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AN EXPLORATION OF E-LEARNING PRACTICES OF TEACHERS AT SELECTED SCHOOLS IN THE WESTERN CAPE

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DECLARATION

I, Osman Gany Sadeck, declare that the contents of this thesis represent my own unaided work, and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

_____ *3rd May 2016*

Signed Date

ABSTRACT

An exploration of e-Learning practices of teachers at selected schools in the Western Cape

This study is about teachers' e-Learning practices at school level. The research aims were to **explore** the patterns that emerge when teachers use and integrate technologies for e-Teaching and e-Learning, and to **explain** why teachers adopted and used technologies. My original contribution to knowledge is that the adoption and use of technologies is influenced by value propositions.

Schools in the Western Cape are acquiring more technology and gaining increasing access to digital products, services and systems at an exponential rate. In spite of the prevalence of technology in the Western Cape, there appears to be an under-utilisation or non-adoption of the available tools and technologies for educational benefits. However the e-Learning practices of teachers are not fully understood by e-Learning policy makers and implementers.

This study sought to address the research problem through an exploration of the technologies that teachers used and **what** they **used** these technologies for; the **patterns** in their **use** and **integration** of technologies; and the **reasons** they offered for their decisions to **adopt** and use technologies.

The research was not strictly confined to one particular method, approach or strategy, as the nature of the phenomena under investigation and the dynamics of the situation required adaptations. A sensible selective blend of qualitative and quantitative approaches, explanatory and exploratory enquiry, and inductive and deductive techniques was employed.

Existing research does not sufficiently describe or indicate patterns of use, practice and adoption of technologies by teachers. While a range of taxonomies, levels and stages exists, they deal in most instances with singularities. Existing technology adoption theories do not explicitly progress beyond the point of 'actual use'. Use of technologies could result in some benefits.

The findings of this study revealed that teachers **used** a purposeful selection of technologies for personal, administrative, teaching and learning purposes. Teachers' practices were found to be incremental and progressive, and aligned to their comfort zones. Teachers adopted and used technologies on account of the value propositions afforded to them. The aggregated patterns of use, practice and adoption could be located on continuums.

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DEDICATION

This work is dedicated to my family

To my wife, Melanie Anne, and my sons, Shahid, Tariq and Ameer. Thank you for your support and encouragement throughout my studies and for your patience during my years of study.

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May this achievement be an inspiration to seek knowledge all through your life, to resolutely believe in yourself and to work towards achieving your goals.

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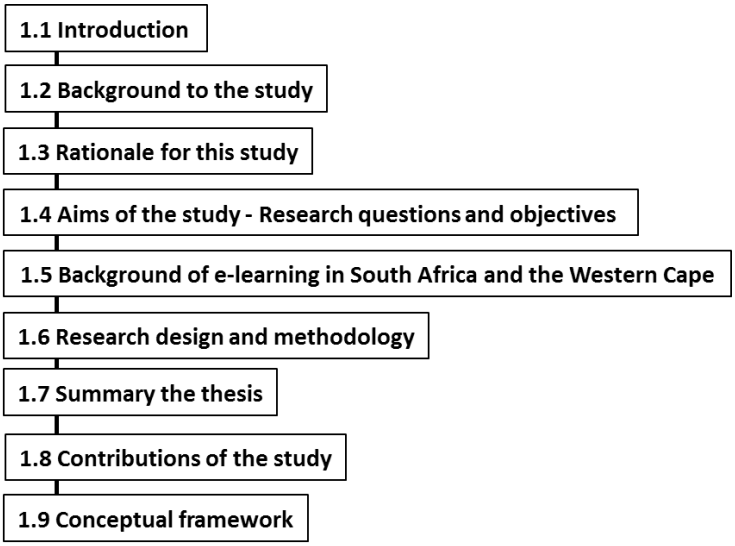
ABBREVIATIONS AND ACRONYMS

BI	Behavioural Intent
CAPS	Curriculum and Assessment Policy Statement
CBAM	Concerns-Based Adoption Model
DoE	South African National Department of Education
FET	Further Education and Training
ICT	Information and Communications Technology
LMS	Learning Management System
OBE	Outcomes-Based Education
PBC	Perceived Behavioural Control
PU	Perceived Usefulness
PEOU	Perceived Ease of Use
SNS	Social Networking Services
TAM	Technology Acceptance Model
TPACK	Technological Pedagogical Content Knowledge
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UNESCO	United Nations Educational, Scientific and Cultural Organization
VIE	Valence, Instrumentality, Expectancy theory
WCED	Western Cape Education Department
WCP	Western Cape Province
ZOPED	Zone of Proximal Development

GLOSSARY

Adoption	Acceptance, implementation, taking on of a new product or innovation. It includes physical technology, digital products, systems, services, pedagogies, teaching and learning models, approaches and frameworks. An innovation may be new to the user or new as an invention.
Affordance	The actual beneficial attributes of technologies.
Digital products / content	Simulations, animations, text, video are examples of digital content or products.
Domestication	A process whereby people encounter various technologies and either reject the technologies or fit them into their everyday lives (Haddon, 2006).
e-Administration	Using technology, digital products, systems and services for administration in teaching and learning.
e-Learning	Learning with and through the use of technology.
e-Pedagogy	Learning pedagogy that incorporates instructional strategies which take into account the affordances of technologies.
e-Learning Practice	The actual activities and actions that incorporate use and integration of technology, digital products, systems, services and e-Pedagogies.
e-Teaching	Using technology, digital products, systems and services to teach.
ICT	Information Communication Technology which includes technologies (see technologies). In this thesis the term ICT is used in text where it appeared as such in the literature.
Innovation	Is to use of something for aspects other than what it was intended for. It is sometimes referred to as ‘creativity’.
Integration	When technologies are an integral part of learning, where the learners themselves use technologies as part of their learning process as opposed to watching technologies being used by the teacher.
Services	Services such as cloud-based services and social networking services.
Systems	Digital systems such as a learning management system (LMS), Wide and Local area networks (WAN, LAN).
Technologies	The range of physical digital devices (see technology), digital systems (see systems), digital services (see services).
Technology	Digital devices such as computers, laptops, tablets, data projectors.
Use	Using technology for teaching / presenting lessons as a replacement of older technology.

CHAPTER ONE



Summary of the Thesis

1.1 Introduction

This study is about teachers' e-Learning practices at school level. The research aims were to **explore** the patterns that emerge when teachers use and integrate technologies for teaching and learning, and to **explain** why teachers adopted and used technologies. This was achieved through three interrelated research questions:

1. **What** technologies do teachers **use** and **what** do they use these technologies **for**?
2. **How** do teachers advance their **practices** for e-Learning?
3. **Why** do teachers **adopt** and use certain technologies in their e-Learning practice?

The findings of this study revealed that teachers **used** a purposeful selection of technologies for personal, administrative, teaching and learning purposes. Teachers' practices were found to be incremental and progressive, and aligned to their comfort zones. The teachers adopted and used technologies on account of the value propositions afforded to them. The aggregated patterns of use, practice and adoption could be located on continuums.

1.2 Background to the study

The Western Cape Education Department (WCED) has made substantial investments in Information and Communications Technology (ICT) in schools over the last 15 years. Schools in the Western Cape are acquiring more technology and gaining access to digital products, services and systems at an exponential rate. In spite of the pervasion of technology in the Western Cape, there appears to be an under-utilisation or non-adoption of the available tools and technologies for educational benefits (Van Wyk, 2011).

Many researchers have echoed in different ways that e-Learning possesses the potential to change education globally. The South African National Department of Education (DoE) states that "ICTs have the potential to improve the quality of education and training" (DoE, 2004:8). This was expanded on by Amin (2013:6) who maintains that "ICTs, especially computers and internet technologies, enable new ways of teaching and learning". Kong et al. (2014:71) further confirm the potential of ICTs in their statement, "The introduction of digital resources, digital ways of communication and digital platforms for learning and teaching brings about many opportunities to enhance the learning process in school education in the 21st century."

However all does not seem to be going well with the implementation of e-Learning at school level. The DoE notes that implementation of its policy (White Paper 7) for e-Education in South Africa is not without challenges. One of the challenges is the "integration of ICT into the learning and teaching process" (DoE, 2004:8).

A study by Bytheway et al. (2010) concludes that the effective use of technologies at schools is yet to be realised. They further note that the role of technologies in teaching and learning has not been sufficiently evaluated to put into place a strategic approach. The context of these statements is similar to that of Fullan (1991) who notes that one of the problems with educational reform (ICTs in education considered as reform) is that there is no clear sense of the reasons for educational change and what is necessary to proceed.

Furthermore Isaacs (2007:10) states that there were a host of “dispersed and uncoordinated programmes and projects” that promoted e-Education in South African schools. Ford and Botha (2010:1) further contend that the “practical implementation of e-Education has been a failure”.

Accordingly the under-utilisation and non-adoption of available technology and varying levels of uptake of e-Learning emerged as concerns. These concerns underpinned the problem to be addressed in this research study. **The problem was that e-Learning practices at school level were not fully understood by e-Learning policy makers and implementers.**

This study sought to address the research problem through an exploration of the technologies that teachers used and **what** they **used** these technologies for, the **patterns** in their **use and integration** of technologies, and the **reasons** they offered for their decisions to **adopt** and use technologies for e-Teaching and e-Learning. The researcher believes that the exploration will shed light on the relationship between the pervasion of technologies and the apparent non-use of these technologies.

1.3 Rationale for this study

To understand e-Learning practice it is necessary to explore the relationship between technologies and adoption, use and practice. It has been stated in the last decade that the use of technology should be an integral part of a holistic teaching–learning process in e-Learning (DoE, 2004; Harvey & Beards, 2004; Stoltenkamp & Kasuto 2011; Stoltenkamp, 2012). However there is not sufficient knowledge of teachers’ practices as a normal course of daily teaching and learning towards an understanding of the use of technology as an integral holistic process. The assumptions that underpin this study are that teachers are using technologies in spite of a range of barriers as part of their normal way of work.

The pattern of teachers’ use of technologies in their work is not fully understood as selective attention has been given in research to the practice of using technologies for school education over the years. Mumtaz (2000:326) noted that research has not

provided “insight into the individual teacher’s learning processes”. Lagrange et al. (2001) contend that previous research has been dominated by difficulties and barriers, and that “references to the teacher dimension are sparse”. Bhalla (2013:176) concludes that research has “ignored systematic studies into ways of using technology and as such overlooked the conceptual and contextual aspects of ways in which technology is used in [the] teaching-learning process”.

While studies on e-Learning are plentiful, research into e-Learning practices is uncommon. Research in the field of e-Learning is relatively young and many initiatives are focussed on technology deployment and use of emerging technologies. As such much of the existing research into the use of technology focuses on singularities that evolve around pilots projects, training initiatives, technology testing, models or method testing, and the ever-present barriers to e-Learning. These provide valuable information in understanding teachers’ uptake and use of technologies. These studies however do not provide us with an understanding of the complexities of why teachers adopt and use technologies.

There appear to be fewer studies that focus on e-Learning practice and concomitantly fewer on reasons for adoption and patterns of use. This study sought to focus on why teachers use technologies so as to understand their practice. A gap thus exist that this study aimed to address. It is against this background that this study sought to explore and understand adoption, use and e-Learning practices of teachers.

1.4 Aims and objectives of the study

1.4.1 Aims of the study

The aims of this study are to **explore** the patterns that emerge when teachers use and integrate technology for e-Teaching and e-Learning, and to **explain** why teachers adopt and use technologies

1.4.2 Objectives of the study

The table below (Table 1.1) sets out the research questions and the investigative questions used to gather data.

Table 1.1 Research questions

Research questions		
1. **What** technologies do teachers **use** and **what** do they use these technologies **for**? 2. **How** do teachers advance their **practices** for e-Learning? 3. **Why** do teachers **adopt** and use certain technologies in their e-Learning practice?		
Investigative question/s	**Objective/s**	**Instrument/s**
Research Question 1: **What** technologies do teachers **use** and **what** do they use these technologies for?		
Sub-question 1.1 What do individual teachers use technologies for?	To understand what technologies are used by teachers and to explore the pattern of what they used these technologies for.	Questionnaire; interviews.
Research Question 2: **How** do teachers advance their **practices** for e-Learning?		
Sub-question 2.1 How do teachers use technologies for teaching and learning?	To explore and understand how e-Learning models, methods and techniques are applied, that is, how teachers integrate technological, pedagogical and content knowledge (TPACK) into teaching and learning.	Questionnaire; interviews.
Sub-question 2.2 What are teachers' dependence on and interest in using technologies?	To understand teachers' orientations, experiences and perceptions of the outputs, benefits and value of the use of technologies.	Questionnaire; interviews; literature search.
Research Question 3: **Why** do teachers **adopt** and use certain technologies in their e-Learning practice?		
Sub-question 3.1 What informs teachers' decisions to adopt, use and integrate technologies into their e-Learning practices?	To understand the cognitive and affective reasons for actions and decisions taken to adopt and use technologies. To understand the value that teachers attach to using technologies in their e-Learning practices.	Questionnaire; interviews.
Sub-question 3.2 How do technical and non-technical factors affect teachers' e-Learning practice?	To understand how technical and non-technical factors impact on adoption, use and practice.	Questionnaire; interviews.
Sub-question 3.3 How does support and professional development enable e-Learning practices?	To understand how support and training affects e-Learning practice.	Questionnaire; interviews.

1.5 Background to e-Learning in South Africa and the Western Cape

This section provides a background to education by locating the Western Cape initiatives within the broader South African context. Its relevance in this thesis is that it provides the evidence of activities and initiatives taken at different strategic levels to attempt to enable and entrench the use of technologies for teaching and learning.

1.5.1 E-Learning: South African National Department of Education (DoE)

The DoE acknowledges that the "expansion of ICTs is driving significant changes" (DoE, 2004:8). The DoE's response to this was the White Paper 7 on e-Education (DoE, 2004). It states that e-Education "revolves around the use of ICTs to accelerate the achievement of national educational goals" (DoE, 2004:14).

Implementation of the White Paper 7 was delegated by the DoE, as a provincial responsibility, to the nine provincial education departments in South Africa. The response from the nine provinces was an attempt to get physical technology into schools first. This represented a tangible asset that could be quantified and counted as progress towards one of the objectives in White Paper 7. A range of ICT pilot projects, connectivity to schools, and training in the use of technology and computer literacy typified the start of e-Education in South Africa. The e-Education policy has been in place since 2004, and to date (2015) there does not appear to be significant progress in implementation of the policy nationwide. What appears conspicuously absent is a national strategic plan for implementation.

The DoE subsequently (November 2015) embarked on a new programme named *Operation Phakisa: ICT in Education*. The aim of this programme is to set up and implement rapidly key enablers for e-Education (at the time of writing this thesis the details had not been officially published). The plan is a holistic plan for all six objectives of the national policy (White Paper 7). This is the first official implementation plan for e-Education in South Africa since the publication of its policy in 2004.

1.5.2 E-Learning: Western Cape Education Department (WCED) – Western Cape province – South Africa

The Western Cape Education Department (WCED) embarked on two large-scale technology-related projects. These were the Khanya technology-in-education project (2002–2012) and the current WCED e-Education Vision (initiated in 2012). The establishment of the Khanya project team and the establishment of the WCED e-Learning unit were the only planned responses that focused on aspects that had the potential to progress e-Learning in the WCED.

1.5.2.1 The Khanya Project

The Khanya Project was initiated in 2002 with the mandate to provide appropriate technology to all schools in the Western Cape. The aims of the project were to bridge the digital divide and improve the mathematics results of Grade 12s. The project was scoped for 10 years and was concluded in March 2012. The activities of the project focused on one key strategic objective in White Paper 7, that is, access to technology. It should be noted that this project was started two years prior to the publication of the White Paper 7 on e-Education (DoE, 2004) and its mandate was not a response to the policy.

The model adopted was one of networked computer laboratories with proprietary software focused on mathematics, science and languages. Approximately 35 000 computers were provided through the project over 10 years. A total of 26 000 teachers were recorded as having received training. As part of the training model, basic training in Microsoft Office, internet, e-mail and the use of proprietary software was provided to teachers. Additionally training was provided to a teacher at each school to function as the school network administrator to manage the computer laboratories. The pedagogical approach to the use of the technology and facilities was akin to computer-based training (CBT, with its roots in military implementation).

1.5.2.2 The WCED e-Learning unit

The second significant response to e-Education in the WCED was the initiation and establishment of an e-Learning unit. With the mandate to implement the national policy on e-Education, the unit set about building on the Khanya project. During the period 2008 to 2012 there was an un-coordinated approach to ICTs and e-Learning in the province.

The aim of the e-Learning unit was to enable e-Learning holistically by addressing all six objectives of the national policy (White Paper 7). Following strategic planning, implementation and operational plans were put in place and implementation initiated in 2008. The strategies included the introduction of a learning management system (LMS) for school education; a digital repository of learning objects; the introduction of open educational resources and freeware; an increased focus on and practical implementation of ICT-integrated training in line with the 2007 draft policy on teacher professional development in ICTs; and the introduction of a blended face-to-face/online mode of training.

These strategies met with resistance as they were considered revolutionary by many who were sceptical of such an approach, while a few people considered it evolutionary. Such an approach was not implemented in the Western Cape or in any other province in South Africa. Through a process of critical introspection the WCED (2012) embarked on an evolved strategy for e-Learning.

The WCED through the e-Learning unit has set out a new vision for e-Education in the Western Cape. This strategy was the first officially documented strategy for e-Learning in the province (scoped 2012-–2032). The e-Education vision focuses on six streams which are: e-Teaching, e-Learning, curriculum / education, systems, environment, and e-Administration. This initiative and strategy of the WCED has been subsequently taken up by the Western Cape Government as one of its ‘game changers’ (Zille, 2015).

At the time of this thesis, the e-Learning unit recorded training and development sessions to 26 753 teachers and department officials. These numbers were spread

over the various course offerings. The training programme was designed and developed in three levels towards basic, integration, and specialisation in use and pegged at cognitive levels. The categories of courses focused on systems and services (towards systems and services integration); content (towards integration and content creation); and pedagogy (towards planning and integration). The understanding was that teachers and officials could, on completion of a course, apply the training at the identified level, but could also operate at lower or higher levels than those which the course identified. In 2014 the e-Learning unit introduced its first exclusive online course on e-Pedagogy to complement the existing training and professional development programme in place.

The first phase of implementation of the e-Education vision was the provision of e-Teaching technology to schools. Dubbed the 'smart classroom', it consists of a set comprising a wireless data projector and a laptop, a document viewer, and a portable device to render an ordinary white board interactive. The deployment of 3353 sets across 247 schools (2014/2015) and 917 sets across 64 schools (2015/2016) of teaching technology was effected with mass technical training (two persons from each school with the understanding that they would cascade skills) on 'how to operate' the devices. Through a DoE initiative the province has deployed 8275 tablets in trolleys at 331 schools. This was accompanied by training on how to operate and work with tablets and an introduction to TPACK and e-Pedagogy planning for integration.

In addition the Western Cape government initiated a wide area network (WAN) for the province. At the time of this thesis (May 2016) **746** schools were connected to the **Broadband network.** To leverage the potential of the WAN for education, wireless local area networks (LANs) were provided to schools. At the time of this thesis (May 2016) 61 schools have received fully functional LANs. These initiatives are aimed at increasing access to the Internet and to digital resources and to working within digital systems. These initiatives commenced in 2015.

1.5.2.3 Conclusion: e-Learning in the WCED

The WCED is not lacking in technology, systems, services, content or professional development initiatives. However its approach may be viewed as techno-centric. The initial implementation steps of the e-Education vision appear to move against logic and common sense based on national and international research on techno-centric approaches. The deployment and installation of technologies and services do not appear to be synchronised. Different schools are receiving different elements of the digital ecosystem with no apparent educational strategy driving the initiative.

However, within this enriched context, the problem of slow uptake and under-utilisation surfaces as a problem. There does not appear to be evidence of the achievement of a critical mass towards adopting and using technologies, either through the Khanya project or the recent e-Education vision initiatives. As such the e-Learning practices of teachers in the Western Cape are largely unknown.

(Further background information on education and e-Learning in South Africa and the Western Cape can be accessed in Appendix B.)

1.6 Research design and methodology

1.6.1 Research approach

The study was underpinned by an interpretivist philosophy to gain rich insights into the complex issue of e-Learning practice at school level. According to Cohen et al. (2005:19-22), the interpretive paradigm is concerned with the individual, and the "social world can only be understood from the standpoint of the individuals who are part of the on-going action being investigated". Saunders et al. (2003:84) further maintain that it is essential "to explore the subjective meanings motivating people's actions in order to be able to understand" people's behaviour.

1.6.2 Research design

This research was not strictly confined to one particular method, approach or strategy, as the nature of the phenomena under investigation and the dynamics of the situation required adaptations. A sensible selective blend of qualitative and quantitative approaches, explanatory and exploratory enquiry and inductive and deductive techniques was employed. Using a mixed-methods approach allowed for complementary qualitative and quantitative research (Johnson & Onwuegbuzie, 2004; Creswell & Plano Clark, 2011).

According to Neuman (2002:30), some techniques are more effective when addressing specific kinds of questions and topics. Van der Merwe (1996:279) furthermore maintains that “induction and deduction should not be regarded as mutually exclusive”. The use of these two approaches symbiotically promotes insight into the phenomenon through Babbie’s (2010) wheel of science.

1.6.3 Design of the study

This study was grounded in theory and used combined inductive and deductive methods. The research was a snapshot in time, working with a representative sample of practising teachers that used technology. As it was descriptive and explanatory, it allowed the researcher to conduct investigations in a focused manner (Van der Merwe, 1996:288; Bassey, 1999:47). Given the diversity of teachers’ actions, a singular study would not have yielded enough diversity to observe emerging patterns (Huysamen, 1994:168). While generalisation was not applied strictly to this study, the findings from this study provide convincing evidence for a case for fuzzy generalisations or even speculations that may be applied to other similar contexts, situations or samples (Bassey, 1999:46;72).

1.6.4 Unit of research and analysis, sample and delineation

E-Learning practice was the unit of research and the unit of analysis was the individual teacher.

Purposeful sampling was used so as to include participants that were most likely to provide reliable and rich data (Bless et al. 2006:95; Merriam, 2009:77). The sample comprised 15 participants for the interviews and 76 for the survey questionnaire from a cross-section of public and private schools. The collective criteria for selection included teachers who had received ICT training and that were known to be using technologies in their classrooms. The sample size was guided by the concept of data saturation, which is likely to occur early with large samples in qualitative research (Glaser & Strauss, 1967; Ritchie et al., 2003; Guest et. al., 2006).

The research was confined to practising teachers within the borders of South Africa. The initial confinement of the study to teachers in the Western Cape province was adjusted on account of emergent information.

1.6.5 Data collection

Data was collected through a survey questionnaire, face-to-face interviews and literature searches. The data was subjected to content analysis. According to Cohen et al. (2005:82), fitness for purpose and legitimacy will govern the criteria used in deciding which forms of data analysis to undertake. *(Details of the research design are set out in Chapter 3.)*

1.7 Summary of the thesis

A brief summary based on the conceptual framework (See Figure 1.1) and research questions is presented in this section.

Research questions:

1. What technologies do teachers use and what do they use these technologies for? (*USE*)
2. How do teachers advance their practices for e-Learning? (*PRACTICE*)
3. Why do teachers adopt and use certain technologies in their e-Learning practice? (*ADOPTION*)

This research started out with the following research problem: e-Learning practices at school level were not fully understood by e-Learning policy makers and implementers. The problem was underpinned by the under-utilisation and non-adoption of available technologies and varying levels of uptake of e-Learning.

In exploring teachers' e-Learning practices the following were noted: Technology adoption culminates in use. Various factors affect how technologies are adopted and used. The way technologies are used is an indicator of e-Learning practice. Why teachers engage in e-Learning practices helps us understand adoption and use. The human element has been found to be dominant in research findings.

The following sections set out the engagement with the three research questions throughout the study.

1.7.1 Use: What technologies do teachers use and what do they use these technologies for?

Teachers use technologies for personal, administrative, teaching and learning purposes. Previous research has found use of technologies to be mostly for administrative purposes and less for teaching and learning. Very few studies noted personal use of technologies. There is a comparable synergy between the findings of this study and findings from previous research which established that teachers used technologies for more than just teaching and learning.

The data showed that technologies were used for both personal and work-related communication and collaboration as well as for personal learning and learners' learning. Consequently the researcher was able to extend personal use of computers only to include the use of social networking services (SNS) and cloud services and systems. The researcher was further able to locate what teachers used technologies for on a continuum of use.

There is a blurring of the distinctions of the separate elements of the technologies that teachers used and what they used these technologies for. Emanating from this

study was that technologies are pervasive in the lives of the teachers in this study, with initial indicators of domestication. The findings in this study corroborate previous findings of what teachers use technologies for. The patterns of what technologies are used for in this study advances the 'what' technology was used for in previous studies to 'what else' in this study. Figure 1.1 below depicts the findings of this study graphically on a continuum of use.

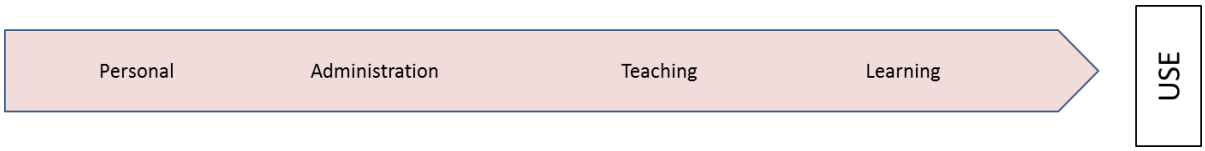


Figure 1.1: Continuum of use

1.7.2 Practice: How do teachers advance their practices for e-Learning?

There is a relationship between what teachers use technologies for and the manner in which this is actioned. E-Learning practice did not feature prominently in previous literature. Practice was discernible only in activities that were researched in initiatives where the use of technology was the focus.

In previous studies teachers' practices with learners were reported as mainly representational as opposed to generative (Hokanson & Hooper, 2000:543). The use of systems for learner benefits was said to be merely to transmit subject content. As such, most research located teacher engagement with technology with learners at the basic, entry and adoption stages. A second aspect from previous research is that use of technologies was incremental and that these gradually replace older practices with newer ones. It has been reported that teachers are building on and extending existing practice.

The third significant aspect reported was that teachers were simply using technologies to fit with what they do normally as opposed to integrating them for changing pedagogies (Hennessy et al. 2005). The use of technologies was said to

be characterised by ways that are compatible with teachers' established style of teaching. It was further contended that methodologies appear to be traditional with technologies as the add-on, and that there were no significant difference in educational outcomes or changing practices. However other information offered that teachers do adjust their practice based on how closely the proposed change aligns with their current practices and pedagogical paradigms.

In this study teachers' practices in the course of their work were reported in different variations. These included the way that teachers used technologies could fit into a spectrum of instructional approaches, varying from traditional to innovative. The findings in this study resonate with previous findings of how technologies were used. The patterns of use found in this study advance the 'how' technologies were used in previous studies to 'how else' in this study. It has emerged that use is incremental, at varying intensities and with different frequencies.

This progressive and incremental characterisation of practice could be located on a continuum of practice. Figure 1.2 below depicts the findings graphically on a continuum of practice.

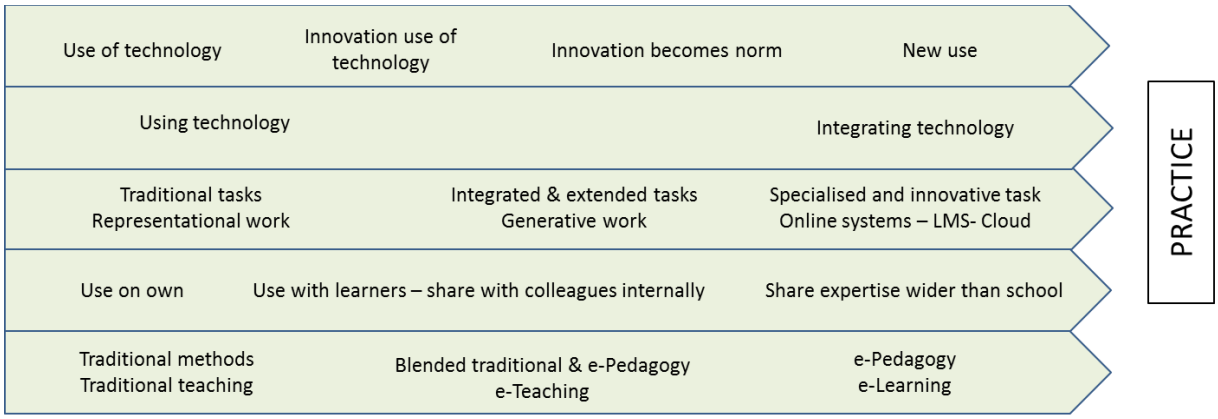


Figure 1.2: Continuum of practice

1.7.3 Adoption: Why do teachers adopt and use certain technologies in their e-Learning practice?

Adoption of technologies is premised on expectancy, that is, what there is in it for the teacher. Previous studies have showed levels of complexity in what the focus of the reasons for adoption and use entailed. Most previous research on why teachers use technologies reported that it made teachers' work easier, and that they were able to do things that were not possible before. There are assumptions and claims that the lessons are more exciting and that results improve.

However previous research has evidenced that impacts such as improved results are inconsistent and inconclusive (Crook et al., 2015). Other researchers have interpreted results differently and reported other positive outputs. These are: learners were more motivated to learn, were learning more independently, and the skills of learning with technology were applicable beyond the classroom. The focus of the reasons found in these studies appeared not to be centred on learner results (marks) as the outcome.

However there are voluminous studies that report on why teachers don't use technologies (Davids, 2009; Chigona et al., 2010). These reasons are: lack of competence, knowledge, autonomy, skills, access, time, resources, training, and technical support. This represents almost all that is necessary to engage in e-Learning. The counter to this is that even if the technologies were available, and the knowledge and skills existing, research has evidenced that these were not conditions that automatically resulted in adoption and use.

Thus far the literature has tended towards the external aspects of adoption. Adoption is in effect a personal and internal process. There is a range of factors and enablers that contributes to our understanding of adoption. Adoption emerges directly as an issue, not about the attributes of the technologies, but about the human element and change. As such change is highlighted as the stimulus that activates both physiological and psychological responses in a teacher. Adoption is based on decision-making processes that affect behaviour and these decision-making processes are believed to be about mental processes.

Mental processes incorporate the cognitive (assumes the use of existing knowledge to understand and make decisions), and affective (based on feelings and not on

using knowledge to evoke feelings to make decisions) domains. This study has found that these domains are predisposed to motivation, self-efficacy, locus of control, confidence, expectancy, beliefs, conviction, determination and satisfaction.

The findings in this study synergise with previous documented reasons for the uptake of technologies for educational purposes. The patterns that emerged in this study provided a different perspective on exploring adoption in that it advances the 'why not' of technology adoption and use to 'why yes' in this study. It has emerged that adoption and use is about human factors and the value propositions afforded to teachers.

Figure 1.3 below depicts the findings graphically on a continuum of adoption.

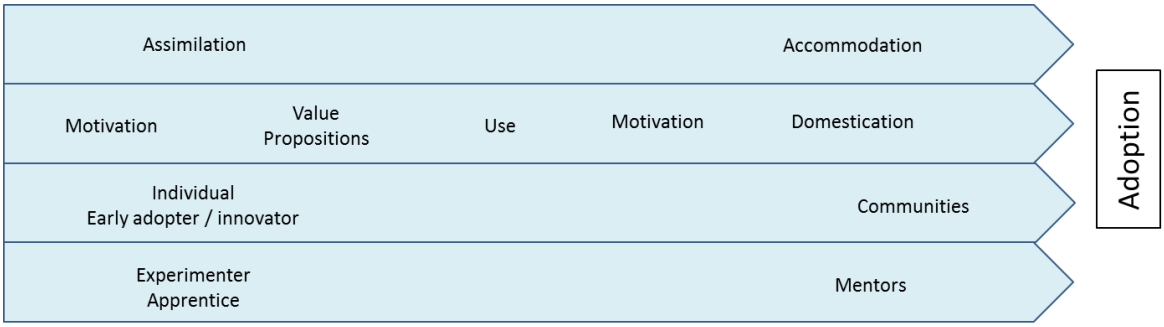


Figure 1.3: Continuum of adoption

1.8 Contributions of this study

This study contributes practical knowledge to the body of e-Learning literature and a theoretical contribution to the technology acceptance model (TAM).

Existing research does not sufficiently describe or indicate patterns of use, practice and adoption of technologies by teachers. While a range of taxonomies, levels and stages exists, these deal in most instances with singularities. Continuums provide indicators of ranges or scales. This study developed and contributed to the continuums of use, practice and adoption to the body of e-Learning knowledge (See Chapter 5.)

Existing technology adoption theories do not explicitly progress beyond the point of 'actual use'. The focus of this study was on why teachers engaged in certain activities. Usefulness of technologies could result in some benefits. It is however the value proposition of using the technologies that determines actual use. As such this study contributed to the TAM model with an adaptation by the addition of the concepts of benefits and value proposition towards understand perceived usefulness. (See Chapter 5)

1.9 The conceptual framework

The conceptual framework (Figure 1.4) was developed from the literature reviews in Chapter 2 (Sections 2.1, 2.2 and 2.3). The *what, how* and *why* questions were placed on individual axes at right angles to one another. Each of these axes would represent a spatial plain onto which teachers activities could be located. The resulting two quadrants thus provide a representation of where an individual may be in them of what technologies they use, how they use these and why they choose to adopt and use these technologies. This representation serves as the backdrop to the aim of the study which was to explore and understand teachers' e-Learning practices. The meeting point of these three axes shows where e-Learning practice is located.

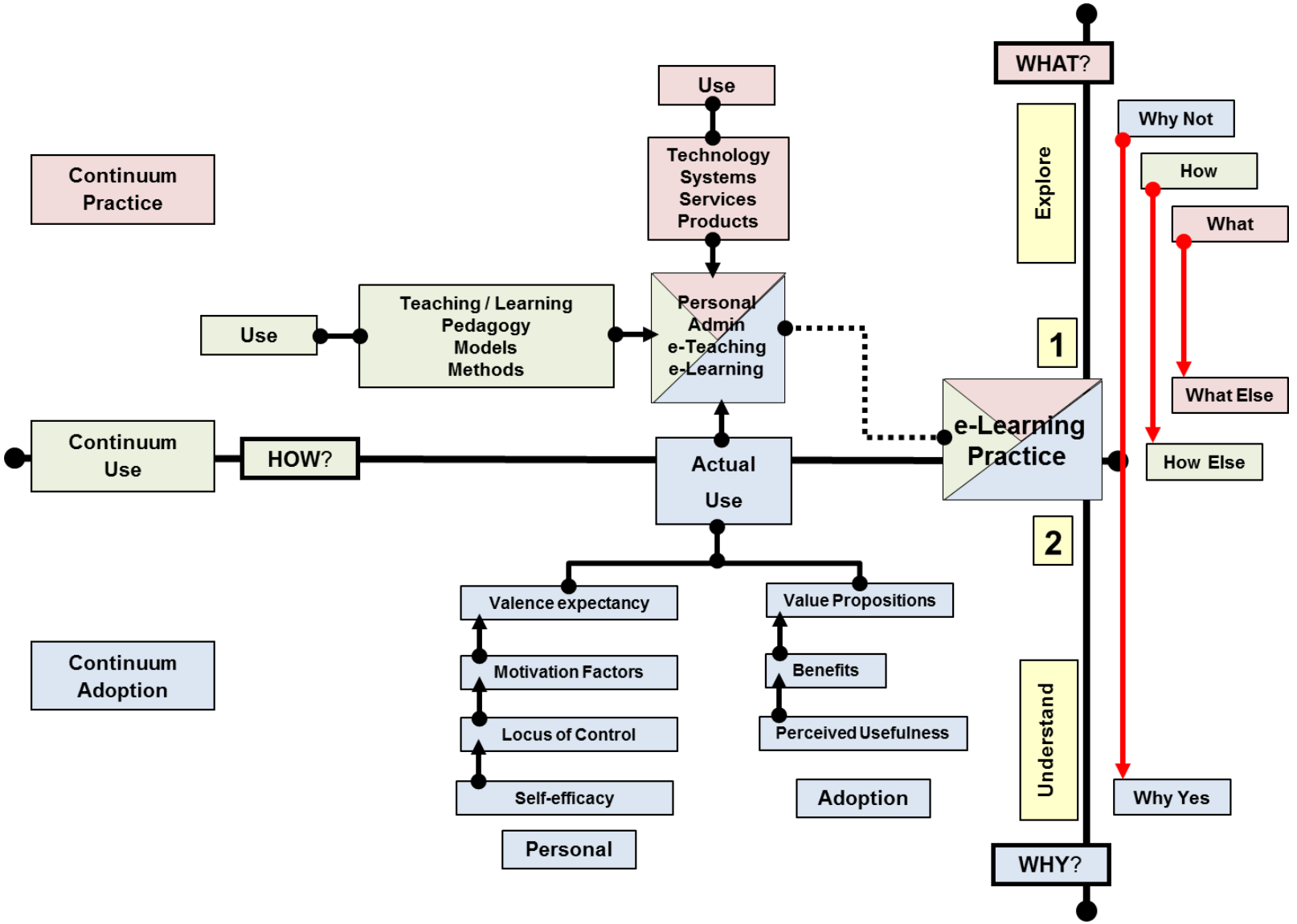


Figure 1.4: Conceptual framework

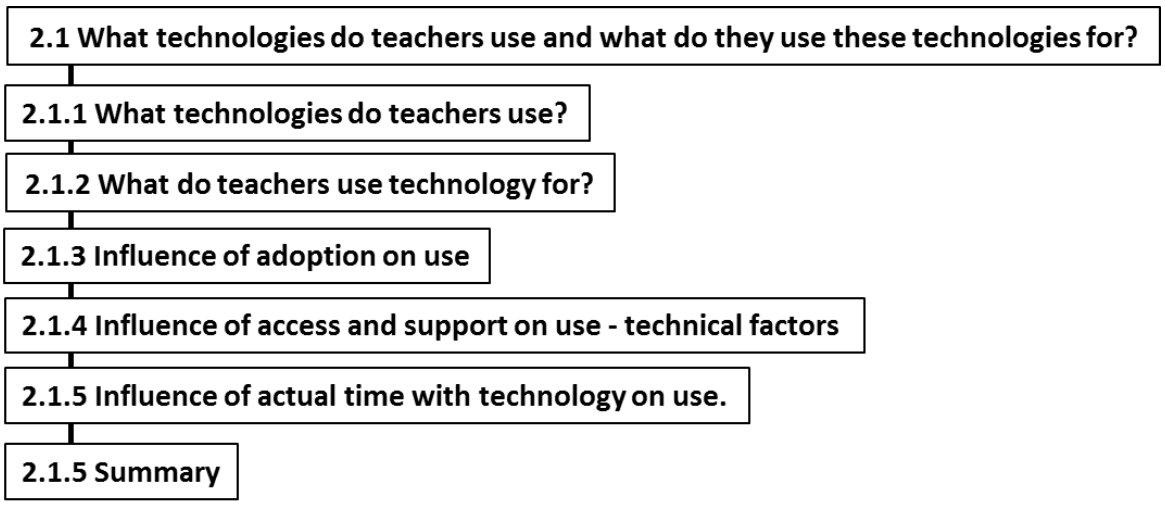
CHAPTER TWO

Literature Review

The purpose of this chapter is to explore e-Learning-related literature to understand what teachers use technologies for and to identify any existing patterns of use and adoption. Chapter 2 is presented in three parts that are directly related to the research questions:

- Section 2.1: Examines what technologies teachers use and what they use these technologies for. Relates to research question: '**What** technologies do teachers **use** and **what** do they use these technologies **for**?'
- Section 2.2: Explores the range of ways in which technology is used for teaching and learning. Relates to research question: '**How** do teachers advance their **practices** for e-Learning?'
- Section 2.3: Considers why teachers use technology to engage in e-Learning practices. Relates to research question: '**Why** do teachers **adopt** and use certain technologies in their e-Learning practice?'

The findings of various research studies undertaken in the Western Cape, South Africa, and abroad provide valuable information towards answering the research questions. The literature was drawn from previous and current research into e-Learning nationally and internationally. The literature was published in peer-reviewed journals and e-Learning publications.



Structure of Section 2.1

2.1 What technologies do teachers use and what do they use these technologies for?

2.1.1 What technologies do teachers use?

'Technologies' is an encompassing term used to describe the range of physical hardware/technology, systems, services and products used in teaching and learning. The term 'technologies' is often used interchangeably with ICT. Paper, chalk, quills, pens, ink, scale rulers, spirit duplicators and other basic technologies for writing, reading and communicating were once innovations in their time. The outcome of human ingenuity that we have at our disposal has over time produced newer technologies for human needs and wants (Beetham & Sharpe, 2013:3).

Examples of technologies include those listed in Table 2.1.
(Hennessy et al., 2005:155; Amin, 2013 :1-2; Beetham & Sharpe, 2013:3; Phiri et al., 2014:63-64).

Table 2.1: Examples of technologies

Hardware/Technology	Systems	Services	Products
Computing devices: Desktop computers, hand held / portable computers, laptop computers, tablets, calculators, data loggers, smart phones *Projection and reception technology:* Television, radio, interactive whiteboards *Digital recording and broadcasting technology:* Audio & video tape cassettes, CD / DVD	*Learning systems:* Learning management systems, databases, course management systems, virtual learning environments, learning support systems, open source e-Learning platforms	*Network services:* Intranet, internet *Broadcast services:* Digital satellite broadcasting, radio and TV broadcasting *Communication services:* E-mail, teleconferencing, voice response system *Social networking services:* Chat rooms, forums, instant messaging *Collaboration services*: File sharing, document collaboration, surveys, cloud based application services	*Digital resources:* Multimedia resources television lessons, gaming, content learning objects, digital texts, document repositories, SCORM objects, simulations, animations

Teachers use the range of technologies available to them. Literature on the technologies that teachers use is scattered among a range of individual research studies (Hennessy et al., 2005; Amin, 2013; Beetham & Sharpe, 2013; Phiri et al., 2014). These studies are focused on evaluation of the use of specific technologies in particular learning contexts. As such, these studies do not provide a finite set of technologies that may be defined as the technologies that teachers use. However such studies have provided us with a reasonable view of what technologies teachers are using in e-Learning along two trends.

These trends are identified by Phiri et al. (2014:63) as trends in approaches and trends in technologies (Table 2.2).

Table 2.2: Trends in approaches and trends in technologies in e-Learning (adapted from Phiri et al., 2014:63-64)

Trends in approaches	Trends in technologies
Interactional: self-paced or instructor led *Flexible:* learning anywhere and anytime *Connective:* learning by being connected with others *Collaborative:* learning with others *Interactive:* interactivity within the learning environment and with products	Connectivity, internet, social networking services, learning management systems; virtual environments, m-Learning, multimedia

The range of technologies potentially used by teachers is dependent on the needs of individuals, contextual factors and the affordances of technologies. The dynamic nature of e-Learning and the emergence of newer technologies constantly alter the choice of technologies and the specific approaches to their integration for teaching and learning. Surveys that have been undertaken have yielded findings that confirm the large range of technologies used in different contexts. For example, Phiri et al. (2014:63-64) note that the *e-Learning Africa Report* of 2013 of data collected from 42 African countries and 413 e-Learning practitioners showed that "laptops, mobile phones and social networking are the most popular technologies supporting education".

In a different context, Gachago et al. (2012:1-3) report that "emerging technologies such as social networking sites or micro blogging applications … are blurring boundaries between academic, social and professional life".

The European Commission's (2013:9) findings report that laptops, tablets and netbooks are being used pervasively in some countries. Interactive whiteboards and data projectors are present in many schools. There appears to be a trend towards

smaller and portable computers, e-readers, mobile phones and digital cameras. Broadband, websites, local area networks and virtual learning environments appear to be in use at schools internationally.

In the Western Cape similar trends in technologies have been and continue to be deployed. However little is known about the trends in approaches and how the affordances of technologies influence teachers' decisions to adopt and use technologies.

