode of teaching. ICT integration is emphasised in the IDE programmes where Moodle and blended learning is supposed to be used. The findings are in contrast to Zendah (2017) findings that showed that a good curriculum does not only suggests what should be taught and learnt in different courses and stages of learning but also elucidates on the way the curriculum should be delivered in the classroom where actual learning takes place and which aspects can best be done using ICTs. This may be because there is no guidance on ICT integration in the policies, and therefore, it is necessary to change the policies to include guidance on ICT integration.

The participants stated that the curriculum does not enforce the use of ICT in teaching and learning as there is no implementation policies in the institutions that address matters of ICT integration during teaching and learning. Takhile noted that the curriculum for the Educational Technology course still teaches about old media and technologies, such as overhead projectors. Yet students are interested in digital media like PowerPoint projectors. This affects the use of technologies in class as students are not interested in using old technologies in their curriculum. Bahati (2010) shared the same sentiments as he found that lecturers stated that PowerPoint slides make teaching preparation easier and new ICTs help lecturers to access instructional resources from the internet more easily.

The participants also stated that if the curriculum is designed by the teacher educators, they are in a better position to draft and include all the components they think should be

included in the curriculum or course content. They interpret the curriculum by drafting their plans of what they will do or include in their lessons to make them interesting. The participants stated that the curriculum encourages the use of ICT, but the course outlines do not show where and when ICTs should be used or which ICTs should be used in each topic or lesson. It would improve the ICT integration of the teacher educators if the curriculum were specific. The findings concur with Bester and Brand (2013) findings that ICTs cannot be a panacea to all education problems but can provide new possibilities to the teaching profession if integrated into the curriculum. The problem of how to integrate ICTs in the curriculum may be due to lack of models on how to use technology to facilitate teaching and learning (Fu, 2013). This leads to preservice teacher preparation not providing sufficient ICT knowledge to support technology based instruction and not demonstrating appropriate methods for integrating technology within a curriculum (Fu, 2013, p. 116). Therefore, teacher educators must demonstrate and apply ICT skills in their teaching in order to integrate ICT-based strategies effectively. This may sound demanding for the teacher educators because there are no examples or guidelines provided by ICT researchers on how teacher educators can effectively integrate ICTs in their pedagogy to cater for the curriculum goals.

7.4 Perceptions on the Educational Value of ICTs

Research Question 3: What are teacher educators' perceptions of the educational value of ICT?

The respondents in the survey questionnaire stated that when they use ICTs they feel in control of their teaching. Their use of ICTs made them feel a sense of achievement and made them feel more interested in doing their work, as a result their work is more effective. The perceived ease of use (effort expectancy) indicated the teacher educators' acceptance and use of ICTs during instruction. The findings concur with McCallum et al. (2014) findings that the perceived usefulness and ease of use of ICTs can impact teacher educators' acceptance and use of ICTs in teaching and learning. Teacher educators integrate ICTs when they use the tools with ease, which addresses their effort expectancy. In line with the findings, Dlodlu (2018) concluded that it is envisaged that the

positive attitude of teacher educators towards ICT integration in their practice is likely to translate to daily use of ICTs during teaching and learning.

The interview participants' perceptions presented the performance expectancy and effort expectancy of teacher educators, which are components of the UTAUT. Ndlovu (2016) argued that teachers' beliefs or what they embrace about their practice actually direct their actions in the teaching process. Teacher educators' perceptions may impact the way they use ICTs in their work, mostly during instruction. The participants value ICTs (digital technologies) because of its affordances of delivering content and retrieving information, which permits easy access to information, and hence, makes life easier. This showed that teacher educators integrated ICTs in their classrooms because they found the ICTs to be useful and to add value to their teaching.

The immediacy of ICTs over traditional pedagogies like talk and chalk was given credit. Participants perceived ICTs as making life easier. ICTs were used to access information through the internet for information processing, sharing and storage. Nozizwe for instance, perceived ICTs to have educational value as they are used for information processing and storage and access to the internet. This was also found by Montrieux et al. (2015), who reported that teacher educators and students perceived the educational value of ICT tools, such as tablets, to encompass the ease of use, the speed of accessing a variety of learning materials, and the ability to search for formation using the internet. Mlungu perceived ICT to be useful to improve teaching, especially because information is online and can be retrieved electronically using online platforms. He highlighted that ICTs are not only useful to access information as most information is retrieved electronically online but that it is also cheaper for students to retrieve information from the internet than to have to photocopy hard copies of documents or journal articles. This is consistent with Bahati's, (2010) findings that lecturers refer students to websites with the detailed information they need for their assignments to find information and retrieve it for discussions.

Thulile perceived that the use of ICT improves her work, and hence, improves her performance expectancy, as it permits more time for interaction with students as she does not have to write on the chalkboard but can refer students to the PowerPoint slides she

prepared before class. In line with these findings, UNESCO (2015) stated that teacher educators may help students use ICTs to enrich students' learning, to gain an understanding of course content, and to relate to complex problems, creating an awareness required for a more harmonious, fulfilling and prosperous society.

7.4.1 Makes life easier

Four of the nine participants perceived ICTs as making their life easier as they do their work. The participants highlighted that the availability of ICT gadgets like smart boards make their life easier. They further said that they take less time lecturing using ICTs than lecturing without ICTs. The notes are shared with the students and that makes the lecture faster as they can read what is lectured to them. The ICT tools were seen as promoting interaction and providing immediate feedback to students. Participants commented that as things are done faster with the use of ICTs, it has improved the worth of the education system because target dates to finish work are met. The participants further stated that ICTs are key for information access through research, which entails searching the internet for information or content knowledge to be used during teaching and learning when doing research projects for academic purposes and when helping students with research. Bahati (2010) found the same in KIE where lecturers stated that the use of ICT make it easier for lecturers to prepare for teaching than when doing it without the use of ICT. The teacher educators' use of ICT is related to its perceived usefulness, ability to produced good, expected results (Lai, 2015), and to how they perceive the ease of use of the ICT tools. Teacher educators' negative perception of an innovation may lead them to be hesitant to adopt that innovation, and therefore, the teacher educators' positive perceptions of the educational value of ICTs in this study show that there is ICT integration in the teaching and learning processes in the HEIs.

Majaha saw ICT as very important in the modern age as it makes life easier and simplifies the teacher educators' work as accessing and sharing information through the internet are easy. Nkosini noted that ICT permits easy access to information through the internet. ICT also makes it easier to handle, store and transfer information than in the past before ICTs. The time of carrying many books is gone; people now carry iPads and use them to send documents, finding it easier to read. Documents can be accessed online as long as

there is internet. The ubiquitous ICTs are used to create personal learning environments to add value to students' learning experiences (Looi et al. 2010). This calls for teacher educators to make their students' learning a seamless experience between prescribed learning and informal learning that take place outside the classroom walls.

Takhile also stated that ICT has brought about a paradigm shift in teaching and learning. This is in line with Pandita et al. (2010) assertion that ICT is an agent of change that brings a paradigm shift to teaching and learning. According to Pandita et al. (2010), the paradigm shift is doing what you had not been doing previously without the use of ICT.

ICT improves the pedagogical delivery of content. The participants highlighted that it takes longer lecturing without the use of ICT than with the use of ICT. The availability of ICTs like smartboards makes life easier. ICT was perceived to make life easier as work is done faster, improving the effort expectancy and performance expectancy of the teacher educators. Bahati (2010) also found that the content is planned easily and is clearly presented when using PPPs. ICTs are also used to prepare slides for presentations and to send PPPs to students as notes after lecturers. Bahati (2010) highlighted that lecturers in KIE use computers to prepare lecture notes by typing these notes, which are sent to students after the presentation.

In spite of the opportunities and affordances that ICT offers to education, the focus has been on the delivery of teacher generated content to ICTs, instead of encouraging students to create and share learning content (Haipinge, 2015). This shows that the ubiquitous access to ICT does not guarantee a change in instruction but can permit a change in pedagogy.

7.4.2 Communication

The findings revealed that an educational affordance of ICT is communication, which offers the possibility of engagement and collaboration among students as they learn. The use of ICTs has brought new ways to communicate and have conversations among teacher educators and among students and their teacher educators. During the interviews, the participants stated that ICTs help develop online discussion forums and chats, which are good for information sharing among students and teacher educators. It

was reported that examiners, part-time teacher educators, tutors and examination moderators send information/comments to students and heads of departments online without having to physically travel to the HEIs. This is in line with social constructionism, which alludes to the fact that with the use of ICTs we collaborate as social beings. For instance, Nkosini stated that she frequently uses ICTs for emails to communicate with part-time lecturers. She sends timetables, work schedules, and meeting dates through emails and WhatsApp. The part-time lecturers and external moderators also send work and even examinations using emails. She remarked that online platforms, mostly emails and social media such as WhatsApp help in communicating with staff members and external moderators, and she gets work done on time. Some external moderators are outside the country, but distance does not hinder them from communicating, sending exams, and giving feedback on time using emails. Nkosini perceived ICT to have an educational value and that if one does not use ICTs, they are left behind. Nkosini perceived the performance expectancy afforded by ICTs, which is the extent to which an individual is certain that using the technology will help increase job performance (Attuquayefio & Addo, 2014).

Takhile pointed out that when she sends messages and shares information from the administration with all the members of her department using ICT, she forwards the message to everyone at the same time. She further highlighted that she uses technology to communicate with students when they do their micro-teaching or teaching practice. During micro-teaching, teacher educators sit in a separate room and monitor students teaching in the other room. They use technology to listen, see and communicate with the students.

Mlungu explained that he communicates with his students through emails as well as MLMS. He said his students can use MLMS to chat or have group discussions among themselves and pose questions for discussions among themselves or to the teacher educator, and he and group members can respond to questions at a convenient time. He also uses emails, especially with master's students, when students send their work and he gives his comments. The comments and corrections are clear as ICTs such as Microsoft Word can track changes. He further said that he communicates with other teacher educators by email and rarely through telephone calls, and he even sends them

attachments/documents. Thulile highlighted that she communicates with her students through emails and through SMS using cell phones. Students are given work using ICTs and they return their assignments using computers.

Montrieux et al. (2015) similarly reported that students and teachers find tablets helpful as tools for learning, encouraging collaboration and information sharing among students using applications such as Facebook. In their study students used MLMS and WhatsApp to spontaneously begin online networks and discussion forums. Students also stated that chat forums with their peers enable them to ask questions freely to clarify concepts, aiding their learning process (Montrieux et al. 2015).

Communication was seen as an affordance of ICT. Nozizwe perceived ICT to be worth using during teaching and learning, but she acknowledged some difficulties. There are instances when students lose concentration in lectures because they are reading the PPP, constructing their own knowledge from the content. She felt that ICT hinders students from concentrating on what teacher educators say during lectures as they shift their focus from the teacher educator to the ICT. This shows that some teacher educators do not unreservedly accept the paradigm shift brought by ICT from teacher-centred to student-centred. Pandita et al. (2010) found that ICT as an agent of change brings a paradigm shift to teaching and learning. This advocates for a shift in traditional pedagogical approaches to benefit the current students who use technologies in their daily lives in HEIs (Keengwe, 2007). Montrieux et al. (2015) remarked that the introduction of tablets as tools entails a shift in learning for which some students are not ready, and in this study some teacher educators also seemed not to be ready.

7.4.3 Teacher educators' lack of competency in ICT use

The participants perceived teacher educators' incompetence or inability to use ICTs in teaching as a barrier to ICT integration in the HEIs. They pointed out that those who are competent in using ICTs in teaching perform better in their teaching, thus improving their performance expectancy. The findings of the study revealed that the inability to use ICTs in class or even as part of instruction during teaching often leads to teacher educators becoming reluctant to use ICTs in their classes. As stated earlier, this might have serious

implications for the teacher trainees who may not be empowered to use ICT tools in their teaching because they have not been exposed to ICTs being integrated by their teacher educators at preservice teacher training during ITE. For instance, Temusa believed that ICT tools are very useful in education but that some teacher educators lack knowledge on how to use ICTs during instruction. She felt they were not comfortable with it and did not have enough knowledge on how to use ICTs for their instruction. This means that ICT training would have a significant effect on lesson delivery using ICT as teacher educators would be able to choose the ICT to use in different topics. These findings were supported by Chigona et al. (2014) findings that teacher educators who are confident to use ICTs during their own time also feel confident and comfortable to use them in their teaching and that teacher educators who are not confident to use the ICT are unlikely to integrate it into their methodology. This shows that the TPACK of teacher educators can help them in their effort to integrate ICT. Hardman (2019) noted that teacher educators' TPACK covers the competencies or learning outcomes that the students must demonstrate as the teacher educator teach the content using technology. Teacher educators' knowledge of how to teach their course content with ICT is key for the pedagogical integration of ICT during teaching and learning.

As stated earlier, Tenkhosi acknowledged that ICT tools are very useful and have educational value. She said the only challenge faced by teacher educators is that they do not use ICTs to their full capacity. She perceived that the teacher educators in her institution are not tech savvy as they may have been born before computers, and hence, they fail to use them efficiently during teaching and learning. Takhile stated that teacher educators have learnt ICT on their own; they may sometimes want to integrate ICT but find that their capabilities are limited. Bahati (2010) noted that professional development of teacher educators is essential and has to encompass a range of activities prescribed for the professional growth of teacher educators, focusing on pedagogy and the use of ICT. Bahati (2010) also found that teacher educators' competencies to use ICT pedagogically depend on their professional development (or in-service training). This shows that basic training to use ICT tools is not sufficient and that teacher educators must be trained on how to integrate ICT pedagogically to gain the knowledge and skills to teach using ICT with confidence and efficiency (Bingimlas, 2009). Takhile also reported that she

sometimes asks students to help with ICT usage as they were born during this technological age, and hence, are tech savvy. The findings are supported by Chabinga's (2015) assertion that if teacher educators are open to explore new avenues by using ICTs, they may change their instructional practices. Like all other professionals, teacher educators need training to perform their tasks effectively and to address disparities in ICT skills and knowledge. Training, according to the UTAUT, is one of the facilitating conditions and is an important determinant of teacher educators' intention to use ICT in teaching and learning (Venkatesh et al. 2003).

7.5 Structures for ICT Integration

Research Question 4: To what extent does teacher education structures in HEIs create an enabling environment for the pedagogical integration of ICT?

7.5.1 Availability of ICT policies

The study discovered that there is a dearth of implementation policies in the institutions for the use of ICT in teaching and learning. The findings indicated that policies are often underdeveloped and underutilised. This showed that there is a great need to improve the potential of an ICT institutional policy. Tenkhosi for instance, highlighted that there is nothing compelling the use of ICT and that supervisors cannot hold anyone accountable for not integrating ICTs since government policies do not compel teacher educators to use ICTs during instruction. ICT is just an accessory to be used at the discretion of the user. The findings are in line with those of Nsibande (2014), who noted that Eswatini does not have a national policy that addresses science, technology and innovations, which affects ICT development in the country.

Nozizwe also felt there is nothing that enforces ICT usage by teacher educators. Temusa confirmed that she has never seen any ICT policy in the institution. She said she had neither seen a policy document nor touched it but that she knows that there is a policy. There are policies; however, they do not say much about how ICT can be integrated into the curriculum. Takhile and Nkosini stated that they have a policy. They said this because in their departments they have a course or modules on ICT, which they believed were established on policy, and an ICT department responsible for connectivity and access in

the institutions. This means that policies are necessary to provide some guidelines on how ICT can be integrated in the curriculum.

7.5.2 Accessibility and connectivity

The study revealed that lack of accessibility and connectivity are barriers to ICT pedagogical integration in HEIs. Lack of finances is a fundamental factor in the digital divide, and hence, lack of accessibility and connectivity becomes a deterrent to ICT use in the HEIs in Eswatini. The participants in the study stated that the internet and Wi-Fi connections are very slow in the institutions; this may be because of the weak bandwidth and slow speed. This is a common problem for developing countries like Eswatini. These findings are similar to those of Kundu and Nath (2018), who reported in India that though the internet is important when using ICT, there is no internet in most rural schools because of the high price charged by internet providers that most schools cannot afford.

Mlungu stated that the Wi-Fi connections in his institution are poor and very weak. He mentioned that not all classrooms are connected to the internet, even though this would make their teaching and learning process easier as they would be able to ask students to use their smart phones and other ICTs to access information on the internet. Njabu stated that they do not have enough computers in the institution. She also highlighted connectivity as a challenge to the use of ICT in teaching and learning. She stated that the Wi-Fi is slow and sometimes inaccessible. On the same note, Temusa highlighted the inaccessibility of Wi-Fi as an obstruction to ICT use. She stated that the internet is at times inaccessible and that there are areas where there is no Wi-Fi. Takhile asserted that the institution needs to increase the Wi-Fi coverage because in some classes they cannot access the internet because of the limited coverage. She stated that sometimes the internet goes down as they are preparing a lesson. Nozizwe emphasised that connectivity is key in the institutions for them to pedagogically integrate ICTs in their instructional processes. She stated that the ICTs might be available, but if they are not connected to the internet, they are meaningless. Nkosini also remarked that though they have internet and Wi-Fi service providers like Eswatini Posts and Telecommunications (EPTC) in their institution, connectivity is too slow when students do their work at the institution. These

findings are similar to that of Chabinga (2015), who noted that lack of access to ICT is a barrier to the use of ICT during teaching and learning.

7.5.3 Professional development in ICT

The findings revealed that there is need for in-service ICT training where teacher educators are capacitated to effectively integrate ICTs in their teaching to enhance students' learning. These findings are supported by Montrieux et al. (2015) finding that change in HEIs because of ICT usage is determined by the availability of infrastructure, the support given to lecturers, and the professional development of the staff. The emergence of new ICTs in the education sphere creates a need for further professional development of educators.

Participants felt their ICT knowledge was insufficient to effectively use ICTs in their instruction during teaching as the training they had undergone in the institutions were not enough. For instance, Temusa believed that they have not received enough training on ICT use and were not comfortable using ICT in teaching and learning. She stated that even though they had received training from the IDE, the training did not happen regularly and the workshops were short and did not cover enough TPK. They did not learn much about how to use ICT tools pedagogically. She stated that they need to be afforded enough time to practice their acquired skills and knowledge. She also felt they should receive more training to become confident in their use of ICTs during instruction because they fear embarrassment when using ICTs in front of students. These findings were congruent with Chigona and Chigona (2010) and Chigona et al. (2014) findings that teacher educators who do not feel confident to use ICTs are unlikely to integrate it into their instructional methods.

Thulile also revealed that involving the teacher educators and asking their opinions about ICT integration are key to smooth ICT integration in the institutions. Institutions have to organise workshops as part of their endeavour to capacitate their teacher educators on the pedagogical integration of ICT. The participants of the study felt that professional development on ICT should be for all teacher educators and not just for those in the ICT department so that technology can be used freely in all departments during teaching.

These findings are in line with those of Chabinga (2015), who maintained that HEIs' administrations, as mandated by their institutional policy, should make it their priority to train their teacher educators in the use of ICT in their various areas of specialty.

Similarly, Nkosini stated that in her institution there was no training, and that the only people who trained in ICTs are the ICT department. Their administrators told them to integrate ICTs in their teaching but she wondered how that could be done if they are not capacitated. Bahati (2010) also asserted that professional development of teacher educators is essential and has to encompass a range of activities prescribed for the professional growth of teacher educators, focusing on pedagogy and the use of ICT.