2.1.2 What do teachers use technology for?

What teachers use technologies for has not received much attention in research studies. Studies that evaluated programmes or investigated the use of technologies have returned some findings that provide glimpses of what technologies are used for. The literature however does provide evidence that teachers actually use technologies for much more than teaching (Kellenberger & Hendricks, 2000 cited in Bhalla 2013).

Robertson et al. (1996:194) found that teachers' "access to the palmtop increased the staff's use of generic applications in their work, particularly for administration". Cox et al. (1999: online) found that teachers who were regular technology users "perceive it [the computer] to be useful for their personal work and for their teaching" and that these teachers planned to extend their use of technologies. These early findings have been confirmed in other studies where it was found that computers were used for teaching and administrative purposes (Kellenberger & Hendricks, 2000 cited in Bhalla 2013).

Cohen's (2003:164) study on ICT in South African schools found that the "most fundamental use being made of the computer in all the schools was for administration purposes". This specificity was also noted in Mdlongwa's (2012:2) study which pointed out that "initially computers were used mainly for administrative purposes, such as keeping student records, recording examination marks, producing school reports and creating timetables". The use for administrative purposes was confirmed in a quantitative study (Kumar et al., 2008:608) which showed high level usage of computers for administration.

These references to initial and fundamental use resonate with the UNESCO (2002:15) levels and stages of teaching and learning with technology (Table 2.3), as well as the incremental use with a gradual accommodation of technology as a normal way of work (Pedretti et al., 1999).

Table 2 3: UNESCO (2002) levels and stages (extract)

	Development Level	Stages
Lowest: emerging	Teachers start by exploring the technology's possibilities. Initial use is mainly for administration.	Teachers discover use of technology: physical operation. Use for administration and teaching.
Highest: transforming	Use of technology becomes pervasive in teachers', administration and teaching.	Teachers expected to use technology in their professional lives for administration, teaching and learning.

Incremental use (Pedretti et al.,1999:136), highlighted both in frequency and intensity over time, is found to be aligned with the UNESCO (2002:28-29) levels and stages of teaching and learning with technologies. The lowest levels further synergise with initial use noted by Cohen (2003) and Mdlongwa (2012). The highest levels confirm the finding of Fox et al. (1999) of use by regular use of technologies.

What teachers use any technology for is inextricably linked to what they are comfortable with, and what they need to do. The tendency to stick with the familiar is evidenced in a range of studies. For example, Shuldman (2004:323) states that the "integration of computers … is characterized by … use of technology in such a way that it is compatible with the teacher's established style of teaching".

The researcher believes that physical technology can be extended to more than just computers, that is, to include tablets, smartphones, laptops, data projectors, etc. Each of these has a prime function and use and some may be used for multiple purposes. When a technology provides other useful purposes, the possibility exists that the teacher may use the technology for another purpose. This possible movement from one technology to another as well as from one use to another may provide an indication of what teachers use technologies for and a pattern of this

usage. Such use and patterns may be contextually similar to the findings of Pedretti et al. (1999:136), noting that teachers "integrated technologies incrementally into their programmes, courses and curricula" and that they "gradually replaced [old traditional practices] with practices that promoted students' use of a range of multimedia technologies".

The literature on what teachers used technologies for and how this use was approached provided useful information that informed the design of the survey questionnaire. Direct questions were posed in the survey instrument to elicit what technologies teachers used and exactly what they used these for.

The conceptual framework of this study leveraged the literature above to progress our understanding from 'what' teachers use technologies for to 'what else' they might use technologies for. Within the Western Cape many teachers use technologies and this study sought to find out if there were other aspects that teachers were using technologies for.

2.1.3 Influence of adoption on use

The literature reviewed in Section 2.1.1 and 2.1.2 foregrounded the technologies that teachers could use and what teachers were using these technologies for. Teachers' use is dependent on conscious decisions to use a technology. This is a process of uptake which the researcher has constructed to be teachers' adoption of technologies for use in their practice. Technology adoption, according to Straub (2009:626-627), is "a developmental process that is complex and inherently social, and individuals construct distinctive but flexible perceptions of technology that influence their adoption decisions".

Hennessy et al. (2005:161) note the issue of "congruence, that is, how closely the changes fit in with existing subject practices, content and pedagogical paradigms" as a major factor of adoption. These factors, according to Bingimlas (2009:237), can be differentiated as intrinsic and extrinsic. Adoption emerges directly as an issue, not about the attributes of the technology, but about the human element and change.

The human element has been found to be dominant at different intensities in many research findings.

The intrinsic factors confirm the human element noted by Hennessy et al. (2005). They are stated as: attitude, beliefs, practice and resistance, confidence, and resistance to change. The extrinsic factors are: access, time, support, resources, training, technical support, training, and organisational support. These lists of factors are confirmed in a range of research (Hadley and Sheingold, 1993; Becker & Riel, 2000; Dawes, 2001; Pelgrum, 2001; Hennessy et al., 2005; Balanskat et al., 2006).

Chigona and Chigona (2010:1) contend that factors are "personal, social and environmental" and Mumtaz (2000:335) concludes that factors are "institution, resources and the teacher". These findings are supported by Manson (2000:1) who notes that "other significant factors are the teachers, curriculum planning, technical support, the students, the actual use of ICT, training and personal development …".

Other studies more focused in terms of actual implementation cite factors such as: teachers' readiness, confidence, lack of competence, attitudes, expertise, lack of autonomy and lack of knowledge to evaluate the use and role of ICT in teaching and learning; and lack of skills to be able to use the ICT equipment (Manson, 2000; Lau & Sim, 2008; Bingimlas, 2009:235; Hennessy et al., 2010).

Factors that impact on adoption, use and integration of technologies into educational activities therefore could be summed up as personal, technological, pedagogical and social factors (Miller et al., 2006; Davids, 2009; Chigona et al., 2010). Adoption is complex and implies change. It is about the human element and change is influenced primarily by internal factors. Teachers' conscious decisions and choices to use technologies for administration, personal use and teaching are ultimately shaped by internal processes.

Research has provided a list of factors found to impact on uptake of technologies and their subsequent use. While many of the factors such as: access, time, support, resources, training, technical support, training, and organisational support and lack of competence, that emerged from the research are reported as inhibiting factors,

they nevertheless provide us with a reasonable probability that these inhibiting factors could also encourage uptake and use. The following sections present literature on some of the factors that are relevant to this study.

2.1.4 Influence of access and support on use – technical factors

Access to technologies is crucial to e-Learning. Without technology, systems, services and digital content, no e-Teaching or e-Learning will be possible. The nature of digital technologies demands technical support. Should this not be available and of acceptable quality, teachers' and learners' experiences with technologies will not be good. This in turn could affect their continued use of technologies for teaching and learning.

Lack of access to technologies is repeatedly highlighted in research into e-Learning. Mdlongwa's (2012:4-5) study in the Eastern Cape in South Africa found that schools were faced with challenges such as "they did not have enough ICT resources … and they did not have access to the internet". According to Lundall and Howell (2000:4), the "principal factors that prevent schools from using computers as a tool for teaching and learning are: insufficient funds; insufficient number of computers; lack of computer literacy among teachers; and lack of subject teachers trained to integrate computers into different learning areas and the absence of a properly developed curriculum for teaching computer skills."

Access to technologies implies the need for support. Van Wyk (2011:6) cites "a lack of technical support in schools" as a challenge to uptake and use of technologies in Western Cape schools. Support needs were also noted by Cantrell and Visser (2011), and Mdlongwa (2012). Cantrell and Visser (2011:280) conclude that strong support systems are required if there is a chance of "increasing computer-use proficiency for teachers in Western Cape province (WCP) schools". Dwyer et al. (1991) note that teachers grapple with technical problems. The users' experiences are consequently affected by the quality of support available. Access without support appears to result in additional challenges. While these are seen as practical challenges, studies have noted that even if technologies are available with support, such use does not appear to be pervasive. Technical support was a key focus of the

Khanya project in the Western Cape, but this support diminished in intensity after the conclusion of the project. Teachers in the Western Cape however continue to use technologies and this study sought to understand why this was so.

The flip side of access to technologies and support is the teacher and learner factor which is equally important. It has also been shown that even in cases where the infrastructure is available, few educators effectively integrate technologies into curriculum delivery, and it has been concluded that there is still no guarantee of use (De Corte, 1990; Pelgrum, 2001; BECTA, 2003). Mlitwa (2007:63) notes that despite evidence of higher levels of technology ownership, there is less evidence of usage. Despite the "provision of infrastructure over several decades" (Amin, 2013:7), the "full realization of the potential educational benefits of ICT is yet to be realized" (Bytheway et al., 2010). It would appear from these findings that access and support may not be the sole reasons for non-use, as noted by Wilson-Strydom et al. (2005).

Wilson-Strydom et al. (2005:76) further argue that "increased access to computers alone does not necessarily mean increased implementation of technology-integrated lessons". Mumtaz (2000:338) in her conclusions notes that "even if teachers are provided with up-to-date technology and supportive networks, they may not be enthusiastic enough to use it [*sic*] in the classroom". However Lundall and Howell (2000:7) state that "while the nature and extent of ICT use is substantially influenced by access to adequate resources, there are some schools that are able to overcome resource barriers and move towards effective ICT usage". This provides a key lead for the exploration of what teachers are doing with technologies irrespective of the inhibiting factors which could, as mentioned, simply be factors for use.

Overall, access to technologies and support is important. Access however does not appear to guarantee usage. Usage has been noted where access or support is minimal, and it can be reasonably assumed that there are other factors that influence use. This study seeks to understand what these factors are.

2.1.5 Influence of actual time with technology on use

One of the many factors noted in research studies is the amount of actual time that teachers and learners get to physically use technology. Insufficient time spent using technology was found to contribute negatively to the entrenchment of changing practices. According to Robertson et al. (1996:79), schools gave "little time to teachers to manage and familiarise themselves with ICT". This finding is similar to Ford and Botha's (2010:2) statement that the "sporadic use of computer technology does not give either the teachers or the learners the prolonged exposure that is needed … to integrate ICTs into teaching and learning practice". Furthermore Soloway et al. (2001:16) state that "it's unreasonable to expect computers to have a positive impact on learning and teaching if students and teachers have limited access to them". This is further confirmed by Van Wyk (2011:6) in his contention that teachers have "insufficient time to come to grips with new ways of teaching".

A result of the lack of quality time with the technology could result in lower computer self-efficacy and subsequently less use or intention to use. Cantrell and Visser (2011:278) state that "educational policy experts in South Africa provide evidence that increased focus on material access to computers and/or giving learners sufficient time to use computers does not automatically lead to increased and/or better use". However Molotsi (2014:42) in her study reports that "teachers' ICT competencies might be the sole contributory factors to why ICT integration is not well off the ground within the South African education system". The need for equilibrium noted in these findings is to determine what would lead to increased use as a starting point. The probability exists that sustained use of technology could lead to proficiency and consequently proficiency could result in better use.

2.1.6 Summary

There is a range of technologies that teachers use for teaching and learning. These are inclusive of technology hardware, services, systems, and products. Choices of technologies are determined by fitness for purpose. The use of technologies has been shown to be mainly for administration and teaching. Personal use and use for learning are however evident in fewer instances. Use has been found to be incremental and aligned with teachers' levels of comfort.

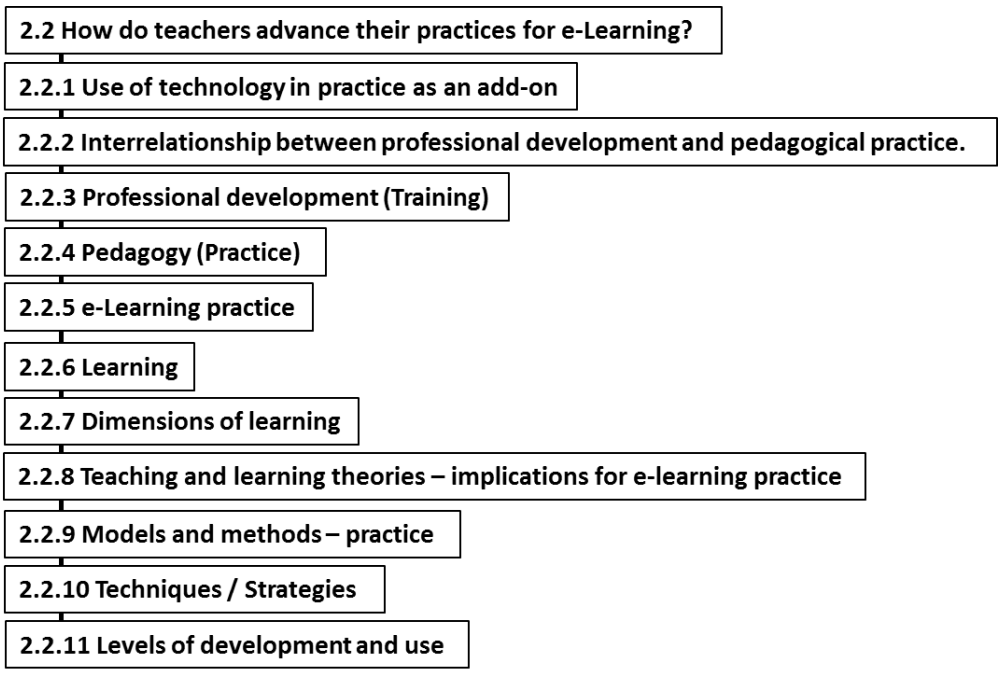
Use of technologies was seen to be influenced by factors such as adoptions, access, support and actual time spent with the technologies. While these factors are reported predominantly as inhibiting factors, instances in the literature have shown that these same factors did not prevent use. The general findings over a range of studies have highlighted that even if these factors were addressed, findings do not show convincingly that their resolution would result in actual use.

The conceptual framework in this study indicates how the literature above further advances the 'why not' of uptake and use towards the 'why yes' to adopting and using technology for educational and personal purposes. The next section focuses on the second research question, that is, how do teachers advance their practices for e-Learning?

2.2 How do teachers advance their practices for e-Learning?

This section presents the literature review on how teachers use technologies. The literature was selected from established learning theories and models. Emerging e-Learning theorist literature has been included as it suggests models for e-Learning that incorporate the basics of learning with technology. This transformative level in e-Learning thus adds value to the review in this chapter. A large portion of the literature appears in books and chapters in books and some in peer-reviewed scholarly journals.

The purpose of this section is to explore e-Learning-related literature to understand the link between the factors highlighted in Section 2.1 and theories, pedagogies, models and methods of learning and e-Learning. It seeks to identify any patterns of use that may have emerged in previous studies. The review in this section attempts to develop a deeper understanding of what is known about how practical implementation of e-Learning occurs both locally and internationally.



Structure of Section 2.2

The first section in this literature review deals with learning. Then teaching and learning are discussed through a lens of theories and approaches. Thereafter models and frameworks, based on theories and approaches, are provided. Finally levels of use are discussed.

2.2.1 Use of technology in practice as an add-on

The way teachers use technologies does not necessarily follow theoretical taxonomies. There is a natural tendency to adhere to familiar methods and techniques. Literature on the use of technologies in teaching and learning has produced two related sets of findings relating to how technologies are used (Chigona et al. 2010; Cantrell & Visser, 2011). The first set of findings relates to the use of technologies as an add-on. The second set of findings relates to the way teachers actually use technologies. Traditional methodologies appear to be maintained, with technologies as the add-on and little indication of significant changes in teachers' practice.

For e-Learning to be fully realised, the use of technologies should be “part of the normal, traditional teaching-and-learning environment of the institution” (Stoltenkamp & Kasuto, 2011:53). This suggests change, and is supported by Laurillard and McAndrew (2003:82-83) who state that the permeation of technologies in our schools is turning teaching into a “conceptual challenge”, which implies that teachers have to re-think their approach to teaching and learning “well beyond the traditional transmission model”.

This does not appear to be the case with e-Learning as noted by Chigona et al. (2010) who conclude that “technology is not well adopted and integrated in the curriculum and the daily teaching; instructors may view the use of ICTs as an ‘add-on’ and not as an integral component of teaching and learning”. Findings from previous research studies provide a glimpse of what comprises the add-on.

In the following known and trusted methods, teachers attempt to fit the new technologies into existing practices. One such example is that teachers use “ICTs to merely transmit subject content rather than utilise the technologies to enhance learning” (Ndlovu & Lawrence, 2012:1). Confirmation of such practices was noted by Molotsi (2014:153), claiming that in “most observed technology-integrated lessons, learners were passive recipients of information”.

Other research has documented usage patterns of learners as: drill and practice, problem-solving exercises and presentation of assignments (Lundall and Howell, 2000:5-6). These learner activities link to the teachers’ tasks that are set and their expectations of technology use. This is supported by Hokanson and Hooper’s (2000:543) finding that many of the activities that learners engage in are “primarily representational as opposed to generative”.

The conclusions of Chigona et al. (2010) resonate with the findings of Hennessy et al. (2005) that teachers tend to ‘assimilate’ use of ICT into existing practices rather than to ‘accommodate’ in terms of changing their subject content, goals and pedagogies. These separate findings corroborate those of a range of previous studies in the way technologies’ use is approached (Kerr, 1991; Goodson & Mangan, 1995; Niederhauser & Stoddart, 2001).

This add-on approach to practice could be indicative of an unwillingness to change. Rogers (1995) observed that teachers were reluctant to abandon their existing pedagogy, and this was considered more an inhibiting factor in the teachers' development than access to technologies. Hennessy et al. (2005:159) likewise agree that "classroom change will not arise through simply providing more machines, software and functionality, and demonstrating that using ICT is effective".

However, for this to change, teachers need to capitalise on the potential of ICT for quality teaching and learning (Cuban, 2001; Smeets, 2005). There are reports of instances of a different take on use of technologies. Hennessy et al. (2005:174) note that some teachers disapprove of simply "bolting on ICT to the curriculum or using it simply because it is available or its use is encouraged or expected". In progressing from the traditional way of work to newer ways, Hennessy et al. (2005:185) note that "teachers were sensibly building on and extending existing practice, exploiting the new opportunities arising, yet not blindly jumping in". This appears to be the incremental use of technologies towards changing practices.

Use of technologies in the literature cited above focused on both teachers and learners. Learners' use of technologies was found to be at basic levels which could indicate that the teachers promoted simple basic-level tasks. This is corroborated to some extent in the literature where teachers are said to maintain traditional practices. What appears to emerge is a cycle of traditional teaching results in traditional learning. Teachers' reasons for adhering to known and comfortable methods appear to point to the human element that ultimately shapes e-Learning. The studies have indicated that teachers are progressing from traditional practices incrementally (Sheingold & Hadley, 1990; Hennessy et al., 2005; Wilson-Strydom et al., 2005).

As indicated in the purpose of this section, this study is interested in patterns of use. Incremental use appears to emerge as a pattern across a range of contexts. Furthermore, traditional use appears to be the starting point for launching into newer ways, possibly indicating a progression in use. These two findings from the literature were useful in determining leads for the dialogue during the interviews.

The next section explores the interrelationship between professional development and pedagogical practice towards an understanding of how these affect use of technologies.

2.2.2 Interrelationship between professional development and pedagogical practice

Shuldman (2004:323) alludes to a teacher's comfort level in the use of technologies to the extent it is "compatible with the teacher's established style of teaching". Comfort in teaching is extended to include established subject nuances and pedagogy. Hennessy et al. (2005:161) note "congruence" with "subject practices, content and pedagogical paradigms". A link between what is done and how it is done begins to emerge as an indicator of practice.

Previous findings have reported that teachers' practices appear to be traditional (Mumtaz, 2000). However, what is found is temporal, as noted by Pedretti et al. (1999:136): teachers "gradually replaced [old traditional practices] with practices that promoted students' use of a range of multimedia technologies". The conceptual framework indicates the search for this progress in how teachers use technologies in their practice from 'how' to 'how else'. The researcher sought to explore the literature for what it offers about training, professional development and current pedagogical practices.

2.2.3 Professional development (training)

Technological knowledge and skill are critical for the successful use and integration of technologies in schools (Drent & Meelissen, 2008). The introduction of technologies into schools implies change and a newness of the changing roles of teachers in a technological environment. Kong et al. (2014:76), in acknowledging this implied change, respond that "this drives the need to empower teachers with the capability to act as learning facilitators in digital classrooms for creating e-Learning environments and designing e-learning activities that promote learners' authentic and contextualised learning".

Although teachers are exposed to and receive training and support, some still felt the "training was not adequate" (Davids, 2009:50). The results of this may be seen in Lundall and Howell's (2000:4) study that reported that "a majority of schools identified the lack of available staff trained to use computers". The inability to use or integrate technology for education may have roots in factors within these training initiatives.

Chigona et al. (2010) suggest that the problem may not necessarily be the use of technological skills, but rather the combination of technological skills, managing the e-Curriculum skills, and an understanding of e-Pedagogies. This combination is supported by Koehler et al. (2007:744), who maintain that learning environments (for teachers and/or learners) should include technological, pedagogical and content components as an integrated whole. It would thus appear that approaches to professional development specifically for technology integration should morph from traditional teacher training to be technologically and pedagogically relevant. Such approaches should model expectations of teachers' behaviours.

This is underscored by Ndlovu and Lawrence (2012:21), suggesting

> … focus must be on giving teachers authentic and relevant experiences with the available tools in their subject teaching contexts, rather than providing them with skills that confine ICT use to the reproduction of old methods that do not develop higher levels of thinking to enhance leaning and are no longer relevant in this emerging information society.

It would be reasonable to assume that the probability exists that should training be aligned with practical ways of implementing e-Learning, then we promote the chances of progressing e-Learning practices. For example, Wilson-Strydom et al. (2010:83) highlight that the Intel training project "may not have resulted directly in specific technology-integrated lessons; it seems to have encouraged more constructivist-inspired pedagogical practices".

Training as it is traditionally referred to in South Africa appears to be a key influential factor towards changing practices. It ought to subscribe more closely to professional development towards authentic and practical ways of implementation as alluded to by Ndlovu and Lawrence (2012).

A practical way of implementing e-Learning implies a way of doing, and this is where practice emerges. If the desire is a move from traditional ways of doing to newer ways, then progressive pedagogy must be the basis of all training activities.

2.2.4 Pedagogy (Practice)

While literature abounds with findings of the impacts of the use of technologies on learning, less is recorded about their impacts on practice. Bladergroen et al. (2012:109) state that "most educators have inadequate ICT and pedagogical competencies for effective integration of ICT into their work". Molotsi (2014:145) further contends that teachers lack critical pedagogical skills in integrating technologies.

> They relied on the ready-made lesson templates … but they failed to effectively integrate these tools [technologies] in their lesson presentations … they lacked the unique knowledge emphasised by TPACK that would enable them to effectively integrate ICTs in their classroom activities.

There appears to be, as Hennessy et al. (2005:181) note, "a perceived lack of impact upon pedagogy".

The findings mentioned earlier appear to confirm a relational link between pedagogical training and practice. Pedagogical issues are critical for transformational practices. The need to keep abreast is noted by Mishra and Koehler (2006:1023): ''Teachers will have to do more than simply learn to use currently available tools; they also will have to learn new techniques and skills as current technologies become obsolete." Given that professional development is considered inadequate or mismatched, Kong et al. (2014:73) suggest that "current teacher development related to e-learning has to be adjusted to prepare teachers to transform their beliefs and practice". This call is echoed by Ndlovu and Lawrence (2012:21).

Shulman (1987) and Mishra and Koehler (2006) have provided significant contributions to the area of teaching and learning with technologies. Mishra and Koehler (2006) specific contributions are now referred to as Technological Pedagogical and Content Knowledge (TPACK). Shulman (1987) notes there are

basic and fundamental knowledge and skills required for teaching and learning, which are pedagogical knowledge (PK) and content knowledge (CK), resulting in pedagogical and content knowledge (PCK). Mishra and Koehler (2006) later added technological knowledge (TK) as a key requirement. This transformed PCK to TPACK towards teaching and learning with technology. See Figure 2.1 below.

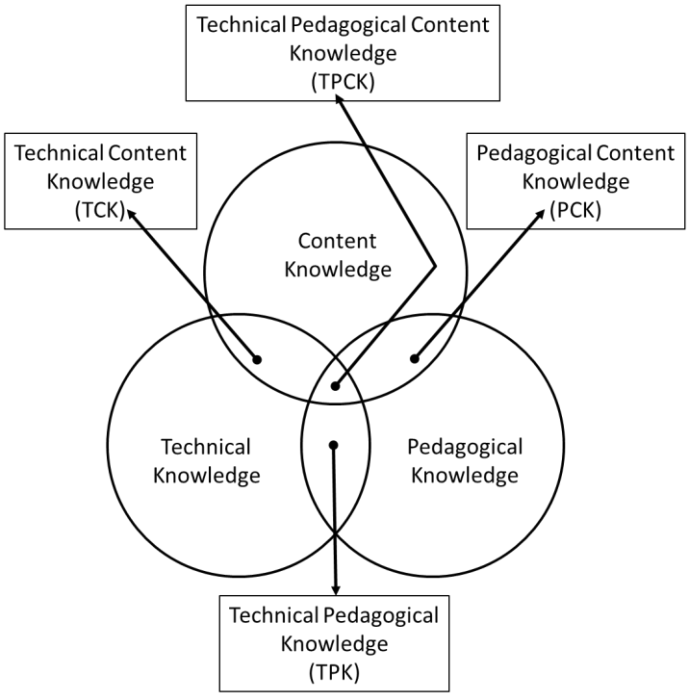


Figure 2.1: Technological Pedagogical Content Knowledge (TPACK) (Mishra & Koehler, 2006)

In tracking the literature thus far towards understanding what teachers use technologies for and how they advance their e-Learning practices, the following have emerged:

Technologies have the potential to enhance education. The introduction of technologies in schools means change for the teacher. The change that is implied is in practices. This means questioning the ways teachers have always done things and the way in which they were taught and learned things.

Teachers' current practices are said to be traditional. Traditional practices are said to be visible by the simplistic technology 'add-on' approach. Teachers are comfortable with the way they do things and see no need for change. Change is difficult and

traumatic. Change means discomfort and thus some teachers are reluctant to change.

However it is noted that some teachers are already changing. The way they are doing this is incrementally and progressively. To assist other teachers to become part of the mass, professional development is identified as key. However, the training that is offered should be pedagogically correct and pay attention to TPACK and attend to the key focus of changing and enhancing teachers' e-Learning practices. The next section looks at e-Learning practice.

2.2.5 E-Learning practice

A gap is evident in that the literature has addressed what technologies are used for and how they are used, but has not addressed the elements of practices. These elements are the observable indicators of teachers and learners' actions.

The advancement of teachers' practices implies a movement from one point to another. This section of the literature review views advancement through lenses of continuums of learning to e-Learning, teaching to e-Teaching and practice to e-Learning practice. It does this by examining the literature on learning, e-Learning models, methods and techniques towards an understanding of the relationship between known theories, models and methods and their adaptations to the 'e' environment. This review further contributes to the second research question of how teachers advance their e-Learning practices.

Before launching into e-Learning practice, it is necessary to operationalise the terms 'e-Teaching' 'e-Learning', and 'e-Learning practice'. The researchers' intention is to conceptualise upfront how these three terms are used in this study in relation to it's' use in international literature. The value of this section lies in its link to the second research question, that is: **How** do teachers advance their **practices** for e-Learning?

2.2.5.1 E-Teaching

The traditional understanding of teaching is someone transferring knowledge and skills to others. E-Teaching is a term gaining popularity in referring to someone who uses technologies for teaching and learning. E-Teaching may simply be considered to be teaching with an ‘e’ element. In the context of this study, e-Teaching is taken to be using technology, digital products, systems and services to teach.

2.2.5.2 E-Learning

Teaching and learning are often used interchangeably when referring to e-Learning and indeed educational processes in general. Fox’s (1983:151) notion that “teaching and learning are elusive concepts … very difficult to put down” affords us another opportunity to examine the relationship between these two separate constructs.

Teaching and learning are both discrete parts of a unified arrangement in education and cannot normally exist in isolation of each other. However, learning can in some instances exist without teaching taking place. One might learn incidentally or on one’s own. This learning could be as a result of vicarious instances or personal experiences (Bandura, 1996:5513). As with learning, the notion of incidental and self-learning can also be applied to e-Learning. In fact, technology enables self-learning more than previously possible.

The distinction between e-Teaching and e-Learning drawn by the researcher in this study is supported by Ellaway (2011:297) who argues that “what is called e-Learning is defined by teachers rather than learners”, and that a better way of referring to it could be “‘e-Teaching’ to reflect both what the teacher does and what they [*sic*] direct their learners to do” (Ellaway & Masters, 2011:297). A further suggestion is that the term “‘e-Learning’ should be used (if at all) to cover what learners do, much of which is unseen and beyond institutional scrutiny” (Mohammad, 2012:229). In the context of this study, e-Learning is taken to be learning with and through the use of digital technologies.

2.2.5.3 E-Learning practice

Practice refers to habitual ways of doing things as part of a routine way of life. Educational practice comprises a blend of methods, pedagogies, and frameworks in

transactional activities among the learner, teacher and content. Two models are presented hereunder that show commonalities of practice. (See Figure 2.2a and 2.2b.)

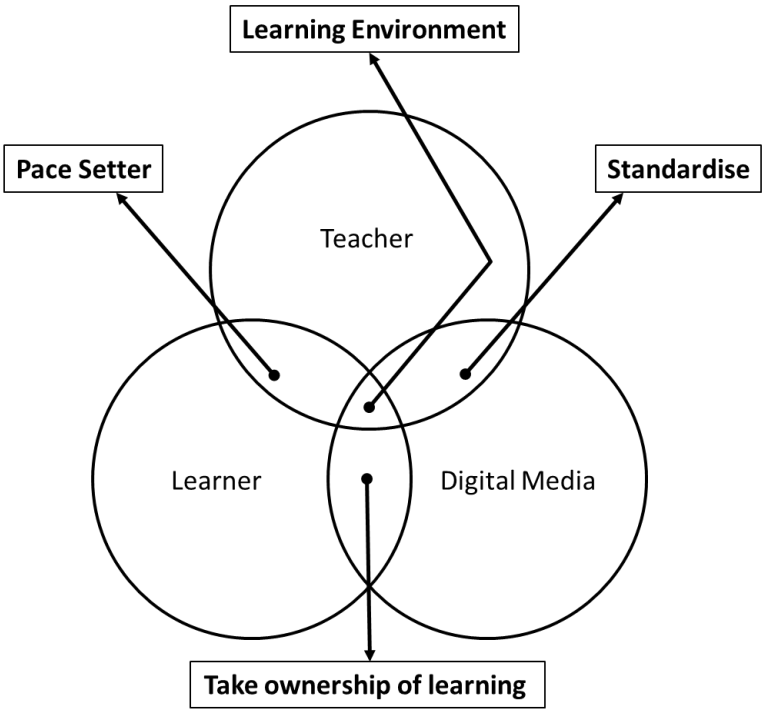


Figure 2.2a: Juries' (2014) world of e-Learning

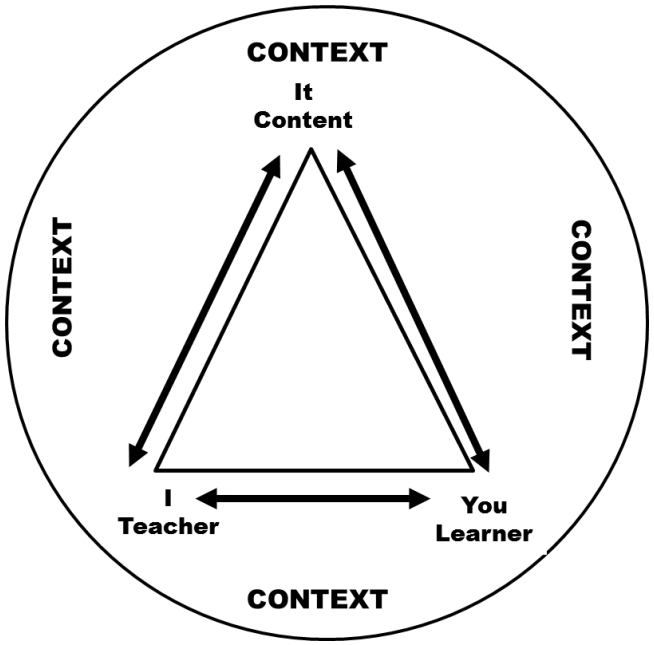


Figure 2.2b: Burkett (2012:23) Model of Language Learning and Teaching

Juries' (2014) world of e-Learning is similar to Burkett's (2012:22-23) process of teaching and learning. The additional aspect in Burkett's model is the enclosure of the triangle in a circle representing the context (see Figure 2.2b). Context in Burkett's model in turn is evident from Illeris' (2003) theory as the environmental element within which all learning takes place. The notable feature of these and similar models of the educative process are the familiar elements: a learner, a knowledgeable other, and something to learn (content).

Burkett (2012:22) reiterates that "these elements are in relationship with each other [and] "also exist in a context, represented by the circle". The teacher element in both models, in turn, bears synergy with Vygotsky's 'knowledgeable other' in the Zone of Proximal Development (ZOPED). Both conceptions of the processes emanate from different foci in education but they are essentially identical. The key is the transactional activities among the elements. The activities or actions are what contribute actuality to practice. E-Learning practice in the context of this study is taken to be the actual activities and actions that incorporate use and integration of technology, systems, services and pedagogies.

2.2.6 Learning

The purpose of this section is to understand the processes that bind teaching and learning and how the introduction of technologies impacts on this union. Exploring learning in detail is crucial as it applies to both teachers and learners. Teachers' learning will help us understand their adoption, and learners' learning will assist us in understanding how the methodologies, models and methods used by teachers advance e-Learning practices.

Learning is a transactional activity between a learner and the environment, (Illeris, 2003:396) among learners, content, and in some instances, teachers or more knowledgeable others. The process of acquiring or building knowledge can happen individually or socially. It can include new knowledge or build on a person's previous knowledge and experiences. These understandings are applicable to e-Learning as well, with added variations of the context that include tools, language and pedagogies, and methods of interaction.

In this study, teaching and learning are located in a context where digital technologies are often seen as an intrusion in the institutionalised notion of schooling with its traditional teaching and learning practices. Hennessy et al. (2005:159) state that, “in practice, established curricula and teaching methods remain in place under a thin coating of technological glitter, and available technology is often underused and poorly integrated into classroom practice”.

The nature of educational practices in South Africa and in many parts of the world remains essentially the same as in previous years. Means and Roschelle (2010:1) state that “formal education systems ... reinforce continuity in educational approaches”. Teaching and learning take place in physical classrooms where a teacher instructs groups of learners. The content is set, graded by levels of complexity and age levels, boxed into subject groupings, and set within a time span. This is confirmed by Lim et al. (2013:61), who note that “the practices in many schools around the world have remained very much constant ... As such teaching and learning is found to be aligned to traditional practices”.

2.2.7 Dimensions of learning

Learning is increasingly accepted as a process rather than an act of acquisition Sfard (1998:5). This process, according to Illeris (2003:398), comprises the integration of two different basic processes, namely internal and external processes. Illeris (2003:399) conceives of three dimensions of learning. These are the cognitive domain, the emotional domain, and the social domain. The cognitive and emotional domains represent the internal process and the interaction with the environment in the social domain represents the external process.

The core claim of Illeris’ (2003:398) theory is that “all learning will always involve these three dimensions” (see Figure 2.3). In this study, these dimensions are critical as e-Learning and e-Teaching are inherently human activities that imply a person’s engagement internally and personally, and socially in the environment. Its relevance to this study is not only towards understanding how and why teachers adopt and use technology, but how these decisions take place within the teachers’ mind as well.

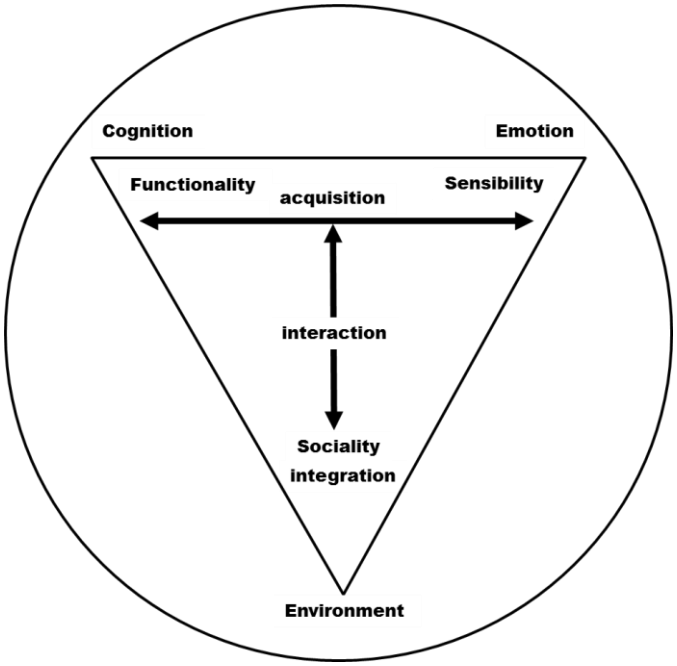


Figure 2.3: Processes and dimensions of learning (Illeris, 2003:400)

E-Learning practice is a manifestation of behaviour. Behaviour is shaped by one's learning which can be identified on one or more of four levels of learning as espoused by Illeris (2003:402). These are: (i) "cumulative or mechanical learning", (ii) "assimilative or learning by addition", (iii) "accommodative or transcendent learning", and (iv) "transformative or expansive learning". Hence in this section the link between learning and behaviour is explored. Learning is the link between Section 2.3 (adoption and conceptual framework) and the teacher, who through learning experiences and processes takes decisions to engage in e-Learning practices.

2.2.7.1 Levels of learning: relationship to e-Learning practice

Cumulative or mechanical learning, according to Illeris (2003:402), is learning something that is completely new and not part of anything in the learner's knowledge base. He maintains that "one must learn something with no context of meaning or personal importance" (Illeris, 2003:402). Hence it has a connection to adoption where teachers encounter new technologies whose use and potential are unknown to them. However, the teacher collects this into his/her knowledge base to be used "in situations mentally similar to the learning context" (Illeris, 2003:402) if needed.

Learning by scaffolding is an example of “assimilative [learning] or learning by addition” (Illeris, 2003:402). This means that when something is learned it can be connected to something already known and builds on this to form new understandings. In this study both teachers and learners would be subjected to assimilative learning. The process of reflective practices, vicarious experiences and experiential learning gives rise to newer understandings. This exponentially builds on existing knowledge of how to use and integrate technology. Progressive knowledge building allows teachers and learners to apply knowledge to contexts unfamiliar to them.

Sometimes learning or experiencing something may not make sense to the teacher or he/she may not be able to make any connections to internal knowledge, or its application is not clear in that instance. According to Illeris (2003), in such instances if something “seems important or interesting” or if “it is something one is determined to acquire”, then learning takes place by accommodation. As noted earlier, a person “changes their current view by taking on the new” to create new knowledge. In the context of this study this is relevant, as the progression from traditional activities to activities that integrate technologies implies change.

A crucial aspect of these processes is the adoption and re-adoption noted in Section 2.3. Illeris (2003:402) refers to this as when one “both relinquishes and reconstructs something and this can be experienced as something painful, requiring mental energy”. Teachers are said to be reluctant to change their habits, but we understand that if something is interesting or useful, these may be accommodated by teachers to become part of their evolved practice.

In the last of the four levels described as transformative learning by Illeris (2003), teachers’ practice is highlighted at the level of how learning is enacted or practised. In this study the introduction of technology into the teaching and learning arena implied a need for changes in practice. E-Learning is thus not excluded from learning as something outside of education that is shaped and subjected to unique theories. The methods and methodologies employed in e-Teaching and e-Learning must draw heavily on teaching and learning theories. Learning has been affirmed as a process that leads to ways of knowing and understanding.

2.2.8 Teaching and learning theories – implications for e-learning practice

The purpose of this section is to understand how teaching and learning theories shape e-Learning practice and models.

The way in which teachers teach is normally associated with a pedagogy they believe in. Hoover (1996) emphasises that teachers teach similarly to how they were taught. Schreuder's (2014:62) review of professional development of teachers is thus useful in understanding teachers' practices through the relationship between the way teachers learn and their subsequent application of this to the teaching and learning situation. An implication of this is that learning activities will closely resemble teachers' own learning experiences.

One might thus infer that if teachers themselves are not schooled, exposed to or experienced in e-Teaching and e-Learning, they will not be in a position to easily capitalise on the potential value of the use and integration of technologies for learning. It is within this trend of thinking that the researcher engages with the following sections.

2.2.8.1 Teaching and learning methods / approaches

The purpose of this section is to understand how teaching and learning methods and approaches shape e-Learning practice and models.

All teaching or learning approaches, or methods as they are sometimes referred to, are underpinned by theories. Teaching methods indicate the general strategies teachers use for classroom or online instruction. These can be either by direct instruction, enquiry-based activities or cooperative activities. At the apex of these methods are two approaches: learner-centred and teacher-centred. Exploring the literature on methods and approaches provides insight into whether teachers' practices are traditional and if they are teacher-centred or learner-centred.

Learning approaches can be located in three broad paradigms: behaviourist, cognitive and humanist / social. Within these paradigms one finds approaches that can be instructivist, constructivist or connectivist. Alessi and Trollip (2001:38), as

noted in Cronjé (2006:391), maintain that the "current world of educational theories is really a triangle, with behaviourism, cognitivism and constructivism at the vertices. Most educators are somewhere in the middle of that triangle". At a pedagogical level of implementation, Cronjé's (2006:396) work shows that learning can take place via four domains: immersion, construction, integration, or injection. The table below (Table 2.4) depicts a mapping of the various constructs.

Table 2.4: Teaching and learning constructs

Teacher-centred	**Learner-centred**		
Behaviourist	Cognitive	Humanist/Social	Incidental / Own learning
Instructivist	Constructivist	Connectivist	
Direct instruction	Enquiry-based activities	Cooperative activities	
Injection	Construction		Immersion
	Integration		
Representational	Generative		

The table emanating from this section is further mapped with the models of e-Learning later in this section.

2.2.8.2 Behaviourism and direct instruction

This type of learning centres on the belief that behaviour can be taught and consequently learned by repetition (Holmes et al., 2001). The behaviourist approach emphasises teacher centredness and control (Fox, 1983). Behaviourist theory is often associated with instructivist methods and direct instruction. The approach is considered mechanical and minimises the affective domain in development. Direct instruction is known as a traditional teaching strategy in that it typifies what teaching was considered to be. It is vital, in this study, to understand the relationship that behaviourism and direct instruction has with the actual way teachers teach and expect learners to learn.

Cronjé's (2006:396) work shows that learning can take place via four domains: immersion, construction, integration, or injection. The knowledge is said to be administered (Cronjé, 2006:396) through telling or showing through direct instruction. As a teaching strategy this links to reports of teachers' using traditional methodologies. A characteristic of this approach is that the activities are typically

repetitive, such as drill and practice with the work being generally representational, that is, giving back the knowledge and facts. This was reported as what many teachers were doing and asking their learners to do. This study seeks to understand this and other strategies that teachers may be using in their e-Learning practice.

Current educational practices reject behaviourist / instructivist approaches as outdated. The preference is for constructivist methods. However, behaviourism should not be rejected outright as most approaches to learning slant towards instruction and to a lesser degree towards direct instruction. Direct instruction in the behaviourists' paradigm has a place in learning due to its "structured, deductive approach" (Mödritscher, 2006:5). It is useful and effective in teaching "basic concepts, fundamental skills and factual information rapidly" (Mödritscher, 2006:5) across a range of content areas. An alternative thinking to behaviourist learning is that learning can take place within an individual's intellect. The next section looks at cognitivism.

2.2.8.3 Cognitivism

The cognitive paradigm is concerned with the human capability of cognition, that is, to reason and understand through one's intellect. It is premised on knowledge creation, knowledge recreation and knowledge retention. According to Illeris (2003:399), learning is an internal process which takes place in the cognitive and affective domains. Holmes and Gardner (2006:82-83) concur with the cognitive activity of learning which "focuses squarely on the mind and the learning processes of the brain". Dewey (1938) stressed that learning comprises 'learning to think'. He maintained that learning transcends mere practical activity as it requires deep reflection.