Some participants mentioned that they were trained once or twice on ICT integration into teaching but have never attempted to use the acquired knowledge and skills. For instance, Temusa was trained once or twice on MLMS and blended learning, but has not attempted to use ICT in her teaching. In agreement with these findings, Su (2009) argued that having good infrastructure and technology training does not guarantee that teacher educators can efficiently integrate ICT into their teaching. Similarly, the researcher observed that the institutions need to monitor their initiatives to ensure implementations. There is need for a national policy on the professional development of teacher educators on ICT integration in teaching and learning to ensure application and easy monitoring.

7.5.4 ICT resources

This study found that the participants expressed that there are limited facilitating conditions in the HEIs to support ICT integration in teaching. They highlighted that there are limited resources in the HEIs in terms of human resources, infrastructure, ICT equipment, and maintenance. The findings showed that there are not enough computer laboratories for the students in the institutions and not enough projectors for the teacher educators in the departments to use and that ICT tools are generally inadequate in the HEIs. Takhile for instance, commented that there are not enough PowerPoint projectors for teacher educators to use during instruction. As they have many enrolled students, they have to scramble to get a projector to use because there is a limited number.

Nkosini pointed out that her institution has insufficient resources, such as shortage of infrastructure, ICT tools, technical assistance, and internet connectivity because of the high numbers of students. Nozizwe concurred with the other participants that resources in the institution are limited. She stated that the ICT tools especially computers and infrastructure are not adequate for use by both teacher educators and students. Lecturer rooms have no computers or projectors. The insufficient resources are consistent Kundu and Nath's (2018) findings that in India there are insufficient resources in schools, which is a barrier in using technology in the classrooms. The insufficient resources can result to teacher educators not use ICT in teaching, and that can water down the ICT integration innovation in HEIs.

The study also found that the general maintenance of the ICT tools is a challenge to ICT use in teaching and learning. The findings revealed that it is expensive to maintain the ICT tools. Tenkhosi, for instance, pointed out that maintaining the ICT tools and setting up the infrastructures in the institution is expensive. The findings revealed that the institutions in the study cannot fund themselves and rely on government funding, which is insufficient for institutions to fund the ICT-related projects. Similar findings were articulated by Kundu & Nath (2018), who also found inadequate maintenance of hardware and software.

7.5.5 Technical support

The study found that technical support is another barrier to ICT integration in the institutions. Participants revealed that technical assistance is mostly provided by the ICT teacher educators in the institutions. This has implications as ICT teacher educators have their own workloads and help teacher educators during their free time and when available, rendering the service inadequate to sustain ICT integration during teaching in the HEIs. Majaha, for instance, pointed out that there is a shortage of technical support because the institution's administration sometimes owes service providers large sums of money, preventing the service providers from providing their services, which include technical support. The technologies, including printers and computers, in the computer laboratories break down and are not fixed. The institution has no technician to attend to malfunctioning ICTs. The findings agree with Montrieux et al. (2015) findings that adequate technical

support and ICT infrastructure are key when introducing any technology innovation into classrooms.

Tenkhosi shared Majaha's sentiments that technical support is a challenge to ICT use in her institution. She highlighted that they do not have a technician to help them when they encounter problems. She stated that they do not have a post for a technician because the government did not approve their request, seeming not to understand the need for a technician in the institution. She highlighted that it is expensive for the institution to hire technicians and that causes them to sometimes avoid using the service providers, yet they do not have a technician on the ground. Temusa also appealed for technical support to assist in the integration of ICTs, especially when a teacher educator does not know what to do. Montrieux et al. (2015) shared the same sentiments by highlighting that institutional conditions, such as the appointment of the ICT coordinator, can help address ICT implementation challenges as the coordinator can guide the process.

7.6 Synthesis of Findings

The themes worked together to address the research questions of the study. The four research questions and the main research question they addressed are stated in section 1.8. The first theme addressed the pedagogical ICT integration practices and answered the first research question of the study. This theme directly addressed the main research question of the study by stating the ICT integration practices by teacher educators in HEIs in Eswatini. These practices include converting content to digital format, which includes using PPPs for knowledge transmission or information sharing. Knowledge transmission also include using audio and videos in class. The practices also include collaboration and communication, research, which promote enquiry learning among students, problem-solving and discussion through online platforms like the LMS, social media and chats. The pedagogical ICT integration practices of teacher educators were influenced by factors such as the structure of the curriculum, teacher educators' perceptions, and how the educational structures in the institutions create or support the pedagogical integration of ICT.

The second research question and the theme unrevised curriculum contributed to understanding the ICT integration practices of teacher educators because curriculum is the knowledge that is taught to students. The curriculum must be structured in a way that it indicates the ICTs and teaching strategies to be used in each topic or lesson. This was found to be lacking in the course outlines reviewed for the study. However, a curriculum needs to be flexible by cultivating unique skills such as ICT integration and positive attitudes.

To understand the practices, it was crucial to discover the perceptions of the teacher educators in the third research question. Teacher educators integrated ICTs in their classrooms because they found the ICTs to be useful and adding value to their teaching. The respondents and participants of the study perceived ICT affordances to include ease of use, accessing a variety of learning materials, search for information, and communication for engagement and collaboration among teacher educators and among students and their teacher educators. The use of ICT for communication is a form of social influence, a construct of the UTAUT. The positive perceptions of the teacher educators on the educational value of ICT meant that ICT were pedagogically integrated in teaching and learning in the HEIs. Participants also revealed that they lacked some competency in the use of ICTs in teaching and learning. This perception of the participants has implications on the training received by the teacher educators on the integration of ICTs in teaching and learning. It may be because the trainers facilitating the training on ICT integration were not competent enough as they only possessed knowledge and skills of technology operations and lacked pedagogical knowledge to help teacher educators integrate ICTs in the teaching and learning processes. In reality, teacher educators need TK, pedagogical knowledge and content knowledge to integrate ICTs in the classroom.

As stated earlier in Chapter 3, the TPACK framework describe seven kinds of knowledge that teachers need to possess for effective ICT integration in classrooms. Koehler and Mishra (2009) noted that teacher educators need to have sufficient PK, CK, TK, PCK, TCK, TPK, and TPACK is the core intersection of the six construct. It was observed that the ICT technicians who trained the teacher educators in the institutions only have computer science knowledge and skills and lacked the other forms of knowledge. This influenced the training they gave the teacher educators on how to integrate ICTs in

teaching and learning. From the findings it is evident that the pedagogical integration of ICT in teaching and learning cannot be adequately achieved with only the application of basic technological skills without TPACK. It was observed that the institutions lacked ICT coordinators who possess TPACK to help teacher educators integrate ICT efficiently and effectively in teaching and learning. The TK should be used together with pedagogy to teach content in the classroom. It is worth noting that teacher educators teaching may not change because of knowledge and skills gained from training, but they can change based on their positive perceptions of the innovation, such as ICT integration. It is definite that when teacher educators perceive problems with ICT integration, they become hesitant to accept or adopt it. Bingimlas (2009) noted that teacher educators' resistance to change and negative perceptions constitute significant barriers that can hinder ICT integration in the classroom.

It was also important to address how the educational structures in the institutions create or support the pedagogical integration of ICT. Though support can never be enough, in this study it is evident that teacher educators were given support to integrate ICTs in teaching and learning. The findings revealed that institutions need to improve accessibility and connectivity to the internet as this is important for ICT integration to be effective and successful. The professional development of teacher educators on the pedagogical integration of ICT must be prioritised for ICT integration to be a success. Teacher educators are motivated to integrate ICTs with ease when they are trained and supported with ICT resources. The teacher educators' acceptance and use of ICTs in teaching and learning were based on their perceived usefulness and the ease of use of the ICT. ICT training would have a significant effect on lesson delivery using ICTs as teacher educators would be able to choose the ICT to use in different topics. This study showed that facilitating conditions that regard and highlight the importance of support, training, and provision of relevant resources are determinants of why teacher educators use ICTs in teaching and learning.

The TPACK of the teacher educators helped them integrate ICT in a student-centred approach for the construction of knowledge. In view of the social constructionism theory, it was deduced from the evidence of teacher educators that they constructed meaning of reality through interaction with other teacher educators and students. The teacher

educators' integration of ICT in teaching was influenced by their social interaction with each other for the construction of meaning and reality. The UTAUT was used to determine factors contributing to pedagogical integration of ICTs in teaching and learning in HEIs in Eswatini. The usage behaviour was determined by performance expectancy (ICT saves time and enhances teaching and learning), effort expectancy (it is easy to use and convenient), social influence (ICT is used for communication and collaboration), and facilitating conditions (technical support, training and resources). There is a relationship among the constructs of the UTAUT and they work in an interrelated way as determinants of ICT integration in the HEIs. From the findings it is evident that teacher educators used ICTs to change their teaching methods to improve their teaching.

7.7 Chapter Summary

This chapter discussed the findings of the study. The findings addressed the themes that emerged during the data analysis process. The literature reviewed for the study was used to substantiate the findings. The findings revealed the practices of the teacher educators in HEIs during ITE. The teacher educators used ICTs for communication and collaboration with colleagues and their students. They also used ICTs for research to search for current information to improve their content knowledge, to present content to students using PPPs, and for online discussions through MLMS, social media and chats. The findings also presented the perceptions of teacher educators on the pedagogical value of ICT in education, and in particular, teaching and learning. The findings presented enabling structures for the integration of ICTs. These are the things HEIs should provide for the integration of ICTs to be a success. The findings of the study revealed that internet access and connectivity, professional development, provision of resources, and technical support are part of the basic requirements for successful ICT integration.

CHAPTER 8: SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

8.1 Introduction

This chapter presents the summary of the findings, the conclusions and the recommendations for the study. The study explored the pedagogical ICT integration practices among teacher educators in ITE programmes in three HEIs in Eswatini. This chapter summarises the aims and objectives, the research questions of the study, the methodology, the theoretical framework, the data collection and the analysis procedure. This chapter further draws conclusions on the major findings of the study and make recommendations.

8.2 Summary of the Study

8.2.1 Research aim and objectives

The aim of the study was to explore the pedagogical ICT integration practices among teacher educators in ITE programmes in three HEIs in Eswatini. The research was done to respond to the research problem and to ascertain the TPK of teacher educators and how they use particular technologies in teaching and learning processes. It also explored how teacher educators pedagogically integrate ICTs in their practices, and the researcher examined the prevalent pedagogical ICT integration practices among teacher educators in ITE programmes through questionnaires, interviews and lesson observations. The research also sought to ascertain how the current structure of the curriculum in ITE affects the technological classroom practices of teacher educators, which was achieved through document analysis and interviews. The study also solicited the perceptions and experiences of the teacher educators through questionnaires and interviews. Finally the study used interviews to determine the extent to which teacher education structures in the institutions create an enabling as well as a constraining environment for pedagogical ICT integration of ICT.

8.2.2 Main research question and sub-questions

The main research question that guided the study was:

What are the pedagogical ICT integration practices among teacher educators in ITE?

The sub-questions for the study were:

1. What are the ICT integration practices among teacher educators in ITE programmes?
2. How does the current structure of the ITE curriculum affect the classroom technology practices of teacher educators?
3. What are teacher educators' perceptions of the educational value of ICT?
4. To what extent does teacher education structures in HEIs create an enabling environment for the pedagogical integration of ICT?

The data gathered from the teacher educators and their HoDs helped the researcher gain insight into what happens when teacher educators integrate ICTs into their teaching and learning processes in the HEIs and to outline the ICT integration level in the institutions.

8.3 Summary of Methodology and Theoretical Framework

The study was a case study that employed a mixed methods approach. It used both quantitative (questionnaires) and qualitative (semi-structured interviews, document analysis and lesson observations) approaches. Terrell (2012) argued that to understand a problem, one should not study it exclusively using one research approach. Hence, this study used a mixed methods research approach to gain a more comprehensive understanding of the problem through the research questions. Qualitative and quantitative approaches should be used together to complement one another in their deficiencies (Onwuegbuzie & Leech, 2007). The target population was teacher educators in the three participating HEIs (N = 87) and HoDs (N = 9). The researcher gathered empirical data using questionnaires, semi-structured interviews, observations, and document analysis. The quantitative data was collected using questionnaires that were distributed to all teacher educators and HoDs in the three HEIs. Eighty-seven (87) respondents returned usable questionnaires. The questionnaire was chosen because it is ideal for obtaining

information about what people know, feel and want (Mundia, 2001). The qualitative data were collected through semi-structured interviews from nine HoDs in the HEIs who integrate ICTs in their teaching and learning processes.

The drafted questionnaire, interview guide and observation guide were subjected to scrutiny by the researcher's supervisors to guarantee external and content validity, clarity and relevance to the study before administration. The researcher also presented her research writings to individual students to review the interpretation of the data and provide feedback.

The TPACK framework, the UTAUT and the constructionist theory helped the researcher understand ICT integration in HEIs in ITE programmes. The TPACK framework asserts that for teaching to be effective there must be access to a good structured and unified knowledge taken from different spheres, including knowledge of content, pedagogy and technology. Technology integration in Koehler and Mishra's (2009) view requires educators to accommodate the complexities of joining together content, pedagogy and technology, the key components of the TPACK framework. The TPACK framework extends Shulman's (1987) idea of PCK, a form of teacher knowledge, to include TK. The TPACK framework was used in the study to understand the teacher educators' TPACK and how it influences and affects their use of ICTs in teaching and learning processes.

Social constructionism was initiated in an endeavour to appreciate the relations with the nature of reality. It originates from sociology and is aligned to post-modernism in qualitative terms. The study concluded that ICT integration in teaching and learning promotes the social construction of knowledge among students as they source information that they use to interact with each other in their chat forums, especially WhatsApp and Moodle, and even through emails. Berger and Luckmann (1991) posited that social constructionism encourages students' engagements in decisions about their learning in their social settings. This may be achieved by engaging students in peer work and even group discussions, giving them the opportunity to share their views and justify themselves. Andrews (2012) believed as people interact with the social world they are influenced, resulting in routinisation and habitualisation. This suggests that if something is done frequently and repeatedly, it is easy to master and do without much effort.

The UTAUT has four variables that determine technology acceptance and integration (use behaviour), namely performance expectancy, effort expectancy, social influence and facilitating conditions (Venkatesh et al., 2003). The UTAUT also suggests that the effects of these four variables are moderated by four moderating factors, namely age, gender, experience and voluntariness of use. This study did not pay attention to the moderating factors and solely focused on the four variables of the UTAUT that determine ICT acceptance and use behaviour to understand the context of the study, which was pedagogical integration of ICTs in HEIs in Eswatini. The UTAUT was selected as one of the frameworks to guide the study to identify the determinants of ICT integration in preservice teacher training in HEIs in Eswatini.

The literature review indicated that ICT integration practices in teaching and learning will undergo fundamental changes as HEIs respond to global, social, technological and learning research trends. Researchers concurred with the findings of the study that the dualism in conceptual models of education and ICT models such as e-learning, blended learning, and ICT integration offer the prospect of transformative change in teaching and learning (Vajargah et al., 2010).

8.4 Summary of Findings

8.4.1 Pedagogical ICT integration practices

Research question 1: What are the ICT integration practices among teacher educators in ITE programmes?

Using the data from the questionnaires, this study found that ICT integration initiatives by teacher educators were done using laptops, computers, and smartphones. Teacher educators do not frequently use ICT gadgets like programmable calculators, iPads and tablets. The findings revealed that teacher educators' TK entails sending emails with attachments, using a printer, using search engines, using projectors, using picture editing programmes, and being able to learn new software programmes on their own. Their TK was revealed to be limited with regard to creating their own websites.

Teacher educators also revealed that their TCK involves having knowledge of ICTs to use for student learning. It also encompasses using technologies during teaching and

learning to help achieve the learning outcomes of lessons. Teacher educators also revealed that as part of their practices they know how use ICTs to develop class activities that are meaningful to students. The findings also revealed that teacher educators can use different teaching approaches in a classroom using ICTs. This shows that ICTs are used to help teacher educators change their teaching methods to improve teaching and learning. This can lead to social interaction and construction of knowledge, which can lead to the construction of meaning and reality.

The teacher educators' TPK was shown by their ability to choose ICTs that enhance teaching approaches for a lesson and for student motivation. Teacher educators have limited skills to evaluate how suitable a new technology is for teaching and learning. Teacher educators' TPACK encompasses the ability to integrate appropriate instructional methods and ICTs that help them teach their content effectively and to combine content, technologies and teaching approaches. The teacher educators pointed out that they are able to evaluate and reflect on the effective use of technologies to enrich teaching and learning.

The interview findings revealed that teacher educators' ICT practices during ITE programmes improve their performance expectancy (Venkatesh et al., 2003). The teacher educators believed ICT integration in teaching improves job performance, and therefore, ICTs are useful as a delivery strategy of their course content through PPPs, for research, for online discussions, for online teaching and to share of information, leading to a paradigm shift in traditional pedagogies. This shows that teacher educators were integrating ICT because the tools enhanced their teaching process. The pedagogical ICT integration practices were identified under the following sub-themes: Converting content to digital format, research, and online discussions.

8.4.1.1 Converting learning content to digital format through PowerPoint presentations

The participants stated they use ICTs for PPPs during lectures. This is done to shift from the traditional strategies of chalk and talk. LCD projectors are used for the presentation of lesson content in class during teaching. Teacher educators prepare PowerPoint slides

during their lesson planning to present to the students during instruction, and this is perceived to save time, improving their effort expectancy. It also helps them circumvent chalk and talk strategies. During lesson observations, the teacher educators tried to avoid chalk and talk strategies by using ICTs, mostly PPPs. It is evident that teacher educators integrate ICT when they are convinced that it improves or adds value to their teaching.

8.4.1.2 Research

The findings also revealed that teacher educators use ICTs to do research by searching up-to-date resources such as e-books and journal articles for their courses. The participants made their students research and source information from different resources such as e-books and journal articles to facilitate discussions. The internet is used for research and information searches to reinforce concepts in the various course contents or programmes.

8.4.1.3 Online discussion

The study revealed that teacher educators use online discussion platforms where students engage in chat platforms on MLMS among themselves and with their teacher educators. The students also debated issues online. Software such as Geogebra is used to help students understand difficult concepts. The teacher educators and students also use social media platforms such as WhatsApp and Facebook to send information to their colleagues. Teacher educators in the HEIs upload materials or discussion questions on Moodle for students to read and engage with in discussions. Chats help group students as they interact on chat platforms. Students connect and take part in the discussions regardless of their location, which is why most participants in the study said that students can continue with the discussions in and out of class.

8.4.2 Unrevised curriculum

Research question 2: How does the current structure of the ITE curriculum affect the classroom technology practices of teacher educators?

The participants highlighted that their curricula need to be revised to suggest ICT integrative strategies to the preservice teacher. ICT integration should be part of preservice training for the teachers to help them effectively integrate ICTs in their teaching. The study revealed that curricula in the HEIs have not been revised to integrate ICT and that teacher educators only use ICTs if they perceive the affordance of the ICT and at their own will. Pedagogically there is no mention of which kinds of ICT tools to use in the programmes or even per topic. The curriculum does not enforce the use of ICT in teaching and learning as there is no policy for ICT integration implementation in the HEIs.

8.4.3 Perceptions of the educational value of ICTs

Research question 3: What are teacher educators' perceptions of the educational value of ICT?

The participants' perceptions of the value of ICTs (digital technologies) were based on its affordance to deliver content and retrieve information, affording users easy access to information, and hence, making life easier. The immediacy of ICTs over traditional pedagogies like talk and chalk was given credit.

8.4.3.1 Makes life easier/perceived usefulness

The teacher educators perceived that ICTs make life easier by enabling them to work faster. ICTs are used to access information through the internet, for information processing, and for information sharing and storage. The teacher educators also regarded ICT as useful to improve teaching, especially by using online platforms and for easy access to information as most information is retrieved online.