In this study, teachers' decision-making processes for themselves, in adoption and for their learners, through their e-Learning practices, rely heavily on cognition.
Cognitivism is generally associated with constructivist approaches in learning situations. Given the potential to develop or learn through cognition, learners are afforded opportunities to learn by engaging in activities that require them to do some thinking, gathering, sorting and differentiating. Should teachers use this approach, their traditional teaching may be considered as developing and advancing. As such it

was necessary to include cognitivism in this study to understand the links between behaviourism and direct instruction and cognitivism towards the research question. The next section examines the social domain.

2.2.8.4 Humanist / social

The social domain is particularly relevant in e-Learning for two reasons. The affordances that technology provides make collaborative learning easier than before. Secondly, research has over time validated the potential for people to learn directly and indirectly as active participants in knowledge construction. Learning through relational interactions with others in an 'e' environment could be face-to-face, individually, in groups, or in online communities. Learning may be direct or vicarious through observations, which are predisposed to e-Learning.

Vygotsky's construct of the Zone of Proximal Development (ZOPED) is concerned with the value add of what one can do alone and what one can do with assistance (Riddle & Dabbagh, 1999:1; Powell & Kalina, 2009:244). The ZOPD is consistent with scaffolding, that is, the potential for learners to "progress from what they can do on their own to learning with the assistance of the teacher" (Powell & Kalina, 2009:244). The socialist learning is premised in its application through cooperative learning. The belief in cooperative learning is that learners learn better when learning and working with their peers. It is considered a learner-centred approach because learners are placed at the centre with responsibility for their own learning and development. There is a strong sense of community within group work.

This approach is more popular now than many years ago. This appears to be based on its close connection to constructivist learning strategies which are more preferred to behaviourist methodologies. Learning is not only an internal enterprise but exists as social external learning. In the digital era of e-Learning, connected social learning is not only enabled but progressed with the affordances of the Internet and related technologies. In social learning, activities closely resemble enquiry-based constructivist tasks that suggest cooperation with other learners. Kalpana (2014:27) notes Vygotsky's' belief that "that opportunities should be provided to learners so that they are able to construct knowledge and understanding through social interaction".

In the learning approaches that are located in the three broad paradigms: behaviourist, cognitive and humanist/social, discussed above, we see the interrelated elements as embedded. Each one has its own merits and together they can provide for meaningful learning for individuals. Bruner supported guided activities in accordance with constructivist and collaborative theories where learners are active participants in knowledge construction. In support, Gage and Berlinger (1988) felt that a learner's intellectual growth is hampered when expected to work individually / independently only. Davydov (1995), in turn, supported the notion that activities should be guided to facilitate development according to learners' ZOPED. A clear case for guided collaborative learning seems to emerge from these theorists. These types of activities, if present in teachers' e-Learning practices, could indicate advancement from traditional methodologies.

The next section examines the constructivist tradition.

2.2.8.5 Constructivism

Constructivism is a learning theory, not a teaching theory, and is essentially learner centred (Richardson, 2003). Theorists such as Bandura, Piaget and Bruner assert that meaning and knowledge are actively constructed in the human mind in cognitive and emotional processes (Illeris, 2003:399). Knowledge is constructed through processes of sorting, organising and transforming previous knowledge. Teachers' decisions to adopt and use technology in their e-Learning practices encounter constructivist engagements. Learning is generative in constructivist activities. Constructivism cannot be explored on its own in totality as it is inextricably linked to learning and specifically to cognitivist and social learning. It was thus necessary to include constructivism to understand what teachers were doing through the expected actions of the learners.

2.2.8.6 Incidental learning – learning on one's own

The enterprise of teaching is not the only way in which learning can take place. Learning can be formal or informal. It can be planned or incidental. Learning, which ordinarily includes a teacher or knowledgeable other, can also occur without these

persons. In many cases, incidental learning is a result of experiences and these experiences emerge from immersion (Cronjé, 2006:397), vicarious instances (Bandura, 1996:5513), observation, trial and error, and contextual circumstances. Incidental learning is wholly learner centred and can occur in social environments or through individual endeavours.

The construct of constructivism is applicable to incidental learning through immersion and the nature of how learning occurs in the mind. Learning on one's own or incidentally subscribes to scaffolding in that the learners build on previous learning in the process of creating and recreating new knowledge (Biggs, 1996:348; Balula & Moreira, 2014:14).

The difference is that the processes involved may not include direct instruction, guidance or a teacher. According to Ormrod (1999), learners do not merely create knowledge or get it from their surrounds; they also reconstruct knowledge. This acknowledges that even when the 'surrounds' are a factor, there are still the cognitive processes of learning at play.

The link to e-Learning practice in this section is with the learning impacts noted in the literature. Learners were said to have acquired skills through the use of technology which had real-world applicability outside the classroom. While incidental learning may not be visible in e-Learning practices, the methodologies they use may advance learners' learning on their own.

2.2.8.7 Transformative learning

Transformative learning is directly relevant to teachers' advancement of their e-Learning practices. Transformation is about individuals' transforming their thinking, perceptions and practices. Transformative learning is indicated in instances where an individual makes meaning through experiences and reflection (Mezirow, 1997), and where an individual is self-directed. Allen (2007) views this type of learning as when people 'critically reflect' on their learning and circumstances. These reflective and self-directed traits are manifested in changes and/or modifications to behaviour. It implies that it is only the person that can alter his/her own situation.

In this study transformative learning is relevant, as the e-Learning practices explored imply work practices that may be significantly different from traditional pre-digital technology intrusion. It provides hooks to insights into teachers' progression (or lack thereof) in their use and integration of technologies for education.

2.2.8.8 Reflection: Learning theories

Technologies do not drive decisions, learning does. Laurillard (1996:1-7) reminds us that approaches should not begin "with what the new technology offers … examining instead what students need …" Thus e-Teaching and e-Learning activities cannot follow an encoded trajectory. This is supported by Duffy and Cunningham (1996) cited in Nwokeafor (2015:197):

> Contemporary learning theory is based on the notion that learning is an active process of constructing knowledge rather than acquiring knowledge and that instruction is the process by which this knowledge construction is supported rather than a process of knowledge transmission.

This concurs with the notion that instruction and construction are not polar opposites. Learning, and by implication teaching, cannot readily be located squarely in one paradigm, if at all. There is almost always an overlap of the different paradigms, approaches, methods and techniques. Activities and tasks draw on the different elements to be applied with different levels of intensity and at different frequencies. "Accordingly, successful eLearning implementation is grounded on sound pedagogical principles" (Stoltenkamp, 2012:33).

Smith and Brown (2005:621) contend:

> No one technology or social pattern of engagement will be able to deliver optimal learning environments to students, but that a blend of learning environments and social interactions, both physical and virtual, driven by the designed learning activities, will result in many and varied blends of learning environments to meet the designed learning needs.

Thus authentic e-Learning environments draw on and weave a tapestry of the three main paradigms (behaviourist, cognitivist and humanist/social learning) in different designs (Nichols, 2003:3). This is captured in Holmes and Gardner's (2006:79) depiction (see Figure 2.4).

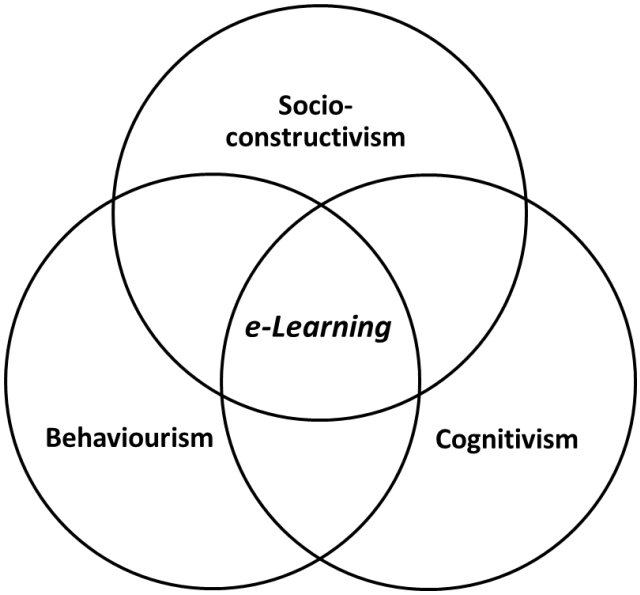


Figure 2.4: Overlapping theoretical underpinnings for eLearning. (Holmes and Gardner, 2006:79)

Both teachers and learners learn. Teachers learning through the processes noted in the preceding section shape their thinking on adoption, use and integration of technologies. These decisions influence their e-Learning practices. Consequently, teachers' e-Learning practices affect the learning of learners. The inclusion of the detailed exploration of learning therefore was deemed necessary for this study towards understanding how teachers do or could advance their e-Learning practices.

E-Learning practice could thus be approached through the relevance of the questions that are posed:

- Moran (2012) asks: "What are teachers doing, how are they doing it?"
- Burkett (2012:21) asks: "How do I do my work as a teacher and why do I do it in this way?"
- This study (Sadeck) asks: "How do teachers advance their practices for e-Learning? How do they do it – how else can they do it?"

2.2.9 Models and methods – practice

It is vital that e-Learning be driven by pedagogical principles rather than technologies and that feedback and assessment be an integral part of the learning experiences. Stoltenkamp (2012:35) suggests that "it is the merging of teaching and learning approaches and technology that enables the creation of effective eLearning models". These, she maintains, provide "structured approaches to the implementation of eLearning". Stoltenkamp (2012:27) furthermore asserts that these models ought to be built "on the pedagogy of existing models".

A range of principles can thus form the basis of tailored learning environments for e-Learning that will be advantageous for a dynamically changing school education system. These include, but are not limited to:

- independent and self-directed learning;
- collaborative learning that allows for engagement between learners and teachers, social learning opportunities;
- cognitively engaging, interactive learning, experiential and exploratory learning; and
- structured learning, guided learning, learning that is authentic and meaningful.

Learning methods are referred to as "ways through which instructors deliver instructions and learners access these instructions" (Kahiigi, 2008:77-88). Models of e-Learning are described by Mayes and De Freitas (2004:5) as "where technology plays a specific role in supporting learning". They further maintain that this can be described both at the "level of pedagogical principles and at the level of detailed practice in implementing those principles". For the purposes of this study, the term 'model' includes frameworks and approaches.

2.2.9.1 e-Learning models clusters.

An overview of a selection of the known models shows how e-Learning may be implemented in practice. These models are used in the analysis of e-Learning practices in this study. Mayes and De Freitas (2004:24) group e-Learning models into clusters along the lines of their pedagogical underpinning. These are: subject matter

focus, cognitive/constructivist, socially-mediated constructivist, and building communities of practice. The researcher has not used the same clustering, but instead has mapped each model into the table of teaching and learning constructs from the previous section (see Table 2.4). The following models relevant to this study are included in the mapping. Only the first three (1–3) are discussed in this section. The remaining five (4–8) are available in Appendix C.

1. Laurillard's conversational model
2. Salmon's five-stage model
3. Learning objects approach
4. IMS learning design
5. Gagné's (1985b) nine steps of instruction
6. The DialogPlus project
7. CSALT networked learning model
8. The OU (IET) extended

Table 2.5: Mapping of models into teaching and learning constructs

Teacher-centred	**Learner-centred**			**Subject-centred**
Behaviourist **S; G**	Cognitive **L; S; DP; CNL; LO; G**	Humanist/Social **S; DP; CNL; LO**	Incidental / Own learning	Sequenced **IMS; S; DP; CNL; LO; G**
Instructivist **IMS; S; DP; CNL; LO; G**	Constructivist **L; IMS; S; DP; CNL; LO;G**	Connectivist **IMS; S; DP CNL; LO**	Learning objects **IMS; LO**	Learning objects **IMS; DP; LO; G**
Direct instruction **IMS; S; DP; LO; G**	-based activities **L; IMS; DP; CNL; LO; G**	Cooperative activities **IMS; S; DP; CNL; LO; G**		Guiding instructions **IMS; S; DP; CNL; LO; G**
Injection **IMS; S; DP; CNL; LO; G**	Construction **L; S; DP; CNL; LO;G; G**		Immersion **IMS; S; DP; CNL; LO**	Templates **IMS; G**
	Integration **L; S; DP; CNL; LO; G**			
Representational **IMS; DP; LO; G**	Generative **L; IMS; S; DP; CNL; LO; G**			

KEY to models:

- L – Laurillard's conversational model
- IMS – IMS learning design
- S – Salmon's five-stage model
- DP – The DialogPlus project
- CNL – The CSALT networked learning model
- LO – The learning objects model of learning
- G – Gagné's (1985) nine steps of instruction

2.2.9.2 Laurillard's conversational model (L)

The Conversational framework of Laurillard focuses on interaction between learners and teachers, that is the "continually iterative dialogue between teacher and students [that] is essential if the students are to be sure that they have understood the teacher's concept" (Laurillard, 2002b:144-145). Laurillard's analysis of academic learning sees learning as mediated through interaction between teacher and individual learners as opposed to situated in direct experience (Mayes & De Freitas, 2004). The model sees interaction on two levels, that is, a "discursive, theoretical, conceptual level" (Laurillard, 2002b:144) and the "active, practical, experiential level" (Laurillard, 2002b:144).

The core tenet of this model is the concept of feedback, either directly from the teacher or from others, or from a digital tool. Implications for e-Learning include designing activities and opportunities for learners to engage with content and obtain feedback on their progress. This sets up opportunities for cognitive development and the options to build on previous knowledge and/or experience.

Application or implementation of this model is via a teaching strategy. The conversational framework provides a description of five teaching and learning events or actions. These are acquisition, discovery, dialogue, practice, and creation. These events take place at different times and as required in different configurations (Czerniewicz & Brown, 2005:4). They are essentially learning experiences which enable teaching strategies. Exploration of the content or subject is "a personal activity", but the teacher is available to "continually monitor" the progress and "provide detailed feedback on developing skills and knowledge" so that learners "may continue to improve" (Fox, 1983:156-157).

The implication of Laurillard's conversational model for this study is that there are learning events that directly influence teaching strategies. Exploring how teachers engage with technology could reveal the differences between using technologies and integration technologies. Such indicators could further be used to confirm or deny the UNESCO and DoE developmental levels.

2.2.9.3 Salmon's five-stage model (S)

Salmon's Five-Stage Model (Salmon, 2000) provides a framework for good practice in engaging learners in online discussion through five incremental steps. These steps form a scaffolding of learning. As a practice it can also be applied to non-online environments. It focuses on the progression in the quality and intensity of interaction between learners–learners and learners–teacher.

The model describes how to motivate online participants, to build learning through online tasks (e-Tivities), and to pace e-learners through stages of training and development (Mayes & De Freitas, 2004). Given its focus, the model is characterised as being sequenced and structured much like the IMS model. Salmon's model is a teaching and learning model. It is different from Laurillard's model which appears more learning-approach focused. It displays social methodologies and is indicative of scaffolding learning with the chances of cognitive development at each stage. Learning in an 'e' environment ushers in a need to address ways of engagement that are educationally sound.

2.2.9.4 The Learning Objects model of learning (LO)

This model is based on the notion of the 'learning object' as "any digital resource that can be reused to support learning" (Wiley, 2000:3). According to Wiley (2000), the model is instructional and technological, to the extent that learning objects (LOs) have been described as 'an instructional technology' rather than a model or approach to learning per se.

The essence of this model, as its learning-design approach, is to sequence learning materials and activities for predetermined outcomes (Mayes & De Freitas, 2004). The core tenet in this model is structured learning. A variation of the learning object is the OU (IET) Extended Learning Objects approach.

The difference in the OU (IET) model is that it represents a holistic learning experience through a learning object. The object is a complete unit of study, that is, learning objects used on their own or within a larger course. It includes a discursive

element, an interactive element, an experiential element, and a reflective element. It could be regarded as a lesson, or a mini-module (Mayes & De Freitas, 2004).

The approach to designing learning engagements in this model is to retrieve LOs from a central repository and to arrange them into an integrated course. The implications of using learning objects have a fundamental impact on e-Learning. The nature of learning objects as digital entities means that they can be used on their own or mediated by teaching. Learning objects can be used in conjunction with a range of approaches for e-Teaching and e-Learning.

2.2.9.5 Reflection: e-Learning models

The core tenets and underpinning in the different models in this section encompass the range of teaching and learning principles. It would not be viable to adopt one model only as the solution to learning design required. Design decisions should be determined by learning needs and context. Use of models and frameworks should factor in adaptations as well as a merging of elements of different models to produce rich learning environments. Table 2.5 shows the mapping of models to teaching and learning constructs from which instructional design decisions could be taken. Understanding these models and the core underpinnings should assist in understanding teachers' e-Learning practices.

2.2.10 Techniques/strategies

Models in themselves are representations of sets of activities. The activities are the actual engagements that learners immerse themselves in. Wilson-Strydom et al. (2005:73) describe integration in two ways: the first is closely associated with adoption, and the second with use. At a practical level of implementation, Wilson-Strydom et al. (2005:74) distinguish between representational and generative activities (Hokanson & Hooper, 2000). Additionally, practical implementation includes use of techniques such as problem-based (project-based), enquiry-based, direct teaching with set tasks and flipped classrooms.

2.2.10.1 Representational

Representational use describes how technologies are used to ‘re-present’ information through new media. This is aligned with teachers’ use of technologies to teach (e-Teaching), and teachers getting learners to use technologies to merely produce (re-present) work by using technologies for work such as to type text, make covers, and insert graphics. Direct teaching with set tasks is an example of the technique used.

2.2.10.2 Generative

Generative use is more aligned with e-Learning, where the focus is on constructive learning. Here technologies are used as cognitive and mediating tools, that is, the interaction with technologies in the creation of knowledge (Hokanson & Hooper, 2000:547). What is important in e-Learning is not only being able to use office applications and view multi-media presentations, but that technologies should be an integral part of a holistic teaching–learning process. (DoE, 2004:19; Harvey & Beards, 2004). Problem-based (project-based) and enquiry-based activities are examples of techniques used for generative learning.

2.2.10.3 Enquiry-based activities (problem-based and project-based)

Enquiry-based activities could be a search for knowledge based on a need, desire or opportunity, or they could be based on a real problem (problem-based activities) to be solved. Activities involving enquiries can be used through guided or self-determined approaches. They constitute a teaching strategy that includes both a social and constructivist component. Using a guided approach includes the teachers or peers who assist learners as mentors.

Project-based learning is an approach to teaching where learners are personally engaged, either on their own or with others. The focus is on generative learning, in an environment of cognitivist, constructivist and social learning. Learners immerse themselves in learning thorough exploration and experiential learning. These activities are real-life based and the outcomes evolve around knowledge creation and problem-solving skills.

2.2.10.4 Flipped classrooms

The flipped classroom is considered a new approach to teaching. Its application in South Africa is not widespread given its particular requirements, which for e-Learning include connectivity and access to technologies at home. As an approach it is not new, as teachers have for many years used similar techniques in relation to work done at home and in class. The affordance of technologies has made this much easier and enhanced in recent years. The flipped classroom assumes that most learners will understand work on their own. The flipped classroom techniques allow for learner self-paced learning.

2.2.10.5 Reflection on teaching techniques

The selection and use of techniques are probably the most critical aspects in designing learning environments. All techniques ought to adhere to sound teaching and learning principles. The techniques are expressions of the activities that learners engage in. These are the more visible actions that evaluators are likely to witness when evaluating e-Learning practices. This provided the researcher with valuable information when conducting interviews.

2.2.11 Levels of development and use

At the outset the researcher noted that the literature review is about e-Learning practice, where there is adoption, use and integration of technologies for e-Teaching and e-Learning. This is achieved through the use of methods, models and approaches. Thus far the researcher has looked at adoption and integration. This section examines ‘use’ through two lenses: (i) development in use and stages (UNESCO, 2002:17) of teaching and learning with technologies (UNESCO, 2002:15) and (ii) technological skills developmental levels (DoE, 2004; 2007).

The purpose of this section is to look at the global levels of how technologies could be used, and at the expectations of the South African DoE in terms of the

developmental levels of teachers in their use of technologies. This will provide a frame of reference when analysing the patterns of e-Learning practice.

2.2.11.1 Development in use and stages of teaching and learning with technology

The way technologies can be adopted and developed for use has been described as emerging, applying, infusing, and transformational on a four-stage continuum. The stages of teaching and learning with and through ICT have been described as discovering, learning how, understanding how and when, and specialising in the use of ICT tools (UNESCO, 2002:15-17). (See Figures 2.5 and 2.6 below.). Its relevance in this study is to assist in identifying the possible developmental space that teachers are operating in.

2.2.11.1.1 Development in use

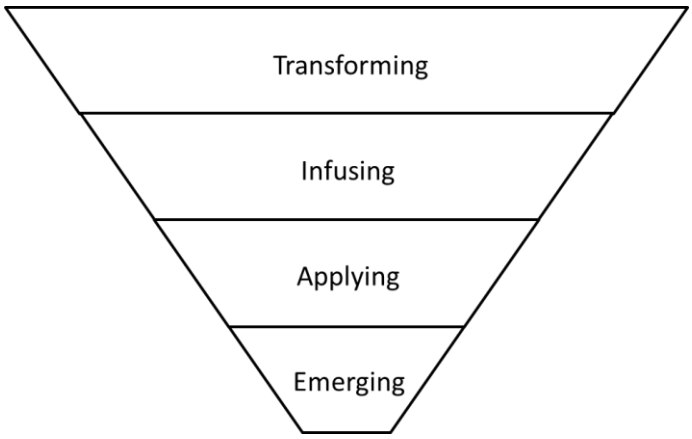


Figure 2.5: UNESCO ICT development in schools (UNESCO, 2002)

Emerging

In this first stage, teachers begin by exploring the possibilities of technology and its use is initially for administration. Some teachers begin to experiment with technology for teaching at a very elementary level.

Applying

As teachers discover the potential of technology, they start to use it for basic e-Teaching. The way it is used sustains traditional teacher-centred teaching methodologies.

Infusing

Teachers begin to explore how the use of technology can increase their productivity and way of work.

Transforming

At this stage the use of technology starts to become pervasive in teachers', administration and teaching. A change in practice begins to emerge.

The stages above set out what is seen as the adoption and sequential use of technology by individuals in schools and schools as whole units. Its significance to this study is that it informs the progressive use of technology that could be expected.

2.2.11.1.2 Stages of teaching and learning with technology

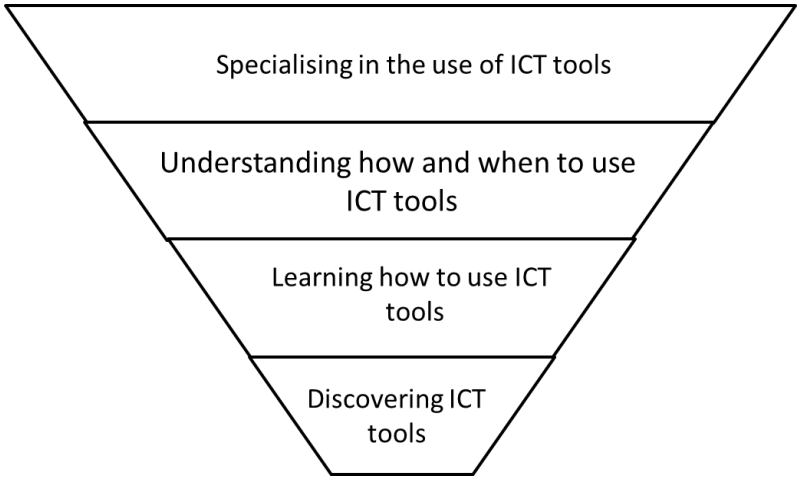


Figure 2.6: UNESCO stages of teaching and learning with technology (UNESCO, 2002)

The frequency and intensity of the use of technology is said to increase incrementally from basic to specialisation as a normal bell curve. In this section the researcher wished to use the UNESCO stages to understand how the use of technologies is advanced by teachers and schools. Its relevance in this study is to assist in cross referencing positions on a continuum with levels of depth and intensity of use and integration.

Discovering ICT tools

Discovery is the key in this basic stage. Teachers are learning about technology, both its physical operation and its use for administration and teaching. Discovery of technology is characteristic of the emerging stage.

Learning how to use ICT tools

The applying stage above is linked to the learning of how to use technology for their administration or teaching. It is at this stage that teachers expand in their attempts to use technology.

Understanding how and when to use ICT tools

At this stage teachers become discerning users. They are able to identify opportunities where technology can be helpful for particular purposes. This suggests a competence to select appropriate technology for particular tasks. In doing this, teachers are found to be in the infusing and transforming stages of technology use and integration.

Specialising in the use of ICT tools

In the specialising stage, teachers find innovative uses for technology. This is often characterised when teachers use technology for uses outside of what it was intended for initially. This stage links with the transformational stage. The UNESCO (2002) information provides useful indicators for evaluating practice as well as planning for personal development.

2.2.11.1.3 Technological skills developmental levels

The DoE has highlighted in two of its documents the crucial need for technological competencies among its teachers. They specify the following professional competency in ICT utilisation at levels of entry, adoption, adaptation, appropriation, and innovation (DoE, 2004:25; DoE, 2007:6). (See Figure 2.7.)

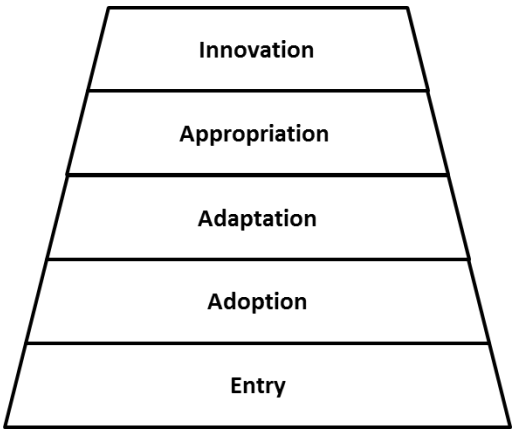


Figure 2.7: DoE ICT competency levels (DoE, 2007)

Entry

At the entry stage teachers should at least be able to develop technological literacies to be able to use technology such as, computers, laptops, data projectors. Additionally, the school should be able to assist learners with the operational use of technology.

Adoption

At this level teachers should be adopting technology into their professional lives. This should be for administration, teaching and learning.

Adaptation

As the level denotes, teachers should now be able to adapt the technology to suit more of the curriculum and learner needs. The curriculum and teaching and learning should thus become enriched with use at this level.

Appropriation

At this level there should be shifts from mere use of technology to authentic integration of technology. Teachers should be able to use technology, systems and services in holistic e-Teaching and e-Learning.

Innovation

Teachers at the innovative level should be able to develop and create dynamic learning opportunities and environments for e-Learning. Learning should be almost exclusively learner centred and technology should be used as the prime interactivity and collaboration tool.

The developmental levels noted above are expectations of teachers if use and integration of technology are expected to make any impact on schooling. These levels are vital for planning teacher professional development.

The three aspects: development in use, stages of teaching and learning with technology, and technological skills developmental levels are depicted in Figure 2.8 below. The three aspects have been mapped to corresponding relational levels and stages. The figure shows an approximation that teachers will progress in how they learn about technologies and begin to use and integrate them. This is indicated by the progression in complexity from basic to advanced (shown on right of the figure). Concomitantly the UNESCO and DoE development levels of read from the right provide highlight the levels of complexity at which the teacher may be operating.

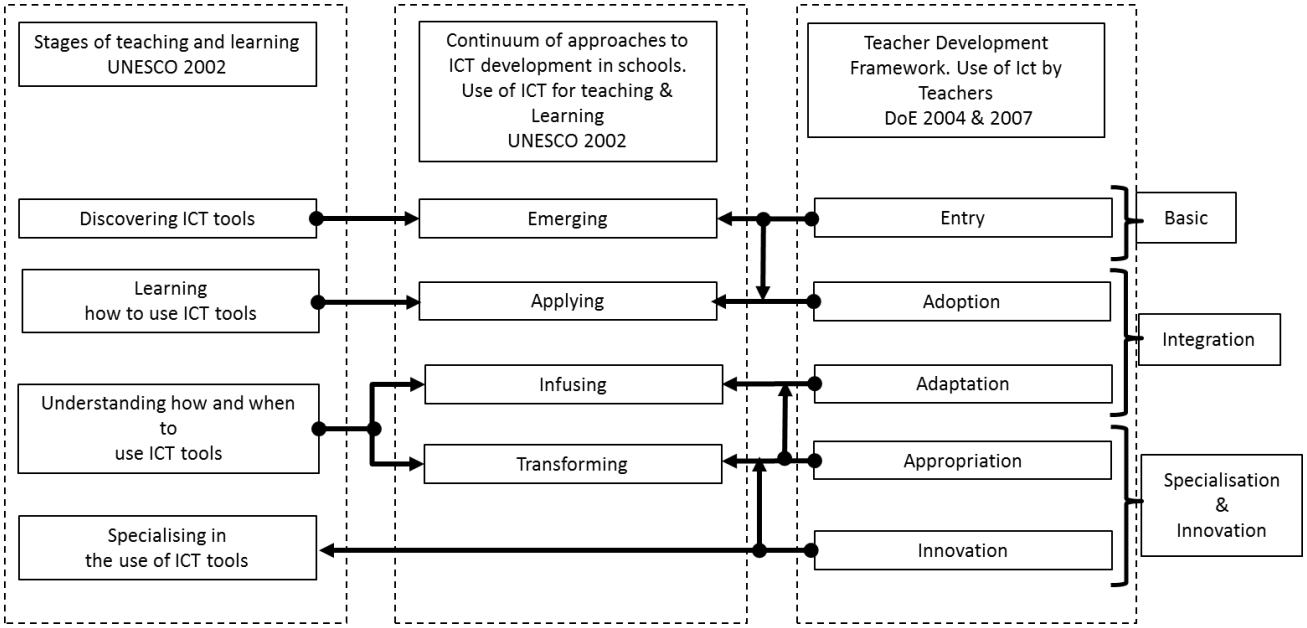


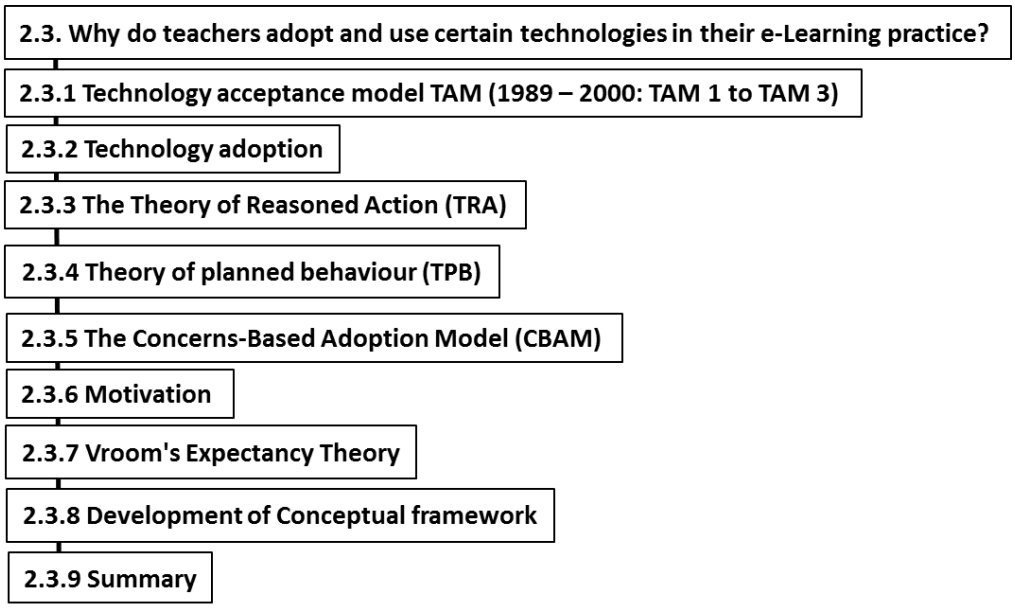
Figure 2.8: Mapped personal levels of technological skills development, use and integration (UNESCO, 2002; DoE 2004, 2007)

2.2.11.1.4 Reflection on developmental levels and stages

Levels of use, integration and development should be viewed as non-sequential applied levels. For example a teacher may be operating at an advanced application level, but may be struggling at a mechanical level. Alternatively, a teacher who

extends an innovation may still be seeking information about the innovation in the orientation level and may not yet have implemented the innovation.

Teachers' decisions to adopt, use and integrate technologies in their e-Teaching and e-Learning practices are based on decision-making processes. Two of these processes which co-exist are assimilation and accommodation, based on Piaget's fundamental processes of intellectual growth. If something does not gel with a current view / thinking or does not make sense, then the individual 'assimilates' (adopts it as part of his/her learned experiences), or 'accommodates' (changes his/her current view by taking on the new) (Atherton, 2013). The cognitive and affective domains are key to decision-making processes. These decisions are explored as a response to the third research question, which seeks to understand why teachers adopt and use certain technologies in their e-Learning practice.



Structure of Section 2.3

2.3 Why do teachers adopt and use certain technologies in their e-Learning practice?

The theoretical grounding for this research derives from the technology acceptance model (TAM) originally proposed by Davis in 1989 to explain the factors that cause

people to either accept or reject information technology. It is considered theoretically sound and capable of explaining user behaviour across a broad range of technologies and user populations (Davis et al., 1989:985). The technology acceptance model (TAM), the theory of reasoned action (TRA) and the theory of planned behaviour (TPB) are the most commonly used models for exploring technology adoption (Oliviera & Martins, 2011:110).

An examination of TAM and its subsequent iterations, TAM 2 and TAM 3, has revealed that they do not sufficiently extend the interrelationship between the mediating and influencing factors of the psychological (cognitive and affective), and the sociological and physiological aspects of a person's intentions and actions. TAM 2 and TAM 3 are thus not used in this study as the theoretical framework.

To address the research question to understand why teachers adopt and use certain technologies, there was a need to engage with other concepts to understand this relationship appropriately. This necessitated an exploration of TAM 2 and TAM 3 to provide richness to the discourse on TAM so as to inform the theoretical framework of this study.

This study thus extends adoption theories and models by explicitly incorporating social cognitive theory's motivational variables of expectancy and self-efficacy as mediating factors to understand the expectancy–value relationship.

2.3.1 Technology acceptance model (TAM) (1989 – 2000: TAM 1 to TAM 3)

This section first operationalises the key concepts related to TAM and explains the development from TAM 1 to TAM 3.

2.3.1.1 Technology acceptance model (TAM)

TAM posits that *behavioural intent* (BI) to use serves as a mediator of *actual use*. It furthermore proposes that *attitude* determines *intention* and that *perceived usefulness* (PU) is seen as impacting directly on *intention*. *Perceived ease of use* (PEOU) is said to have a direct impact on perceived usefulness. The two cognitive

beliefs, *perceived ease of use* (PEOU), and *perceived usefulness* (PU) are said to jointly impact on *attitude* (Davis, 1989). See Figure 2.9.

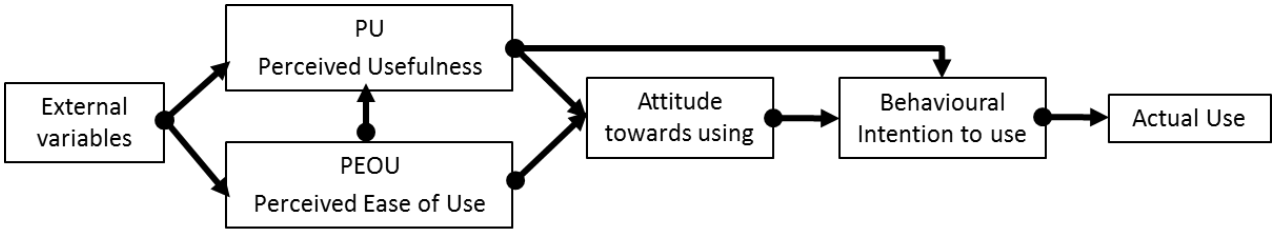


Figure 2.9: Technology Acceptance Model (TAM) (Davis et al., 1989:985)

Perceived usefulness is considered central to TAM (Davis, 1989:320). It is defined as the degree to which the user believes that using a system would "enhance his/her project performance" (Davis, 1989:320). Perceived ease of use, on the other hand, is defined as "the extent to which a person believes that using the system will be free of effort" (Davis, 1989:320).

The key strength of TAM lies in its suggestions that intentions influence usage (Bagozzi, 2007). This is congruent with the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980). TRA contends that an intention (mental process), which is a type of decision, transforms a thought into a physical action. The attitude concept of TAM further overlaps with the theory of planned behaviour (TPB) (Fishbein & Cappella, 2006).

In the revised TPB model, the three primary determinants of intention are stated as attitude, perceived norms, and self-efficacy. Intentions to use are strengthened by the two cognitive influencing factors of PEOU and PU through the influence of attitude. These attributes of TAM have contributed significantly to its usefulness in explaining user acceptance.

However, the core concepts of TAM (perceived ease of use, perceived usefulness, and attitude) and related overlapping concepts from TRA and TPB (subjective norm,

self-efficacy) have been subjected to critique for not sufficiently explaining or reconciling influencing and mediating factors.

According to Lee et al. (2005:1102), perceived ease of use does not have any significant direct effect on attitude. Park (2009:159) concurs that “neither perceived usefulness nor perceived ease of use had a significant direct effect on behavioural intention to use e-Learning”. Parks (2009:159) further contends that “those concepts [PU and PEOU] affected attitude towards e-learning and their attitudes affected intention to use”.

Two separate studies were undertaken to explore university students’ intention to use e-Learning in 2005 and 2006. The findings of the effect of subjective norms of each study opposed those of the other. Grandon et al. (2005) found subjective norms to be a significant factor, while Ndubisi (2006) showed that subjective norms had no significant effect.

Similar contradictory findings were noted regarding computer self-efficacy. Venkatesh and Davis (1996) conclude that computer self-efficacy acts as a determinant of perceived ease of use. However according to Grandon et al. (2005), student self-efficacy’s influence on perceived ease of use is indirect.

Park’s (2009:159) study has shown, as have others, that “some TAM concepts had a direct and indirect effect”. There is a range of contextual mediating and mitigating factors that impacts on acceptance and use. For example, in the study by Lee et al. (2005), the samples were teenagers and ease of use was not considered an issue with that age group. Furthermore Park (2009:158) concludes that variances may be justified via motivational theory. Self-efficacy may be an intrinsic motivational factor and subjective norm an extrinsic motivational factor. The categories of motivation thus influence significance and effects (Park, 2009:158).

Many studies have used TAM with extensions or adaptations to the original core concepts. The contextual nature of the research appears to have prompted such adaptations. A selection of these studies are:

- Gong et al. (2004) and Sanchez-Franco (2009): Developed theoretical models to understand behaviours associated with adoption of learning technologies among students.
- Dasgupta et al. (2002) and Jarvenpaa and Staples (2000): Found that TAM was not developed for technology adoption in a Web 2.0 environment and thus adapted TAM for their studies.
- Cheung and Vogel (2013): Extended TAM to explain the factors that influence the acceptance of applications for collaborative learning.
- Lee et al. (2005): Found it necessary to integrated TAM with motivational theory.
- Liu et al. (2005): Used flow theory in conjunction with TAM to understand systems learning.
- Pituch and Lee (2006): Added system and learner characteristics as external variables to TAM.
- Hossain and De Silva (2009): Extended their exploration with TAM by considering social ties for understanding social networking systems.
- Sanchez-Franco (2009): Enhanced the TAM model with the effect of perceived affective quality.

The need for adaptations and extensions to TAM, and the validation and non-validation of concepts, are noted by Bagozzi (2007:244). He states that there are “fundamental problems with TAM” and that the “field is at the threshold of crisis in regard to explaining technology acceptance”. This had not gone unnoticed and subsequent iterations of TAM such as TAM 2 and TAM 3 have emerged that attempt to address findings of the application of TAM. The following two sections provide a review of TAM 2 and TAM 3.

2.3.1.2 Technology acceptance model (TAM 2)

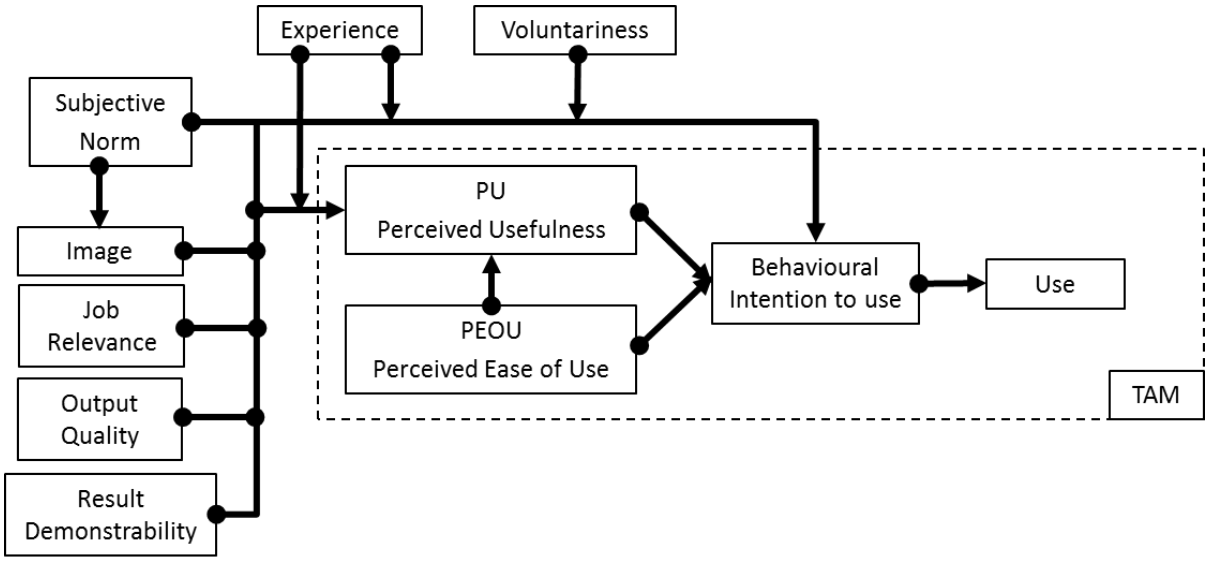


Figure 2.10: TAM 2 – Extension of original TAM (Venkatesh & Davis, 2000:187)

TAM 2 (Figure 2.10) retains the underlying core concepts of TAM. These are *behavioural intention*, *perceived usefulness* and *perceived ease of use,* with the exclusion of *attitude.* The exclusion was prompted by Davis and Venkatesh (1996:21) as a result of studies that found that attitude only partly mediates perceived usefulness.

The extended TAM 2 has two additional processes. The first is the social influencing processes (subjective norm, image, and voluntariness). The second addition is the cognitive instrumental processes (job relevance, output quality, and result demonstrability) and experience. These additions are confined as influencing factors on perceived usefulness. TAM 2 further suggests that in mandatory contexts, subjective norms have a direct effect on intention through the mechanism of compliance. According to Park (2009:152), testing the updated version of TAM in both voluntary and mandatory settings strongly supported the additions and furthermore was useful in explained 60 percent of user adoption.

TAM 2 however does not offer any mediating or influencing factors for perceived ease of use. It is as a result criticised for “the lack of actionable guidance to practitioners” (Venkatesh & Bala, 2008:274). This resulted in a further extension of TAM 2 to TAM 3.