8.4.3.2 Communication

Another educational value of ICT that the participants presented is its affordance for communication, which comprises the potential for learning through engagement and collaboration among students. The use of emerging ICTs has created opportunities for new ways of communication among teacher educators and among students and their teacher educators. ICT is perceived as permitting collaboration among students, among

teacher educators and among other stakeholders. The study found that the use of ICTs makes information sharing easy. The teacher educators communicate with each other and their students through emails and SMSs and on MLMS.

8.4.3.3 Teacher educators' lack of competency in ICT use

The study revealed that teacher educators' incompetence in using ICT tools in teaching is a barrier to ICT integration in the HEIs. Though the questionnaire findings revealed that teacher educators know how use ICTs to develop class activities that are meaningful to students and how to use ICTs to use a variety of teaching methods in classrooms, the interview findings revealed that teacher educators were not competent using ICTs during instruction. They felt they need training on the pedagogical integration of ICTs and not only on basic computer skills. This shows that professional development should not be fragmented but should allow participants to be involved in the design process. The competencies the teacher educators need should intersect ICT, methodology and content knowledge. There is a gap on how to support teacher educators to use ICT to impact pedagogy and content in particular contexts. Teacher educators' incompetence in the use of ICT, or even as part of instruction during teaching, often leads to teacher educators becoming reluctant to use or not fully using ICTs in their classes. This has serious implications for the teacher trainees during preservice training who may not be empowered to integrate ICT tools in their teaching because they were not exposed it by their teacher educators during ITE.

8.4.4 Teacher education structures enabling integration of ICT

Research question 4: To what extent does teacher education structures in HEIs create an enabling environment for the pedagogical integration of ICT?

The study revealed that there is a dearth of implementation policies for the integration of ICT in teaching and learning in the institutions. Teacher educators pointed out that there is nothing compelling the use of ICTs by teacher educators in the HEIs and that teacher educators integrate ICT in their teaching at their discretion. Government policies do not compel or reinforce the integration of ICTs during teaching and learning. Performance

expectancy and effort expectancy cannot be monitored easily as there is shortage of policy to direct the use of ICT in the HEIs.

Although government and HEIs initiatives to ensure internet access and connectivity cannot be overlooked, it is not enough for the ICT integration to be a success. Poor accessibility and connectivity were acknowledged as challenges to the pedagogical integration of ICTs in the HEIs. Financial restraints are a fundamental factor in the digital divide, and hence, accessibility and connectivity prevent ICT integration in the HEIs in Eswatini. The participants mentioned that not all classrooms have computers or are connected to the internet, even though it would make the teaching and learning process easier as they would be able to ask their students to use their ICTs to access information using the internet.

8.4.4.1 Professional development in ICT

The study revealed that there is a need for in-service ICT trainings where teacher educators are capacitated on the use of ICTs in their teaching so that student learning is enhanced. Participants of the study felt that their ICT knowledge is not sufficient for them to effectively use ICTs in their teaching as the training they have received at the institutions was not enough. The teacher educators felt they did not gain much from the training on how to use ICT tools pedagogically. They stated that they need to be afforded enough time to practice their acquired skills and knowledge. In some institutions only the ICT department teacher educators received training, even though ICT integration should happen in all courses. Some participants highlighted that they were trained once or twice in ICT integration in teaching but have never attempted to use the acquired knowledge and skills. This may be because the training was not meaningful or because nobody is monitoring ICT integration in the HEIs. There is an improved chance of ICT adoption in teaching and learning in HEIs if teacher educators are competent users of ICTs.

8.4.4.2 ICT resources

The study revealed that facilitating conditions in the HEIs to support ICT integration in teaching are limited. The participants highlighted that the HEIs have limited resources such as human resources, infrastructure, ICT equipment and maintenance. There are not

enough computer laboratories for the students in the institutions. There is a shortage of projectors for use by teacher educators in the departments, and ICT tools are generally inadequate in the HEIs. It is therefore concluded that facilitating conditions are determinants of ICT integration in teaching in HEIs in Eswatini.

8.4.4.3 Technical support

The findings of the study reported that technical support is another challenge to ICT integration in the institutions. Participants revealed that technical assistance is mostly provided by the ICT teacher educators in the institutions. This is a problem because the ICT teacher educators have their own workloads and help other teacher educators during their free time and when available, rendering the service inadequate to sustain ICT integration in teaching in the HEIs.

8.5 Conclusions of the Study

The findings of this study led to the conclusions on ICT integration in teaching and learning discussed in the following subsections. The reviewed literature made it clear that teacher educators have a crucial role to play in the integration of ICTs in teaching and learning. They have to integrate ICTs in their various pedagogical practices during instruction and in their daily routines.

8.5.1 Pedagogical ICT integration practices

Research question 1: What are the ICT integration practices among teacher educators in ITE programmes?

Teacher educators use ICTs with different teaching methods in the classrooms. Teacher educators' TPACK involves integrating appropriate instructional methods and ICTs that help them teach their content effectively. They combine content, teaching approaches and ICTs to enhance teaching and learning. The findings concur with the TPACK framework, which emphasises the connections among teacher educators' knowledge of content, pedagogy and technology interaction for effective teaching. Teacher educators' ICT practices during ITE programmes improve their performance expectancy, effort

expectancy, and social influence. The teacher educators believed that ICT integration in teaching improves their job performance; hence, ICTs are useful to deliver course content using PPPs, research, online discussions, online teaching and sharing of information, leading to a paradigm shift in traditional pedagogies. Teacher educators use ICTs because they add value to their teaching and enhance teaching and learning processes.

The findings of the study revealed that teacher educators use ICT for PPPs during teaching to shift away from traditional chalk and talk strategies. The teacher educators also use audio and videos for illustrations and to give explanations to students. They record video class sessions online and also send notes, journal articles and relevant links to students online. They engage students in discussions and collaborative learning using ICTs.

Learning with ICT involves creating contexts for authentic learning in integrated and meaningful ways for the production of knowledge and to disseminate ideas. Teacher educators will integrate ICT into their teaching if they are convinced that it will improve their job performance and effort expectancy and add value to their teaching. The findings revealed that when ICT is properly used in the classroom, it can save time during instruction.

Teacher educators use ICTs for research purposes. They make their students research and source information from different resources such as e-books and journal articles to facilitate discussions. The internet is used for research or for information searches to reinforce concepts in the various programmes. Teacher educators' role has shifted from being an information provider to helping students manage and interpret acquired information. They encourage students to engage in enquiry-based learning, where they search for information before or during lectures.

The findings showed that online discussion platforms were used in this study. They involved the use of chat platforms by students and their teacher educators, especially the MLMS where students engage in online discussions or chats and debate issues online. Teacher educators in the HEIs upload materials or discussion questions on Moodle for students to read and engage in discussions.

8.5.2 Unrevised curriculum

Research question 2: How does the current structure of the ITE curriculum affect the classroom technology practices of teacher educators?

There is a need to revise the curricula in the HEIs so that it demonstrates ICT integrative strategies to preservice teachers. The teacher educators felt that ICT integration should be part of teacher training for the successful integration of ICTs in teaching. The curricula have not been revised to integrate ICT, and teacher educators only use ICT as they perceive its affordances and by choice. The curricula do not really integrate ICT tools. There is no mention of which types of ICT tools to use in the programmes or even per topic in the course outlines. The curricula do not enforce the use of ICT in teaching and learning as there are no policies in the institutions that address ICT integration during teaching and learning. It is concluded that ICT integration is influenced by the structure of the curriculum, which must guide both teacher educators and students on the ICTs to use in each topic.

8.5.3 Perceptions of the educational value of ICTs

Research question 3: What are teacher educators' perceptions of the educational value of ICT?

When teacher educators use technology, they have a sense of being in control of their teaching and that they have achieved their goals. They become more interested in and effective at their work. Their positive attitudes towards ICT integration in their practices translate into daily use of ICTs during teaching and learning. The immediacy of ICTs over traditional methods of teaching is an advantage and makes teacher educators' lives easier. ICTs are used to access information through the internet, for information processing, and for information sharing and storage. ICTs improve teaching, especially because the information is online and can be retrieved electronically using online platforms. ICTs improve performance expectancy and effort expectancy, allowing more time for interaction with students as teacher educators do not have to write on the board but can refer students to the PPPs they prepared.

ICTs are used to create personal learning environments to add value to students' learning experiences. ICT as an agent of change has brought a paradigm shift to teaching and learning. ICTs improve the pedagogical delivery of content as content is converted to digital formats. The ubiquitous access to ICT does not guarantee a change in instruction but can permit a change in pedagogy.

Another educational value of ICTs is its affordance for communication, which aids engagement and collaboration among students. The study revealed that ICT facilitates new ways of communication among teacher educators and students and their teacher educators. ICTs help develop online discussion forums and chats and are good for information sharing among students and teacher educators. Online platforms, such as MLMS, emails social media (WhatsApp), help with communicating with other staff members, external moderators and students. ICTs advocate for a shift in traditional pedagogical approaches to benefit the current students who use technologies in their daily lives in HEIs.

Based on the findings, teacher educators' incompetence at integrating ICT tools in teaching is a barrier to ICT integration in HEIs. Those who are competent in using ICTs in teaching perform better in their teaching, thus improving their performance expectancy. Incompetence leads to teacher educators becoming reluctant to use ICTs in their classes. Some teacher educators lack knowledge on how to use ICTs during instruction, which makes them uncomfortable using ICTs in their instruction. Hence, teacher educators who do not feel comfortable and confident using ICTs are unlikely to integrate them during instruction. This implies that the HEIs in Eswatini must have regular training on the pedagogical integration of ICT to capacitate teacher educators to confidently use ICT in their teaching. Teacher educators' knowledge of how to teach content using ICT is key for the pedagogical integration of ICT in teaching and learning. Teacher educators in the HEIs do not fully use ICTs; hence, they fail to use them efficiently during teaching and learning.

8.5.4 Enabling structures for the integration of ICTs

Research question 4: To what extent does teacher education structures in HEIs create an enabling environment for the pedagogical integration of ICT?

Based on the findings, it can be concluded that there is a lack of ICT implementation policies in HEIs in Eswatini. Teacher educators stressed that government policies should compel or reinforce the use of ICTs in teaching and learning.

Accessibility and connectivity are barriers to ICT pedagogical integration in the HEIs. Financial limitations are a fundamental factor in the digital divide, making lack of accessibility and connectivity a barrier to ICT integration in the HEIs. Internet and Wi-Fi connections are very slow or completely absent in the institutions because of low bandwidth and slow speed.

Based on the findings it is concluded that HEIs should have in-service ICT training where teacher educators are capacitated on how to use ICTs in their teaching so that student learning is enhanced. The workshops received by the teacher educators are irregular and too short. Not much have been gained from these workshops on how to pedagogically integrate ICTs during instruction. The training should be sufficient to address the needs of the teacher educators. It is also concluded that the continuous use of ICT can increase teacher educators' confidence and ease of use when integrating ICTs during instruction.

The findings also revealed that there are limited facilitating conditions in the HEIs to support ICT integration in teaching. The HEIs have limited resources such as human resources, infrastructure, ICT equipment, and maintenance. There are not enough computer laboratories and projectors in the institutions. ICTs are inadequate as students share computers in the HEIs. The lecture rooms have no computers or any other form of ICT in them. It is expensive to maintain ICTs, and therefore, the general maintenance of ICTs is a limitation to ICT integration in teaching and learning in HEIs.

Technical support is another barrier to ICT integration in the institutions. There are no technicians in the institutions, and technical assistance is mostly provided by the ICT teacher educators. When ICT tools such as computers and printers break down, they are not fixed because of there are no technicians.

8.6 Implications of the Findings

The reviewed literature provided comprehensive knowledge of what pedagogical ICT integration in the classroom entails without demonstrating ICT integration practices in the classroom. This has implications for the practices of teacher educators in their technology-enhanced teaching. It is important to determine the course content and the ICT affordances that can help achieve the curriculum goals (Ndlovu, 2016). Students must be capacitated not only with knowledge but also with skills to use ICTs for their learning in an information and industrial society. The findings revealed that ICTs were used to present content to students, which means that the teacher educators taught to meet curriculum goals and not the students' needs. This may satisfy policy needs but can make ICT integration unimportant in meeting students' needs as students' involvement can be minimised. It is worth noting that student involvement in ICT integration as advocated by the constructionist approach presents ICTs as tools used to achieve students' learning goals.

The TPACK framework, social constructionism, and the UTAUT, used as theoretical frameworks that guided the study, implies that ICT integration can be effective when used together with other forms of knowledge, such as pedagogy and content. The teacher educators' TPACK should address the needs of students, who learn best when pedagogy is student-centred. This means the ICT-pedagogy should promote student involvement. The integration of ICT is also determined by other factors, namely performance expectancy, effort expectancy, social influence, and facilitating conditions. These are the components of the UTAUT used in the study.

The findings revealed implications for teacher educators' training and professional development. The integration of ICT in the HEIs were limited to basic ICT knowledge and skills. The pedagogical integration of ICT is not being done properly since the participants stated that the training is irregular and insufficient. This impacts how teacher educators teach with technology as they lack the skills and confidence to teach with ICT. This affects the extent of ICT integration in the curriculum. This in turn may affect preservice teachers' competency in the use of ICT for their teaching and learning practices. Therefore, training

must move from basic ICT knowledge and skills to address competencies on how to combine or intersect content, pedagogy and technologies.

The study also has implications for the future implementation of ICT integration projects in Eswatini and beyond. It is necessary to monitor and evaluate new innovations like ICT integration in HEIs in Eswatini. The ICT coordinators in the institutions can help design, monitor and evaluate ICT integration programmes.

The findings also have implications for ICT policies. The teacher educators were not involved in policy formulation, yet they are the implementers and custodians of the curricula in the HEIs. It is evident that the ICT integration policy was created only by MoET without consultation with key stakeholders, such as teacher educators in the HEIs. That is why most of them said there is no policy. Although government initiatives for the implementation of ICT in HEIs in terms of providing ICT infrastructure and resources cannot be overlooked, it is not enough for the ICT integration initiative to be a success. Government must involve all stakeholders during the inception of any innovation, such as ICT integration, for the innovation to be a success. The policies are more likely to be implemented if they serve the interests of all stakeholders. Rolling out ICT policies to relevant stakeholders, like teacher educators, can make them aware of the new initiatives and allow them to follow the guidelines on how it should be implemented. The policies should give guidance for decision-making in the institutions in matters of ICT integration. This makes stakeholders aware of their responsibility and the expectations on them. This can be achieved when the stakeholders adhere to the policy and ensure compliance to the guidelines.

8.7 Limitations of the Study

A limitation of the study was the use of the case study design. A case study enables the researcher to explore the phenomenon under study using a small sample. The small size of the sample hinders the findings from being generalised. This limitation was addressed by using a survey questionnaire for all teacher educators in the three participating HEIs. Hence, the results can be generalised to the whole population.

The researcher would like to acknowledge that exploring the ICT integration practices of teacher educators using a mixed methods approach was subject to some limitations. The mixed methods approach calls for the researcher's expertise in both quantitative and qualitative approaches, which may have been a challenge to her in this study.

The study was limited to three government aided HEIs in Eswatini, and thus, the results cannot be generalised to other HEIs that are not funded by the government of Eswatini. This limitation did not affect the results of the study, which addressed the research questions of the study adequately. It is also hoped that the research findings extended the frontiers of teacher knowledge, policy and curriculum implementation, and teacher educator professional development in ICT integration.

8.8 Knowledge Contribution of the Study

The successful pedagogical integration of ICT in HEIs during ITE programmes cannot be done only by teacher educators. The education structures and administration in the institutions also play significant roles in successful ICT integration. The study contributes to the existing body of knowledge on the integration of ICT in the curriculum in HEIs in an effort to support teacher educators' ICT integration efforts. The study provides data that can be used as guidelines for policy formulation and as support for ICT integration initiatives. The study contributes rich empirical data that can guide theoretical understandings for pedagogical ICT integration in Eswatini. For instance, the study showed that teacher educators' knowledge, pedagogical practices, the structure of the curriculum, teacher educators' perceptions on the pedagogical value of ICT, and institutional support are contribution factors to effective ICT integration in HEIs.

The study showed that teacher educators' positive perceptions of the educational value of ICT lead to them integrating ICTs in teaching and learning processes despite barriers that may hinder ICT integration. The study will help the government, HEIs, and other stakeholders provide enough access to ICT tools and infrastructure to support ICT integration in teaching and learning. The government of Eswatini can benefit from this study by changing its current technical intervention strategies to focus on empowering teacher educators to integrate ICT in teaching.

In this study, teacher educators used technology from a student-centred perspective, which is how ICT can be integrated in classroom activities to promote student learning, and this supports the use of constructionism as one of the theories in this study. This also addresses a gap in Fu's (2013) research, namely that teachers use technology to support their existing approaches and rarely use ICT to foster student-centred learning. The study emphasised that the ultimate goal of ICT integration is to enhance teaching and learning processes. ICT affordances that enhance teaching and learning include access to information, sharing information, promoting interactions, and communication among and between teacher educators and students.

Consistent with the action theories on teacher practices (e.g., Argyris et al. 1985; Kane et al. 2002; Strauss, 1993, all cited in So & Kim, 2009), teacher educators in this study demonstrated espoused and in use TPACK. Espoused TPACK means knowledge that teacher educators have acquired about using ICTs for their subject matter. This knowledge may be acquired from other teacher educators and the ICT coordinator. This substantiates that social interaction is important for teacher educators to help each other cooperatively as they encounter difficulties in the integration of ICTs. In use TPACK means knowledge that teacher educators demonstrate in the use of ICTs for teaching and learning. This involves teacher educators translating perceptions and their understanding to design and implement TPACK (So & Kim, 2009). This study emphasised the importance of an ICT coordinator in the HEIs in Eswatini who has strong TPACK to assist teacher educators in ICT integration.

To develop a strong TPACK teacher educators may:

- a) design their curricular (course outline) to integrate ICT;
- b) engage students with various ICT practices for formative feedback and epistemological reflection for teaching and learning;
- c) present course-specific ICT integrated lessons.

8.9 Recommendations of the Study

The recommendations made by this study are based on the findings and conclusions of the study. They are made to improve ICT integration in Eswatini higher education.

8.9.1 Recommendations for policy and practice

- Teacher educators' practices should be informed by policy. Teacher educators should use ICTs during instruction for students to acquire ICT integration skills while at HEIs. It is recommended that teacher educators should develop class activities that use instructional technologies and that all HEIs include ICT use in teaching as a component of the curriculum.
- It is recommended that curriculum planners be up to date with what is happening in ICT use in education to be able to update current curricula to incorporate ICT where needed.
- It is recommended that national and institutional policies are to inform ICT integration in HEIs. A clear national policy on ICT integration and development in the country is needed. The policies should compel and reinforce the use of ICTs during teaching and learning by having very clear expectations for students and teacher educators so that performance expectancy can be easily monitored.
- The findings of the study revealed that teacher educators use projectors for PPPs but that there are not enough projectors. It is thus recommended that HEIs provide teacher educators or departments with enough projectors to improve the presentation of lesson content in digital format. This will limit the sharing of projectors by teacher educators, which may compromise the quality of instruction.
- It is recommended that institutions encourage sourcing information by using ICTs. This can best be done by ensuring accessibility and connectivity in the institutions. It is recommended that internet connectivity should be improved. Encouraging research in HEIs can create more opportunities for teacher educators and students to use ICTs and will make the benefits of ICTs more observable, demonstrated, and experienced.
- It is recommended that curricula in HEIs should be revised to suggest ICT integrative strategies to preservice teachers. This initiative can compel institutions to embrace ICT integration as it will be part of the curriculum instruction. The study revealed that curricula in the HEIs have not been revised to integrate ICT and that

teacher educators only use ICTs if they perceive its affordances and of their own will. Curricula must enforce the use of ICTs in teaching and learning.