2.3.1.3 Technology acceptance model (TAM 3)

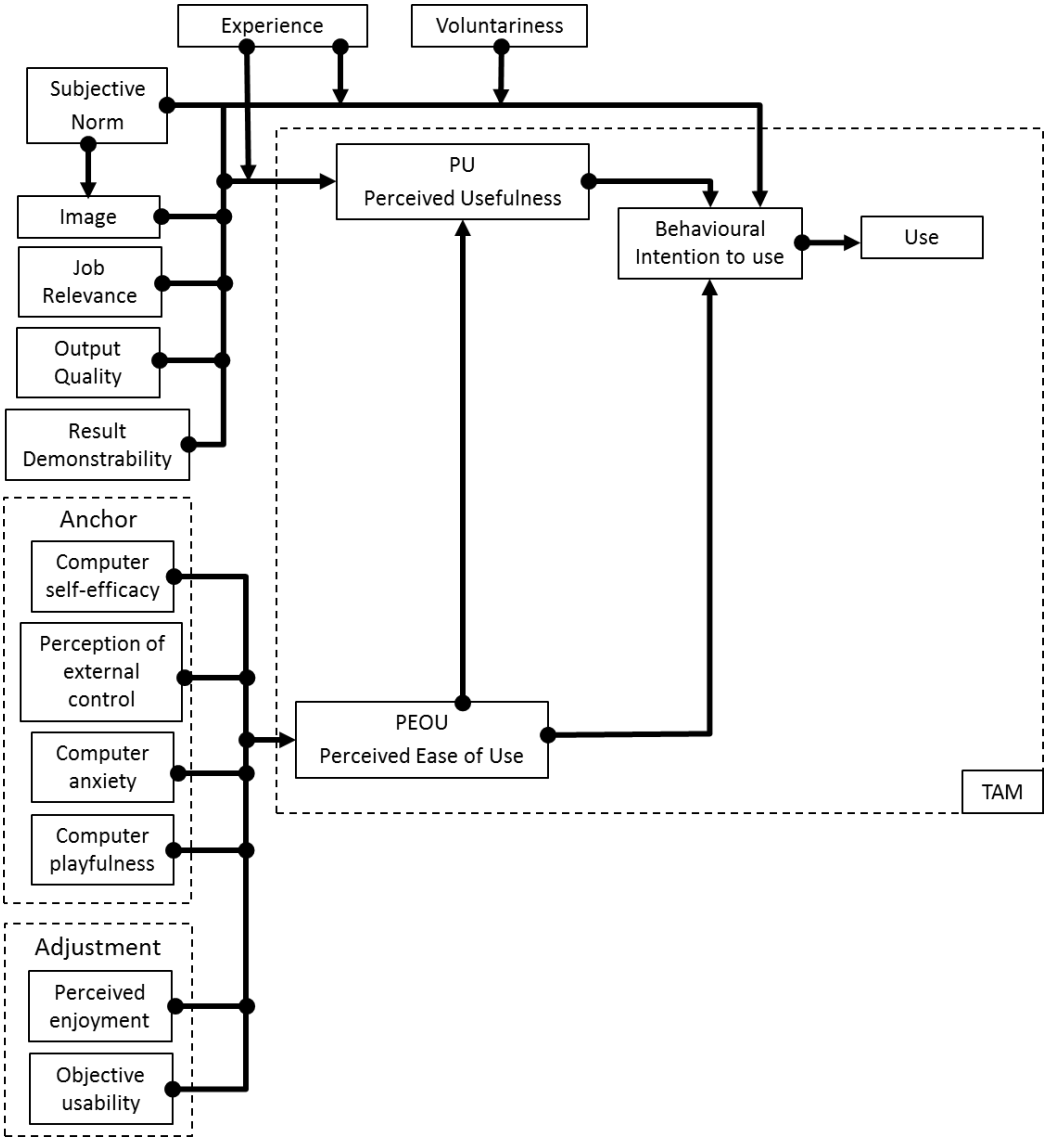


Figure 2.11: TAM 3 – Extension of original TAM (Venkatesh & Bala, 2008:280)

TAM 3 (Figure 2.11) includes determinants for perceived ease of use (Venkatesh & Bala, 2008). These determinants are divided into two categories: anchor determinants and adjustment determinants. The anchor determinants are focused on beliefs about computers and usage and include computer self-efficacy, perception of external control, computer anxiety, and computer playfulness. The adjustment determinants emanate from direct experience and are used to moderate attitudes. They include perceived enjoyment and objective usability.

Through a combination of TAM 2 and TAM 3 the added determinants are focused on *perceived ease of use*, and *perceived usefulness*. The resulting models, however, contain a range of independent variables (belief factors) for predicting intentions but to a lesser extent for explaining behaviours.

At this point it is worth reflecting on the one significant difference between the iterations of TAM and TRA. TAM 2 and TAM 3 proposes a direct path from *perceived ease of use*, and *perceived usefulness* to intention, while TRA shows *attitude* completely mediating the relationship between beliefs and intention. The researcher found this to be limiting for this study which sought to understand the mediating factors influencing intentions that result in teachers' adoption and use of technology.

2.3.1.4 Adapted TAM for this study

According to Lee et al. (2005:1097), "the decision to use technology is determined partly on a rational calculation of the benefits". Behaviour is motivated by "perceived values and benefits derived" from the utility value and affordances of a technology (Lee et al, 2005:1097). Perceived usefulness is one of the concepts that directly simplifies utility value. Consequently usefulness of a technology could be explored through an expectancy–value relationship.

The general acceptance that a favourable attitude results in action is challenged by a favourable attitude and external factors that counter the freedom of an individual to perform an action. Furthermore, a favourable attitude must be based on something tangible, at least in one's mind, that is, there must be something about usefulness that is compelling. Benefit to be gained (Lee et al., 2005:1097) from the usefulness of a technology is potentially the connection between intention and use. However favourable an attitude and attractive the benefits may seem, the decision to eventually use a technology is mediated by a person's motivation to act.

Motivation can influence a decision and can be influenced by outcomes iteratively. One can carry out an action because of a belief that it is valuable and, when the action is completed, it could result in internal satisfaction or external praise. This in turn can further stimulate motivation to sustain such actions.

In examining expectancy and motivation one needs to consider why a teacher would do anything if it has no meaning or benefit value, that is, no value-laden outcome. One could deduce from this, that as a cognitive process theory of motivation, the expectancy theory is based on the notion that a person will be motivated if he/she believes that a concerted effort will result in a good output (expectancy) and this output will earn him/her the desired rewards (instrumentality), and that the value of the rewards is highly positive (valence) (Lunenburg, 2011:1). Expectation levels could be different based on the levels of confidence or skill (capability of doing) and the amount of effort expended. The expectancy concept can be linked to self-efficacy and perceived behavioural control, and to external concerns of impact.

Having examined TAM through its iterations and overlaps with TRA and TPB, this review focused on understanding the mediating factors for teachers' adoption and use of technologies. These factors were not explicit in TAM and this study thus incorporates social cognitive theory's motivational variables of expectancy and self-efficacy as mediating factors to understand expectancy–value relationships. The ensuing model (Figure 2.12) is an adaptation to TAM contextualised for this study. The various elements explored above and in subsequent sections provide the framework for exploring and analysing the reasons for teachers' adoption, use and integration of technologies.

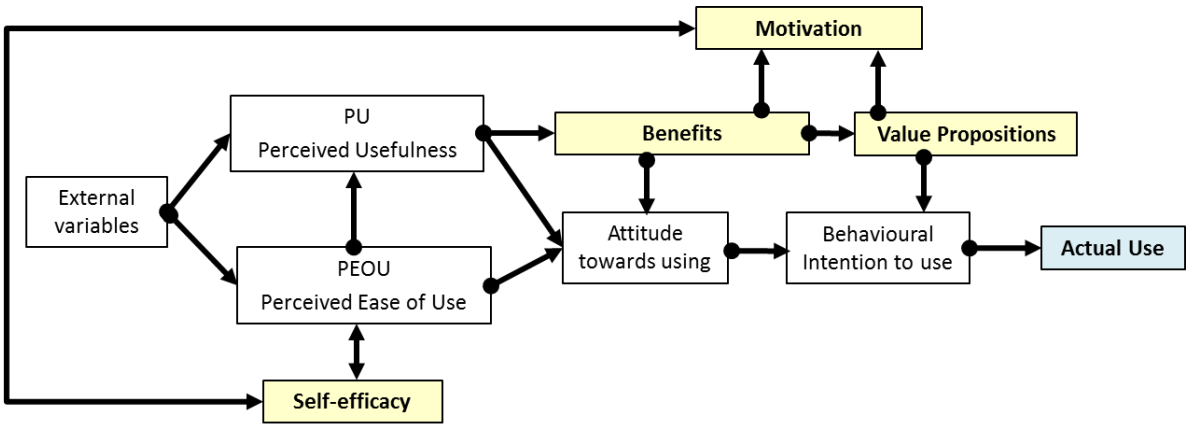


Figure 2.12: Researchers' adapted TAM

2.3.1.5 Supporting technology adoption theories and models

Other technology adoption (TA) theories have similar concepts that have been used in the different iterations of TAM and have contributed significantly to the conceptual framework of this study:

Adoption theories and models have explored individuals' attitudes (Rogers, 1962, 1995) towards an innovation, based on perceived ease of use and perceived usefulness, and the influence of attitude on behavioural intent (Davis 1989). These have been further extended to single out behavioural intent (Vroom, 1964; Ajzen & Fishbein, 1980; Bandura, 1996) as a more reliable predictor of adoption, with attitude found to be less significant a predictor of adoption.

Subjective factors (TRA) have been forwarded as influencing intention to use ICTs. Perceived behavioural control (TPB) (Ajzen & Fishbein, 1980) has been introduced as an influencing factor of behavioural intent with self-efficacy as influencing both attitude and motivation iteratively.

The Concerns-Based Adoption Model (CBAM) (Hord et al., 1987) considers decision making in three related domains: personal, external and social. The behavioural intent aspect, a crucial stage in decision making, is multifaceted as it is located in the cognitive domain of expectancy and motivation (Vroom, 1964).

The cognitive domain is a key zone to understanding why teachers adopt and use technology for e-Teaching and e-Learning. In acknowledging that each teacher is an individual in his/her own right, attempting to understand each teacher's behaviour necessitates probing mediating factors that shed light on the reasoning behind decisions that the teacher takes. Straub (2009:626) concludes that technology adoption is "a developmental process that is complex and inherently social, and that individuals conceptualise distinctive but flexible perceptions of technology that influence their adoption decisions".

While adoption, that is, changes in behaviour, could be measured empirically, adoption theories are limited in providing an understanding of the underlying predictors of the changes in behaviour. These predictors are more appropriately

understood through cognitive, affective and contextual factors. However no one theory accounts for all the aforementioned factors (Straub, 2009:627). The following sections briefly describe the relational concepts in the adoption theories and models explored in this review.

2.3.2 Technology adoption

Adoption refers to the acceptance, implementation and taking on of a new product or innovation. *Innovation* refers to something new, or more accurately something that is perceived as new. Rogers (1995:11) defines innovation as “an idea, practice or object that is perceived as new by an individual”. While the use of the term ‘innovation’ is commonly associated with physical artefacts, for example, technology, it also includes ideas and practices. When applied to, or used in educational context, it ought to be considered more widely to include pedagogical aspects that include teaching and learning frameworks, models, and methods, with their associated approaches and techniques.

Adoption theories focus on predicting individuals’ choices to accept or reject innovations. The adoption trajectory of people will be shaped by their take on the innovations’ perceived benefits, their motivations and their personal beliefs of being able to implement the innovations. These theories are not only focused on the adoption of an innovation, but are concerned with behavioural changes and the results of implementation such as the possible domestication of the innovation. The behavioural changes could be adaptations to existing practices or evolving new practices. Adoption theories thus focus holistically on change by looking at the constituent parts that make up the whole.

Adoption is not a one-time event, but rather a process (Hall, 1974:5-6), which Straub (2009:628) explains as “beliefs and attitudes … formed over time, which in turn may influence decisions”. Given the exponential rate of changes in technologies and the dynamic nature of the teachers in this study, the repeatable process of adoption and re-adoption will occur. Rogers (1995:208) proposes five attributes of the rate of diffusion. These presented in Figure 2.13.

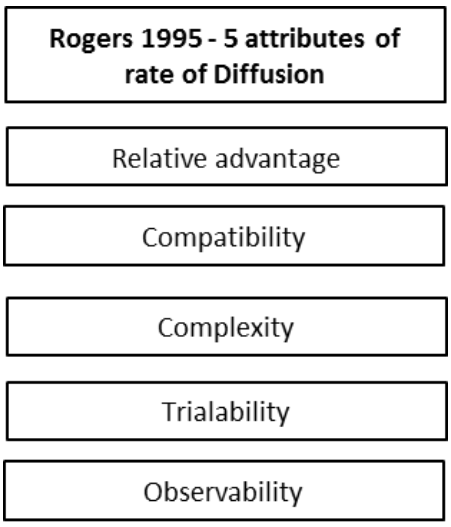


Figure 2.13: Five attributes of rate of diffusion (Rogers, 1995:208)

Relative advantage offered by an innovation is a perception that a teacher could have that the innovation or technological product could be better than a previous one. Adoption, based on this, is said to be more rapid if the innovation is considered better (Rogers, 1995:217-218). Relative advantage could be related to usefulness in TAM.

Innovations that are familiar and fit in with teachers' existing understandings are also said to be more readily adopted. This familiarity is referred to as *compatibility* (Rogers, 1995:223-224). Teachers sometimes consider an innovation to be complex, that is, difficult to understand, use or apply. This refers to the attribute of *complexity*, which is hypothesised to be negatively related to the rate of adoption of an innovation (Rogers, 1995:230-231). The attribute of complexity can be related to self-efficacy and perceived ease of use in TAM.

If a teacher is afforded the opportunity to try out an innovation, he/she may understand it better and see potential in its adoption. This chance for experimentation, according to Rogers (1995:231), is a *trialability* attribute which can be direct or vicarious. Trialability could be aligned to results' demonstrability (TAM2) and perceived usefulness in TAM.

Observability leads pervasiveness in a culture, that is, the point when an innovation becomes so prevalent that even teachers, who would not normally espouse an innovation, consider adoption (Rogers, 1995:232). The idea behind observability is

similar to unspoken peer pressure, that is, if other teachers or managers use an innovation or own a new technology, the teacher will be more likely to consider adopting it as well.

The five attributes of the adoption–diffusion process are inherently descriptive and based on the attributes of an innovation. As such, these five attributes are insufficient for providing a basis for understanding the underlying cognitive processes that go into adoption decisions. The researcher sought to understand teachers' reasons for adoption, that is, to understand the conscious decisions for actions. For this the researcher looked to the cognitive and affective processes associated with adoption which are distilled into five sequential stages (Rogers, 1995:169-170). These are shown in Figure 2.14:

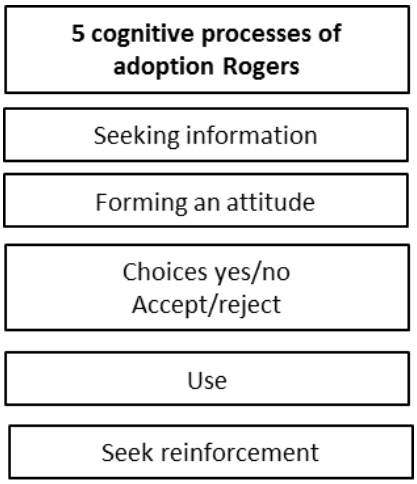


Figure 2.14: Five cognitive processes of adoption (Rogers, 1995:169-170)

In the decision-making process of innovation adoption, teachers form either favourable or unfavourable attitudes toward an innovation. Attitude formation is a mental activity which is either cognitive (knowing) or affective (feeling). When teachers are faced with the possibility of having to adopt an innovation, they generally start with actively *seeking information* about the innovation.

The attributes set out earlier, such as relative advantage, compatibility and complexity, are considered important at the beginning stages when considering adoption. In *developing attitudes* toward an innovation, a teacher contemplates, mentally, options of how to apply it or how it can be applied to his/her current or

future situation before deciding whether or not to try it out. A teacher may then make a *choice* and decide to go into action and *try out/use* the innovation.

All innovations are typically associated with a degree of uncertainty in terms of their outcomes. This phenomenon causes a teacher to *seek social reinforcement* of his/her peers (Rogers, 1995:169-170). These decision-making processes naturally invoke concerns which are discussed later in the concerns-based adoption model.

The adoption theory is limited in that it focuses on certain attributes of an innovation and how these attributes promote adoption or non-adoption. It is equally important to note that the stages in the adoption theory focus on the innovation and do not necessarily factor in external variables. Its application in this study is limited, in that it does not tell us about the underlying reasons teachers have for undertaking e-Learning-related activities. This does not trivialise the processes, but to adequately address the research question of 'why' teachers engage in e-Learning practices, the cognitive and affective mental activities associated with intention and action are of particular relevance.

Attitude is the degree to which a person has a favourable or unfavourable disposition towards adopting an innovation (Ajzen, 1991:188). In the context of this study this positive or negative attitude of a teacher is one of the behavioural factors in the decision to accept or reject an innovation. When teachers make decisions to accept an innovation, they formulate a behavioural intent to use the innovation. This could lead to actual use which could be observed and measured.

A teacher could also have an unfavourable disposition and this could result in non-adoption. However a teacher may still engage in an action even if he/she holds an unfavourable attitude towards it. For example, the use of ICT may be mandatory and the teacher has to use it whether he/she likes it or not. While attitude is a determinant of intent (to use or not to use), its application as a predictor of a teacher's action is not considered to be reliable across all contexts.

2.3.3 The Theory of Reasoned Action (TRA)

The Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980) states that a person's behaviour is informed by *behavioural intent* (BI) and that BI gives meaning to a person's *attitude* toward the behaviour. Alongside attitude are a person's personal *subjective norms* that have a bearing on their BI. Figure 2.15 presents this diagrammatically.

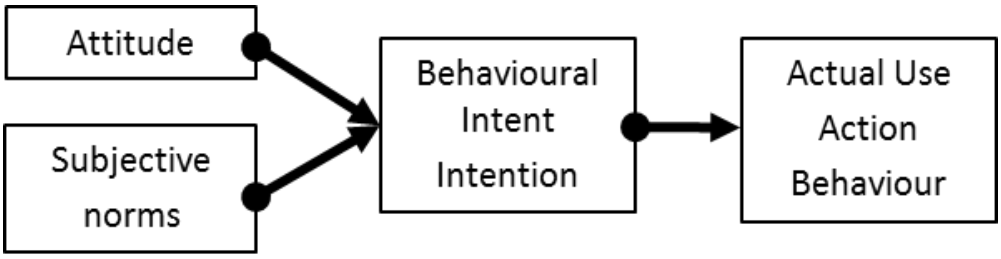


Figure 2.15: Theory of Reasoned Action (Azjen & Fishbein, 1980)

In this study, the researcher attempted to locate intentionality within a conceptual framework that clearly highlights its significance for understanding teachers' decisions in using technology for education. An operational understanding of the concept of behavioural intent, attitude and subjective norms was necessary for a primary conceptualisation of using TRA towards this goal.

Behavioural intent is an intention and not an action, as these are different aspects separated in time with intention preceding action. Intentionality, according to Bandura (2001:6), is "a representation of a future course of action to be performed", that is, a conscious commitment to do the action. According to Ajzen (1991:181), "intentions are assumed to capture the motivational factors that influence behaviour". In effect they are simple indicators of whether a person is considering doing an action.

Intention does not mean that an action will be performed, as all intentions do not effect action, given that 'external variables' such as availability of time, resources and support impact on realising an intention (Davis, 1989). Internal variables, those of interest to this study, such as *self-efficacy* (Bandura, 1982), *perceived behavioural control* (Ajzen, 1991) and *motivation* (Vroom, 1964) are also determinants that mediate decisions to act. However, an intention to perform a behaviour can only

come to fruition if the behaviour is under volitional control, that is the person is free to engage in the process of making and acting on decisions at will (Ajzen, 1991:181-182).

2.3.4 Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB) (Ajzen, 1991) is a theory which attempts to predict deliberate behaviour. TPB postulates three conceptually independent psychological (internal) determinants of behavioural intention, that is, *attitude*, *subjective norms*, and *perceived behavioural* control (PBC) (Ajzen, 1991:188). See Figure 2.16.

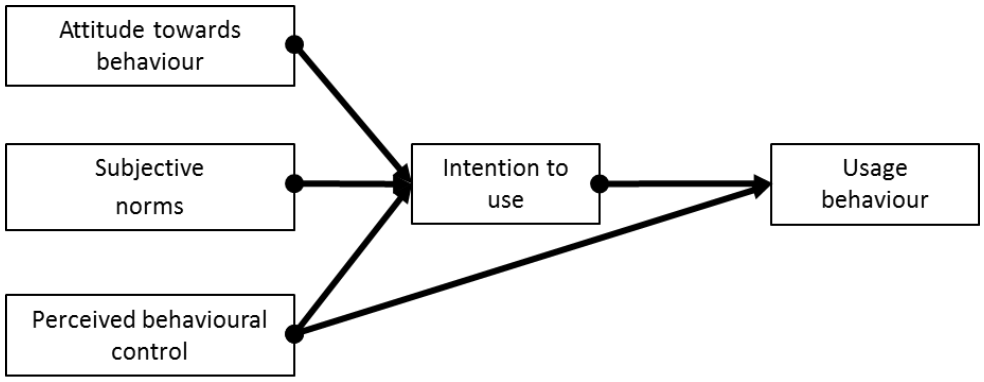


Figure 2.16: Theory of planned behaviour (TPB) (Ajzen, 1991)

TPB is a derivative TRA, and adds a third concept, that of *perceived behavioural control*. TPB holds that attitudes, subjective norms, and perceived behavioural control are direct determinants of intentions, which in turn influence behaviour. Subjective norms and perceived behavioural control are two concepts which are absent in the original TAM (Dillon & Morris, 1996).

It is essential to provide an operational understanding of the new concept of *perceived behavioural control* (PBC). Intention and attitude will be explored further within the context of what TPB offers as new.

Perceived behavioural control, according to Ajzen (1991:183), refers to people's perception of the ease, or difficulty, or capability to perform behaviour. PBC shows a

natural relational link to Bandura's (1982) concept of self-efficacy. Self-efficacy, according to Bandura (1982:122), is "concerned with judgments of how well one can execute courses of action required to deal with prospective situations". The theory of planned behaviour places the concept of perceived behavioural control and self-efficacy belief within a general framework of the relations among beliefs, attitudes, intentions, and behaviour (Ajzen, 1991:184).

PBC comprises two facets: the amount of actual control the teacher has over behaviour, and how confident he/she feels about being able to perform or not perform the behaviour. These in turn are determined by control beliefs about the influence of both situational (perceived control of time, resource, etc.) and internal (self-efficacy) factors to impede or facilitate the execution of the behaviour.

Thus in this study PBC has the potential to probe behavioural decisions, based on the teacher's intentions. If the teacher has the intention, and believes he/she has the capability and believes he/she can control the external factors, then the likelihood that the behaviour will be performed exists. Accordingly, performance of a behaviour is a joint function of intention and perceived behavioural control. Bagozzi et al. (1989:36) note that when final behaviour is the criterion, the direct path from attitudes to behaviour is non-significant.

Within the context of TPB intention can be used a proxy measure of behaviour in the absence of a perfect relationship between behavioural intention and actual behaviour. The variables, that is, attitude, subjective norms and perceived behavioural control, in TPB can be used to hypothesise on the likelihood of uptake and use of technology by teachers. As a general rule, the more favourable the attitude and subjective norm with respect to behaviour, and the greater the perceived behavioural control, the stronger should be an individual's intention to perform the behaviour under consideration (Ajzen, 1991:188).

However, prediction of intention is expected to vary across behaviours and situations (Ajzen, 1991:188). In certain contexts one might find only attitude has a significant influence on intentions, in other contexts it may be that attitudes and perceived behavioural control are sufficient to account for intentions, and in additional contexts one might find that all three predictors make independent contributions (Ajzen,

1991:188-189). Given the different contexts of each of the teachers, the above knowledge will assist in understanding intention and action.

Ajzen and Fishbein (1980:5) furthermore maintain that attitudes only impact behaviour indirectly through intentions. This is supported by Bagozzi et al. (1989:36) who state that "it seems unreasonable to maintain that attitudes automatically stimulate action, as a direct path implies". They contend that for "attitudes to cause behaviour, one must decide or intend to perform the behaviour" (Bagozzi et al., 1989:36). This decision or intent is a mental activity and as such warrants the focus on cognitive and affective processes.

This further confirms that even if one has a favourable attitude towards performing an action, the action may fail to materialise because of some non-attitudinal reason and conversely one might perform an action even if the attitude were unfavourable. An implication of this for this study is that in a Western Cape context there is no one correct reason for teachers' adoption and use of technologies. Hence, in this study there was a need to explore as wide a range of relevant literature and theories, and models to assist in understanding teachers' e-Learning practice.

However, adjustments to the TPB model have been effected and the model is now referred to as 'an integrative model' of the TPB (Fishbein & Cappella, 2006). In the revised model the three primary determinants of intention are stated as attitude, perceived norms, and self-efficacy. These psychosocial variables are now considered as relatively important determinants of intention (Fishbein & Cappella, 2006:S2-S3). See Table 2.6 and Figure 2.17.

Table 2.6: TPB 1980 - 2006

TPB 1980	TPB 2006
Attitude	Attitude
Subjective norms	Perceived norms
Perceived behavioural control	Self-efficacy

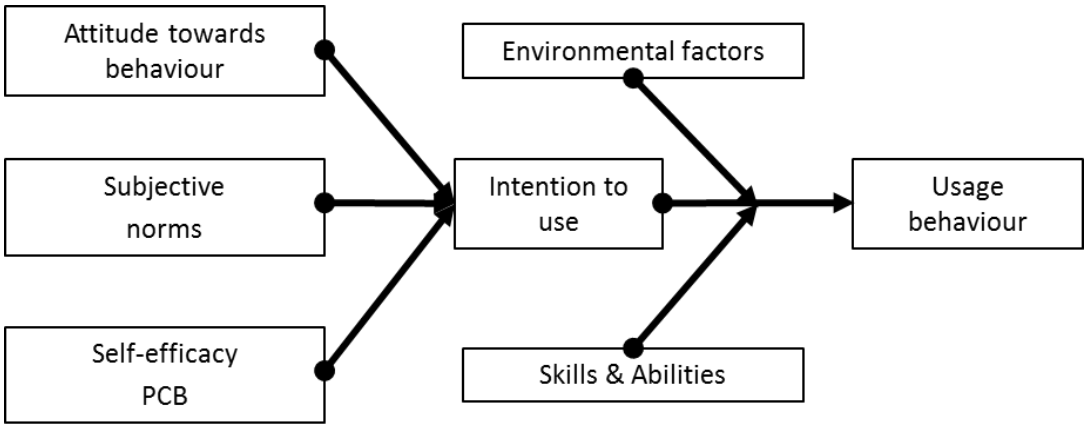


Figure 2.17: An integrative model (Fishbein & Cappella, 2006)

The inclusion of self-efficacy synonymously with perceived behavioural control warrants exploration as to the appropriateness of its relational attributes in the first instance and its relevance to this study in the second instance.

Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. These beliefs will impact on what teachers elect to do and the amount of effort they are willing to invest in these activities (Bandura, 1996:5517-5518). Accordingly Bandura (1996:5516) defines self-efficacy as “people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives”.

People’s beliefs about their capabilities can be traced to four sources as expounded by Bandura (1996:5517). Each of these describes the events that contribute to feelings of self-efficacy. These sources are relevant to this study to assist in elucidating indications of self-efficacy that could include motivational factors as to why teachers adopt and use technology. The sources are presented in Figure 2.18.

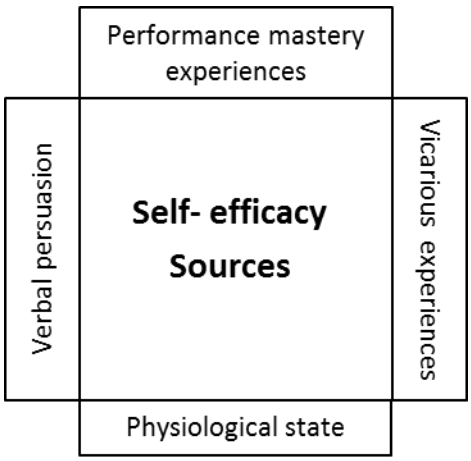


Figure 2.18: Self-efficacy sources (Bandura, 1996)

- ***Performance mastery experiences*** – *successful* experiences boost self-efficacy, while failures erode it.
- ***Vicarious experience*** – *observing* a peer succeed at a task can strengthen beliefs in one's own abilities.
- ***Verbal persuasion*** – *credible* communication and feedback from peers and superiors can boost self-efficacy.
- ***Physiological state*** – *a* positive *state of mind and body* can boost one's self-efficacy beliefs, while anxiety can undermine it.

Both self-efficacy and perceived behavioural control are control beliefs. These exert influence over situational factors (teachers' beliefs of being able to control time, resources, etc.), and internal factors (teachers' beliefs of their ability to carry out the action) that impede or facilitate the execution of a behaviour. However, perceived behavioural control is a belief, and should not be confused with actual control, that is, where a teacher is actually able to exert influence on the situational factors.

Given the above, both self-efficacy and perceived behavioural control are focused on beliefs: self-efficacy as an internal trait and perceived behavioural control as external to a teacher. If a teacher believes he/she has the ability to perform the action and is in control of the situational factors, then the probability of the action's being performed is high. If however the situational factors cannot be controlled and the capability belief is high, the probability of the action's being performed may be low.

The relevance of self-efficacy as an internal trait in this study is high and the appropriateness of perceived behavioural control as an external factor operating alongside self-efficacy is sound. Perceived behavioural control and actual control are more predictors of actual behaviour than self-efficacy. If teachers have a strong sense of self-efficacy they could be intrinsically motivated to take on stimulating tasks. These teachers are more likely to put in more effort to succeed and attain the desired outcomes (Zimmerman & Cleary, 2006:51).

2.3.5 The Concerns-Based Adoption Model (CBAM)

“The adoption of an educational innovation is a complex process involving a multitude of variables” (Hall et al., 1973:3).

The concerns-based adoption model (CBAM) focused on change triggered by the adoption of innovations by both individuals and schools. It was developed “to describe changes people undergo as they adopt a new program” (Loucks, 1983:1). A consequential experience of any modification to existing behaviours will cause concerns. This means that change, as the stimulus in this case, activates both a physiological and psychological response in a teacher. This stimulus brings about a reaction in the form of concerns which, in turn, triggers two control mechanisms: one that mobilises (to carry out an action) and the other that immobilises (not to carry out the action).

The CBAM provides a "developmental perspective on how an individual’s concerns influence integration (and use) of an innovation” (Straub, 2009:632). Its inclusion in this study will assist in facilitating two checks, that is, if concerns have been addressed either directly or incidentally and mapping the levels of use of technology. Its strength lies in the application of affective and cognitive concerns in an educational context. One of the limitations of the CBAM is that in some contexts it presupposes that adoption is present. This, however, is a plus factor for this study as the respondents are teachers who have adopted and currently use technology.

As a conceptual framework, the CBAM, describes, explains, and predicts probable teacher behaviours in the change process towards and during adoption and use of

innovations. There are two components to the CBAM: a diagnostic component and a prescriptive component. The three principal diagnostic dimensions are:

1. ***Stages of Concern*** – Seven different reactions and feelings that teachers experience when they implement an innovation.
2. ***Levels of Use –*** Behaviours teachers develop as they start and continue to use an innovation as they become more skilled and familiar with the innovation.
3. ***Innovation Configurations –*** Different ways in which teachers adapt innovations to their unique situations.

Two of the dimensions of the CBAM are of interest in this study. These are: *stages of concern* (cognitive concerns) and *levels of use* (of innovations in teachers' e-Learning practice). These two dimensions will symbiotically assist in understanding the different concerns of the teachers as well as how they use the innovations in their e-Learning practice. Hall et al. (1973:17) caution that "an isolated notation of a stage of concern or level of use will be insufficient evidence" for understanding use of innovations.

Three domains are present in the (Concerns-Based Adoption Model CBAM) of Hord et al. (1987). These are: *personal*, *external* and *social*. When teachers engage in decision making processes, they work through a series of internal questions. Mann (2006:36-37) sum this up as: "In the stages of concern model, individuals go through the stages of *seeking information*, then personal (self) *concern*, and then focus on *use* (task concern), then external *concerns* (impacts) about the innovation." See Figure 2.19.

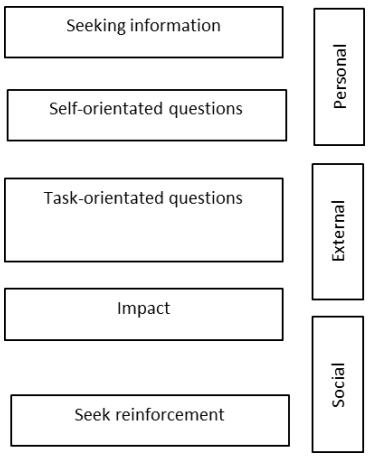


Figure 2.19: CBAM stages of concern (Hord et al., 1987)

Hord et al. (1987) suggest that neither the domains nor the questions that emerge are mutually exclusive as "teachers will evidence concerns of all stages at any given point during the process" (Hord et al., 1987; Straub, 2009:634).

The diagnostic dimensions of levels of use of the CBAM are thus appropriate for this study. Levels of use link directly to the e-Learning practice focus of this study. The levels of use (see Table 2.7) describe behavioural changes as teachers experience and implement an innovation. This refers to their use or practice as they make the transition from traditional teaching to teaching differently. This is linked directly to what is actually done by the teachers in their classroom

The levels of use below are, according to Hord et al. (1987:55), arranged in eight levels.

Table 2.7: CBAM Levels of use (Hord et al., 1987:55)

0. Non-use	A teacher does not use or has no intention to use an innovation.
1. Orientation	A teacher is seeking additional information about an innovation but has not determined whether he or she will implement it.
2. Preparation	A teacher gets ready to include an innovation (but has not yet implemented it).
3. Mechanical	A teacher begins implementation but generally struggles with logistics of the innovation.
4A. Routine	A teacher successfully integrates an innovation.
4B. Refinement	A teacher changes the innovation to suit his or her needs.
5. Integration	A teacher goes beyond his or her own classroom to share his or her implementation of an innovation with peers.
6. Renewal	A teacher extends an innovation, transforming the innovation.

Each teacher in this study is a unique individual and will have his/her own unique experiences and concerns. Teachers may however have commonalities in their development trajectory as they take on the innovations. Hall (1974:8) contends:

> There are observable differences in how various individuals approach and use an innovation. Specifically, it is hypothesized that there are identifiable, definable and measurable levels of use of an innovation that range from lack of knowing that the innovation even exists to an active, sophisticated and highly effective use of it.

This is supported by Loucks (1983:2) who notes that CBAM supports several assumptions. Two of these that are of particular significance to this study are:

- “Change is a personal process that individuals experience differently each at his/her own pace and degree of trauma” Loucks (1983:2).
- “Although individuals change at different rates, they undergo a similar growth pattern in terms of feelings they have about the change and the knowledge and behaviours they develop as they become increasingly involved in the new program” Loucks (1983:2).

2.3.6 Motivation

Motivation is considered a concept useful to explain behaviour. In its simplest form it describes why one does something, that is, motivation is what causes us to act. But what exactly motivates us to do the things we do? What might be the reasons for people's actions? Are these to satisfy an inner challenge, or personal satisfaction, or on account of external rewards or personal gratification, or on account of pleasing someone?

In this study the researcher wanted to understand why teachers engage in e-Learning, hence the relevance of motivation to this study. The inclusion of motivational factors as a frame of reference is to understand the external variables that mediate the formation of attitudes and beliefs. To progress this need the researcher deemed it necessary to explore the relationship amongst attitude

formation, beliefs, motivation, self-efficacy, subjective subject norms, and external variables noted earlier in this section.

Theories of motivation are divided into two encompassing groups (Parijat & Bagga, 2014:1-2).

- Content theories such as Maslow's hierarchy and McClelland's theory focus on individuals' needs.
- Process theories such as expectancy theory and cognitive evaluation theory focus on cognitive processes.

The cognitive processes that teachers are engaged in are of relevance to this study to shed light on why teachers choose to use technology for e-Learning. Expectancy as a process theory (Vroom, 1964), as noted above, is explored in the next section.

Two major types of motivation have been identified in literature, intrinsic and extrinsic motivation (Usher & Kobe, 2012:3). Intrinsic motivation, according to Davis et al. (1992:1112), refers to ''the performance of an activity for no apparent reinforcement other than the process of performing the activity per se", that is, purely for the sake of its intrinsic value of pleasure, or interest, or achievement in itself. Extrinsic motivation is described as ''the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself''. Extrinsic motivation is this same desire, however not for itself but for the purpose of a certain result, that is, an external reason or instrumental value (Pintrich, 2003:673).

Extrinsic and intrinsic motivators are two different types of drivers capable of evoking specific outcome behaviour (Lee et al, 2005:1097). Usher and Kobe (2012:3) furthermore note that there is a relationship between these two types of motivation, and "it is often difficult to categorize motivation as purely intrinsic or extrinsic". "According to self-efficacy theory [of Bandura], perceived ease of use influences intrinsic motivation" (Lee et al, 2005:1099). Davis et al. (1992) and Venkatesh and Speier (1999) classify enjoyment as a type of intrinsic motivation and perceive usefulness as a type of extrinsic motivation.

To understand and discern between the intrinsic and extrinsic motivators of teachers' decisions to use technology will provide useful indicators towards why teachers use technology for their e-Learning practice. This resonates with outcome expectancy and self-efficacy, and personal and external impact concerns which are all individual related factors important to this study.

2.3.7 Vroom's Expectancy Theory

One of the process theories of motivation is Vroom's (1964) *expectancy theory* (Parijat & Bagga, 2014:2). This theory provides a basis to understand the concepts that encompass motivation and expectancy. These concepts are: *valence, expectancy* and *instrumentality* (Vroom, 1964:15-18) and these together are known as the Valence, Instrumentality, Expectancy theory (VIE) (Van Eerde & Thierry, 1996:575).

The first concept, *valence*, encompasses intrinsic value. This could be a sense of personal accomplishment, or of success of seeing learners succeed, or of the satisfaction of seeing other teachers taking on innovations, or of seeing your ideas and efforts taken up into the organisation, or of seeing the seeds that you planted begin to take root. At work here are the emotional orientations which teachers hold with respect to outcomes (rewards). It shows a discerning teacher considering what to do, based on how valuable or meaningful the desired outcome is. The valence concept can be linked to "expectancy–benefits–value relationships" (Lee et al, 2005:1097) and personal concerns of the CBAM.

A teacher's behaviour is impacted upon by the degree of probability that an output (first-order outcome) is attainable. This refers to *expectancy*, which concerns the probability that a particular act will be followed by a particular result or output (first-order outcome) (Vroom, 1964:17). Furthermore, a teacher's expectation level could be different based on the levels of confidence or skill (capability of doing) and the amount of effort expended. The expectancy concept can be linked to self-efficacy, perceived behavioural control, and to external concerns of impact.

Instrumentality in the VIE theory refers to the perceived link between expectancy and the eventual outcome (second-order outcome), that is, will an action be followed by a

result or output (first-order outcome), and will this output (first-order outcome) in turn provide the desired outcome (second-order outcome), that is, a reward of some sort that the individual desires (Vroom, 1964:18).

It may be possible to conclude that if a teacher's valence is positive and his/her expectancy and instrumentality are high, then it is possible that the teacher will be more likely to be motivated to carry out the action. Figure 2.20 shows the researcher's depiction of the basic expectancy model.

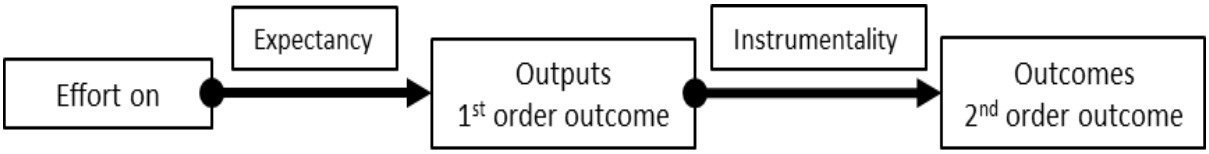


Figure 2.20: Basic expectancy model (adapted from Vroom, 1964)

Four assumptions are associated with the VIE theory. For the purposes of this study and in the context of teachers' use of technology for education, only two assumptions that are relevant are addressed.

Assumption one – conscious decision: "An individual's behaviour is a result of conscious choice" (cognitive and affective decisions) (Lunenburg, 2011:1-2). This means that teachers are at liberty to select behaviours that are best proposed by their own self-efficacy beliefs.

Assumption two – value proposition: "People will choose among alternatives so as to optimize outcomes for them personally" (Lunenburg, 2011:1-2) This means that teachers will decide what to do if this will give them the satisfaction or result that they want.

The affective and cognitive domains within a teacher work together in decision making. When viewing attitude and behavioural intent from the first instances in this chapter, we find that the first concept, that is, attitude, is effectively shaped by motivation. The attributes of innovations may be attractive, the resources may be available, the skills may be present, but it is ultimately the teacher's inner desires, feelings, thoughts and needs that ultimately prompt action. See Figure 2.21.

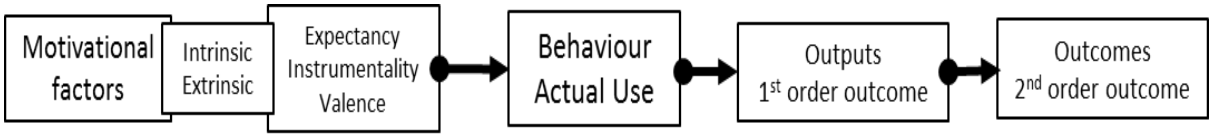


Figure 2.21: Teachers' innovation uptake expectancy

The three concepts: self-efficacy (and perceived behavioural control), expectancy, and motivation share relational aspects relevant to this study on teachers' e-Learning practices. Self-efficacy and perceived behavioural control are linked to motivation, and motivation is linked to expectancy. See Figure 2.22.

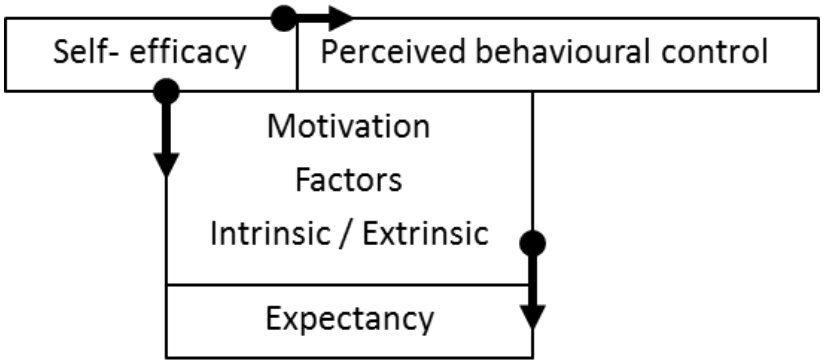


Figure 2.22: Relationships: motivation – self-efficacy – expectancy

2.3.8 Development of Conceptual Framework

The conceptual framework for this study was developed in three stages. Stages 1 and 2 focused on reconciling all theories and models reviewed in Section 2.3 with the adaptations suggested to TAM. Stage 3 synthesised Sections 2.1, 2.2 and 2.3 into a conceptual framework for this study.

Stage 1:

A matrix of the concepts from the different theories and models in this chapter is presented in Table 2.8.

The main domains have been categorised as *cognitive*, *affective* and *contextual*. The purpose of the exercise was to map out the concepts and concepts using colours to indicate the three main domains:

- *Cognitive* (cream)
- *Affective* (blue)
- *Contextual* (amber)

Thereafter the main concepts and common concepts from the various theories and models were identified and mapped to the three domains. The resultant matrix was developed as a depiction of a 'Cognitive–Affective–Contextual Adoption & Use Matrix'. (See Table 2.8.)

Table 2.8: 'Cognitive–Affective–Contextual Adoption & Use Matrix'

Focus	Underpinning	Domains	Overarching	Teachers' Individual Factors	Primary-Secondary BI influencing factor	Adoption Diffusion	TAM	TRA	TPB	CBAM	VIE	Socio-Cognitive	Sadeck					
Adoption and Use	Psychological	**Cognitive**	Behavioural changes / modifications	Normative belief	Percieved bahavioural control - external	Relative advantage	Attitude	Attitude	Attitude	Concern	Motivation: Extrinsic-Intrinsic	Motivation: Extrinsic-Intrinsic	Cognitive	Perceived usefulness	Process theories - expectancy	Vicarious learning - observation		Levels of use
	Physiological	**Affective**	Behavioural intention	Personal norms	Actual behavioural control	Compatibility	Perceived ease of use	Norms	Percieved bahavioural control	Domain - personal	Valence	Perception			Self-expectancy		Behavioural intent	Behaviour
	Sociological	**Contextual**	Behaviour	Perceptions	Control beliefs - situational	Complexity	Perceived usefulness	Behavioural intent	Percieved bahavioural control	Domain - external	Instrumentality	Vicarious learning - observation			Expectancy-capability + effort expended			Oucome 1st level
			Subjective norms	Motivation	Control beliefs - internal self-efficacy / PBC)	Trialability	Subjective norms	Behaviour	Subjective norms	Domain - social	Behavioural intent	Behavioural intent						
			Cognitive concerns	Expectancy	Behavioural intention	Observability	Behavioural intent		Behavioural intent	Behavioural intent	Behaviour = conscious choice	Behaviour	Affective	Attitude	Behavioural beliefs	Motivation: Extrinsic-Intrinsic	Instrumentality	
			Contextual concerns	Attitude	Behavioural beliefs	Seeking information - Cognitive	Behaviour		Behaviour	Behaviour	Self-efficacy	Self-efficacy		Subjective norms	Normative belief	Self-efficacy: Conviction	Valence	Outcome 2nd level
			Affective concerns	Self-efficacy: Confidence	Motivation intrinsic & extrinsic	Forming Attitude - concern			Self-efficacy	Seeking information	Effort	Attitude				Usefulness: personal-professional	Vicarious learning - trialibility	Concern: personal-task-society
			Internal factors	Motivation: Extrinsic-Intrinsic	Self-efficacy: Conviction	Choice - Accept-Reject - concern			Actual behavioural control	Personal -self concern	Value laden outcomes	Beliefs					Mastery experience - success = success	Impact: personal-learners
			External factors	Needs: personal / professional	Self-expectancy	USE - Behaviour - concern			Making associations	Use- task concern	Expectancy-capability + effort expended	Value laden						
			Situational factors	Need for control - external	Educational imperative-Forced / mandatory usage	Seek reinforcement - concern			Society	External concerns impacts	Oucome 1st level	Mastery experience - success = success	Contextual	Percieved bahavioural control		External variables		
					Emotional state / Health	Societal /peer pressure				Innovation Configurations	Outcome 2nd level	Emotional state			Actual behavioural control		Contextual concerns	Societal /peer pressure
	KEY				Societal /peer pressure					Levels fo use		Verbal persuasion				Situational factors		
	Cognitive	**Cream**			Value-laden outcomes					Impact		Vicarious learning - trialibility						
	Affective	**Blue**			Satisfaction					Oucome 1st level		External variables						
	Contextual	**Amber**			Usefulness: personal-professional					Outcome 2nd level		Content theories - needs						
					Concern: Direct-Indirect-Incident							Process theories - expectancy						
					Impact: personal-learners							Cognitive evaluation theory - cognitive processes						

Stage 2:

A schematic scheme was developed to link the concepts from the theories and models (contained in the matrix) to the suggested adaptations to TAM.

The theories were:

- Technology Adoption (TA)
- Technology Acceptance Model (TAM)
- Theory of Reasoned Action (TRA)
- Theory of Planned Behaviour (TPB)
- Concerns-Based Adoption Model (CBAM)
- Valence, Instrumentality, Expectancy theory (VIE)

The adaptations suggested to TAM were:

- Motivation
- Self-efficacy
- Benefits
- Value

Motivation, self-efficacy, benefits, value, and use were formulated as organising headings. Use was included as a heading as it incorporated the core concepts in TAM: perceived usefulness and perceived ease of use.

The concepts of *attitude*, *behavioural intent* and *actual use* from TAM were used as an anchor for the main headings. The process thereafter was to map the information from the matrix (Table 2.8) into the main headings. Thereafter the concepts in the main headings were summarised and these summaries were linked to the anchor concepts from TAM. The ensuing schematic is a diagrammatic representation of all the theories and models reviewed in relation to TAM as the underpinning theory. See Figure 2.23.

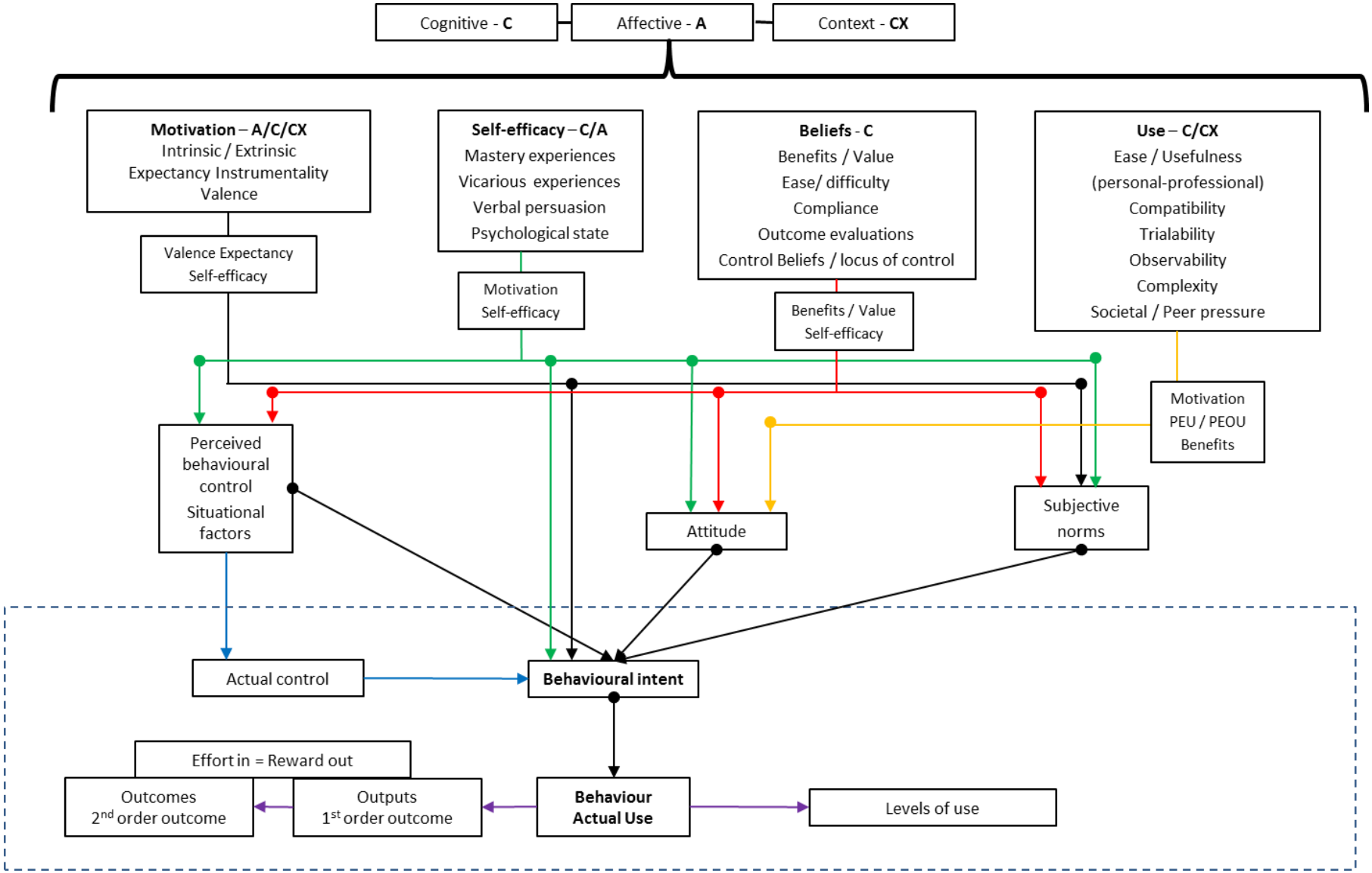


Figure 2.23: Schematic of theories

Stage 3:

The information from the matrix (Table 2.8), the schematic (Figure 2.23) and the literature reviews (Sections 2.1 and 2.2) informed the conceptual framework for this study (see Figure 2.24).

The process in developing the framework was informed in the following way:
Section 2.1 provided data on what technologies were used for and what technologies were being used by teachers. Some of the literature reviewed in Section 2.1 and the literature in Section 2.2 provided data on how technology was used by teachers. Section 2.3 provided data on the determinants of adoption and use of technologies.

These three sets of data from the reviews provided context to the three research questions.

1. **What** technologies do teachers **use** and **what** do they use these technologies **for**?
2. **How** do teachers advance their **practices** for e-Learning?
3. **Why** do teachers **adopt** and use certain technologies in their e-Learning practice?

The three questions, the *what, how* and *why*, were placed on individual axes at right angles to one another. The meeting point of these three axes shows where e-Learning practice is located. The resulting two quadrants provide the backdrop to the aim of the study which was to explore and understand teachers' e-Learning practices.

The interrelatedness of what technologies teachers use, what they use these technologies for, and how they use these technologies is located in the 'explore' (1) quadrant, and why teachers choose to do this is located in the adjoining 'understand' (2) quadrant.

The *how* axis indicates the relationship between decisions to adopt technologies and decisions on what technologies were used, what they were used for and how these technologies were used.

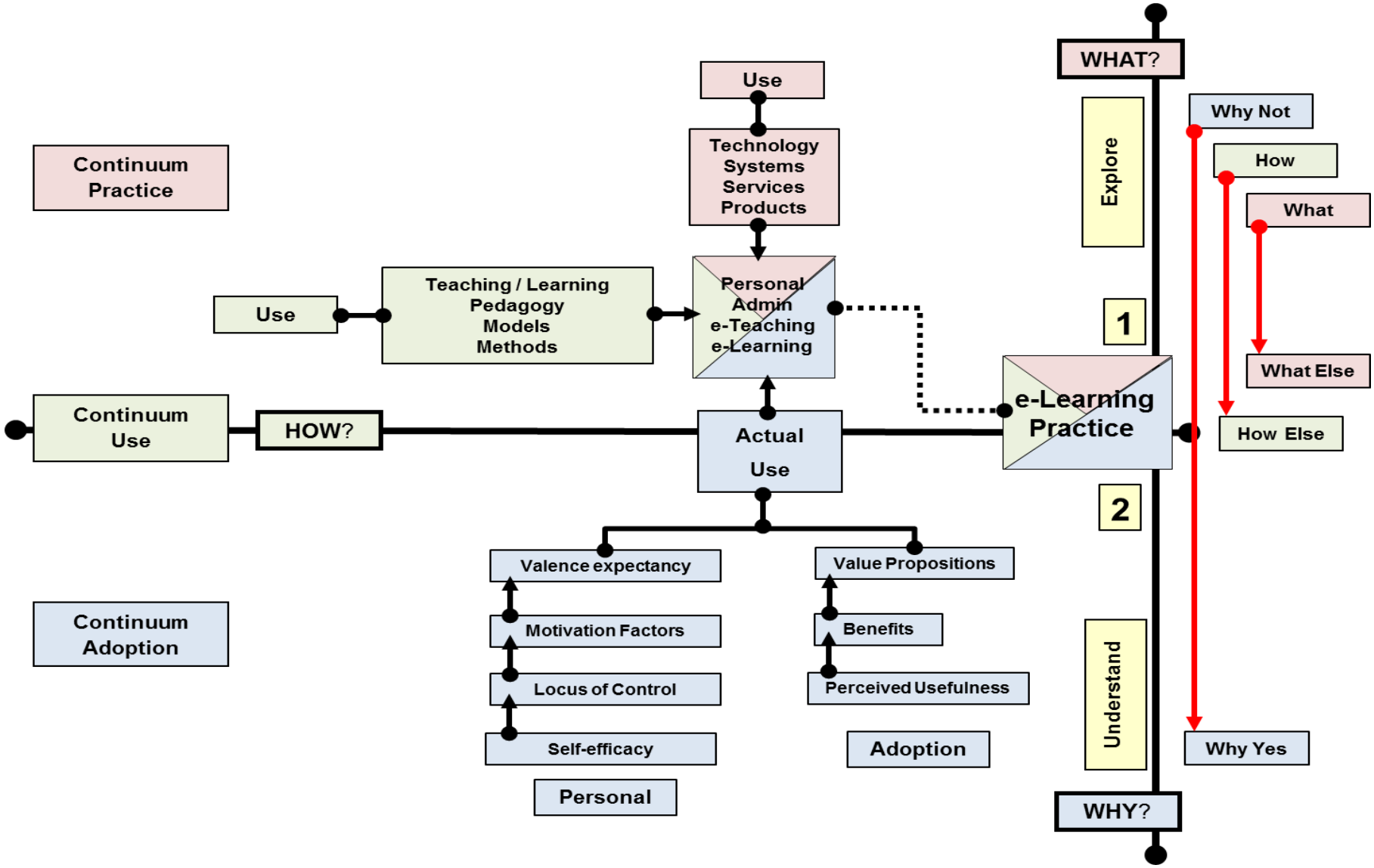


Figure 2.24: Conceptual Framework

2.3.9 Summary

The exploration of the literature was necessitated by an understanding that human action is complex and dynamic and that no single theory, model, framework, or paradigm would have been able to account for all the intricacies of this study; hence the most salient and relevant aspects from Sections 2.1, 2.2 and 2.3 were amalgamated to design and develop the conceptual framework for this chapter. Accordingly there is no one model for understanding the processes in which an individual engages before adopting a new innovation (Straub, 2009:626).

Section 2.1 showed that teachers used technologies incrementally and according to ways they were comfortable with. Use of technologies was primarily as an add-on. Practices were reported to be mainly traditional with isolated reports of emerging and innovative use.

Section 2.2 showed that the way teachers used technologies was mainly representational as opposed to generative. Elements of the use of methods and methodologies aligned with known teaching and learning theories were evident in some teachers' use of technologies. E-Learning and e-Teaching were seen to be the same as learning and teaching, with an added 'e' element. The introduction of technologies into the education process implied changing ways of work.

Section 2.3 showed the overlapping elements of adoption theories towards understanding adoption of technologies. To explore the research questions it was necessary to look at the relationships amongst the various theories. The researcher is of the opinion that no single theory could adequately explain the phenomenon. As such it is necessary to explore related theories and use a concise blend of the most appropriate elements of each. The shortcoming of TAM to address the focus of this study was highlighted and suggested adaptations were advocated.

This chapter developed, out of the existing data in the three sections, a conceptual framework to understand the cognitive decisions that teachers' make in electing to use technology for education.

CHAPTER THREE

Research Design and Methodology

Structure of Chapter Three

3.1 Introduction

Chapter 3 discusses the research design used to generate, collect, and analyse data towards addressing the research questions.

This study is ‘an exploration of e-Learning practices of teachers at selected schools in the Western Cape’. The aim of the study is to explore the patterns that emerge when teachers use and integrate technologies for e-Teaching and e-Learning, and to understand and explain why teachers adopt and use technology.

Little information is available on how teachers actually use technologies in the literature, and the previous chapter highlighted that the introduction of technologies into education implied newer ways of engaging in teaching and learning. Findings of previous research suggest that professional development and support appear to be enablers of practice. Constraints, challenges and concerns emerge as inhibiting

factors in many of the studies. The way technologies are used is incremental and bears close similarity to existing practices. As such these practices resemble traditional ways of teaching. The practice associated with use of technologies is reported as an ‘add-on’ to existing practices.

To respond to the research questions, this study includes elements of being exploratory, explanatory and descriptive. As research “is never solely explanatory, exploratory or descriptive” (Van der Merwe, 1996:287), the conceptual framework developed in Chapter 2 provides a delineation to focus the study.

3.2 Quadrants of enquiry

According to Cronjé (2013:21), if the aim of a research is to understand and explain, then the questions to ask are ‘How’ and ‘Why’. If the aim is to explore, then the questions to ask are ‘What’ and ‘How’. In this study all three questions (what, why, how) are asked, and the resultant mapping yielded the three axes placed at right angles to one another.

Based on a combination of the research question and the aims of this research, the focal point of the study is located at the intersection of these three axes (see Figure 3.1). Each axis represents the key focus of the research question. This arrangement resulted in the two focal areas – an area of exploration and an area of understanding. The phenomenon of e-Learning practice was viewed through two lenses focused on each of these areas: an exploratory lens and an understanding lens.

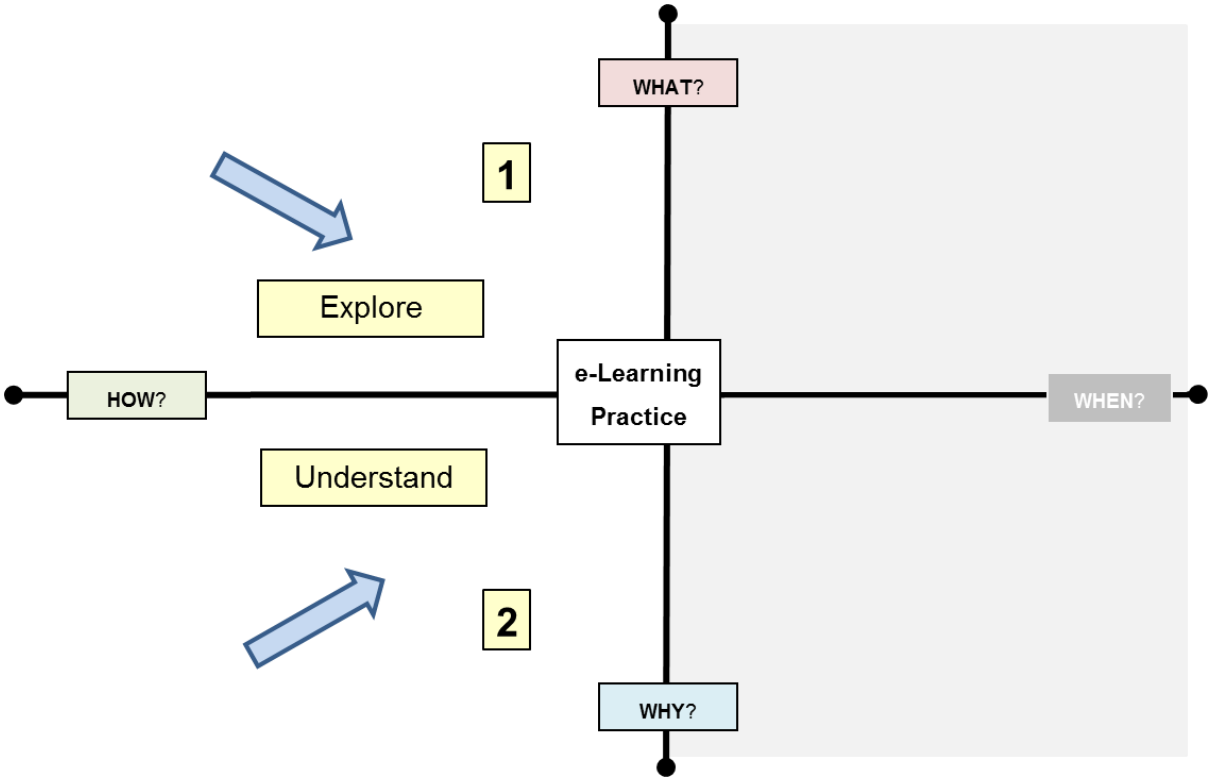


Figure 3.1: Two related quadrants of enquiry (adapted from Cronjé, 2013:20)

The 'explore' lens in area 1 explored the teachers' existing e-Learning practices. It looked at how teachers responded to the inclusion of technologies into teaching and learning. The data assisted in understanding what technologies teachers used and what they used them for. In this area use and integration (teachers' actions) related to what technologies were used and for what purpose, and were examined through elements such as pedagogy, models and methods.

The 'understand' lens in area 2 looked at individual teachers in an attempt to understand why they adopted and used certain technologies in their e-Learning practice. In this area, reasons were sought (on teachers' decisions) to help understand the decision-making processes that contributed to their adoption and use of technologies for e-Teaching and e-Learning. This involved examining the technical and non-technical determinants of their actions. It probed their technology adoption and use, and their reasons for implementing e-Learning, by focusing on reasons for their choices or preferences.

3.3 Research questions

The questions that guided the data collection are (see Table 3.1):

Table 3.1: Research questions and sub-questions

Research questions		
1. **What** technologies do teachers **use** and **what** do they use these technologies **for**? 2. **How** do teachers advance their **practices** for e-Learning? 3. **Why** do teachers **adopt** and use certain technologies in their e-Learning practice?		
Investigative question/s	**Objective/s**	**Instrument/s**
Research question 1: **What** technologies do teachers **use** and **what** do they use these technologies for?		
Sub-question 1.1 What do individual teachers use technologies for?	To understand what technologies are used by teachers and to explore the pattern of what they used these technologies for.	Questionnaire, interviews.
Research question 2: **How** do teachers advance their **practices** for e-Learning?		
Sub-question 2.1 How do teachers use technologies for teaching and learning?	To explore and understand how e-Learning models, methods and techniques are applied, that is, how teachers integrate technological, pedagogical and content knowledge (TPACK) into teaching and learning.	Questionnaire, interviews.
Sub-question 2.2 What are teachers' dependence on and interest in using technologies?	To understand teachers' orientations, experiences and perceptions of the outputs, benefits and value of the use of technologies.	Questionnaire, interviews, literature search.
Research question 3: **Why** do teachers **adopt** and use certain technologies in their e-Learning practice?		
Sub-question 3.1 What informs teachers' decisions to adopt, use and integrate technologies into their e-Learning practices?	To understand the cognitive and affective reasons for actions and decisions taken to adopt and use technologies. To understand the value that teachers attach to using technologies in their e-Learning practices.	Questionnaire, interviews.
Sub-question 3.2 How do technical and non-technical factors affect teachers' e-Learning practice?	To understand how technical and non-technical factors impact on adoption, use and practice.	Questionnaire, interviews.
Sub-question 3.3 How does support and professional development enable e-Learning practice?	To understand how support and training affects e-learning practice.	Questionnaire, interviews.

Decisions on research design and method rest on the type and purpose of the research and its view on reality. According to Babbie and Mouton (2001:75), research design focuses on the end product by looking at the research problem or question, and then determining what type of evidence will address it. Method, on the other hand, concerns itself with the actual techniques, tools and procedures that are employed.

A phenomenological orientation grounded in theory was deemed appropriate for this study. A mixed-methods approach that comprised qualitative and quantitative methodologies was used. The methodology was underpinned by the predominantly interpretivist philosophy and employed both inductive and deductive research approaches.

3.4 Research design

3.4.1 Philosophy

The research design of this study draws on the delineation, the “onion skin approach” (Figure 3.2), as suggested by Saunders et al. (2003:83).

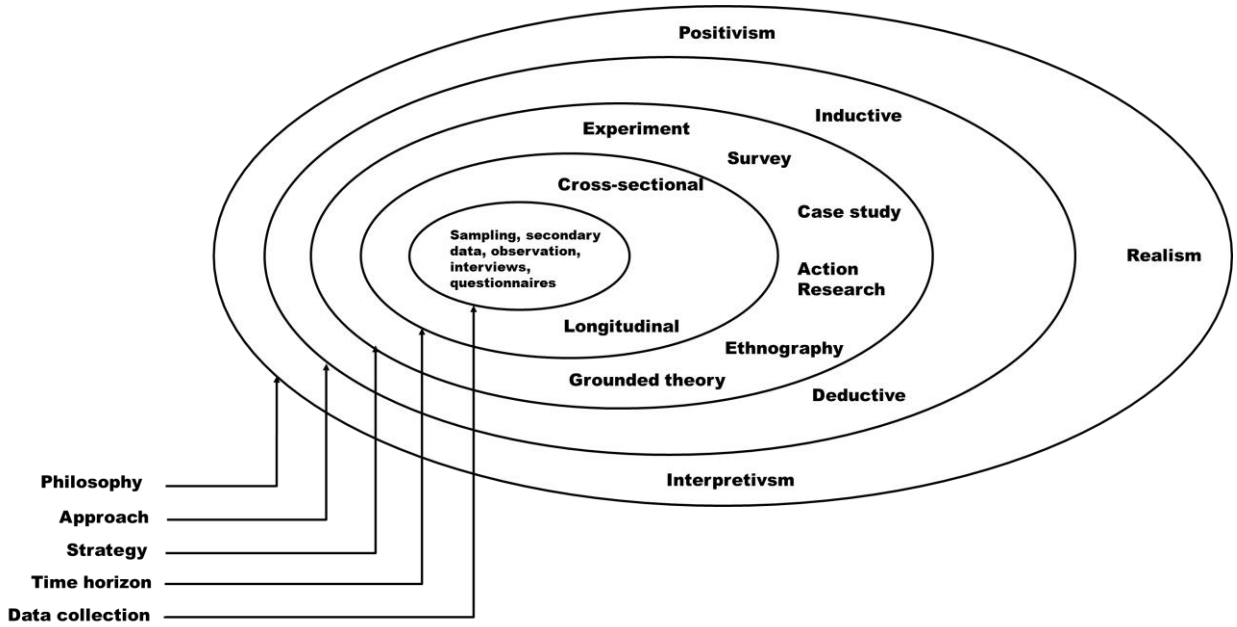


Figure 3.2: Onion skin approach (Saunders et al., 2003)

A phenomenological tradition was used to guide this study towards an understanding of the behaviour, practices and decisions of teachers in their specific practices for e-Learning. The phenomenologist emphasises that humans are engaged in the process of making sense of the world (Babbie & Mouton, 2001:28). Constructs of what people experience determine their behaviour and motivation in interaction with the world (Babbie & Mouton, 2001:29).

The epistemological ideal in this tradition focuses on understanding human action, and includes descriptions of people's meanings, perceptions and reasons as opposed to observable behaviour only (Babbie & Mouton, 2001:33). Phenomenologists generally do not attempt to rationalise or explain behaviours (Babbie & Mouton, 2001:33), as non-observable behaviours such as intention, beliefs and values, while providing valuable insights into understanding human actions, cannot be explained subjectively.

In exploring the phenomenon of e-Learning practice through the actions and decisions of the players (the teachers), this study observed the teachers' behaviour and how they understood e-Learning. It also examined their beliefs about what they were doing from their viewpoint. This dovetailed with the research purpose and was well suited to be guided by the phenomenological tradition.

3.4.2 Research methodology

3.4.2.1 Qualitative research in an interpretive methodology

In the interpretive paradigm the emphasis is on how people differ from each other (Cohen et al., 2007:9). The distinguishing features in the interpretive tradition are:

- "People act intentionally and make meanings in and through their activities" This study sought to understand why by probing the intentions of the teachers.
- "People actively construct their social world" – in this study the assumption was that the teachers were not mere followers but instead early adopters and innovators.

- “Situations are fluid and changing rather than fixed and static; events and behaviour evolve over time and are richly affected by context” – in this study the patterns of use were found to be fluid and on a continuum.
- “Events and individuals are unique and largely non-generalizable” – no attempts were made to generalise findings to a large population.
- “A view that the social world should be studied in its natural state, without the intervention of, or manipulation by, the researcher” – this study was no experimental, nor evaluative of any program. (Cohen et al., 2007:20)

Events in this paradigm are “not reducible to simplistic interpretation, hence thick descriptions…representing the complexity of situations are preferable to simplistic ones” (Cohen et al., 2007:21). A core phenomena of the interpretivist tradition is “theory is emergent and must arise from particular situations; it should be ‘grounded’ in data generated by the research act. According to Cohen et al. (2007:21) “Theory should not precede research but follow it. Hence the researchers decision to use a ‘grounded in theory approach’ that employed inductive and deductive approaches.

According to Babbie and Mouton (2001:33), the methodological implication of the phenomenological tradition is closely associated with a qualitative methodology. Qualitative methodology incorporates subjective and objective sense making in the process of understanding, describing and interpreting social phenomena (Denzin & Lincoln, 1994:44-45). The qualitative approach was selected based on the need to understand teachers’ e-Learning practices. This selection was substantiated by the research method articulated in Cohen et al. (2005:19), which maintains that the “social world can only be understood from the standpoint of the individuals who are part of the on-going action being investigated”. This study is thus accordingly aligned with the methodology of qualitative studies.

Because of the dynamic nature of human behaviour, where people constantly change and construct their own worlds, an interpretation of their actions and decisions needs to be considered to understand their world. In this research all participants represent individuals who experience things differently while they

interact with other people and technological products. They subsequently construct their own meanings through these social interactions (Merriam, 2002:3).

As this research sought to get an insider's perspective ("emic") perspective (Babbie & Mouton, 2001:53), an interpretivist approach was deemed appropriate. The researcher believed that employing this approach would assist in understanding the subjective reality of the participants, thereby leading to an understanding of their actions, intentions and motivating factors in respect of e-Learning practice. This argument draws support from the work of Saunders et al. (2003:84). Reality is socially constructed and people interpret situations differently; this results in varied behaviours. They further maintain that it is essential "to explore the subjective meanings motivating people's actions in order to be able to understand these".

This research is primarily qualitative. According to Bendassolli (2013: online), qualitative research "may aim to refine existing theories; confirm or falsify hypotheses (derived from current theories); develop new inductive theories; present counterfactual inferences (that is, cases that do not confirm one current theory); and even make inferences, in the sense of prospective causal explanations".

Characteristics of qualitative studies are that they are primarily descriptive, consisting of rich narratives and heavily laden with words that describe the phenomena. The purpose of qualitative studies "is not to produce generalizations (in terms of law-like statements) but rather to understand the phenomenon" (Bendassolli, 2013: online). The implications of this for the study are that there is a need to produce an account of practice that is typically representative of the population.

However the researcher believed that mere descriptions of teachers' e-Learning practices would not sufficiently capture an understanding of the underlying reasons behind their actions. This is supported by Bendassolli (2013: online), who states that qualitative research which is merely descriptive "runs the risk of being purely descriptive and its explanation just an abbreviation for situated empirical observations". To address this, the research drew on literature that provides a rationale for the blending of description with interpretation.

In some studies mere descriptions are not considered sufficient and the researcher usually attempts to determine why a particular phenomenon exists and what the implications of this might be (Babbie & Mouton, 2001:80-81). Accordingly, to uncover, understand and learn how individuals interact in their world and what it means for them, researchers reconstitute from an individual's insider view, and this requires an interpretive approach (Merriam, 2002:4; Laverty, 2003:26). This implied that in this study the best way to obtain data would be to hear from the participants themselves in a conversation. This was preferred rather than through testing or observations where a researcher might bring subjectivity to the interpretation of the teachers' actions.

In this research there was a compelling case for a deeper understanding of teachers' e-Learning practices. These were to understand, describe and interpret aspects related to the teachers' actions, which are stated as goals of qualitative research (Cohen et al., 2005; Denzin & Lincon, 2005; Leedy & Ormrod, 2005). There is however no clear-cut boundary determining where descriptions end and where interpretation picks up. A natural linking relationship exists between the two, which according to Finlay (2008:11), are points on a range.

Reporting on the e-Learning practices of teachers would have been essentially descriptive, but reporting on why teachers choose these methods or why they formulate intentions to use and integrate technology in their e-Learning practice is explanatory (Babbie & Mouton, 2001:81). Given the nature of the data gathered in this research, describing the phenomena inevitably necessitated a level of interpretation which was achieved through iterative inductive and deductive reasoning.

3.4.2.2 Inductive and deductive approach

It was stated that a mixed-methods approach of qualitative and quantitative methods was used. The difference between the two that should be noted is that qualitative research is considered inductive and quantitative research deductive. However

induction and deduction on their own are inadequate to base compelling arguments on in this complex study of e-Learning practice.

Induction, a characteristic of qualitative research driven by observation, does not elicit actual proof. On the other hand, deduction, by the nature of its logic driver, provides proof but does not base this on the real world through observation. This perceived dichotomy creates a tension in deciding on an approach for a study. The researcher elected to use mixed methods to harness the richness of the two approaches and to address internal validity.

The focus of this study is on what the participants do in e-Learning and why they elect to do this. To achieve this, the researcher found it necessary to employ both inductive and deductive reasoning which is aligned to Babbie's (2010:23) wheel of science. Van der Merwe (1996:279) refers to this wheel of science as the "cycle of scientific enquiry" (See Figure 3.3 below).

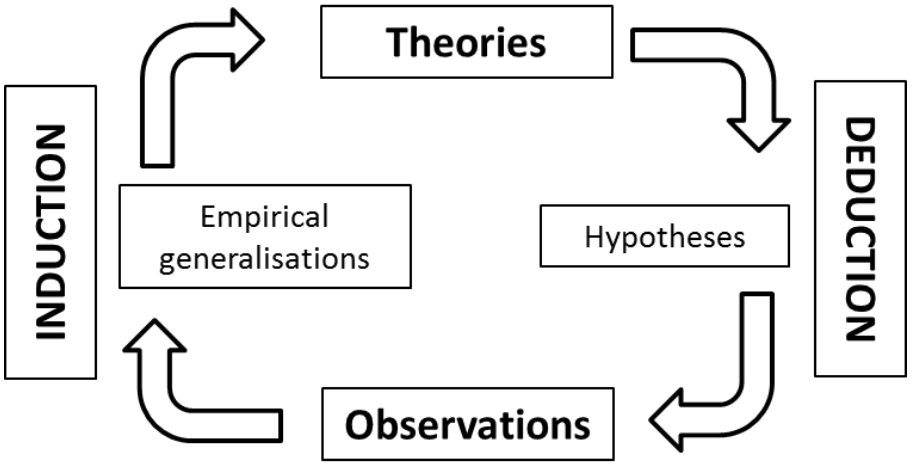


Figure 3.3: Cycle of scientific enquiry (Babbie, 2010:23, as adapted by Van der Merwe, 1996:279)

In the implementation of this study the researcher used an iterative approach, progressing from the known to the unknown and looping back. This dual approach, according to Mouly (1978:5) is "a back-and-forth movement" where a researcher "operates inductively from observations to hypotheses, and then deductively from these hypotheses to their implications" to "check validity from the standpoint of

compatibility with accepted knowledge" (Cohen et al., 2005:4-5). This is referred to as the constant comparative method typified in the grounded theory tradition (Glaser and Strauss, 1967). This was particularly useful for the researcher to listen to the teachers and check what this represented in terms of the teachers' beliefs. It further allowed the researcher to validate the teachers' reality against known theories and for a theoretical concept to be tested against the teachers' actions.

The deductive approach is based on a premise where a theory and hypotheses are developed and a strategy is designed to test the hypotheses. To understand why something is happening, according to Saunders et al. (2003:90) is deductive. This enables "researchers to make deductions from existing theories about the phenomena under investigation" (Van der Merwe, 1996:279). This does not presuppose that theory comes before data. Instead there is a relationship between data and theory, as empirical data may yield unexpected events and phenomena which may not be explainable through a theory. The richness of the product of relationship between theory and data is that it enables a theory-building process.

In this study the researcher needed, as a baseline, to determine what technologies teachers used, what they used these technologies for, what factors influenced their use of the technology, and their levels of uptake of technology. A survey questionnaire was used that drew on the constructs in technology adoption and diffusion theories. The researcher believed that such a questionnaire would provide data that could be measured statistically and further inform the design of leads and probes for the interviews.

The data from the survey questionnaires would yield proof in numbers and this could be interpreted using frequencies to show trends and patterns. Hence in this study the quantitative method using a deductive approach was deemed suitable. Employing the deductive approach in this research assisted in providing a frame of reference for the analysis and interpretation of the data.

The inductive approach conversely begins with data that has been generated, such as through interviews and observation. These are categorised and coded and, trends and patterns are sought as they emerge. These codes from the data are referred to

as “substantive codes which are developed during the open coding stage” (Bendassolli, 2013: online). An additional process of logically determining what theory or theories could explain the data is undertaken. In such cases the coding is known as theoretical codes, referring to the formal categorisation inherent in the specific theory (Bendassolli, 2013). The inductive approach tends to use small samples and is well suited to qualitative data. The sample size of this study is discussed later in this chapter.

To generate this data, interviews were used to elicit teachers’ perceptions on e-Learning and what drives them to use technologies for education. Interviews are one of the common methods of data collection in qualitative research, in inductive data gathering and in the grounded theory tradition (Glaser & Strauss, 1967; Bendassolli, 2013). The resulting data provided the basis for identifying trends and patterns. This was then used for linking with known theories that expound on the theoretical reasoning or underpinning aspects related to the actions of the teachers.

Electing to use the inductive approach as the qualitative method allowed the researcher to look for links, patterns and relationships in the data which, according to Van der Merwe (1996:279), “is useful in guiding subsequent data collection”. Details of the data analysis process are set out later in this chapter. Babbie’s (2010) wheel of science referred to as the “cycle of scientific enquiry” (Van der Merwe, 1996:279), is congruent with the "generic analytical cycle" (Bendassolli, 2013:online), which assumes qualitative research to be a cycle of induction and deduction. Accordingly Bendassolli (2013: online) notes that “researchers deductively draw upon concepts from an extant theory in order to explain, accommodate or embed their emergent substantive theory (the theory they were able to ground in their data)”.

In this study the creation of new knowledge through abduction comprised combining identifiable elements that emerged from theory with elements from the data. Abduction in the context of this study is taken to be a form of inference through which previously unrelated elements are subsequently suggested to be related.

3.5 Research method

3.5.1 Mixed-methods

This research was not strictly confined to one particular method or strategy as the nature of the phenomena under investigation and the dynamics of the situation warranted adaptations. In this study a sensible, selective blend of qualitative and quantitative approaches, explanatory and exploratory, and inductive and deductive techniques was employed. A mixed-methods approach, according to Onwuegbuzie and Leech (2006:474), is research that involves collecting, analysing and interpreting quantitative and qualitative data in a single study. This supports the contention of Neuman (2002:30) that some techniques are more effective when addressing specific kinds of questions and topics.

Quantitative and qualitative research each has inherent strengths and weaknesses (Bowen, 2005:209). Qualitative research is considered subjective and comes to rely on the researcher's personal interpretations. This could increase the chances of bias. The findings in qualitative research are difficult to generalise to a larger population. Quantitative research on the other hand is scientific in that it seeks empirical, testable laboratory-like evidence. Such evidence would not have sufficiently factored in an understanding of the contextual realities of the teachers in this study.

However, "the possible gains achieved by mixing methods in evaluation are great" (Greene et al., 2001:41). This thinking is also maintained by Schram and Caterino (2006:23) who note quantitative methods may be used jointly within a qualitative framework. In the process of qualitative data collection, simple statistics are generated naturally, and these can be quantitatively coded. Qualitative studies furthermore may focus on in-depth descriptions of individuals, an event or social situation. They may also describe frequencies and dependencies of variables in samples or correlation studies. The descriptions may then be narrative or statistical reports (Babbie & Mouton, 2001:81).

The mixed-methods approach to this research sought to capitalise on the strengths of each method to provide understandings of the statistical occurrences of the factors in the e-Learning phenomena. The research is however dominated by the qualitative method in the phenomenological tradition as it sought to understand teachers' reasons for their e-Learning practices. The decision to employ a qualitative-laden method through an interpretivist design was prompted by a need to facilitate an in-depth study of the phenomena as well as the research focus, which was to explore the individuals' perceptions and the meanings they assign to their actions (Merriam, 2002:3).

The statistical data from the survey and interviews were used to support the qualitative data collected during the interviews and assisted in elaborating on factors related to technology adoption, behavioural intent, attitudes and perceptions relating to e-Learning. The use of the mixed-methods approach was thus deemed suitable for this study as the qualitative and quantitative methods using both inductive and deductive reasoning could co-exist without being considered polar opposites.

3.5.2 Case study

This research is a case study that deals with individuals' current subjective reality of their world. The case-study approach was selected in order to gain a rich understanding of the e-Learning practices of participants in their own context. Case studies are suitable when the contextual factors of the issues are critical, a researcher has no control over contextual factors or events (Hitchcock & Hughes, 1995:322), and when a researcher is integrally involved in the case (Merriam, 2002:4). Furthermore Hitchcock and Hughes (1995:319) note the characteristic of case studies in being able to delineate boundaries around the case such as individuals, context and time.

Given the nature of the research question and the interpretive approach adopted in this study, using a case study approach was deemed the most appropriate research strategy for this study as it provides a systematic way to collect data, analyse information, and report the results. The researcher further believed that it possessed

the relative advantage of revealing the perceptions, beliefs and concerns of the individual participants in their unique contexts, and that this would facilitate an understanding the phenomena of e-Learning practice in great depth. Using a case study is supported in this study, given that case studies investigate and report on the interactions of events and other relevant factors in the unique instance (Cohen et al., 2005:181-182).

Given the nature of the research questions, and the interpretive approach adopted in this study, the researcher believed that the use of a case study in the tradition of grounded theory would be the most appropriate research strategy for this study. Case study research does not rely on any one particular method of data collection or data analysis (Merriam, 1998:28). In the tradition of grounded research the methods used may be qualitative data or quantitative data or a mixture of the two (Glaser & Strauss,1967).

In the study, this characteristic was leveraged as support for the adoption of both qualitative and quantitative data-collection methods towards obtaining a more coherent depiction of the object of the study. It provided a systematic way to collect data, analyse information, and report the results (Strauss & Corbin, 1990). Furthermore the exploratory, interpretative and descriptive nature of this case study is an aspect that resonates with interpretive methodologies (Cohen et al., 2005:182-183).

The research was applied to singularities, that is, practicing teachers, in their natural school settings. It was bound to a particular cohort of teachers that used technology and was a snapshot in time of teachers' practices. The study was cross-sectional and multi-sited, comprising a purposeful selection of participants from different contexts, to include the idiosyncrasies of the various factors and individuals towards the whole. Given the diversity of constructs, as the responding teachers interact with the same world, a single case study would not have yielded enough diversity to observe emerging patterns as there was a need to understand the uniqueness of each particular case (Huysamen, 1994:168). The individual participants each represented a separate case. These multiple cases then contributed to the single research aim of understanding e-Learning practice.

This approach allowed for comparison and contrast so that emerging patterns and relationships could be identified (Cohen et al., 2005:169). The relevance of the qualitative procedure in the case studies is provided via the interplay between the grounded data and known theories. This is justified in comparing of cases and coding of factors inductively (from data) and deductively (from theory) towards central themes and abstract constructs not previously recorded. Without this the study would merely have reported empirical data with no relevance or connection to theory or the phenomena of e-Learning practice (Bendassolli, 2013).

Case study research is however subject to criticism as a result of its heavily laden contextualised nature, inability to be statistically generalised and lack of transferability of findings to other cases. The sample in this study was relatively small (15 interview participants and 76 survey respondents) and contextually bound to the Western Cape. This could have been considered contextually heavy and its findings not easily transferable to other studies. This notion is supported within the qualitative research paradigm where, owing to the contextualised nature of the data, claims are not generally made that the findings simply can be transferred to other contexts or cases (Babbie & Mouton, 2001:277).

The counter to the notion of generalisability is that while some literature cautions against generalisations owing to the contextualised nature of the data, this study has found in its literature review (and in its own data analysis) that a range of other variables in a study might provide a case for 'fuzzy' generalisations or even speculations that may be applied to other similar contexts, situations or samples (Bassey, 1999:46,72; Stake, 1995:85-86; Yin, 2003:15). Dzakiria's (2006) criticism of this notion of fuzzy generalisations is that it indicates uncertainty. There is a possibility that if something exists in one case at a given time it may or may not also exist elsewhere at a different time.

However Adelman et al. (1980) suggest that case studies allow for generalisation. Nisbet and Watt (1984), on the other hand, maintain that case studies cannot be generalised. In keeping with this argument, Stake (1978:6) refers to "naturalistic generalisations" where "similarities" between cases or units of analysis are the

starting point as opposed to “generalising to entire populations”. Transferability or generalisations as noted by Babbie and Mouton (2001:277) and Cohen et al. (2005:184), depends largely on the reader or receiver of the information and the contextual situation at hand.

In this study no active attempt was made to generalise the findings. The resulting findings (in this study) may not fully support extensive generalisations but present contextual findings of repetitive events, which could continue until the opposite is found. This is based on the well-known analogy of Popper (1959) who noted that because we observe that the swans we see are white, we assume that all swans are white, and this thinking does not allow us to assume that there could be a black swan. In this study the generalisability value is high, given that the number of observations in multi-sited contexts yielded data that allowed inferences from the empirical data (particular) to the theoretical (universal) (Bendassolli, 2013).

What was found in this study at this given time could be the same elsewhere until other findings on e-Learning practice are found and these could be validated or rejected in further research. The issue of generalisations or transferability addressed in this study as related to trustworthiness is discussed in the section on validity and reliability.