8.9.2 Institutional support

- It is recommended that online teaching should be encouraged in HEIs to replace traditional forms of teaching and learning, which are restricted to the four walls of the classroom, and also to move with new trends.
- Teacher educators believed online teaching improves their job performance. It is recommended that factors contributing to performance expectancy should be identified and strengthened in the HEIs to improve ICT integration as a practice in teaching and learning.
- It is also recommended that HEIs should continuously capacitate their teacher educators through in-service training on ICT integration into teaching and learning. Teacher educators' incompetence to use ICT as part of instruction during teaching often leads to teacher educators becoming reluctant to use ICTs in their classes. Capacitating teacher educators with ICT integration skills will improve their confidence and motivation to use ICT.
- The study recommends that HEIs should provide enough ICT tools to allow each student access to ICTs during lessons. Institutions should permit ICT integration in every classroom. This means that each classroom should at least have ICT gadgets for lesson presentations. More ICT centres or laboratories should be built in the institutions to accommodate more students at once.
- It is further recommended that the HEIs should provide technical support. Technicians should be hired to attend to malfunctioning ICT tools and to assist when teacher educators encounter problems.

8.9.3 Accessibility and connectivity

- It is recommended that the internet service providers Eswatini MTN, Eswatini Mobile, and Eswatini Post and Telecommunications ensure internet connectivity to all HEIs to ensure equity and accessibility. Internet access costs should be regulated to allow easy access to useful information. Sustainable Development

Goal number 4 of the Education Agenda 2030 emphasises that education in all countries should be accessible and equitable to all students, and this can best be done by ensuring internet connectivity and accessibility in HEIs (Chabinga, 2015). Institutions should eliminate many students sharing ICTs because it may compromise the quality of instruction.

8.10 Recommendations for Further Study

- A similar study confined to specific courses can be conducted to give a clear picture of programme-specific ICT integration in teaching and learning in HEIs during ITE.
- Future research must identify specific interventions to increase the components of the UTAUT, such as social influence and performance expectancy, for HEIs to achieve ideal ICT integration practices.
- The study revealed that facilitating conditions are a key component of ICT integration in HEIs during ITE programmes in Eswatini. Future research can identify specific interventions to achieve facilitating conditions to further develop ICT integration.

8.11 Chapter Summary

This chapter presented an overview the thesis. It outlined the aims, objectives and research questions for the study. The chapter also presented a summary of the findings, the conclusions, and the implications of the findings. It further highlighted the limitations and contributions of the study to the existing body of knowledge and made recommendations. It was concluded that teacher educators integrate ICTs when they perceive it to add value to teaching and learning. ICT use was determined by social influence, effort expectancy, and facilitating conditions. It was further concluded that ICTs should be used with other forms of knowledge, such as pedagogy and content knowledge.

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APPENDIX A: CONSENT FORMS

Appendix A.1: Teacher educator's Consent Form

Dear Teacher educator

Please fill in and return the reply slip below indicating your willingness to be a participant in my voluntary research project entitled “***Pedagogical Integration of Information and Communication Technology in Higher Education: A Case Study of Initial Teacher Education Programmes in Eswatini***”. I would like to emphasise that your participation in this project is voluntary and that you will not be affected negatively in any way for not participating in this project.

I, _____ give my consent for the following:

Permission to review/collect documents/artefacts Circle one

I agree that the course outline can be used for this study only.

YES/NO

Permission to observe you in class

I agree to be observed in class. YES/NO

Permission to be audiotaped

I agree to be audiotaped during the observation lesson YES/NO

I know that the audiotapes will be used for this project only YES/NO

Permission for questionnaire

I agree to fill in a questionnaire for this study. YES/NO

Informed Consent

I understand that:

my name and information will be kept confidential and safe and that my name and the name of my school will not be revealed

I do not have to answer every question and can withdraw from the study at any time

I can ask not to be audiotaped

All the data collected during this study will be destroyed within 3–5 years after completion of my project.

Sign_____ Date_____

Appendix A.2: Dean of faculty or HoD Consent Form: Permission to audiotape

Dear Dean of faculty or HoD

Please sign and return the form to give or decline your consent to have your interview audiotaped. I will use this audiotape for my research entitled "*Pedagogical Integration of Information and Communication Technology in Higher Education: A Case Study of Initial Teacher Education Programmes in Eswatini*". I would like to emphasise that participation in this project is voluntary and that you will not be affected negatively in any way for not participating project.

Permission to have my interview audiotaped (tick where appropriate to give or not give your consent to have your interview audiotaped)

I _____ give my consent/ do not give my consent to have my interview audiotaped. I know that I may withdraw from the study at any time and will not be advantaged in any way by participating in this study. I know that I can stop the audio recording of the interview at any time. I know that audiotapes will be used for the purpose of this study only. I am aware that academic papers will be developed and published, and that the researcher will not mention my name in all publications. I know that the audiotapes will be destroyed within 3–5 years of completing the study and will be kept safely until then.

Dean of faculty or HoD's signature: _____

Date _____

**Appendix A.3: Dean of Faculty or Head of Department (HoD) Consent Form:
Permission to use the institution ICT Policy**

Dear Dean of Faculty or HoD

Please sign and return the form to give or decline your consent to have your institution's ICT policy used for my research project entitled "***Pedagogical Integration of Information and Communication Technology in Higher Education: A Case Study of Initial Teacher Education Programmes in Eswatini***". Participation in this project is voluntary and your institution will not be affected negatively in any way for not allowing me to use the institution ICT policy.

Permission to use the institution ICT Policy (tick where appropriate)

I, _____ **give my consent/ do not give my consent** to have the institution's ICT policy used for the research project entitled "***Pedagogical Integration of Information and Communication Technology in Higher Education: A Case Study of Initial Teacher Education Programmes in Swaziland***". I know that the institution may withdraw from the study at any time and that it will not be disadvantaged in any way by participating in this study.

I know that the information collected will be used for the purpose of this study only.

I am aware that academic papers will be developed and published, and that the researcher will not mention the name of the institution in all publications.

I am aware that the researcher will keep all information confidential in all academic writing.

Dean of faculty or HoD's Signature: _____

Date _____

Appendix A.4: Student teacher's Consent Form

Dear Student teacher

Please sign and return the form to give or decline your consent to be observed for my research project entitled “***Pedagogical Integration of Information and Communication Technology in Higher Education: A Case Study of Initial Teacher Education Programmes in Eswatini***”. I would like to emphasise that participation in this project is voluntary and that you will not be affected negatively in any way for not participating in this project. If you do not wish to be observed, there will be seats reserved for such students teachers in the classroom where you can sit.

Please fill in the reply slip below if you agree to participate in my study.

My name is: _____

Permission to observe you in class

Circle one

I agree to be observed in class.

YES/NO

Permission to be audiotaped

I agree to be audiotaped during the observation lesson

YES/NO

I know that the audiotapes will be used for this project only

YES/NO

Informed Consent

I understand that:

My name and information will be kept confidential and safe and that my name and the name of my institution will not be revealed

I do not have to answer every question and can withdraw from the study at any time

I can ask not to be audiotaped

All the data collected during this study will be destroyed within 3–5 years after completion of my project.

Sign _____ Date _____

APPENDIX B: TEACHER EDUCATOR'S QUESTIONNAIRE

A: DEMOGRAPHIC INFORMATION

NAME OF INSTITUTION: _____ TEACHER EDUCATOR'S AGE:

TEACHING EXPERIENCE: _____ TEACHER EDUCATOR'S SEX:

HIGHEST QUALIFICATION: _____

B: USES OF TECHNOLOGIES (ICTs)

Indicate the technology you have access to by means of a cross in the box next to the tool's name

Smart phone ☐
Tablet ☐
iPad ☐
Laptop ☐
Computer ☐
Programmable Calculator ☐

Indicate the technology(ies) that you usually use to help you in teaching and a brief explanation of how you use them. Mention as many as you use.

Technology	Use
1.	
2.	
3.	
4.	

5.	
6.	
7.	
8.	
9.	

C: PEDAGOGICAL ICT INTEGRATION PRACTICES THROUGH TPACK MEASURE

Please complete the following by placing a tick in one of the five boxes next to each statement indicating the extent of your agreement to each of the statements. ICTs are a broad concept that can mean a lot of different things. For the purpose of this questionnaire, ICTs, refers to digital technology(ies). That is tools such as computers, laptops, iPads, smart phones, interactive whiteboards, software programs, etc.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
TK (technology knowledge)					
I am able to send an email with an attachment					
I am able to save an image from a website to a hard drive of a digital device					
I am able to use a search engine to find current information on the topic that I need					
I am able to learn new software programs on my own					

I am able to create my own website					
I am able to use basic computer software (ex., Windows, Media Player) and their functions					
I am able to communicate through Internet tools (ex., email, MSN Messenger)					
I am able to use a picture editing program (ex., Paint)					
I am able to save data into a digital medium (ex., Flash Card, CD, DVD)					
I am able to use a printer					
I am able to use a projector					
I am able to use a scanner					
I am able to use a digital camera					
I am able to use a smart phone					
I am able to use a tablet					
I am able to use an iPad					
CK (content knowledge)					
I know how to develop class activities that are meaningful to students					
I know how to develop projects that are meaningful to students					
I follow recent developments and applications in my course					
I follow up-to-date resources (ex, books, journals) in my course					
I keep up to date with conferences and activities in area of specialisation					
PK (pedagogical knowledge)					
I am able to assess student performance in my course					
I am able to adapt my teaching based on what students currently understand or do not understand					
I am able to adapt my teaching style to suit different students					
I am able to use a wide range of teaching approaches in a classroom setting					
I am able to use a wide range of different learning theories in a classroom setting					
PCK (pedagogical Content knowledge)					

I am able to select effective teaching approaches to guide student thinking and learning					
I am able to select appropriate and effective teaching strategies for my content area					
I am able to develop assessment strategies and tools					
I am able to integrate ICTs in my teaching					
TCK (technological content knowledge)					
I have knowledge about technologies that I can use for students learning					
I am able to facilitate equitable access to technology resources for all students learning					
I am able to develop class activities involving use of instructional technologies					
I am able to develop projects involving use of instructional technologies					
I am able to use technologies in my teaching to easily achieve the learning outcomes of my lesson					
TPK (technological pedagogical knowledge)					
I am able to choose technologies (ICTs) that enhance the teaching approaches for a lesson					
I am able to use technology to support learner-centred strategies that address the diverse needs of students					
I am able manage a technology-rich classroom effectively					
I am able to evaluate the appropriateness of a new technology for teaching and learning					
I am able to use technologies to motivate students					
TPACK (technology pedagogy and Content knowledge)					
I am able to appropriately combine content, technologies and teaching approaches in my teaching					
I am able to integrate appropriate instructional methods and ICTs that help to teach my content effectively					

I am able to facilitate a technology-enhanced experiences that encourage all students to develop higher order thinking skills					
I am able to apply appropriate ICTs to assess all students' learning					
I am able to apply appropriate ICTs to reflect upon the assessment results and communicate these results					
I am able to evaluate and reflect on the effective use of ICTs to enhance teaching and learning					
I am able to use ICTs to communicate and collaborate with students, colleagues and the larger community					
I take advantage of the new and emerging digital age ICTs, to improve on my practices in promoting students' creativity and learning					
I am a leader in spreading the use of technological innovations in my teaching community					

D: TEACHER EDUCATOR'S PERCEPTIONS MEASURE

Please complete the following by placing a tick in one of the five boxes next to each statement indicating your agreement. Information Communication Technology (ICT) is a broad concept that can mean a lot of different things. For the purpose of this questionnaire, ICT is referring to digital technology(ies). That is tools such as computers, laptops, iPads, smart phones, interactive whiteboards, software programs, etc.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
When I use technologies I feel in control of my teaching					
When I use technologies I feel a sense of achievement					
When I use technologies my work is more interesting					
I am motivated to use technologies in my class					
When I use technologies my work is more effective					

When I use technologies, I feel tired and exhausted					
I am not afraid of using technologies in my class					
Using technologies in my class is frustrating					
I get a lot of satisfaction using technologies in my class					
When I want to use technologies I always ask for advices from my colleagues					

Thank you very much for your cooperation

Ngiyabonga kakhulu

APPENDIX C: DEAN OF FACULTY OR HEAD OF DEPARTMENT (HoD)

INTERVIEW GUIDE

The interview focused on the Pedagogical Integration of Information and Communication Technology in the institution during Initial Teacher Education, specifically on how the institution create an enabling environment to develop ICT pedagogical practices.

Interview Questions

How does Information Communication Technology (ICT) help you in your work?

How often do you use ICTs for communication between yourself and lecturers, members of staff and outsiders?

Can you give the number of functioning ICTs in your faculty/ department?

Available for lecturers

Available for students

Are the ICTs connected to internet?

What are your perceptions on the educational value of ICTs?

Does your institution have a plan or policy for the integration of ICTs in teaching and learning?

If yes, can I have a copy, if not, describe the context of absence of a plan or policy.

What are the most significant barriers to the integration of ICT in your institution?

How is your curriculum in the institution affecting classroom technological practices of lecturers?

What do you believe to be most critical to improving ICT integration at your institution?

Is there regular training for teacher educators/ lecturers to keep up with new technologies?

Is there training in the pedagogical integration of ICT organised for lecturers in the institution?

(a) If yes, indicate the number of trainings, and further outline the skills or competencies in which lecturers were trained

If not, describe the absence.

Do you feel your teacher educators are adequately prepared to integrate ICTs into their teaching?

Are there any other additional comments to raise with regard to pedagogical integration of T in teaching and learning in the institution?

Thank you so much for your time

Ngiyabonga kakhulu

APPENDIX D: OBSERVATION GUIDE

Date: _____ observation start time: _____ Observation end time _____

Institution Pseudonym _____ Class: _____

2. Technology used by teacher educators/ lecturers

Technology	Use
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

3. Teacher educator's pedagogical orientation. Indicate the method used by means of a cross in the box.

☐ Lecturing

☐ Discussion

☐ Modelling

☐ Simulations

☐ Drill and practice

☐ Others

(Comments)

4. How the teacher educator use of technology in teaching and learning. Indicate with a cross in the box.

☐ Uses the technological tools without making any mistakes

☐ Uses the ICT tools but commit a few mistakes

☐ Is able to use the ICTs but commit a lot of mistakes

☐ Does not know how to use the tools

5. Teacher educator's Technology Pedagogy and Content Knowledge (TPACK)

☐ Is able to choose technologies that enhance the teaching approaches for a lesson

☐ Is able to use technology to support learner-centred strategies that address the diverse needs of students

☐ Is able to manage a technology-rich classroom effectively

☐ Is able to evaluate the appropriateness of a new technology for teaching and learning

☐ Is able to integrate appropriate instructional methods and technologies into teaching

☐ Is able to appropriately combine content, technologies and teaching approaches in my teaching

☐ Is able to evaluate and reflect on the effective use of technology to enhance teaching and learning

☐ Is able to use technology to communicate and collaborate with students, colleagues and the larger community

☐ Takes advantage of the new and emerging digital age communication resources, to improve on my practices in promoting students' creativity and learning

APPENDIX E: DOCUMENT ANALYSIS FORM/GUIDE

Type of document: Policy/ course outline (tick the correct type)

Author:

Policy/Course Title:

.....
.....
.....

Policy/ Course code:

Document goals and objectives:

.....
.....
.....
.....
.....
.....

Instructional strategies.....

Document description and Contents on ICT integration:

.....
.....
.....
.....
.....

A brief summary of the document:

.....
.....
.....
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.....
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.....

APPENDIX F: ETHICAL CLEARANCE CERTIFICATE



Wits School of Education

27 St Andrews Road, Parktown, Johannesburg, 2193 Private Bag 3, Wits 2050, South Africa.
Tel: +27 11 717-3064 Fax: +27 11 717-3100 E-mail: enquiries@educ.wits.ac.za Website:
www.wits.ac.za

02 October 2017
Student Number: 1171545
Protocol Number: 2017ECE025D

Dear Fikile Nkambule

Application for Ethics Clearance: Doctor of Philosophy

Thank you very much for your ethics application. The Ethics Committee in Education of the Faculty of Humanities, acting on behalf of the Senate, has considered your application for ethics clearance for your proposal entitled:

Pedagogical Integration of Information and Communication Technology in Higher Education: A Case Study of Initial Teacher Education Programmes in Swaziland.

The committee recently met and I am pleased to inform you that **clearance was granted**.

Please use the above protocol number in all correspondence to the relevant research parties (schools, parents, learners etc.) and include it in your research report or project on the title page.

The Protocol Number above should be submitted to the Graduate Studies in Education Committee upon submission of your final research report.

All the best with your research project.

Yours sincerely,

Wits School of Education
011 717-3416

cc Supervisor - Dr Reuben Dlamini and Dr Alfred Masinire

APPENDIX G: MoET CLEARANCE

The Government of the Kingdom of Swaziland



Ministry of Education & Training

Tel: (+268) 2 4042491/5
Fax: (+268) 2 404 3880

P. O. Box 39
Mbabane, SWAZILAND

8th November, 2017

Attention:

Head:

University of Swaziland	Southern Africa Nazarene University	William Pitcher College
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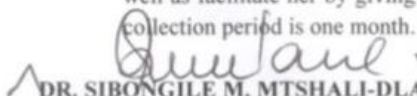
THROUGH

Manzini Regional Education Officer

Dear Colleague,

**RE: REQUEST FOR PERMISSION TO COLLECT DATA FOR UNIVERSITY OF WITS
WATERRAND STUDENT – MS. FIKILE NKAMBULE-NTSHALINTSHALI**

1. The Ministry of Education and Training has received a request from Ms. Nkambule a student at the University of Witwatersrand that in order for her to fulfill her academic requirements at the University she has to collect data (conduct research) and her study or research topic is: *Pedagogical Integration of Information and Communication Technology in Higher Education: A Case Study of Initial Teacher Education Programs in Swaziland*. The population for her study comprises all lecturers, Deans or Heads of Departments in the above mentioned Universities and College. All details concerning the study are stated in the participants' consent form which will have to be signed by all participants before Ms. Nkambule begins her data collection.
2. The Ministry of Education and Training requests your office to assist Ms. Nkambule by allowing her to use above mentioned Institutions in the Manzini region as her research site as well as facilitate her by giving her all the support she needs in her data collection process. Data collection period is one month.


DR. SIBONGILE M. MTSHALI-DLAMINI
DIRECTOR OF EDUCATION AND TRAINING

cc: Regional Education Officer – Manzini
Chief Inspector – Tertiary
3 Head of the above mentioned Institutions
Dr. Reuben Dlamini – Research Supervisor



APPENDIX H: LANGUAGE EDITING CERTIFICATE



WORDPLAY EDITING
Copy Editor and Proofreader
Email: karien.hurter@gmail.com
Tel: 071 104 9484
Website: <http://wordplayediting.net/>

29 September 2021

To Whom It May Concern:

This letter is to confirm that *Pedagogical Integration of Information and Communication Technology in Higher Education: A Case Study of Initial Teacher Education Programmes in Eswatini* by Fikile Sibongile Nkambule was edited by a professional language practitioner.

Regards,

A handwritten signature in black ink, appearing to be "KH" or a stylized version of the name Karien Hurter.

Karien Hurter