3.5.3 Sampling

This research used purposive sampling of participants and applied the snowball methodology. This was to obtain the participants best suited to participate in the research, that is, those that were deemed best placed and knowledgeable to provide reliable and rich data. An advantage of using purposeful sampling is that it can be applied to small groups of people as was the case in this study (Merriam, 2009).

The aim of being selective of the sample lay in the need in this research to obtain information that was rich in its contributions towards the research questions. As the researcher had knowledge of the population and the e-Learning arena of the Western Cape school education, the main sample for the interviews was selected

based on a key criterion of practising teachers who were using technology in their classrooms. This was to ensure that the purpose of the research and the research question, that is, the e-Learning practices of teachers, could be addressed.

The value of purposive sampling, according to Bless et al. (2006:95), is if the researcher knows the population and has knowledge of the research field. Babbie and Mouton's (2001:166) thinking is likewise aligned when they propose that it is appropriate to handpick a sample based on a researcher's knowledge of the discipline, the aims of the study, and a good knowledge of the available population. Merriam (2009:77) further adds that the value in purposive sampling is that a researcher gets to select the cases from whom the issues of the study can be learned.

A danger highlighted by scholars about purposive sampling is that it relies on the subjectivity of the researcher and could lead to bias. One of the ways in which this possible bias was addressed was by administering the survey to all respondents within the Western Cape and across the other provinces in South Africa. These respondents were those who would have had the potential to be users of technology in their classrooms, thereby providing a fair chance of selection. When the boundaries of the research were expanded by including participants outside of the Western Cape, the main selection criteria were adhered to. Opening up the research to participants beyond the Western Cape was prompted by the need to test the validity of the instruments.

Snowball sampling, according to Huysamen (1994:44) and Babbie and Mouton (2001:167), entails the use of the initial participants in a study acting as advisors of other potential people within the same criteria as the original sample, to be included in the research. This process of referral can then continue to include other potential respondents. In this research the methodology of snowball sampling was applied to complement the purposeful sampling.

The initial selection of respondents was done by the researcher. This was supplemented by approaching the e-Learning advisors in the various districts to identify people in their districts that met the sampling criteria mentioned earlier.

When the boundaries of the sample were expanded, the snowball methodology was applied by requesting the participants already included in the study and approaching people who responded to the survey outside of the Western Cape.

3.5.3.1 Sample saturation

A number of issues can affect sample size in qualitative research. Samples for qualitative studies are generally much smaller than those in quantitative studies. However, a guiding principle in qualitative studies should be the concept of saturation, which is likely to occur early with large samples in qualitative research. According to Glaser and Strauss (1967:40), qualitative studies ought to follow the concept of saturation, that is when, the "collection of new data does not shed any further light on the issue under investigation".

It was understood that each participant in this study would possess his/her own opinions and beliefs, and that the sample in this study ought to be of a size sufficient to harness most or all of the opinions and beliefs. If however the sample identified in this study was too big, subsequent data collected could become repetitive and eventually, superfluous (Mason, 2010). In the context of this study the possibility existed that a large amount of data could be collected that was repetitive.

The selection of a small sample is supported by Ritchie et al. (2003:83) who maintain that there is "a point of diminishing return to a qualitative sample … as the research goes on more data does not necessarily lead to more information". It may lead to more statistical occurrences and give you more of the same. Strauss and Corbin (1990) believe that the concern with saturation should be when more data becomes *'counter-productive'*, that is, what is discovered as new does not shed light on the issues at hand or contribute to the research focus and goals.

Furthermore Guest et al. (2006) maintain that "a high level of homogeneity among the population" may be sufficient "to enable development of meaningful themes and useful interpretations" (Guest et al., 2006:78). The common thread of characteristics of the participants in this study was: they were all practising teachers, all were known to be using technology in their classrooms, they had exposure to training

programmes in the WCED, they had access to digital resources and content, and benefited from the same support structures. Their selection was based on purposeful sampling as they were considered to be in a position to provide rich data related to the use of technology in the classroom. It was found after the first few interviews that similar information began to surface and that the same trends were beginning to emerge.

3.5.3.2 The sample, unit of research and unit of analysis

The population from which the sample was drawn represents approximately 15 000 teachers in the Western Cape who had received ICT training. They represented a cross-section of age, teaching at different types of schools, level of schools and location of schools. The purposeful sampling sought out teachers who were known to be regular users of technology. The sample in this study comprised 15 participants that included the following:

- Nine men and six women.
- Teachers from five high and nine primary schools.
- Teaching at twelve ordinary mainstream and two special schools.
- Teachers from one private and thirteen public schools.
- Teachers from schools in six rural and eight urban settings.

E-Learning practice was the unit of research and the unit of analysis was the actions of individual teachers. Although the individual teachers were part of a group representative of practising teachers, the focus was on individuals and not on the group that may be located at the same or similar schools. A further expansion on the unit of analysis was the individuals' "orientations", that is, opinions, attitudes, values, and preferences, and their "activities", that is, use of technologies, decisions to use, reuse, and e-Learning practice (Van der Merwe, 1996:285).

The next section discusses the instruments and research procedure inclusive of the data-collection process.

3.6 Research procedure

3.6.1 Research procedure and data-collection process

Collecting data is an integral part of the research process which requires tools that are often referred to as the instruments. The instruments and method used in this study were informed by that which would be most effective in providing the data required (Maxwell 1996:92). The process of collecting data was aligned with the grounded theory approach of Strauss and Corbin (1990).

Exploring the unit of analysis using multiple instruments enhanced reliability. The instruments used in this study were:

- Survey: online structured questionnaire.
- Individual semi-structured interviews.
- Literature reviews.

Research procedures were conducted in four stages.

- The initial stage was an exploration and analysis of literature relating to e-Learning locally, nationally and internationally (see Chapter 2).
- The second stage was the design and administration of the survey to generate data on teachers' use of technology and to elicit their perceptions on e-Learning. This stage looped back to include relevant elements in the literature reviews.
- In Stage 3, theoretical sampling was applied. Two pilot interviews were conducted to test the interview leads and questions and to attend to issues of reliability and validity. This stage iteratively revisited the initial literature (specifically theory) and the survey findings in the second stage.
- Stage 4 incorporated the face-to-face interviews with the whole sample using the finalised interview instrument. The building from the survey data, the concepts from theory and the new data from the interviews progressed Stage 4 towards the final data set in this study.

3.6.1.1 Stage 1: Research procedure: literature reviews

The literature review stage was an exploration and a search of e-Learning-related literature. These included:

- Previous research on e-Learning and technology in education.
- Codified literature on e-Learning.
- Literature on technology adoption and diffusion.
- Documents such as the South African Department of Education (DoE) White Paper 7 (DoE, 2004) for e-Education, DoE (2007) guidelines for teacher training and professional development in ICT, Western Cape Government e-Vision for e-Education: e-Learning and e-Teaching in schools of the future (Western Cape Government, 2012), Khanya documentation (Van Wyk, 2011), and UNESCO documentation (2002, 2008, 2011).

Cohen et al. (2007:203) caution researchers not to "simply accept" text as finite when engaging in literature analysis. They advise that as literatures are "social products" which are context bound, they should be "interrogated and interpreted". The education departments' and UNESCO literatures (ICT competency standards for teachers, 2008 & 2011; Information and communication technology in education, 2002) were used to understand the policy and high-level expectations for e-Learning. This was deemed vital as previous research speaks of a mismatch between policy and implementation.

The review and exploration of these literatures focused primarily on the concepts of e-Teaching, e-Learning, implementation of e-Learning, developmental stages of implementation, and practice in e-Learning. The analysis and interpretation of these literatures were to discern the tangible aspects of implementation, integration and use of technologies for e-Learning and e-Teaching. These were specifically the developmental levels of use of technologies, e-Teaching and e-Learning expectations, professional development and training expectations, and how e-Learning was expected to be implemented.

The information from the literature reviews informed the conceptual framework and research questions of this study. The survey instrument and interviews were designed based on selected aspects from this information.

3.6.1.2 Stage 2: Research procedure

The instrument used was a survey questionnaire that was administered online.

A survey study was conducted to inform aspects of the study on teachers' e-Learning practices. The purpose of the survey was to inform and refine the pilot interview instrument, which in turn was used to refine the final interview schedule of semi-structured interview leads and questions. A set of 35 structured questions was developed for the survey. The survey instrument is available in appendix F. Multiple-choice questions in the survey emanated from discussions with teachers and some questions were drawn from existing TAM questionnaires. The survey collected biographical and demographic information, participants' personal and professional use of technologies and social networking services (SNS), motivational and challenging factors in implementing e-Learning, and their perceptions, opinions and beliefs on e-Learning. The data set is available in appendix H.

The survey was conducted online in a Moodle Learning Management System (LMS). Participants who were involved with ICT integration training at schools in the Western Cape were invited to take part. Trainers of these ICT integration training courses were invited to respond as well. The researcher felt that the WCED respondents mentioned above would be suitable respondents at this stage, based on the assumption that they had been exposed to training and could be using technologies at their schools.

Further to this the researcher approached SchoolNet SA to extend the survey to potential respondents from its members across South Africa. The decision to approach SchoolNet was based on an understanding on the researcher's part of the training and programmes that SchoolNet offered. The WCED training was known to be similar, as some of the courses offered by the WCED are from the SchoolNet

programme. The researcher believed that this would provide a fairly homogeneous population responding to the survey.

The researcher had access to the database of the WCED individuals who had attended the training programme. The process with SchoolNet was that they would send out the invitation to participate in the survey themselves. This was agreed to owing to the sensitive nature of the SchoolNet database of members. The survey was open from May 2013 to July 2013. Seventy six responses were recorded. The results are discussed in Chapter 4. Initial codes and themes began to emerge from the survey instrument, which could be mapped to theory, and some were found to be new. This information was used in the next stage to inform the pilot interviews.

3.6.1.3 Stage 3 Research procedure: pilot face-to-face semi-structured individual interviews

Following the survey stage, pilot interviews were conducted with two respondents, one each at a high and a primary school. In considering this sample, the researcher purposefully selected schools where it was known that technologies were used by the teachers, that similar technology was available, and that the initial ICT training to the teachers was the same.

The purpose of the pilot interviews was to test and refine as necessary the final interview leads and questions. This was to improve reliability and validity of the interview leads and questions to be used. The test and refinement were to elicit qualitative feedback on the following:

- Time taken to complete the survey.
- Chronological suitability of leads and questions.
- Clarity of leads and questions.
- Validity of leads and questions – did they elicit that which was relevant?
- Was the interview reliable in terms of the ability to administer it to another respondent?
- Could suitable results be obtained?

In the interviews, the open-endedness of the leads and questions afforded the respondents opportunities to respond from their personal viewpoints and experiences. The leads and questions were designed to obtain detailed inputs of teachers' perceptions, opinions and accounts of their work. They were asked:

- to share what they were doing in their classrooms and to describe their own successes with using technologies,
- to share their personal development stories of using technologies,
- to share why they chose to adopt and use technologies for their work,
- to reflect on what they felt was not happening in e-Learning, and
- to share what they felt was necessary for e-Learning to happen.

When analysing the pilot interviews, special note was taken of two aspects: the process and the product. In terms of the process, the researcher noted the time taken, the number of leads and questions that required clarity, and the points at which additional probes were needed. The interviews were recorded digitally and transcribed verbatim (see appendix G). An initial analysis was done to check validity, that is, did the responses provide useful data relevant to the research.

The reliability check came in the second pilot interview to check if the same leads and questions would provide similar data. Initial categories, themes and codes that emerged from the data were recorded. These were then cross-referenced with the clustered survey questions and the codes and themes that had emerged in the preceding stage. Face-to-face discussions with the pilot respondents were undertaken for feedback and suggestions for those aspects of the interview leads and questions that they felt needed editing and changing. Modifications were then done to the leads and questions, and coding instruments. Issues validity and reliability, and ethical considerations are set out in sections 3.8 and 3.9 respectively.

3.6.1.4 Stage 4: Research procedure: face-to-face individual semi-structured interviews

The next stage of data collection comprised the main face-to-face semi-structured interviews. The purpose of these interviews was to elicit insight into the adoption, acceptance and use patterns of respondents. Interviews are used to ascertain what participants think, know and feel (Henning et al., 2004:79). Interviews are one of the common methods of data collection in the grounded theory tradition (Glaser & Strauss, 1967).

Cohen et al. (2005:146, 248) state that it is popular to use semi-structured interviews as a technique in qualitative research, where a "sufficiently open-ended" schedule is prepared that allows for "digressions and expansions" and allows for "further probing". According to Cohen et al. (2005:255), "open-ended responses might contain the 'gems' of information" that might not have emanated from a questionnaire.

3.6.1.4.1 Development of the semi-structured interview instrument

The design and development of the interview leads and questions were done primarily to serve as leads to initiate the conversation during the interviews. Yin (2003:89) maintains that interviews should be "guided conversations rather than structured queries". These leads were aligned to the data that emerged from the pilot interviews, the survey instrument and the literature review. The main categories of the leads were mapped from the research questions. This was to ensure internal validity and reliability towards the research aim.

The broad categories of the interview questions and leads were:

- Adoption: To attempt to understand dependence on and interest in the use of technologies.
- Factor 1: Technical and non-technical factors. To develop an understanding of personal and professional development and support factor influences on adoption and practice.

- Practice: How teachers engage in e-Learning. To develop an understanding of existing patterns of practice.
- Factor 2: Technology push and educational pull. To attempt to understand the extent to which technology and pedagogical factors influence e-Learning practices.
- Motivation: Reasoning behind decisions to integrate and/or use the different elements for teaching and learning. To attempt to understand perceived value, benefits and other emerging aspects.

3.6.1.4.2 Semi-structured interview process

The selected participants (as set out in the section on sample earlier) were approached for an agreed date, time and location for the interview. The researcher was initially limited to practising teachers in the Western Cape. Having interviewed participants in the Western Cape, the researcher extended this to some participants outside of the initial boundary. It was envisaged that the value add would be an understanding of the data by examining teachers whose context, access and training may have been different. Gaining an understanding of the e-Learning practices and motivational factors of these respondents would add richness to the data. This decision is aligned with Huysamen (1994:169) who states that sometimes a researcher in a study may find it necessary to adjust the boundaries of the sample.

The additional participants, outside of the Western Cape, responded to the interview leads and questions online. The online interviews were e-mailed to participants. The drawback of this was that the researcher could not probe responses. The researcher did however request clarity on some of the responses.

The interviews ranged from between 45 minutes to 1 hour and 15 minutes. These were conducted in their natural setting, that is, at their schools and in some instances in the classrooms where teachers plied their trade. All interviews were conducted in English, and respondents were encouraged to respond in the language of their choice. Some of the respondents did respond in Afrikaans. The researcher did punctuate the interview with Afrikaans for these respondents. The researcher

believed that the respondents would be more comfortable in their mother tongue and be able to express themselves more clearly and freely.

After introductions, the purpose of the interview was explained and the approximate duration of the interview was stated. The letter of approval to conduct research was made available to the respondents. Respondents were first asked if they agreed to be interviewed, and as the interviews were to be recorded, the respondents were asked if they agreed to this as well. The anonymity of the respondents was assured.

The hard copy of the interview schedule of each respondent was used to record field notes as the interview progressed. These notes were used during the interview to seek clarity, and at the analysis stage these notes supplemented the data analysis.
The face-to-face interviews allowed the researcher to engage in a conversation with the respondents using leads and allowed further probing of the respondents for expansion of responses and in some cases for clarification. The flexibility of the semi-structured interview allowed the researcher to re-phrase or clarify questions. A summary of the data-collection process is shown in Figure 3.4 below. It represents graphically the four stages expounded on above.

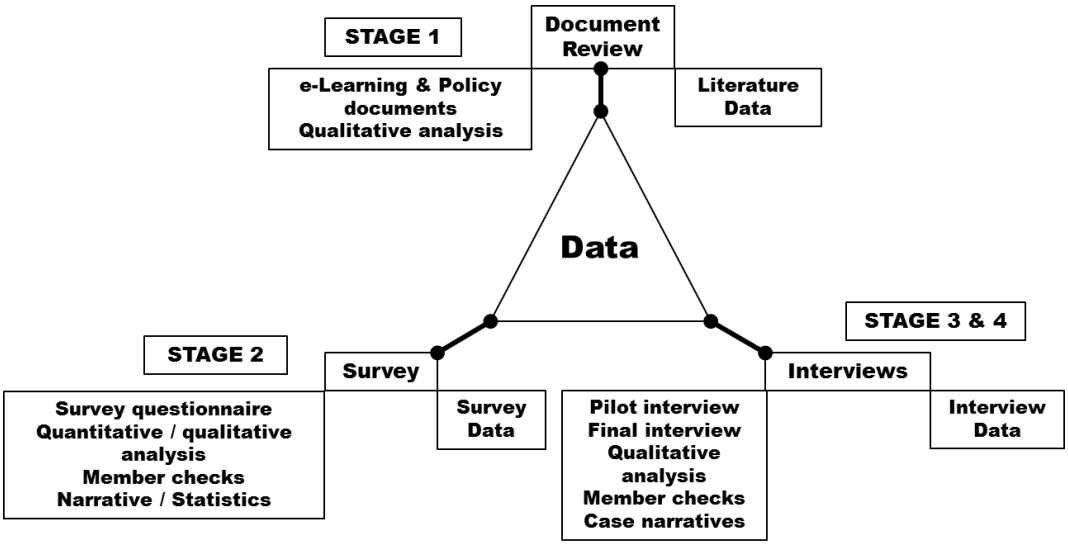


Figure 3.4: Data-collection process

3.7 Data analysis and reporting

In the process of analysing the data, the researcher began with a wide angle lens, using iterative processes of sorting, sifting, reviewing and reflecting, with the purpose of identifying salient features, noting patterns, themes, categories and regularities that emerged (Parlett & Hamilton, 1976, cited in Cohen et al., 2005:147-148). The process of gathering and analysing data began with the first stage during the literature reviews and at all points in the different stages. This notion is supported by Neuman (2002:420) who asserts that in qualitative research analysis begins early so as to seek out relationships and patterns.

According to Babbie and Mouton (2001:490), there is “no one neat and tidy approach to qualitative data analysis, nor even one approach”. Babbie and Mouton (2001:53) further assert that analysis of qualitative data emphasises grounded theory and other more inductive analytical strategies. Given this, a content analysis approach which was informed by the grounded theory of Strauss and Corbin (1990) was employed in this study. The codes themselves derived from the empirical data responsively instead of being pre-determined.

Literature abounds with terminology related to data analysis. In the context of this study, particular meanings have been attributed to certain words and phrases. The following paragraphs refer to these words and phrases:

Cohen et al. (2005:148) speak to a sequence of seven steps in data analysis. Step 1 is noted as “establish units of analysis of the data, indicating how these units are similar to and different from each other”. The ‘units’ in this study were established by ascribing ‘codes’ to the data. The codes emerged from the data and were words and acronyms describing what they represented. Open coding was used by coding the responses, sometimes by paragraph and sometimes by sentence and word (Babbie & Mouton, 2001:500). It was the relational aspects among the codes and among the clustering of codes that provided coherence to what was emerging in the study.

In step 2, a researcher is to create a ‘domain analysis’ and in step 3 establish relationships and linkages between the domains. This requires grouping the units

into domains, that is, into “clusters, groups, patterns, themes and coherent sets to form domains**”** (Cohen et al., 2005:149). In this study the term ‘cluster analysis’ was used to represent domain analysis. A notable feature of clusters is that they should contain internal coherence, that is, the codes in the cluster should be similar to one another. The codes in each cluster ought to be different in some way from codes in another cluster. The different clusters themselves may or may not be found to have relational links.

Two additional terms are used in this study: ‘families’ and ‘networks’. These emanate from the ATLAS.ti software that was used during the qualitative analysis process. The term ‘families’ refers to themes, that is, the clustering of codes. The term ‘categories’ refers to a group of themes, and the term ‘network’ refers to the relationships regarding the themes and the codes that they contain.

The highest level categories in this study were taken to be ‘technical’ and ‘non-technical’. Each of these categories was associated with a group of themes. The themes represented a cluster of codes. The codes themselves were the atomised units. Refer to Figure 3.5.

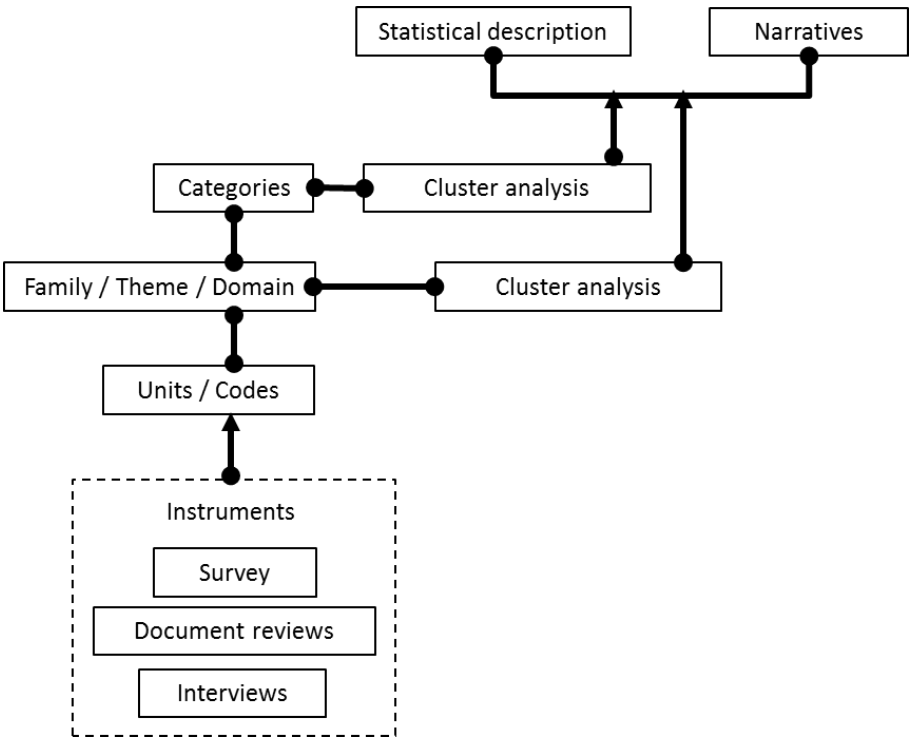


Figure 3.5: Categories, themes and codes

The data analysis process of the qualitative data was to inductively atomise and assign codes to the data under the most relevant themes and categories. Initial codes and themes were gleaned from the theory of technology adoption and diffusion, motivation, self-efficacy and expectancy deductively, with additional themes emerging from the data.

Analysis was undertaken using the ATLAS.ti computer program for qualitative data analysis. Emanating from this were descriptions which were provided as narratives. The purpose of the narrative was to describe specific characteristics related to each case, and to the main research question.

The procedure employed with the quantitative data was to reduce the data to a set of numbers and percentages. This was analysed and percentages and descriptions with inferential commentary were used to describe the emerging trends. Given that the use of the quantitative method was primarily to support the qualitative findings, this treatment of the quantitative data was believed to be sufficient and effective. This can be supported by Huysamen (1994:169) who notes that “in some instances descriptive statistics may be appropriate”.

The treatment of the data using both inductive and deductive approaches offered greater insights into links and relationships between theory and the empirical data. Induction and deduction, according to Van der Merwe (1996:279), “should not be regarded as mutually exclusive”. This is underscored by Cohen et al. (2005:5), who assert that induction and deduction are both useful.

3.8 Validity and reliability

In this study content, construct and face validity were used (Bless et al. 2006:135; Cohen et al., 2005:105). Validity is generally associated with whether the research instrument measures what it intended. Bless et al. (2006:135) maintain that unless we are sure our techniques actually measure what is intended, we cannot be certain of what the results mean.

However Cohen et al. (2005:105) state that in recent understandings of the concept of validity, it "can be addressed through the honesty, depth, richness and scope of the data achieved, the participants approached, the extent of triangulation and the disinterestedness or objectivity of the researcher". The most important types of validity are noted as content validity, criterion-related validity, construct validity, and face validity.

3.8.1 Content validity

In this study the researcher sought to investigate both technical and non-technical factors, and the sub-parts of these two broad categories that influence e-Learning practice. In social research, phenomena that are studied are complex, and comprise multiple parts. Content validity requires that for an understanding of the whole, all of these parts need to be understood. This approach is supported by Cohen et al. (2005) and Bless et al. (2006) as follows.

Cohen et al. (2005:109) maintain that an "instrument must show that it fairly and comprehensively covers the domain or items that it purports to cover". This is similar to Bless et al. (2006:136), who contend that for content validity, a researcher "must find a technique which will provide information on all its different components". In this study the researcher sought to investigate both technical and non-technical factors, and the sub-parts of these two broad categories that influence e-Learning practice.

3.8.2 Construct validity

Theories of technology adoption and diffusion, motivation, self-efficacy and expectancy were used in this study to enable construct validity. The researcher wanted to establish a link between the measurement technique to be used and known theories in the field of study, and felt that if the link were close, then a higher level of validity could be attained (Bless et al. 2006:138). Cohen et al. (2005:110) argue that to maintain construct validity, a researcher's construct of a particular issue must be in agreement with other constructs of the same issue. This they believe can be achieved through parallels with other forms of measurement of the phenomena.

In this study the researcher sought to investigate e-Learning practice in terms of the understandings of the constructs of integration, adoption, ease of use, usefulness and benefits.

3.8.3 Face validity

The interviews in this study sought to elicit opinions and beliefs about the use of technologies for e-Learning. It was thus important to ensure that the instrument used would be valid and reliable. Face validity is aligned to the overall notion of validity, that is, the plausibility of an instrument to do what it is intended to do. Cohen et al. (2005:132) note this as "that, superficially, the test appears to test what it is designed to test". The notion of "at face value" (Cohen et al., 2005:132) is echoed by Babbie and Mouton (2001:642), who state face validity as "that quality of an indicator that makes it seem a reasonable measure of some variable". The researcher has after careful design, and checking and testing of the instrument, reached the conclusion that the interview leads and questions were able to elicit the required data.

In ensuring validity in this study, an online survey, literature reviews and semi-structured interviews were the three main sources of data collection. Each of the three sources produced data which could be analysed either qualitatively and/or quantitatively. The use of many data sources to collect evidence of the same phenomenon is indicative of triangulation which increases the validity of a study (Cohen et al., 2005:112-113). In this study, methodological triangulation was used in that both qualitative and quantitative methods were employed. The quantitative analysis was used at a basic level to support the qualitative data where relevant, and to look for emerging trends.

The researcher needed to ensure that the instruments could be used with the different participants in their own context and yield similar outputs. If this could be done using the same methodology with similar outputs, then the instrument and methodology of application could indicate reliability. The notion of reliability is summed up as focusing on the consistency of measurement, that is, consistent and

replicable “over time, over instruments and over groups of respondents”; in other words, whether the same results will be achieved in different contexts (Bless et al. 2006:130; Cohen et al., 2005:117).

The researcher noted that to provide trustworthiness and legitimacy to the study, the criteria in deciding which forms of data analysis to undertake would need to be governed by their fitness for purpose (Cohen et al., 2005:82). The data was subjected to cluster analysis using both inductive and deductive techniques. Using this approach and technique symbiotically promoted insight into the phenomena of e-Learning practices.

The conventional views of reliability and validity, according to Cohen et al. (2005:129), in referring to the work of Lincoln and Guba (1985), is equated to the concept of ‘trustworthiness’. Four concepts are associated with the notion of trustworthiness.

These are: credibility, confirmability, transferability, and dependability. A similarity in understanding of trustworthiness is noted by Maxwell (1992:285) in the identification of categories of validity: descriptive, interpretive (similar to credibility and confirmibility), theoretical, generalisable (similar to transferability) and evaluative validity (similar to dependability).

The research approach to addressing credibility and confirmability was to make available the instruments and all data for scrutiny, comparison and confirmation by other researchers. This included the raw data from the survey, the leads and questions from the semi-structured interviews, the transcribed interviews, and the reference list for the literature analysis.

The analysis and discussion of the data included direct quotations from transcriptions of the interviews and from the open-ended questions in the survey. These were subjected to member checking for verification.

In this study, dependability is linked to credibility and confirmability. The reference list, and where available reference web links, are made available so that authenticity

of the study and findings can be checked. Direct transcriptions of the audio-recorded interviews and exact raw data from the survey are available. These constitute an audit trail of evidence collected during the study.

3.9 Ethical considerations

Ethical considerations are about being honest and transparent about one's research. The considerations in this study are set out in the four points below:

- Permission and consent: The first consideration was to obtain the necessary permission from the Western Cape Education Department to conduct research with participants in the schools. The necessary forms were completed and submitted to the WCED and permission was granted. A stipulation in the letter of permission from the WCED noted that participants were not compelled to take part in the research. Therefore each individual was approached to request his/her voluntary participation in the study. Verbal consent was obtained from the participants. Consent was also obtained from the principals at the participating schools. Before interviews were conducted, the participants were asked if they still wished to be interviewed and were informed that the interview would be audio-recorded. Written consent was obtained for this from the respondents who signed the interview schedule if they agreed to the interview.

- Confidentiality: Participants' privacy and anonymity were ensured. It was explained before the interview took place that no names or any means of identifying them or their schools would be used in the thesis. The survey instrument collected data anonymously.

- Honesty: No data was fabricated for use in this study. Interview transcripts were referred to participants for verification and agreement.

- Transparency: Information about the study and data collection processes was provided voluntarily to the participants and principals. The purpose of

the study was explained. A preamble was included in the survey instrument explaining the purpose of the survey. Participants were informed that the interviews would be audio-recorded. All role players were made aware that this was a private study by a doctoral student of Cape Peninsula University of Technology (CPUT) and not research on behalf of the WCED. Participants were informed that the data collected was for the purposes of the study and would neither be used beyond the study, nor given to the WCED.

3.9.1 Positionality of the researcher

Within the phenomenological tradition, a researcher is considered an integral part of a study as one of the research instruments (Merriam, 2002:4). As an individual in this study, I would have my own constructs, beliefs, attitudes and understandings. Therefore possible subjectivity on my part could surface, which could in turn influence the interaction between me as researcher and the participants (Simons, 2009:81).

Furthermore, in this study the aspect of power presented itself in that I, as the head of the e-Learning unit of the Western Cape Education Department (WCED), have knowledge of and influence in the e-Learning arena in the WCED. This is because I manage the e-Learning ICT integration training programme, am the first-level trainer of trainers, am the implementer of e-Learning in the WCED, have authored the WCED e-Vision, and have contributed to e-Learning at a strategic level. Thus relationships at varying levels exist between the participants and me at a professional level.

Within qualitative research, subjectivity and the position of power come into play, especially as it is the researcher who ultimately interprets the data. These aspects were acknowledged and strategies put in place to counter them. According to Simons (2009:81,94), to counter these, a researcher should be flexible and self-reflective.

To counter subjectivity and bias, the following were done:

- Participants and knowledgeable colleagues were included in verification and reliability checks.
- In the case of interviews and personal communication, the researcher provided opportunities for the participants to verify the transcripts. The transcripts were additionally subjected to a member check.
- The transcribed interviews were read and re-read to ensure that no information was omitted or incorrectly reported.
- Participants were given the opportunity to rectify any errors and determine if parts of the transcripts needed to be removed.

3.10 Summary

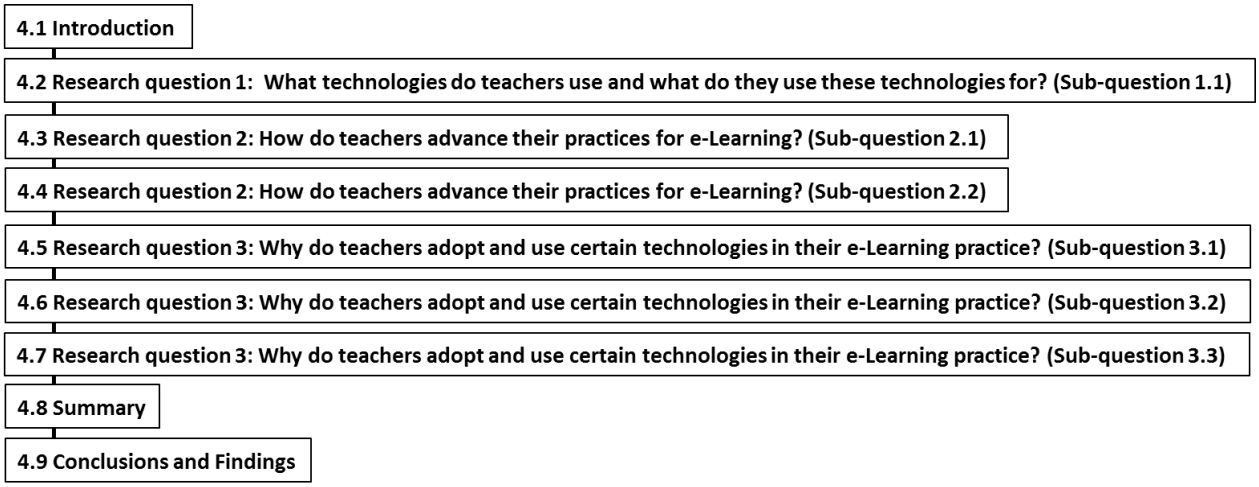
The study was underpinned by an interpretivist philosophy to gain rich insights into the complex issue of e-Learning practice at school level. A selective blend of qualitative and quantitative approaches, explanatory and exploratory enquiry, and inductive and deductive techniques was employed.

This study was aligned with the characteristics of theory building and underpinned by the tradition of grounded theory by using combined inductive–deductive methods. The research was a snapshot in time, working with a representative sample of practising teachers that used technology; being descriptive and explanatory, it allowed the researcher to conduct investigations in a focused manner.

Purposeful sampling was used. The sample comprised 15 participants for the interviews and 76 respondents for the survey questionnaire from a cross-section of public and private schools. The common criteria for selection included teachers who had received ICT training and were known to be using technologies in their classrooms. The sample size was guided by the concept of data saturation. The research was confined to practising teachers within the borders of South Africa. Data was collected through a survey questionnaire, face-to-face interviews, and literature searches. The data was subjected to content analysis. Chapter 4 presents the data and findings of the study.

CHAPTER FOUR

Findings and analysis



Structure of Chapter Four

4.1 Introduction

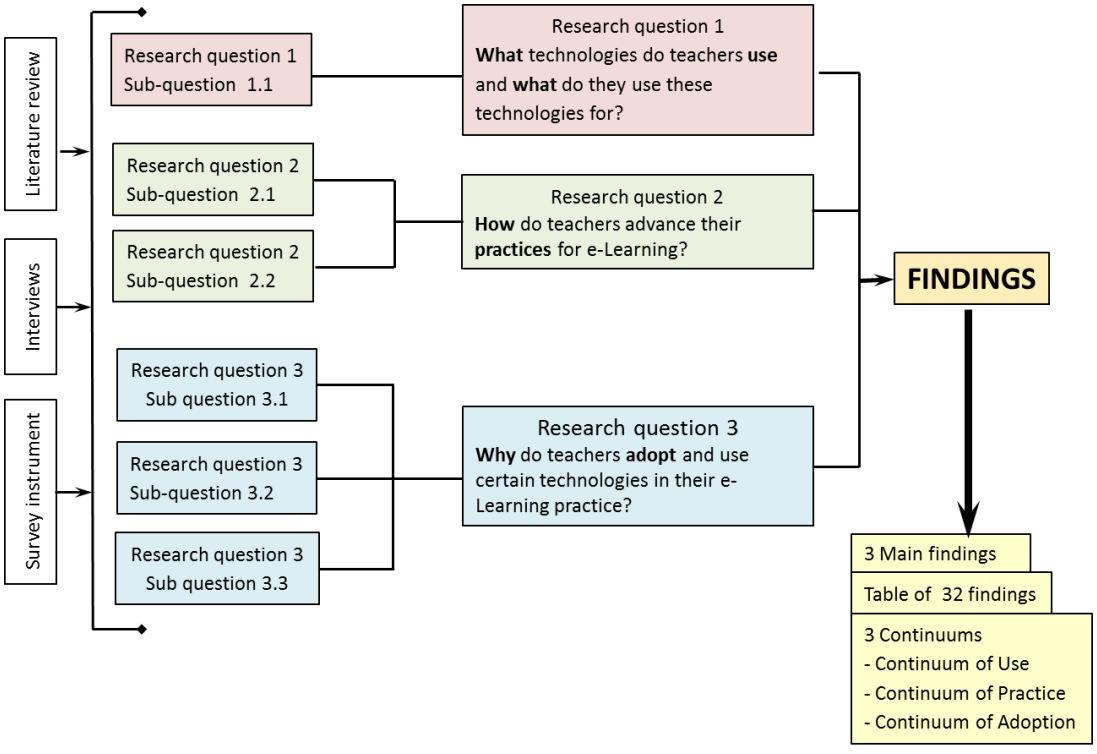


Figure 4.1 Data-collection and analysis process

Figure 4.1 shows that interviews, a survey questionnaire and literature reviews were the instruments used for data collection. The research findings of each of the sub-questions contributed to the three research questions. The information obtained from these questions addressed the main research question of this study. The findings were finally derived from the information extrapolated from the research questions.

The data was obtained through interviews with teachers, a survey questionnaire and literature reviews. The collective responses of the survey questionnaire and interviews are presented in this chapter following the structure as shown in Figure 4.1 above.

A system of letters and numbers was used to represent the respondents: interview respondents were named R1, R2, R3 … R15, (full data set available in appendix G) and the respondents to the survey questionnaire were named SR1, SR2, SR3 …. SR76 (full data set available in appendix H). There were 15 interview respondents and 76 survey questionnaire respondents.

The survey questions were subjected to a quantitative analysis, and qualitative analysis was applied to all open-ended questions. Statistical methods using percentages and descriptions with inferential commentary were used to describe trends as they emerged. According to Huysamen (1994:169) “in some instances descriptive statistics may be appropriate”.

The interviews were analysed using cluster analysis on the codes in themes which were similar and related. Cluster (domain) analysis was applied to these themes to elicit the main findings and tentative answers to the research questions. According to Cohen et al. (2005:149), a notable feature of clusters is that they should contain internal coherence, that is, the codes in the cluster should be similar to one another.

4.2 Research Question 1: What technologies do teachers use and what do they use these technologies for?

(Mapped to sub-question 1.1): What do individual teachers use technologies for?

In exploring teachers' e-Learning practices the researcher looked at a range of elements to understand the pattern of what teachers do with technologies in their work. Of the two instruments used, the survey questionnaire and interviews, the responses from the interviews proved to be more insightful. Section 4.1 is presented in the following sequence:

- Continuum of use.
- Contributions to understandings of 'use' of technologies.
- Initial indicators of what teachers use technologies for.

An examination of the data revealed that teachers' actual use of technologies permeated their lives and was not confined to their work only. Teachers were found to be using technologies for a range of applications in their personal and professional lives. The boundaries between personal and professional use of technologies were found to be blurred. Teachers' usage patterns suggested a continuum of use.

The data revealed that technologies were employed for personal use, communication, networking, administration, teaching, own learning, and learners' learning. There was a high level of dependence on technologies for personal, administrative and educational use. Technologies were deemed to be useful for a range of reasons. Personal experiences with technologies were strong factors for forming attitudes and informing behavioural intent to use that went beyond the TAM concept of usefulness. Value that teachers attached to the usefulness of technologies was a key contributor to continued use.

4.2.1 Continuum of use

The data highlighted that teachers incorporated technologies progressively for social purposes, own studies, work-related administration, teaching (e-Teaching) and learners' learning (e-Learning).

When teachers were asked how they used technologies, their responses provided insight into technologies' incorporation into personal use, administration, and teaching and learning. For example: teachers' personal study with technologies influenced them to use technologies for teaching; social networking services (SNS) in the personal space prompted use of SNS for learners; using technologies for work administration led to using them for teaching.
R13 started by bringing her social technology into her work space:

> [R13]: "Started with my cell phone … for admin of marks."

And R4 alluded to his long association with technologies when he mentioned:

> [R4]: "Maar van daai tyd af, veral die admin se gedeelte, het ons hom van daai tyd af baie gebruik." ("But from that time, especially with admin work, we used it a great deal from that time.")

R8 spoke of how he started using technologies for administration and then moved onto using it for teaching:

> [R8]: "Started typing out my own question papers; I started [to] practise teaching and computers."

R5, like R13, spoke of how a technology which was used at home was the initiation of his using it at work:

> [R5]: "Ja [Yes], it started influencing it at home and … it started influencing my work space as well."

The pattern of use, that is, personal–administration–teaching–learning, while outwardly linear, appears to be an indication of the emergent uptake pattern when teachers first start using technology. However, in the sample the use of technologies was known to be was current, and thus the pattern in the continuum was a suitable indicator of operational activities. Teachers were found to be at different points of the continuum simultaneously. The influence and movement within the continuum did not appear to be unidirectional. Indeed one respondent said that use of technologies for work created regression in respect of personal use. There was no discernible evidence to suggest that teaching with technologies exerted any negative influence on personal or administrative work.

Use patterns were confirmed in both instruments. The survey instrument data showed that there were significant variances in the use of social networking services (SNS) by teachers for personal purposes, for own learning, and learners' learning. It was noted that for teachers' own learning, they used more cloud-based collaborative spaces. Table 4.1 below shows a diminishing intensity in the use of SNS from personal to own learning to learners' learning (see Table 4.1 and Figure 4.2). Social networking services (SNS) used by teachers for personal purposes was used progressively less for their own learning and learners' learning.

Table 4.1: SNS usage comparisons

SNS – personal use		SNS – own learning / studies		SNS – teaching / learning school	
Facebook:	64 (84.21 %)	Facebook:	25 (32.89 %)	Facebook:	17 (23.29 %)
WhatsApp:	65 (85.53 %)	WhatsApp:	26 (34.21 %)	WhatsApp:	14 (19.18 %)
Twitter:	35 (46.05 %)	Twitter:	18 (23.68 %)	Twitter:	8 (10.96 %)
		Google Docs:	43 (56.58 %)		
		Drop Box:	39 (51.32 %)		

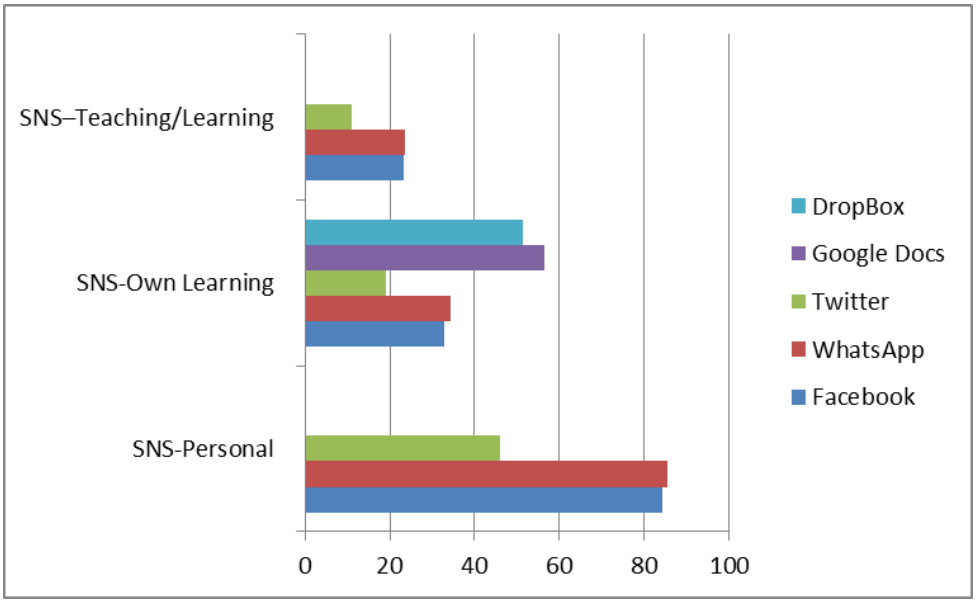


Figure 4.2: SNS usage comparisons

The data highlights that SNS usage is not pervasive in teachers use at schools. It would appear that social services were reserved for social interactions.

4.2.2 Contributions to understanding of 'use' of technologies

The findings extend the notion of pervasive use by including contexts to include teachers who are avid users of technologies, are early adopters and innovators, and to include teachers' own learning, to include all technology outside of computers, to include the use of social networking services and learning management systems.

The teachers' technology usage patterns could be mapped to a continuum. This provides us with the probability that newer initiates to the use of technologies may follow a similar progression. This is confirmed within adoption/diffusion theories where Hall (1974:5-6) notes that adoption is not a one-time event, but rather a process. The researcher noted earlier (Chapter 2) that "the repeatable process of adoption and re-adoption will occur".

4.2.3 Initial indicators of what teachers use technologies for

- Teachers use technologies for the following:

    - Personal: social communication networking.
    - Administration in the execution of their work: school work, collaborations, communication.
    - Teaching: e-Teaching.
    - Learning: Own studies, learners' curriculum learning.
    - Communication: social, administrative networking – with parents and learners.
    - Collaboration: with learners, with colleagues; networking.
    - SNS: teachers were found to use technology less for learners' learning than for personal use. Use of SNS was noted as being progressively less intense from their personal use to teaching to learning.
    - Teachers' use of technologies is progressive with regard to personal use, administration, teaching, and learning.

4.3 Research Question 2: How do teachers advance their practices for e-Learning?

(Mapped to sub-question 2.1): How do teachers use technologies for teaching and learning?

The purpose of this question in the study was to understand the e-Learning implementation approaches and methodologies, that is, how teachers use and integrate technological, pedagogical and content knowledge (TPACK) into teaching and learning. The instruments to elicit these were the interviews and survey instrument. The interviews were the primary contributors of the valuable insights towards answering the question.

Section 4.3 is presented in the following sequence:

4.3.1: e-Teaching
4.3.2: Reflective practice
4.3.3: Approaches
4.3.4: Continuum
4.3.5: Entry, adoption and application in e-Teaching and e-Learning
4.3.6: Adaptation, infusion and appropriation in e-Teaching and e-Learning
4.3.7: Appropriation, transformation and innovation in e-Teaching and e-Learning
4.3.8: Contributions to extend our knowledge of teachers' practices
4.3.9: Indications of how teachers responded to the introduction of technology

The conceptual framework shows that an integrated combination of use of elements such as approaches, methodologies, with appropriate technology, and incorporating a sensible blend of systems, services and digital resources contributes to the practice of e-Learning and e-Teaching. The way in which this is manifested outwardly with each individual provides a picture of e-Learning practices.

E-Teaching refers to the use of technology, digital products, systems and services to teach. E-Learning is learning with and through the use of technologies. Indicators of practice were the ways technologies were used and integrated for personal, administrative and teaching and learning purposes. Findings relating to how teachers used technologies were correlated between the two instruments. E-Teaching and e-Learning practices were evidenced in the way teachers used and integrated technologies. Teachers were seen to be using technologies and methodologies in similar ways. Figure 4.3 shows the outcomes from the category of use.

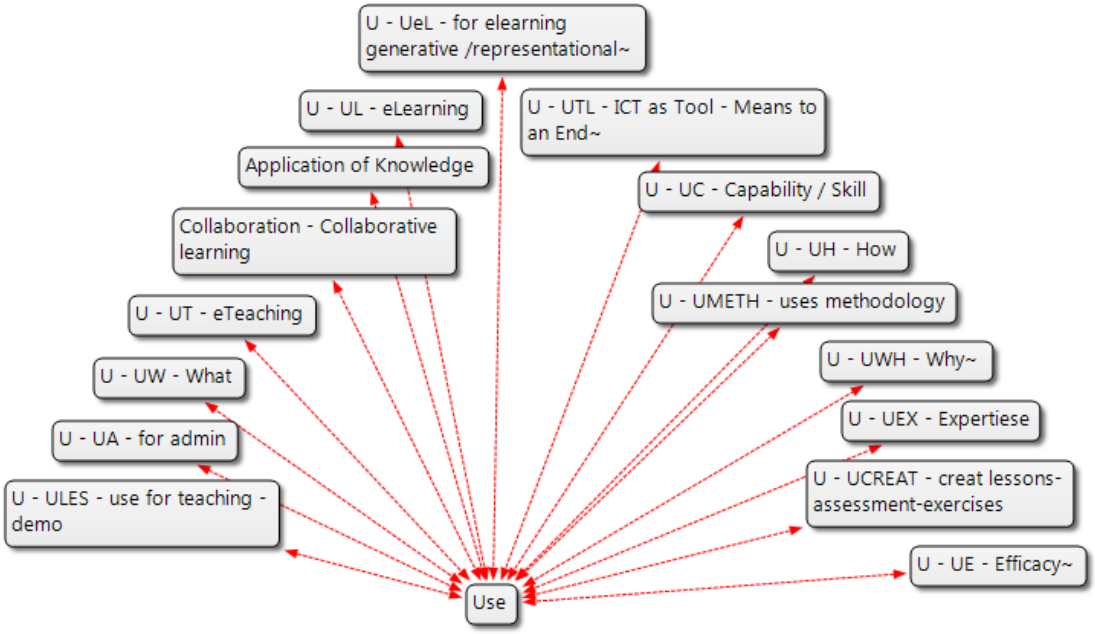


Figure 4.3: ATLAS.ti – Use

4.3.1 e-Teaching

The activities noted in the data and separated into teacher and learner activities were:

Teacher activities:

- Teachers presenting and demonstrating lessons using technology.
- Teacher assessments.
- Teachers providing digital resources.
- Teachers getting learners to find information.

Learner activities:

- Learners getting opportunities to create knowledge and using the World Wide Web.
- Learners completing work using computers and doing assignments online.
- Learners using social networking services (SNS).
- Learners communicating and collaborating online in a learning management system (LMS).

These activities resonate at different intensities with Gagné's (1985b) nine steps of instruction, the five teaching and learning events as proposed by Laurillard (2002a), Salmon's (2000) five-stage model of e-Learning and the levels of use (Hord et al., 1987).

The overall practice of using technology, digital resources and pedagogies appeared to follow a predominantly traditional path aligned with prevailing institutionalised methodologies. Teachers were found to carry out activities in ways they always had done.
R8 stated that he used:

> [R8]: "… a variety of different technologies and methods to see how it works … I tend to try and follow that pattern".

R3 mentioned that he

> [R3]: "… always open up with a little PowerPoint presentation, a message of inspiration, just to start off with, and then obviously we do the teaching … depending on the lesson … take a clip here and there".

The sustained use of methods aligned to the teachers' knowledge, skills and comfort zones highlighted that teachers were inclined to lean towards the familiar as they navigated new ground.

This finding is supported by, amongst others, Shuldman (2004). Shuldman (2004:323) contends:

> Integration of computers … is characterized by … use of technology in such a way that it is compatible with the teacher's established style of teaching … culminating in the teacher's ability to combine idea and product technologies to encourage students to engage in deeper cognitive activity.

4.3.2 Reflective practice

A critical eye has been cast by teachers on whether there has been a difference in their teaching since their introduction to technologies.
R8 maintains that his

> [R8]: “teaching has evolved since I started using ICTs”.

While R1 believes that what he does is

> [R1] “not e-Learning but more e-Teaching … learners are passive and do not interact much with the technology”.

Their reflective actions are supported by Laurillard and McAndrew (2002) who allude to the need for reflective practices when exploring new ways of teaching. While many of the teachers are of the opinion that there has been a change in what they do, there are some who believe that there has not been much of a change.

Alongside what teachers were doing, and their reflections on their practice, teachers’ views of technology as an instrument of change were highlighted. Teachers appeared to recognise that teaching and learning are essentially the same and that the technology advantages could be capitalised on.

> [R8]: “… it’s just I use the different perks that come with the devices differently … as the technology evolved I adapted”.

Although the institutionalised nature of schooling remains relatively unchanged, the approaches to teaching and learning can change in response to the infiltration of technologies. The data highlights how teachers perceive their own adaptation to the potential offered by technology.

> [R4]: “En dan die werk het nie verander nie, maar net die manier hoe die werk nou gedoen moet word, daai het basies verander.” (“The work has not changed, but just the manner in which the work must now be done is what basically has changed.”)

The value to be gained in the integration of technologies lies in the teachers' approach. This refers to:

- technological pedagogical content knowledge (TPACK) and subsequent pedagogical approaches;
- what technologies are selected and used;
- what the technologies are used for and how one adapts (innovative) technology (based on affordances) to the needs of the curriculum and the learners;
- understanding how the subject is best learned; and
- understanding how learners learn.

4.3.3 Approaches

The responses from the teachers' in the survey on how they used technology leaned more towards teaching (demonstration) than learners engaging with technology for learning. A small number of respondents indicated use of technology for collaboration (see Table 4.2).

Table 4.2 Technology usage

I use the data projector to present my lessons	I use the interactive whiteboard (IWB) to present and demonstrate my lessons	I get the learners to use the technology to complete their work (e.g. do a presentation, type a document, complete a worksheet)
23 (30.26 %)	9 (11.84 %)	17 (22.37 %)

The data suggests that technology use was at emerging stages with glimpses of use at the innovative level.

> [SR69]: "I use a data projector and an interactive whiteboard AND I give projects in which students must use ICT."

> [SR45]: " … and I teach using an integrated, just-in-time approach. We use blogs and wikis and occasionally Skype. It also gives them the opportunity to practise literacy skills and explore real-world problems".
>
> [SR10]: "It is the use and integration of the technology, not the teaching of the technology that is important."

This continuum of use correlates with implementation as an incremental process (Pedretti et. al., 1999).

Two distinct approaches are indicated in the data, that is, instructivist and constructivist. Instructivist practices are generally associated with a pedagogical approach which is equated to transfer of knowledge and instructions of what to do. The constructivist approach was discernible in transactional interaction among the learners, content, methodologies and the teacher. These approaches are not mutually exclusive as constructivist activities inherently contain instructional events.

Sections 4.3.4, 4.3.5, 4.3.6, and 4.3.7 present the findings on teachers' use pattern and their approaches to use.

4.3.4 Developmental frameworks

In considered how teachers used technologies, the researcher found it necessary to locate this use within developmental frameworks. This section on continuums is a consolidation of the stages of the continuum of approaches to ICT development in schools (UNESCO, 2002:15) and teacher developmental stages (DoE, 2007:6). Figure 4.4 below is a consolidation of the DoE and UNESCO levels and stages.

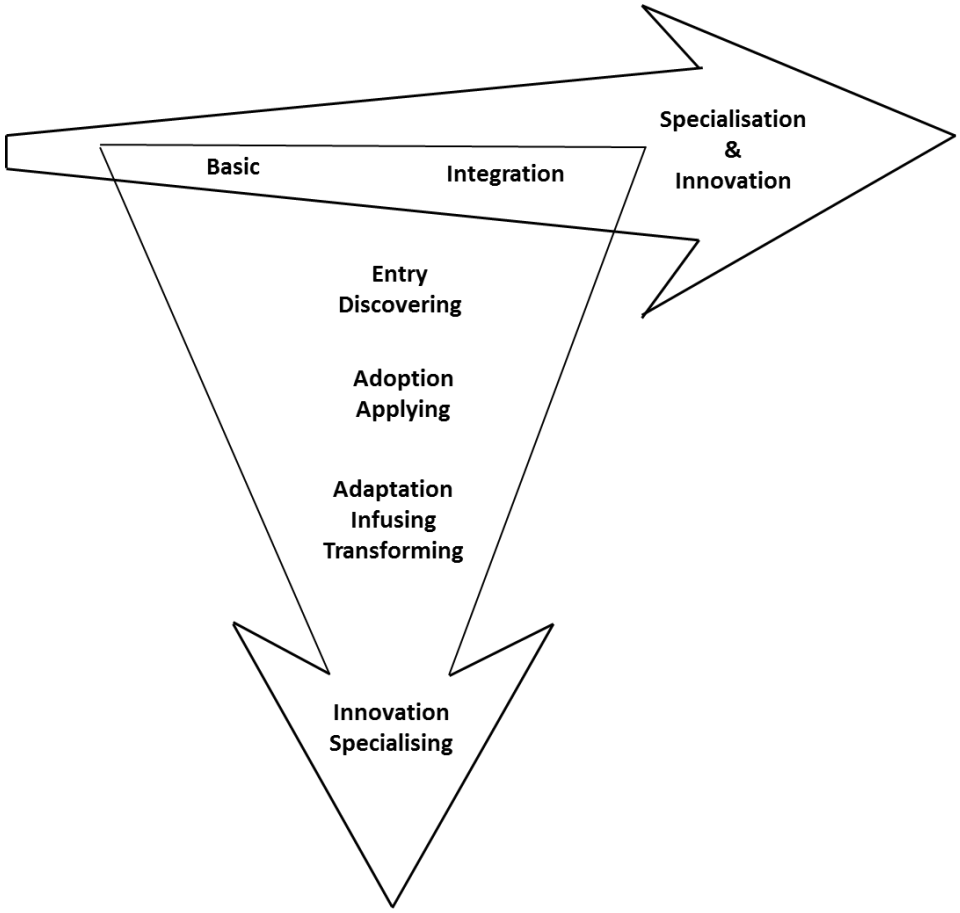


Figure 4.4: Consolidation of teacher approaches and developmental stages

The way teachers use technology exhibited two patterns. The first is the suggestion of a progression in complexity in use from basic to advanced. The second is progression in developmental levels which are not points of attainment, but rather indications of growth. A teacher could be working in the continuum of use at different points, but his/her practice may be at varying levels of complexity.

For example, Figure 4.4 above is an approximation that a teacher could be doing work in specialisation and innovation, such as using tools and technologies like an LMS, but could only be operating in the LMS at a very basic level, such as only uploading resources for learners to access. In similar vein, a teacher could be using basic word processing, but the learner activities could be complex, generative and transformative.

4.3.5 Entry, adoption and application in e-Teaching and e-Learning

Many of the teachers' teaching practices bore similarity to traditional teaching or e-Teaching. For example:

> [R11]: "I use the projector and SMART Board to play educational videos, discuss PowerPoint presentations, display textbooks, project my i-pad screen."

> [R4]: "… die laaities … 'n ondersoekie moet doen". ("The lads must do an investigation.")

The activities for learners were similar to traditional tasks. Learners were asked to present classwork using a computer or to research something and present it. The research tasks showed some resemblance to project-based tasks and Web Quest.

> [R2]: "… to find an artist … need image research … find different images … do research on the artist and get reference pictures and write up …"

> [R4]: "… doen hulle vir my ondersoek take, navors take op die rekenaar en dan stoor hulle dit op die server". ("They do a research task for me on the computer and then store it on the server.")

These examples echo Mlitwa (2007:56), who reports that practitioners believe that "using ICT implies using the web". Furthermore many of the activities that learners engaged in were primarily representational as opposed to generative (Hokanson & Hooper, 2000:543). Teacher R1 initiated the use of computers for work from learners by requesting work be:

> [R1]: "… typed up" and "oral presentations to be [accompanied] by PowerPoint presentations".

Technology was found to be used in two ways, one to make the instructions and lesson more exciting and relevant, and secondly to provide some opportunity for learners to interact with technology or be exposed to the use of technology for learning. In these cases teachers used whatever technology was available as

teaching aids. The prevalence of instructivist strategies and representational activities evidenced in the following contexts were:

- teachers' access to technology was primarily to teaching technology such as a data projector, interactive board and a laptop/computer;
- learners' access to technology was minimal or non-existent; and
- the technological skills of the teacher were at a comfort level.

The value proposition from these approaches was that teachers were introducing learners and themselves to technologies in education. The e-Learning practices in these instances were found to be located at entry and emerging levels (UNESCO, 2002; DoE, 2007).

The general findings in this section were that the actions of some of the teachers were not found to be very different from those typically seen during the pre-digital technology phase of schooling. As a first level of use, technology was the tool to perpetuate traditional methodologies. Teachers would demonstrate, describe, explain and set tasks for learners. These activities can be mapped to transmission, acquisition and practice in teaching and learning events (Laurillard, 2002a).

4.3.6 Adaptation, infusion and appropriation in e-Teaching and e-Learning

Teachers' practices in this stage were traditional, generative and constructivist. However these were evident in fewer of the teachers' activities. Individual e-Learning frameworks and models were discernible in these teachers' activities. There were indications of teachers using project-based, problem-based and collaborative methodologies.

One e-Learning model visible in all of the teacher and learner activities was the learning object approach. Constructing teaching and learning activities is characteristically what teachers did, that is, using building blocks such as textbooks, transparencies, charts, and encyclopaedias to build their lessons. The purposeful selection of digital resources such as the Internet, videos from YouTube, simulations

and animations, interwoven with interactional tasks, learning opportunities, teaching strategies and appropriate devices, is all typical of planning an e-Engagement.

The researcher found that all teachers typically adopted a blended approach in this progressive level. This second progressive stage entailed blending traditional methodologies with an incorporation of technology to extend and enhance traditional methodologies.

> [R8]: “We’re now moving towards a combination of PowerPoint, simulation, and yes, I still use the chalkboard as well.”

Teachers used simulations, software, and applications (apps) that allowed learners to interact directly with the digital resource.

> [R8]: “I use simulation software … we don’t have microscopes … we don’t have equipment for electricity experiments … we can do a circuit … through FET simulation software.”

The teaching and learning approach was found to be both instructivist and constructivist: the teacher told the learners what must be done; he/she provided the limits of the learning opportunity; he/she then guided the process through dialogue and facilitated a debriefing of the activity by providing feedback and confirmation of learning.

> [R3]: “Using the netbook (and the) GeoGebra program, the kids explore … they come up themselves with answers.”

Basically learners were given opportunities to construct knowledge through experimentation, testing, playing and collaboration and communication.

> [R6]: “As hy self fisies kan speel en gaan sien hoe verander dit en dat sy bestaande kennis kan verander.” (“If he can physically play (experiment) and check how much further he can extend his existing knowledge.”)

Teachers evidenced that they understood how and when to use technologies. They recognised the relevance of using collaboration and communication to augment learning activities.

> [R14]: “There are subjects that are more conducive to this.”

This was evident in the way in which the more experienced teachers adapted technologies and integrated SNS into the teaching and learning activities.

> [R1]: “I’ve introduced my learners to blog sites where learners are able to interact and exchange ideas … voice their opinions.”

Technologies such as blogs, forum discussions and chats were employed, and learning environments for this to take place were developed.

> [R6]: “Nie net by homself nie maar tussen sy maaitjies dat hulle gesaamentlik daai knowledge kan kry.” (“Not just by himself, but among his friends, so that they can communally gain the knowledge.”)

> [R13]: “I then introduced peer working for them to share more closely.”

The prevailing attitudes of teachers were to use the advantages of technologies to teach differently and to give the learners the opportunity to learn differently. The value proposition from these approaches was being able to achieve more by harnessing the potential of technologies in making learning experiential.

4.3.7 Appropriation, transformation and innovation in e-Teaching and e-Learning

Levels of innovation and transformation in the use of technologies were evident in a few teachers. The researcher found in the data that teachers who operated at innovative and transformative levels typically traversed the entire gamut from entry-level technology use to authentic examples of e-Learning. These teachers used a learning management system (LMS) (Moodle) for teaching and learning activities.

This third progressive stage of use employing an LMS is an example of technical specialisation. The researcher has categorised such use as ‘specialisation and innovation’ (see Figure 4.4) by merging ‘specialising in the use of ICT tools’ from the stages of teaching and learning (UNESCO, 2002) and ‘innovation’ from the teacher development framework (DoE, 2007).

The introduction of an LMS into school education was in its infancy at schools in the Western Cape. It was thus uncommon to find teachers who saw the potential and opportunity to use it, specifically with their learners in class. The teachers in this sample were early adopters and innovators and were mainly self-developed in the use of an LMS. They were however encouraged and supported by the education department of the Western Cape.

The approaches employed using the LMS were the flipped classroom and blended face-to-face / online engagements.

> [R7]: “Learners actually log onto a site to engage with content and to do assessments … I’ve sequenced the digital object in such a way… got learners chatting on the Moodle system.”

> [R6]: “I make my own simulations like a podcast or the screencast and upload to Moodle … learners can watch in their own time.”

The data showed evidence of application of Salmon’s (2000) five stage model of e-Learning; Laurillard’s (1993) conversational framework and learning events, and the learning object approach. Both instructivist and constructivist approaches were evidenced in the activities. Instructivist and constructivist approaches are not mutually exclusive and no activity is devoid of instruction as seen in the examples of teacher R7.

> [R10]: “PPTs are uploaded to Moodle … students download it [*sic*] to prepare for class … Leaners review text, animations, videos, PPTs, podcasts or screen casts before class. In class they are expected to complete text- and picture-based digital mind maps on computers … becomes a useful study resource afterwards.”

The value proposition from these approaches for the teacher was freedom, creativity, and control of teaching and learning. The use of Moodle presented a content-free flexible tool that could be developed and designed as teachers felt necessary.

The data in this section showed that teachers' e-learning practices comprise e-Teaching and e-Learning. Teachers used technologies in similar ways and they were found to be reflective of their practices. Their e-learning practices were contingent on current needs, own expertise, access to technologies and levels of compatibility with current practices.

This is supported in the review of literature, where Mumtaz (2000:327) reports that teachers "integrated technologies incrementally into their programs, courses and curricula". Thomas and Cronjé (2007) further affirm the progressive and incremental nature of adoption, implementation and integration.

The data showed that teachers' e-Learning practice emerged as a progressive pattern of action. This progression was found to be aligned with the UNESCO (2002) and DoE (2007) frameworks. Teachers were found to operate at different levels of use simultaneously.

Progression from one stage to the next appears to follow experience and value-add beliefs. E-Learning practice mapped onto a continuum shows progression indicated by: traditional use – blended face-to-face of traditional use with integration of technology – blended face-to-face / online with the use of online systems.

In this study, all the teachers displayed the necessary motivation, technological skills and concomitant self-efficacy. The data revealed innovative practices. Innovations can be something new to a person or "something that is perceived as new" (Rogers, 1995:11), and also be the use of something that it was not originally intended for.

4.3.8 Contributions to extend our knowledge of teachers' practices

A useful contribution towards understanding e-Learning practice is that teachers engage in the use and integration of technologies as a continuum of their practice at varying intensities and frequencies. Teachers can be found to operate at different points of this continuum of practice simultaneously. Social networking services (SNS) are used progressively less by teachers on a continuum from personal to teaching to learning.

4.3.9 Indications of how teachers responded to the introduction of technology

Teachers' practice:

- Teachers' practices comprised the use of technology for e-Teaching and e-Learning.
- Contextual realities determined the methods and methodologies that were used with technology.

Teachers' approaches to practice:

- Teachers use technology in ways that are aligned with their comfort zones.
- Teachers employ pedagogical approaches that they believe are relevant and appropriate for learning.

Teachers' patterns of practice:

- There was a pattern of progressive application of methodologies from teaching to e-Teaching and from learning to e-Learning.
- There was a pattern of progressive approaches from traditional f2f – to blended f2f/online – to online in their use of technology. SNS was used progressively less by the teachers from personal to teaching to learning.
- Teachers' use of technology through different approaches and methodologies can be positioned at different points of a continuum simultaneously.

The patterns noted in teachers' practice integrate well with the theoretical framework that locates teachers somewhere within the three axes. These findings are supported in section 4.4 integratively with research question 2.

4.4 Research Question 2: How do teachers advance their practices for e-Learning?

(Mapped to sub-question 2.2): What are teachers' dependence on and interest in using technologies?

The purpose of this question was to attempt to understand teachers' orientations, beliefs, experiences and perceptions of the outputs, benefits and value of technologies' uses. Literature reviews, the survey, and interviews were used to elicit this information. The interviews were the most useful of the instruments in providing insights to this question.

The use of technologies was found to be endemic in these teachers' lives to the point of discernible dependence. This dependence traversed personal and professional boundaries. This was evidenced by their acknowledgment of:

> [R15]: "ICT plays a big role in my life. I am very dependent on it. Especially in terms of administration in both my personal and work life."

The following teachers' comments confirmed the degree to which they were dependent on technologies:

> [R1]: "… invaluable … becomes an integral part of me".
> [R2]: "I have come to rely on it more and more."
> [R10]: "I use it every single day in class."
> [R12]: "I rely on it thoroughly … cannot live without it."

Although most teachers noted dependence, one teacher mentioned that:

> [R8]: "I use ICTs but I haven't made it a dependence … I always stick to the fact that if that day comes when I don't have it."

The data showed that interest in technologies was attributed to individual teachers. Some teachers mentioned an affinity for all things technological, while others spoke of the euphoria associated with new technology.

> [R14]: “The thing that excites me the most is the constant change and there are always new things that are coming out.”

> [R6]: “Om iets uit te vind, ja, en so voeg ek tot my eie kennis ook so … dis ‘n belangstelling van my.” (“To find out something, and this is how I to add to my own knowledge … it’s an interest of mine.”)

Having adopted and used technologies and understanding the benefits and value add, teachers appear to have assimilated these into their normal way of work. Pedretti et al. (1999:136) confirm that teachers, as they incrementally integrate technology, gradually replaced [old traditional practices] with practices that promoted students’ use of a range of ICTs. Further confirmation is found in Sheingold and Hadley’s (1990) study into teachers who evidenced integrating computers into their teaching practices; teachers were “comfortable with technology and used computers for many purposes” (Sheingold & Hadley, 1990:1) and teacher’s teaching practices became more student centred with the integration of technology (Sheingold & Hadley, 1990:7).

4.4.1 Teachers’ dependencies on technology

The data and findings contribute to our knowledge of the relationship between technology advancements and our use of technology. The pervasive nature of technology and its exponential rate of advancement have given rise to dependence within individuals for both personal and professional purposes.

The indicators of teachers’ dependence on and interest in using technology were evidenced by:

- teachers in this sample having assimilated technology into their normal way of work on account of its benefits and value add; and

- teachers in this sample having become dependent on technology in all spheres of their lives, where the use of technology for personal purposes influenced its use for professional purposes.

4.5 Research Question 3: Why do teachers adopt and use certain technologies in their e-Learning practice?

(Mapped to sub-question 3.1): What informs teachers' decisions to adopt, use and integrate technologies into their e-Learning practices?

The main focus of this study in its exploration of teachers' e-Learning practices was to understand why teachers elect to adopt and use technologies. The purpose of the research question above was twofold: to understand the cognitive and affective reasons for actions and decisions taken by teachers for their e-Learning practices; and to understand the perceived benefits and value that teachers may enjoy from their e-Learning practices.

Both interviews and the survey questionnaire were used to generate and gather this information. The ability to probe teachers' responses has resulted in the interviews providing the best data. Section 4.5 is structured as follows:

4.5.1: Satisfaction of needs
4.5.2: Benefits for teachers
4.5.3: Evidence / proof of success and that a technology works
4.5.4: Motivation and self-efficacy
4.5.5: Internal and external influences
4.5.6: Benefits for learners and/or self
4.5.7: Usefulness for self and/or learners

All teachers evidenced similar factors that contributed to their uniquely different adoption and actual use and integration of technologies. The factors were found to correlate with the various elements in the conceptual framework in this study (see Chapter 3). The various elements that shaped teachers' reasons for using technologies are depicted graphically from the data analysis in Figure 4.5. However, the researcher's focus was not on collating a list of factors that influence teachers'

decisions that could be confirmed by a theory, but rather on understanding the relationship between these factors and teachers' uptake.

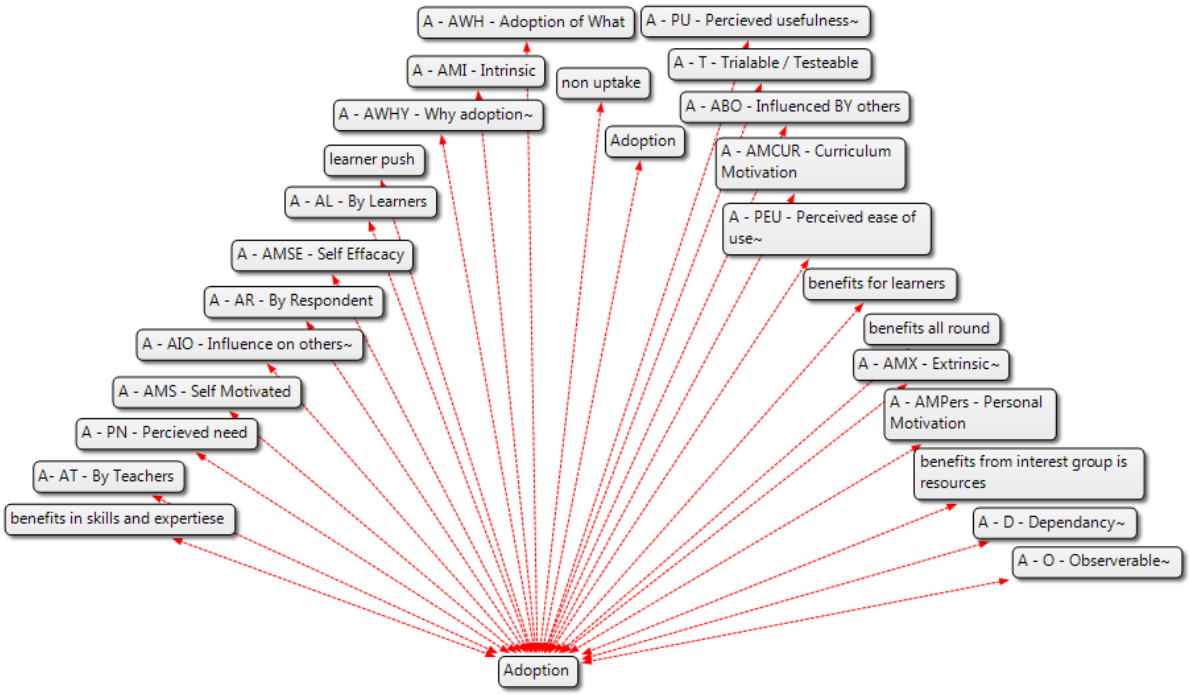


Figure 4.5: ATLAS.ti - Adoption

The elements that featured prominently were intrinsic motivation, self-efficacy and expectancy. Expectancy was linked to the value propositions of the various benefits of using technology. The findings are based on the teachers' experiences and their own evidence.

4.5.1 Satisfaction of needs

Most teachers articulated the way in which they believed the use of technologies satisfied their needs and provided opportunities that were previously not thought possible. They were found to be prepared to adapt and apply knowledge and skills in using technology to different situations according to their needs.

> [R7]: "You've fulfilled your need for something."

R9 found that learners did not want to work and

> [R9]: "… tried to use Facebook, but it did not satisfy the educational need".

He needed

> [R9]: "… to do practical experiments [school didn't have science equipment]".

He found the solution in the *'PhET'* simulations.
R7 registered a different but related need:

> [R7]: "I had a lot of disciplinary problems … the learners couldn't understand the content that I was teaching … and then I realised this [technology] is the tool that's going to make the information … more visually appealing … I don't have that [*sic*] problems anymore."

Access to physical technology is important for e-Learning. Despite non-provisioning of technology for teachers in many instances, some of them were motivated enough to purchase their own, and use it for personal and work situations to achieve some predetermined aim.

> [R13]: "I used my laptop to do research with learners."

> [R7]: "I bought own computer."

The data further revealed that teacher engagements (practice, playing, experimenting, and sustained use) with technologies highlighted possible opportunities for the use of technology to them. It further highlighted the potential that the use of technologies could offer.

> [R11]: "I first familiarise myself with the ICT before I attempt to use it in the classroom."

> [R1]: "… use technology to fully and visually describe the concept … technology … effective tool … that opens up … avenues that weren't available before".

There was a cautious optimism of the place of technology in the teaching and learning process and its implications for teachers' practices. The survey data highlighted that teachers believed that they understood the place of technologies in teaching and learning and that this contributed to better learner engagement.

> [SR75]: "Teachers must remember that ICT is only a tool that can be used to enhance their pedagogy and they need to change their teaching methodology for effective and optimal ICT incorporation."

> [SR41]: "It does not replace the use of traditional methods, but enhances the didactic experience in the class."

> [SR14]: "This is the digital era. Every teacher must equip her/himself with knowledge and skills in order to use ICT as a tool for teaching and learning."

> [SR70]: "Technology can never replace the teacher, but it can enhance and affirm teaching."

The data linked well with the elements of motivational theories and self-efficacy. This allowed the researcher to work deductively in these instances to understand why teachers choose to adopt and use technologies.

4.5.2 Benefits for teachers

Teachers were unanimous that there were benefits to be gained from using technology.

> [R8]: "The difference here of course is while the document viewer is a digital camera it allows me to perform an experiment and actually put that on a big screen. That is an added plus which the overhead didn't allow me …"

The outputs and outcomes of using technologies were not confined to changes in results (the least claimed benefit), but included aspects such as interest from

learners, learning stimulated with multi-media, lessons being more exciting for themselves, and classrooms becoming more exciting.

> [R3]: “It’s a tool to me where you can enhance the method of teaching in some of the concepts.”

This finding was supported by the survey data where 92.11% agreed that using technologies enabled them to make learning more exciting for the learners, and the same percentage (92.11%) noted that it made their own learning easier.

4.5.3 Evidence / proof of success and that a technology works

In alignment with teacher engagements on their own with technologies through practice and sustained use, the data showed many instances where teachers were influenced by self-testing and trialling, and vicarious experiences.

> [R10]: “Use of trial-and-error [with technology] because of limited support.”

> [R7]: “At night I … I learned it. The next day …I practiced what I had learned and so I gained confidence.”

> [R6]: “You see it works and there is evidence it works …”

> [R15]: “As long as I have seen or read proof that a new concept has worked, and how it has made life easier for the learners.”

Attitudes towards adoption can be positive or negative. Teachers’ first-hand experiences with using technology appeared to have contributed to a positive attitude towards the use of technologies. A positive attitude however does not guarantee use as other factors could prevent teachers from actually using the technology.

Conversely a negative attitude does not indicate that technologies will not be used. Mandatory requirements may force a teacher to use technology. According to Ajzen

(1991:206-207) “It is at the level of beliefs that we can learn about the unique factors that induce one person to engage in the behavior of interest and to prompt another to follow a different course of action”. Positive attitudes were also noted in the survey responses.

There was evidence in the data that validated trialability and observability as factors that influence adoption and use decisions. According to Rogers (1995:231-232), if an individual gets a chance to try a technology, he/she may see potential for adoption, and if teachers see other teachers or management own and use a technology, they will be more likely to consider adopting it.

Furthermore teachers’ adoption on account of first-hand experiences is supported by situated cognition (Brown et al., 1989). These teachers had direct experiences with the technologies through situated learning where they were learning by being immersed in the learning environment.

Teachers appeared to be convinced of the usefulness and benefits of technology use through personal experiences, experimentation and research. This resulted in adoption and adaptation to technologies for intended and untended uses. For example, using Facebook for learning discussions, or using a cellular phone for taking photos and surfing the Internet.

4.5.4 Motivation and self-efficacy

Various frequencies of teachers’ motivational reasons were found in the data under this theme. These included outputs (first-order outcome) such as:

- Improved teacher and learner skills.
- Increased self-confidence and self-efficacy beliefs of teachers.
- Increased interest and enthusiasm of learners.

Second-order outcomes were:

- Learners' evolving learning.
- Teachers' evolving teaching.
- Changed attention and interest of learners.
- Teacher and learner increased productivity.
- Teachers' work easier.

The teachers in this sample were all found to be determined and driven. They exhibited confidence and capability. These characteristics appeared to contribute to their motivation and beliefs of self-efficacy. These characteristics can be linked to Bandura and Vroom in the following way. The interplay between "how well one can execute courses of action" (Bandura, 1982:122) and a person will be motivated, if he/she believes that an "increased effort" will lead to an "increase in level of performance" Vroom (1964:284) will provide indications of self-efficacy and motivation.

The data indicated both intrinsic and extrinsic drivers. The intrinsic drivers were revealed in:

> [R5]: "And so I want to, to move. So I want to, I just want to know about things and I want to learn more."

> [R7]: "The will to succeed makes my life easier … This whole IT use for me at school, it's been such a personal challenge."

While the extrinsic drivers accounted for:

> [R8]: "The kids here that I teach is [*sic*] obviously the driving force behind it."

> [R1]: "[A] sense of gratification when you see … that learners are able to grasp a difficult concept … and [are] able to do things quickly."

Self-efficacy beliefs in the data were seen to be linked to motivation.

[R7]: “There is a difference in having the technological skill, the equipment and the motivation ... In my case, content confidence overrides e-confidence.”

[R8]: “Because I’ve learned, I’ve developed a skill to actually use that tool and now I know how to use it. Now it’s better.”

Shulman (1987) notes that curriculum knowledge and pedagogical knowledge are crucial. Mishra and Koehler (2006) add technological knowledge as a key requirement in TPACK towards teaching and learning with technologies. Capabilities and confidence as noted above were visible in the teachers in this study.

Motivation and capability were seen to be interconnected. Attributes of self-motivation, internal locus of control and high self-efficacy beliefs were influential in adoption and use of technology. The teachers appeared to be driven to higher levels of interest as their competencies and knowledge grew.

[R12]: “I am exceptionally familiar with the use of technology …”
[R15]: “It sparked an interest and enthusiasm and I only grew from there. I decided for myself to go and further my studies in IT.”

[R7]: “And I basically go in and train myself and the familiarity gives me self-confidence.”

4.5.5 Internal and external influences

The data revealed that apart from internal drivers of adoption and use of technologies, some teachers were subjected to external influences. External influences were found to be other people and mandated deliverables from school management and technology imperatives. Social engagements and vicarious instances were also found to be representative of external influences.

[R11]: “School management and policies encourages and demands [*sic*] the use of ICT.”

> [R7]: “The initial workshop that I went to was proof enough of the use in my personal and classroom life and the benefits that it would have.”
>
> [R15]: “I have been encouraged to use social media.”
>
> [R14]: “Being on Twitter and going to teach-meets … are where most of my adoption of various things comes from.”

What teachers were doing in their e-learning practices was found to be exerting a positive influence on fellow colleagues and learners.

> [R7]: “The teachers want to try what I’m doing … I see you put your stuff online, you must show me how to do it.”
>
> [R8]: “In this case it’s showing them what you’re doing.”

The data highlighted the positive influences on learners as well. Teachers’ use of technologies started to pique learners’ educational interest. They maintained that learners were more eager to be in their class and were more attentive. The use of methods and technology closer to the way learners learn appeared to show increased participation.

> [R13]: “Learners wait for my lesson with curiosity.”
>
> [R11]: “The learners fully engaged in the lessons and discipline turned around completely … The learners begin to believe in the subject and they begin to like the subject … so they are more eager to want to try their hand at it.”
>
> [R3]: “When it’s something different like that … they pay attention.”

Survey respondents reported that learners were more engaged when they or the learners used technologies. These reports confirm the interview respondents’ comments.

> [SR41]: “It is fun for the learners to do different investigations, while learning new concepts. Learners seem to respond more positively when they use technology. It makes the learning experience exciting for them, and captures their attention for a longer time span than usual.”
>
> [SR71]: “The learners are more active when I use digital resources.”

Self-motivation appeared to be an indicative trait of early adopters and innovators such as these teachers. The teachers in this study appeared to influence others and were themselves influenced by others in their uptake and use of technologies.

4.5.6 Benefits for learners and/or self

Benefits were viewed through a lens of value propositions. The focus of analysis steered away from the outcomes and focused rather on the outputs. Both are important, but for the purposes of this study, the researcher wanted to focus on why teachers engage in certain activities, that is, what value it offered them if any at all. External rewards for the teachers were marginally discernible in the data. There were no apparent external incentives or rewards that they were working towards.

In some instances the outputs, such as other teachers using or beginning to use technologies and learner interest, resulted in fulfilment.

> [R5]: “it encouraged the teachers more at our school to be more into technology … this is [*sic*] the positive things that come … ICT was happening at the school … I had an old teacher thanking me … I must have learnt [*sic*] him something real.”
>
> [R4]: “Hy begin dit nou al toe self by sy vakfase, so ek hoef nie nou meer te gaan kyk nie.” [He has begun to use it himself in his subject phase, and I do not need to go and check anymore].”

The satisfaction of success is in itself a known motivator and individuals sometimes do not desire external rewards. The intrinsic value of the satisfaction of seeing other teachers appropriating the use of technologies on account of one’s support is the

valence construct in Vroom's (1964) theory. In many cases this may be sufficient for individuals and they may not desire other rewards. This was the case in this study as the data did not conclusively show that teachers' motivation was on account of external rewards. The possibility exists that this could be the case, but the researcher was unable to find empirical evidence of this.

The survey correlated many of the interview findings directly and some indirectly. See Figure 4.6.

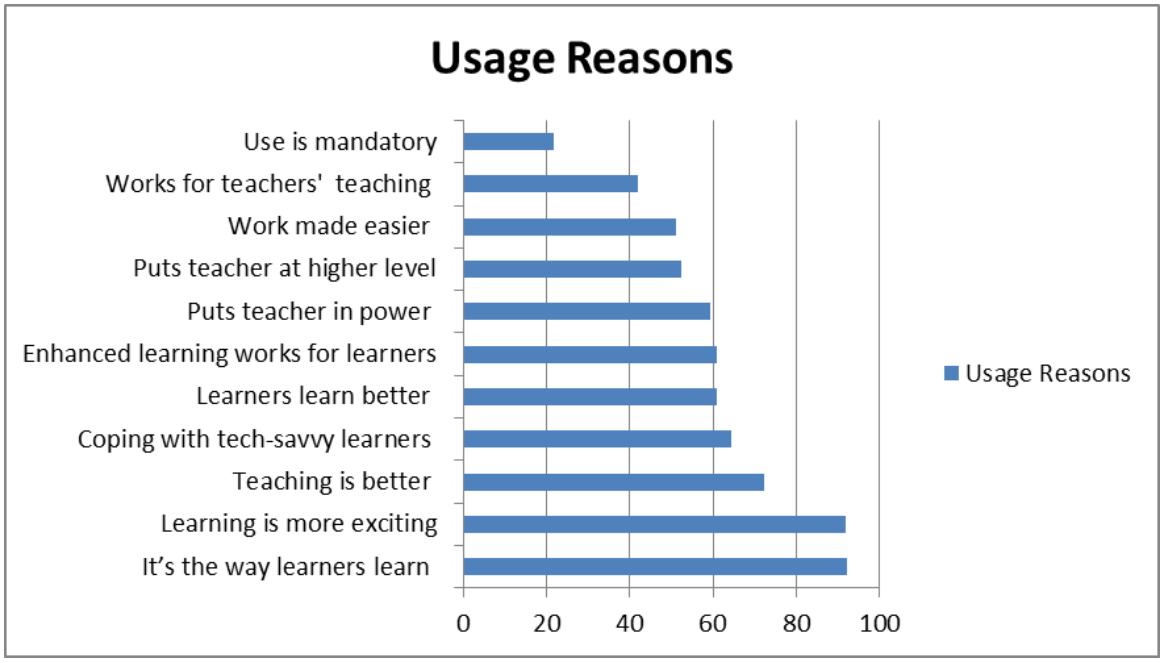


Figure 4.6: Teachers' reasons for the use of technology

The figure above (Fig. 4.6) shows frequencies in the survey questionnaire. Reasons for use of technology were it made work easier (51.3%) and helped manage teaching and learning. Technology empowered them in the classroom (59.5%) and situated them at a higher level than the learners (52.5%), thereby helping them to cope with technology-savvy learners (64.4%). It was convenient, easy to use and useful, allowed fast access to information, and made teaching exciting. There was satisfaction that it worked for them in their teaching (41.9%), and they maintained that the learners learned better (60.8%). Teachers felt that it was the way of the future and in keeping with the way learners learn (92.1%). It helped them teach

better (72.3%) and they claimed that it helped make learning more exciting (92.0%). It enhanced learning experiences and worked for their learners (60.8%).

One external reason put forward by 21.6% of the respondents was that it was mandatory to use ICTs at their school.

4.5.7 Usefulness for self and/or learners

Usefulness was revealed as a key factor that appeared to contribute directly and indirectly to adoption and use. The data showed that the teachers' use of technologies was not confined to isolated events and multi-media oddities. In this study the researcher saw usefulness as a contributor and not just a predictor of intention and actual use. The TAM (Davis, 1989) posits that usefulness and ease of use influence attitudes and behavioural intent towards eventual use.

Teachers' perceptions and experiences of usefulness which determined benefits and their concomitant value were evident in four correlated domains. These were the personal, administrative, teaching and learning domains. Teachers noted that technologies had the potential to make work easier and further claimed that they made work meaningful, faster and more structured.

In the domains teaching and learning, teachers claimed that technologies were useful for extending the teachers' reach and for teaching difficult concepts and aspects of the curriculum that were best learned through multi-media.

> [R10]: "… explains an entire section … complex like protein synthesis in 3 minutes". [One teacher spoke of its use alongside mainstream schooling.]

> [R15]: "In terms of inclusive education, there are so many apps and new adaptive technologies around."

The value that teachers attached to this usefulness for teaching and learning was significantly indicated in its benefits. Teachers said:

> [R11]: “It creates opportunities that would not otherwise have been possible if it were not for ICTs … It adds value and … enriches/enhances conventional teaching and learning methods.”

Teacher R10 felt that:

> [R10]: “… use of ICT promotes independence in learners”.

R6’s comment supports this notion:

> [R6]: “… dat die kind self interaktief kan wees, dat hy self sy knowledge kan create [*sic*].” [That the child can interact personally, thereby creating knowledge himself.”]

Mumtaz (2000:337) notes that “teachers who have a high value for ICT and perceive it to be useful completely transform their teaching … teachers who are motivated and have strong commitments to their pupils’ learning and their own professional development will evidently integrate computers more easily within their teaching”. This finding supports the researcher’s conceptualisation of usefulness leading to benefits and value propositions.

In the domain of work-related administration, teachers maintained that technologies were useful for ordering their work, making administrative tasks faster and easier, and for communication. The various curricula that South Africa has implemented over the last two decades have consistently necessitated large volumes of administration. Teachers considered the administrative requirements of CAPS and the teaching profession in general a burden. The interview respondents who were early adopters and innovators mentioned that:

> [R4]: “Jy kom nooit kla met admin nie … maar dit raak makliker en dit raak vinniger.” [“You cannot finish all the admin … but it is becoming easier and quicker”].

> [R13]: “It’s quicker … doing preparations and record keeping.”

> [R5]: “It was making work very easy … it’s neater also … and quicker.”

Survey respondents commented that there was not enough time to prepare lessons as well as for learners to use technology for it to be effective. The lesson preparation constraints represented administrative requirements of the curriculum. This contrasted with the interview respondents who felt that technology made things easier.

Teachers believed that technologies were also useful for work-related communication and being connected. They mentioned that it was easier to communicate and access information.

> [R14]: “Things like smart phones make my life easier with regard to mail and communicating.”

> [R11]: “Makes it easier to: complete tasks, to communicate with colleagues, to keep in touch with friends and family and to obtain information.”

Ease of communication and of being connected were correlated in the data from the survey respondents. Ease of access to information: 78.38%; option to respond to questions and requests for help online: 42.59%; anywhere / anytime learning: 44.00% and collaborate with others on work: 58.11%.

Teachers’ comments in both the survey and interviews, based on their experiences, expressed their positive beliefs about the use of technologies. This reflected knowing and feeling correlated with the cognitive and affective domains. Behaviour can be understood through two wide categories such as: cognitive (how one knows the world), and affective (how one understands the world through attitudes and emotions).

Cognitive processes assume use of existing knowledge to understand and make decisions. They are about mental functions and mental processes (thoughts). Affective domain processes also represent mental functions and mental processes (thoughts), but these focus on feelings and are not based on using knowledge to evoke feelings. Processes in these domains contribute to decisions to adopt and use

technology and as motivational factors that encourage one to consider using technology.

This rationale is confirmed by Straub (2009:645), who concluded that “technology adoption is a complex, inherently social, developmental process” and that “individuals construct unique (but malleable) perceptions of technology that influence the adoption process”.

The useful contributions of this study are that value propositions are the main reasons for teachers’ adoption, use and integration of technology. The key determinants of value propositions are benefits. Benefits in turn are derived from the usefulness of technology affordances.

The initial indicators of what informs teachers’ decisions to adopt, use and integrate technology into their e-Learning practices are as follows:

- Value propositions are the topmost reasons for adoption and use of technology. Usefulness and technology affordances determine benefits, and benefits in turn are the main determinants of value propositions. Teachers were more inclined to internal rewards as opposed to external or societal expectancies.
- Intrinsic motivation is key to adoption, integration and use of technology.
- The options to trial, experiment, use, observe and experience that provided evidence of benefits and value add were contributing factors to adoption and use.
- The evidence and experience of the satisfaction of teachers’ needs contributed to teachers’ decisions to adopt and use technology.

4.6 Research question 3: Why do teachers adopt and use certain technologies in their e-Learning practice?

(Mapped to sub-question 3.2): How do technical and non-technical factors affect teachers' e-Learning practice?

The purpose of this question was to determine possible use or application-related factors which regulate decisions to use and integrate technologies into e-Learning practices. The key instruments used were the survey questionnaire, interviews, and literature reviews. It was found that the survey and interviews provided the more useful data to address this question. The interviews provided insights different from the cliché of lack of technology and training needs. Section 4.6 is set out under the following sub-headings:

4.6.1: Technical Factors
4.6.2: Non-Technical
    4.6.2.1: Educational outcomes
    4.6.2.2: Pedagogical implications
    4.6.2.3: Curriculum requirements

Teachers in this sample were seen to be highly motivated, specifically in taking charge of their own development and as agents of diffusion of the use of technologies. They however articulated factors affecting e-Learning practice in their work and e-Learning implementation in general. The data has shown that these concerns are both technical and non-technical, in respect of themselves and the learners (see Figure 4.7).

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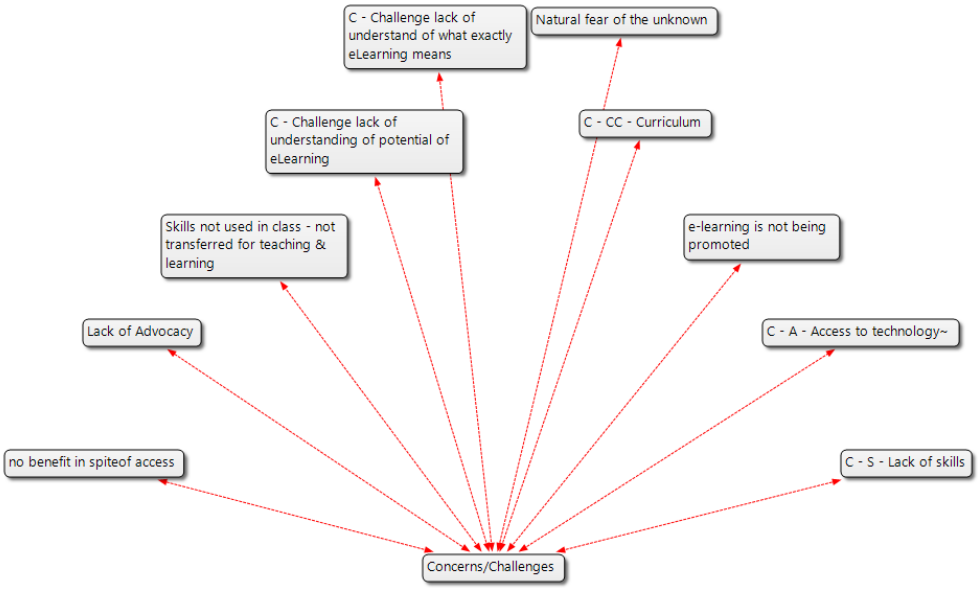


Figure 4.7: ATLAS.ti – Technical and non-technical concerns and challenges

4.6.1 Technical factors

In spite of the work done by teachers and their constant attempts to incorporate technologies into the teaching and learning environment, teachers noted concerns. These were mainly that physical access to technology, connectivity and infrastructure for learners and themselves were problematic. This was found in both the survey and interviews.

The lack of physical access to technology, and where technology was available, the lack of technical support, were found to be factors that impacted on teachers' work. This was specifically when they needed learners to work with the technology.

> [R1]: "Access I'd say is also a limiting factor … we don't have technology in the classrooms really … so i cannot do what i need to do in my job situation."

> [R10]: "Technical support, technical support and technical support."

These finding were supported by the survey respondents who noted that access to technology for learners, internet access and the speed of connectivity were factors that negatively affected their use of technology:

> [SR14]: “The non-availability of computers or digital resources can play a negative role in using ICT's for e-Learning.”

> [SR13]: “Will help if learners have access to the latest technology.”

> [SR69]: “Equal access for learners … no 1–1 programme here, therefore it is hard.”

> [SR64]: “We only have Smart Boards … learners only get a 30-minute period a week.”

Teachers also noted that their own physical access to technology was not ideal. It was found that these teachers were sufficiently motivated to attend to their own technology needs.

> [R13]: “I was working in a school with no computers. I relied on my laptop and a few computers in the nearby library.”

However the data from the survey questionnaire yielded incongruous information. Factors that generally return a negative correlation in research were found to correlate positively with this group. Teachers did not find access to technologies, technical support and management and peer support particularly inhibiting. They reported that they would continue to make a plan. These returns are supported by Molotsi’s (2014:152) finding that the lack of resources did not deter teachers. (See Table 4.3 and Figure 4.8.)

Table 4.3: Access and support dependence

How does access to technology affect your decisions to use it for teaching/learning?		How does technical support for technologies and systems affect your decisions to use technology for teaching/learning?		How does support of management / peers / department affect your decisions to use ICTs for teaching/learning?	
I don't use it because I do not have access	2 (2.63%)	I don't use it because I do not get support if something goes wrong or does not work	1 (1.32%)	I will not do it because there is no support at school or from the department	0 (0%)
No effect – I make a plan to get access	49 (64.47%)	No effect – I find a way to make it work	56 (73.68%)	No effect – I make a plan to do it without any support	50 (65.79%)
I use it only if I can get access	19 (25.00%)	I use it if I know that there will be technical support	15 (19.74%)	I will be willing to use it if I get the support that I need	23 (30.26%)

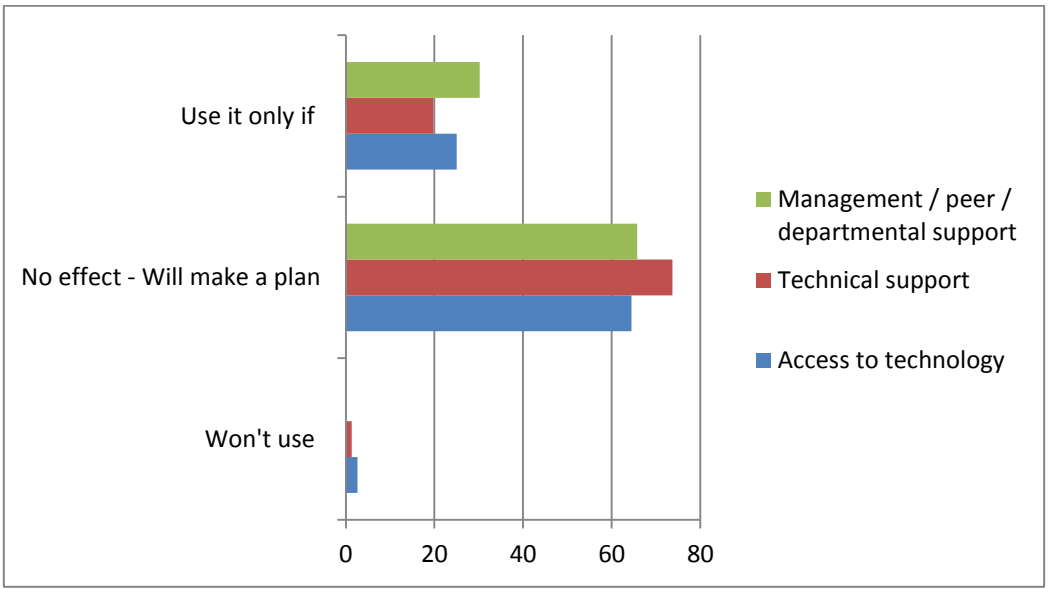


Figure 4.8: Access and support dependence.

In spite of the statistics returning that teachers did not find lack of support discouraging, the open comments in the survey instrument reiterated the necessity for support.

Many research studies have examined the factors that determine the use of technology and factors that prevent and inhibit technology use. Van Wyk (2011:6) cites challenges as “a lack of technical support in schools”. Mumtaz (2000:332) noted in her report on the intervention programme of Dwyer et al. (1991), that instruction remained primarily unchanged and teachers grappled with technical problems.

The common findings of technical factors evolved around physical access to technology, sufficient access in terms of time, and access to support for this technology. Access is vital if any learning through the ‘e’ is to take place. This technical factor of access to and support for technology is not trivialised as it was expected in this study, as numerous studies have noted access to technology as a concern. However, the focus of this study was on use and not non-use.

This was premised on the basis of conclusions and reports of previous studies that noted that even if technology, training and support were available, there is no guarantee that it will be used. For example, an encompassing summing up of this phenomenon is found in Mumtaz (2000). She concludes that “even if teachers are provided with up-to-date technology and supportive networks, they may not be enthusiastic enough to use it in the classroom” (Mumtaz, 2000:338).

4.6.2 Non-technical factors

The non-technical factors highlighted in the data referred more to those that hampered implementation, specifically as they did not allow them sufficient time to use technology to build confidence and expertise. These factors were expressed as concerns instead of challenges. They are:

- educational outcomes – net effect on learner outcomes
- pedagogical implications – expectations of e-Learning
- curriculum demands – content coverage, assessments, administration, time implications.

The researcher's findings are supported by existing literature that explored factors that influence technology adoption and use. Chigona and Chigona (2010:2) maintain that "there are also non-technical factors". This is supported by Manson (2000:1), stating that "other significant factors are the teachers, curriculum planning, technical support, the students, the actual use of ICT, training and personal development". In another study of factors, the following were noted: teachers' readiness, confidence, knowledge and ability to evaluate the role of ICT in teaching and learning, and lack of skills to be able to use the ICT equipment were stated as factors (Manson, 2000; Lau & Sim, 2008). Molotsi (2014:42) further reported that "teachers' ICT competencies might be the sole contributory factors to why ICT integration is not well off the ground within the South African education system".

4.6.2.1 Educational outcomes

Success in any learning situation is to a degree quantifiable by the results of learners. Does the use of technology produce enhanced and increased results? The existing body of literature is inconsistent and inconclusive. Some teachers claim an increase in results and some not.

R14 maintained that:

> [R14]: "On the whole technology has not improved the quality of education."

R1 would not claim improved results, stating that they were much the same as previously.

> [R1]: "Very difficult to gage what the successes are … you wouldn't see immediate results."

Teachers in this study provided their opinions based on their unique experiences. The data in this study revealed mixed findings, some claiming improvements and some maintaining that there was marginal to no difference.

This was similar comments by R3:

> [R3]: “Personal results, yes – not a problem. Overall results, we have a problem if I have to be honest.”

However other respondents reported differently.

> [R6]: “As ons kyk na vorige jare se resultate en vandat ek beginne [*sic*] ICT gebruik, die resultate dan. Dit sal al verbeter het.” [“If you look at previous years’ results, and from the time I started to use ICT, the results then. They improved.”)

> [R15]: “We have seen improvements in results and pupils' attitude towards learning.”

The findings are supported in the literature that says, “it is not clear whether ICT is making a positive impact on the teaching and learning process” (Ford & Botha, 2010:2). According to Soloway et al. (2001:17), “as long as computers are not ready-at-hand, they will not be used in a routine, day-in, day-out fashion; the impact of computers on K–12 education will continue to be essentially zero”. Van Wyk (2011:17) notes, “little is known about the e-Learning practices at these schools and the impact of the technology is yet to be evaluated”. Cantrell and Visser (2011:281) conclude that “the impact of ICTs on education is not automatically positive”.

4.6.2.2 Pedagogical implications

Many of the teachers noted that the curriculum required something different of them in the way they approached teaching and learning. R8 and R9, amongst others, provided valuable insights into the kinds of realisations and reflective practice that the introduction of technology have brought about.

This was seen in the comment below:

> [R9]: “The teacher still does hands-on practical work, as well as minds-on written work and selectively uses digital interventions.”

R8 realised changes were needed:

> [R8]: “I then soon realised that the projector is nothing but a replacement for the blackboard which really isn’t doing it … this idea of sitting in a classroom and watching this TV screen or a projector really is a novelty and it initially used to work … and the novelty wore off … so you now needed to change your approaches.”

In the survey data teachers expressed a desire to become ‘comfortable’ with the use of ICTs for e-Learning, adding that assistance and training on e-Learning methods and how to integrate ICTs were needed.

> [SR39]: “Development of ICT skill would enhance teaching.”

Teachers revealed themselves to be at different skills and implementation levels from emerging to innovative; from only using the data projector or interactive board to using the Moodle LMS.

> [SR62]: “The tool (LMS Moodle) of the future, if we can only get more teachers up to speed.”

Interview respondents did not express a need for training per se. They did allude to the fact that the training provided was ineffective.

> [R11]: “Training is not provided or the training is ineffective.”

Most of the interview respondents were experienced teachers with high capabilities and technological skills.

The realisations of the teachers are inextricably linked to the findings of Shulman (1987) and Mishra and Koehler (2006) through the necessary knowledge and skills required to operate in a technological classroom. There are implications of different approaches that need to be considered. The need to keep abreast is noted by Mishra and Koehler (2006:1023): ‘‘Teachers will have to do more than simply learn to use currently available tools; they also will have to learn new techniques and skills as current technologies become obsolete.”

4.6.2.3 Curriculum requirements

The core deliverable of teaching is based on a curriculum. Teachers in general felt that the CAPS was demanding, both in terms of time and resources. In this regard teachers felt that not enough attention was given to content and the curriculum.

> [R8]: “The best thing that influences what I do in the class is not ICT, it’s actually my CAPS document …”

Some of the comments appeared to point to an educational pull. Teachers in this study affirmed this in the following way:

> [R9]: “Outside of all this e-stuff, content learning must go on … [I] decided to attend to the needs of the curriculum and the learners, but [am] looking for more exciting ways to engage the learners.”

> [R13]: “Changes in curriculum force us teachers to adapt to new technologies and even the type of learner we are teaching.”

The data further showed that teachers found that the demands of the curriculum and the use of ICTs impacted on time, and time conversely impacted on the intention to use the technology for e-Learning.

> [R12]: “… with the expectations of CAP’s there is not enough time in the day / week / term for the learners to interact freely with ICT and to discover for themselves”.

The survey respondents confirmed that the demands of the curriculum did not allow enough time to engage themselves or to afford the learners sufficient time with technology.

> [SR7]: “I do use it, but the one thing that prevents me from using it often is the lack of time – you do need enough time to prepare properly!!! … At the end of the day, the effectiveness of ICTs will depend on the teachers' enthusiasm and how much time they have to experiment and prepare.”

The relationship among curriculum, time and technology use has been noted previously in a range of studies. McDougall and Squires (1997) and Laurillard (1996) provide insights into the positioning of the curriculum in e-Learning. McDougall and Squires (1997:118) note that "teachers raise issues related to explicit, implicit or even absent curriculum considerations in the use of IT". Laurillard (1996:1-7) maintains that the start is not "with what the new technology offers … examining instead what students need …"

Others have noted the relationship between time and expected outputs. Robertson et al. (1996) found that schools did not provide sufficient time for teachers to become familiar with technologies. Soloway et al. (2001:16) state that "it's unreasonable to expect computers to have a positive impact on learning and teaching if students and teachers have limited access to them". Ford and Botha (2010:2) further maintain that the "sporadic use of computer technology does not give either the teachers or the learners the prolonged exposure that is needed … to integrate ICTs into teaching and learning practice". Van Wyk (2011:6) notes that barriers include "insufficient time to come to grips with new ways of teaching".

Non-technical factors appear to be more decisive as enablers of actual use and integration of technology than technical factors. As noted earlier, even if technology and concomitant support are available, there is no guarantee of effective usage. The key determinant from this study is the human factor (teachers) alongside other non-technical factors. The human element has been highlighted in previous research and in the literature review in Chapter 2. Benefits in turn are derived from the usefulness of technology affordances.

The initial indicators of how technical and non-technical factors enable teachers' e-Learning practice are:

- Limited physical access to technology and technical support hinders effective use for teaching and learning. This also affects contextual factors that determine the approaches and methodologies to be used when they are available.

- Curriculum demands are hampering the implementation of technology in education. Furthermore educational outcomes may deter teachers from using technology if they perceive it to detrimental or ineffective.
- Pedagogical change is crucial for effective and efficient technology use and integration.
- Motivated individuals are not deterred by lack of technology access, changes in teaching methodologies and curriculum demands.

4.7 Research question 3: Why do teachers adopt and use certain technologies in their e-Learning practice?

(Mapped to sub-question 3.3): How does support and professional development enable e-Learning practice?

The approach taken in this study was to problematise access as cognitive and physical access. Cantrell and Visser (2011:280) note that “sole material access is not enough to increase accessibility; teacher training and self-confidence must be addressed for more efficient transfer of learning through the use of technology”. The researcher included the cognitive dimension in alignment with the human factors that emerged prominently in this study.

The purpose of this question was to understand how support contributed to teachers’ e-Learning practice. The instruments that provided data were the survey questionnaire, interviews, and the literature reviews. The interviews and survey provided useful data for this question. Support is presented under the following headings:

4.7.1: e-Readiness and e-Capability
4.7.2: Support to learners for learning
4.7.3: Support to teachers for administration, teaching and learning
4.7.3.1: Inner intimate context support
4.7.3.2: Broader context support
4.7.4: Support from management

The data has highlighted support as a key enabler. Support factors about management, training and professional development are generally reported on negatively. While the data in this study suggested support as a concern, the researcher elected to examine support through a more developmental lens to understand how teachers in this study addressed this concern. This was decided on for two reasons. The first reason is that the support concerns noted by teachers are not explicitly contained in the CBAM (Hall, et al., 1973; Hord, et al., 1987). Although the three main concerns – social, task and personal concerns – dominate the CBAM, Loucks (1983:4) states that "other kinds of concerns are also present". The second reason was to understand the nature of the relationship between access and support. The overall support factors from the data are set out in Figure 4.9 below.

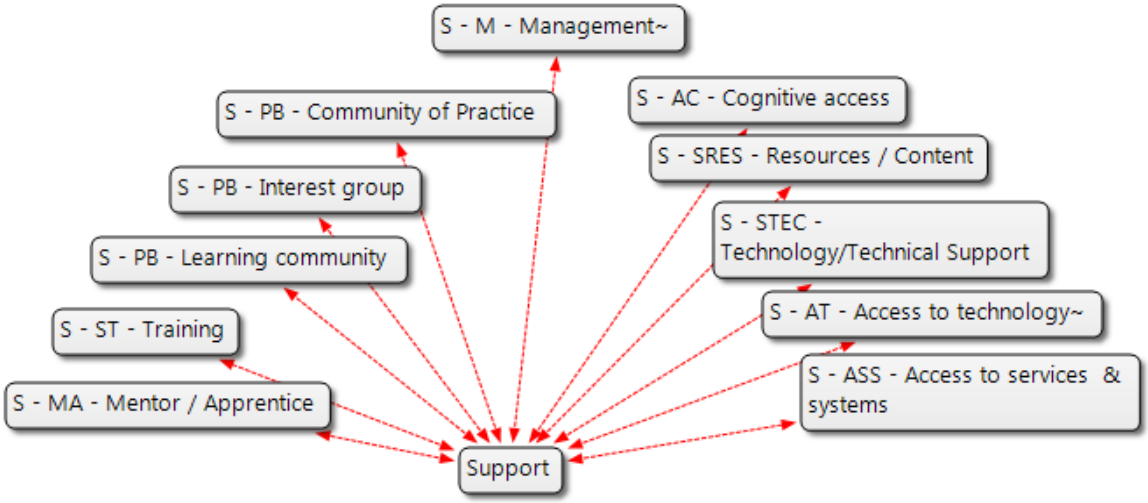


Figure 4.9: ATLAS.ti - Technical and non-technical support factors

Two comments that encapsulate teachers' thinking about support and access are:

> [R2]: "Accessibility, main thing. What is the use of having e-Learning without accessibility?"

> [R6]: "Ek sal sê net met die hulp van 'n cognitive tool [*sic*]. Net daai bietjie meer toegang te gee … ICT, op die internet, net vir hulle te wys hoe dit werk en 'n liefde te kweek in hulle ..." ["I would say with the help of a cognitive tool. Just to give that little

more access … to ICT, to the Internet, just to show them how it works and to instil a love in them …"]

4.7.1 E-Readiness and e-Capability

For technology to be truly meaningful in teaching and learning, people ought to be able to work with and through it. This by implication means that there needs to be a reasonable level of skills and comfort in its use and an understanding of its potential. Two distinct strands that focused on teachers' and learners' capabilities emerged from the data relating to e-Readiness and e-Capability. These were:

- Many teachers felt that the learners were not technology-savvy enough when using technology for school work.
- Many of the other teachers at the school were not up to speed with the use of technology.

Both these strands were found to correlate between the interviews and the survey instrument.

4.7.2 Support to learners' for learning

Learners' adeptness with technology had surfaced as an inhibiting factor and as a concern that needed support. Teachers noted through their experiences that learners were not ready for technology-integrated learning. They cited that learners were not educationally tech-savvy and lacked technological literacies. This was evident in both the survey and interviews. They felt that learners needed to be 'equipped' to engage with technology and e-Learning.

For learners to access learning with and through technology, they require physical access to technology and infrastructure. However they also need to be brought from the periphery into the core of learning opportunities that include the use of technology. According to Eynon (2011:1), learners "who become fluent in the use of digital technologies will be able to participate to a greater extent in digital practices and are thus more likely to benefit from these practices".

Teachers provided insights into this aspect of e-Capability through the following:

> [R1]: "… responsible ICT usage … their [learners'] knowledge could be a limiting factor … they don't fully understand the repercussions of their actions when they make use of technology".

> [R10]: "Also students mindset about how ICT should make learning and studying easier. They have not developed a twenty-first century mindset about ICTs."

> [SR62]: "The learners are not used to discussions so it's something I need to work on."

> [R11]: "It takes a while for learners to get used to using different ICTs."

However one teacher maintained:

> [SR42]: "Teachers are not motivated to use ICT with their learners. The learners are therefore not computer literate."

The observations by teachers of their learners contradict the general hype around learners being digital natives (Prensky, 2001). Mumtaz (2000:337) notes in her conclusion that teachers' integration of technology is impacted upon by the "students' expertise in computer use". Mohammad (2012:232) further contends:

> It is naïve to simply assume that the mere presence of such IT tools is the sole prerequisite for developing self-directed and autonomous learners. Indeed, the majority of learners, even digital natives born with a mouse in hand, are unable and unwilling to completely control (or even marginally control) their own studies.

However the status quo of learners' varying challenges with technology for learning is not static.

> [R3]: "In designing the lessons you have to think in terms of are the kids equipped enough to use a netbook or should I say a computer?"

Teachers in the interviews commented on their own initiative to remedy this.

> [R13]: “I had to firstly teach them basic computer skills, and then we moved to Google to search for information.”

Learners thus needed to be knowledgeable and confident in using technology for learning. Teachers in this study understood this, and together with the need for access in a digital milieu, they provided the essential cognitive and skills support.

> [R7]: “I’ve taught the learners how to create a blank document … I first started teaching them the messaging system.”

> [R14]: “I would also cover skills that they would need so that they are better equipped when using laptops and other technology.”

One could infer that if this support were absent, learners would effectively have been excluded from learning opportunities. The teachers in this study, who were experienced in using technology, understood what engaging with technology for learning entails. Teachers in the interviews provided good data that showed how they addressed this need by including the appropriate support in their planning. The value proposition for the teachers in the support for learners was success, fulfilment, and increased status for the teacher.

Teachers’ support of learners showed that learners were, in general, positively affected by the use of or introduction to technology.

> [R1]: “Exposure to technology has created a number of techno-savvy learners.”

The feedback from teachers showed that learners were generally excited when technology was used in the lessons, that they were able to use it on their own and took initiatives to work with technology outside of school as well:

> [R8]: “Learners are telling me they did go online the night before and …”

[R13]: “They [learners] were very excited … show[ed] me notes of what they got from their mothers’ cell phones.”

4.7.3 Support to teachers for administration, teaching and learning

The success of implementing e-Learning is to some degree dependent on a workforce being enthused, and willing to adopt, use and integrate technologies as part of their work. This is supported in the work of Chigona et al. (2010:22-23), who state that if (technology) is “not well adopted in the school, the educators may view the use of ICTs as an ‘add-on’ and not as an integral component of teaching and learning”. Use of technology should be “part of the normal, traditional teaching-and-learning environment of the institution” (Stoltenkamp & Kasuto, 2011:53).

Teachers need support in their use of technology. Some teachers in the survey cohort believed they did not have sufficient personal competency and the necessary skills and knowledge to implement e-Learning. Their support needs included technological, pedagogical and skills support to use technology efficiently and effectively.

There were no major issues with the teachers’ use of technology, but they commented through both instruments (the interviews and the survey questionnaire) on the culture of e-Learning and the use or non-use of technology at their schools. Teachers were of the opinion that there was a need for more teachers to ‘come on board’ with e-Learning. Although there was evidence of a great deal of professional development as well as access to technology and support, teachers at schools were said to be not using technology for teaching and learning.

R1 noted that teachers acquire skills but the use of ICT skills is limited to administration and personal use:

[R1]: “[They] make use of it … for writing up question papers and searches on Google … but there’s not that transfer of technology … they know how to do things, but they don’t transfer it, and they don’t make use of it in the classroom.”

Confirmation of the non-uptake and use of technology even if it is provided can be found in Hennessy et al. (2005:159) who state that “classroom change will not arise through simply providing more machines, software and functionality, and demonstrating that using ICT is effective”. Mumtaz (2000:338) contends even if technology were made available and all other factors were in place, there was no guarantee that technology would be used for education.

The counter to this was when the researcher probed about success in the use of technology. The majority of respondents recorded satisfaction in seeing other teachers using technology.

> [R14]: “The majority of staff have embraced the technology and are using it effectively.”

> [R1]: “[Teachers are] making use of technology quite a lot.”

The contradictory remarks on use and non-use necessitated a closer examination of the data. The researcher was able to deduce from the fresh scrutiny that use was being made of technology, but more for administration than for teaching and learning. This trend was also noted by Kumar et al. (2008:608).

> [R6]: “Teachers are using it just for admin but, but they’re using it more now.”

The researcher has delineated the data on support for teachers in this study into two contexts. These are an inner intimate context and a broader social context. The inner context refers to colleagues and management at school and the broader context refers to the education department, professional and interest groups, and social contacts.

The support for this categorisation can be positioned in Hall’s (1974) description of collaborative linkage. Hall (1974:4) refers to the school and individuals as the “user system” (my inner intimate context) and a support system as a “resource system” (my broader context). The resource system, according to Hall (1974:4), is there to help and is “sometimes an individual, sometimes it is located inside the user system”

and it is “more likely located outside the user system, possibly an outside organization”. There was little evidence to support that teachers, in this sample, were the recipients of support from the inner context.

Teachers in this sample were concerned about support for themselves, as well as support for learners and fellow colleagues. Consequently the teachers in this sample were found to be the contributors of support to learners and teachers in the inner context. Support evolved around more advanced concerns of access and not the traditional technology provision, infrastructure or training support. Hall (1974:12) maintains that concerns are “most likely to effect advancement in the level of use of the innovation.”

Support is value laden in that it can empower or disempower. Hence Hall’s (1974:4) notion that a “one-way association is not likely to survive” supports the strategies employed by teachers in this study. Teacher R1 noted his support of fellow colleagues as:

> [R1]: “I don’t do it for you, I show you how to do it.”

The question that emerges from this is: where would leaders, early adopters and innovators, such as these teachers, go for help and support?

4.7.3.1 Inner intimate context support

The data showed that support provided in the inner context by teachers in the sample favoured the empowering approach through mentorship and apprenticeship.

> [R13]: “I mentor and coach. I assist teachers with their new gadgets … laptops, tablets, etc.”

Teachers in this sample used strategies to guide and direct fellow colleagues as a means of support. One encompassing stated example is:

> [R14]: “I also team teach with staff … I teach the different grades to show teachers what technology is in their classroom and how they can use it.”

The support was found to be non- coercive and often on request. Teachers at the school saw what the teachers in this sample were doing and achieving.

> [R7]: “The teachers want to try what I’m doing … [a] teacher asked me … you must show me how to do it.”

Teachers’ reasons for requesting support could be accounted for in Rogers’ (1995:208) ‘observability’.

The value proposition from support to fellow colleagues appeared to be feelings of accomplishment, satisfaction, status and power, and of worth and appreciation as change agents. These feelings appeared to contribute to the teachers’ self-esteem.

4.7.3.2 Broader context support

Given the lack of inner context support, some teachers were seen to find support from external agencies such as interest groups and professional bodies. Others, on the other hand, simply went it alone. Being self-motivated, these teachers took the initiative to study and experiment on their own.

Many of the teachers did not belong to any professional body. A few of them were found to be affiliated with interest groups or formed professional sharing and learning contacts or communities. Two opposing sentiments were expressed about the usefulness of professional bodies.

The one set of sentiments alluded to professional bodies as not very useful.

> [R1]: “[It] wasn’t a very broad learning experience.”

This did not meet his needs at the time. This teacher did not at the time of the study belong to any professional body focused on e-Education.

> [R14]: “Yes, I belong to one professional body, but it has not had any real impact on what I do with ICT… the body does not “always focus on schools and training or implementing ICT into the classroom.”

The opposing sentiments, to support from interest groups, as captured were:

> [R13]: “They motivate me because through them I attend conferences, seminars, workshops, webinars, etc., where I get information to solve or survive challenges I face [and] how to integrate ICT successfully in my teaching and learning.”

> [R15]: “I have also learnt many exciting new concepts and discovered many helpful tools. I have also thoroughly enjoyed sharing my learning and knowledge with others, and have enjoyed assisting other schools.”

> [R4]: “Maar het jy lekker gelink [*sic*] met mense van ander …, ander onderwysers.” [But you networked well with other teachers.”]

The data leads the researcher to conclude that it is probable that external community-type support structures that are more relevantly focused on ICTs in education would be more beneficial for teachers in advancing their e-Learning practices. The value proposition for teachers through an involvement in professional or interest groups was a community for sharing, learning and growing.

Teachers noted a lack of support for teachers from the education department and curriculum officials.

> [R10]: “Technology has advanced the way teaching takes place but there is no significant paradigm shift in terms of ICT integration in SA education. The policy documents talk about this paradigm shift but there is no support for the effective implementation in SA schools.”

Training was reported to be once-off events and focused on technical skills and did not entail pedagogical support. Technology was provided and the expectation was improved learner results. A lack of strategic implementation planning at school or education department level summed up the thinking of a few of the teachers.

The finding in this study adds a new dimension to that of Becker and Riel's (2000) study on the effects of professional activities. They conclude that "professionally engaged teachers may be more accomplished at integrating computer technology into their own professional lives" (Becker & Riel, 2000:25). The teachers in this sample have been seen to be 'accomplished' and integrators of technology with a semblance of ease while not being fully involved in professional activities. It is probable that non-professionally engaged teachers such as many in this study may elevate their levels of accomplishment in activities within learning communities and in communities of practice.

4.7.4 Support from management

While teachers were the givers of support, this was not reciprocated by fellow teachers and management in the inner context. Supportive leadership from school management was noted at polar opposites at the different schools.

> [SR39]: "Management is not supportive – they lack understanding of ICT."

> [R7]: "They [management] had no effect on the use of my time or my willingness to use ICT."

> [SR42]: "Incompetent management who do not understand ICT and the benefits of using it and do not give the use of ICT a priority."

There were a few teachers who reported than they did have the necessary support.

> [SR70]: "… fully integrated ITC school with incredible support by management and 24/7 technical support whenever needed".

> [R11]: "School management and policies encourage and demand the use of ICT."

Where supportive leadership from the Department of Education officials was concerned, via its curriculum advisors, R7's comment encapsulates a teacher's observation:

> [R7]: "… advisors do not themselves … so…."

It was found in the data that very few schools' management actively supported the use of technology either through training sessions, through policy, or by making it mandatory. In fact more schools were reported to be non-supportive. This was seen by the absence of organisational impetus for the inclusion of ICTs into the curriculum, the lack of interest and monitoring of teachers' activities with technology, and the non-promotion of diffusion. Teachers at these schools were mostly left alone to fend for themselves.

The data showed that the management itself was not comfortable with the use of technology and as such did not act as change agents.

> [R13]: "Principals or SMT [school management team] that lacks passion on ICT."

> [R4]: "Kyk, sommige skole se hoofde is nog by exam pads." [Look, some school principals are still at exam pads."]

> [R10]: "It does have a negative impact because I do not have the complete support of management to promote overall ICT integration."

However in this study, the evidence showed that management's non-support did not adversely affect teachers' decisions to implement e-Teaching and e-Learning. This finding was also evident in the survey instrument where teachers noted that they would make a plan even if support was not forthcoming (see Table 4.3).

Management support or policy demands were not conclusive. A few schools reported mandatory use and encouragement to use technology, but many of the other respondents maintained that management was not supportive.

[R11]: “School management and policies encourage and demand the use of ICT.”

[R12]: “Standard school regulation – all staff must teach with the use of ICT.”

[R8]: “The school policy actually encourages us to use the equipment.”

The findings in this study are supported by previous findings such as those of Manson (2000:1), who found that “significant factors are the teachers, curriculum planning, technical support, the students, the actual use of ICT, training and personal development” (cited in Chigona & Chigona, 2010:3). Cantrell and Visser (2011:282) further argue that strong support systems are required if there is a chance of “increasing computer-use proficiency for teachers in WCP (Western Cape province) schools, and the integration of web-based learning into traditional pedagogical models”.

Support can be both physical and cognitive. Physical access to technology is less beneficial without cognitive access. Cognitive support is more decisive as an enabler of actual use of technology.

The indicators of the relationship between access and support and the role of support as an enabler are:

- Support is an enabler of e-Learning practice.
- There is a relationship between access and support. Support provides cognitive access for use.
- Non-technical factors exert a greater effect on e-learning practices. These are evidenced in support needs such as cognitive access, pedagogical support, learners’ technology-use related skills, training, and sustained support.
- Support for cognitive access is more vital than physical access.

4.8 Summary

This chapter explored adoption without which e-Learning practice could not materialise. The researcher examined what teachers used technology for and how

they used it in their e-Learning practice. The study then went on to explore reasons why teachers engage in e-Learning.

A distinctive trend became evident from various respondents in both the interviews and the survey, namely, that e-Learning practice in its complexity encompasses a range of factors. These factors were found to be interrelated and interdependent. Teacher factors, and specifically those in the cognitive and affective domains, are primary in e-Learning practice. The initial indicators to the question of why do teachers adopt and use certain technologies in their e-Learning practice are because of the value propositions associated with all the activities inherent in e-Learning practices. Their interest is enabled by motivation, self-efficacy, benefits, usefulness and intrinsic rewards.

Continuums of use, adoption and practice emerged from the way in which teachers used technology. Teachers were found to be dependent on technologies for personal and professional purposes. The data showed that teachers were using and integrating technologies innovatively.

E-Readiness and e-Capabilities were highlighted as concerns both for learners and teachers. Should these not be in place, the chances of successful integration of technologies into education is diminished.

There is a duality in support. Support is ultimately about access. Access is both cognitive and physical. Both teachers and learners needed support. This duality cannot be addressed with a single intervention or any intervention as events. Support has to be carefully planned and sustained.

There was an absence of organisational drive and policies, and a general non-diffusion in some schools. In this study lack of management or peer support was found to be less pivotal in influencing use decisions (both interview and survey respondents).

Teachers' attitudes, beliefs, pedagogical adeptness, motivations and efficacy are among the key factors that influence how they allow or disallow the apparent lack of

support to hinder their e-Learning practices. There is no certainty that teachers will adopt and use technology across contexts, even if this was made available.

4.9 Conclusions and findings

The analysis of the data yielded 32 interrelated findings. A summary of the findings are presented (in no specific order of merit) below as:

- Main findings of the three research questions.
- Continuums for use, practice and adoption.
- 32 findings mapped to the research questions (see Appendix D).

4.9.1 Summary of the main findings

- **What** technologies do teachers **use** and **what** do teachers use these technologies for?

Teachers used basic teaching and learning technologies available to them. Social networking services were used only to some extent. Some teachers used cloud services and learning management systems. Teachers used technologies for personal use, work-related administration, personal and work-related communication and collaboration, teaching, own learning, and learners' learning, all along a continuum of personal–administration–teaching–learning.

- **How** do teachers advance their **practices** for e-Learning?

The way technologies were used by the teachers for teaching and learning is evidenced along a continuum of traditional approaches / pedagogies, to innovative approaches / e-Pedagogies, and from using technology to integrating technology. Teachers use methodologies that they are comfortable with and which they believe are appropriate.

Teachers function simultaneously at different points of the continuums in their e-Learning practice. Teachers' use and integration of technologies are progressive and at varying levels of intensity and frequency.

- **Why** do teachers **adopt** and use certain technologies in their e-Learning practice?

Teachers elect to use technologies on account of the value proposition that technologies afford them in their personal and professional lives.

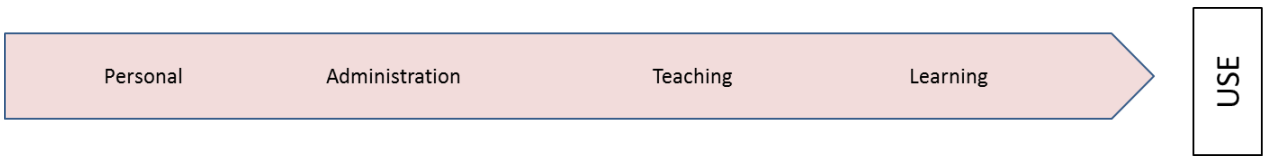
Intrinsic motivation and self-efficacy appear to be the main personal factors that enable teachers' e-Learning practices. The options to observe, experiment, use and experience with technologies for teaching and learning contribute to adoption and eventual use and integration.

Support was found to be an enabler of access. Teachers' and learners' access needs are both physical and cognitive. Cognitive access for use and integration of technology appears more crucial as an enabler than physical access.

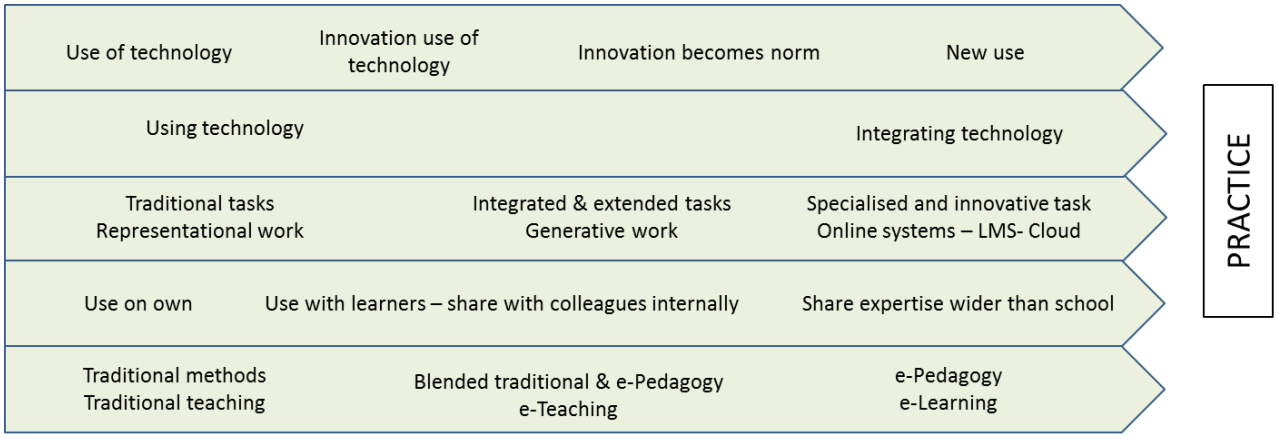
E-Capability for teaching and learning was found to be contingent on technological pedagogical content knowledge (TPACK) as an enabler. Adequate time and quality of access to technology enable confidence and proficiency towards domestication.

4.9.2 Findings – Continuums:

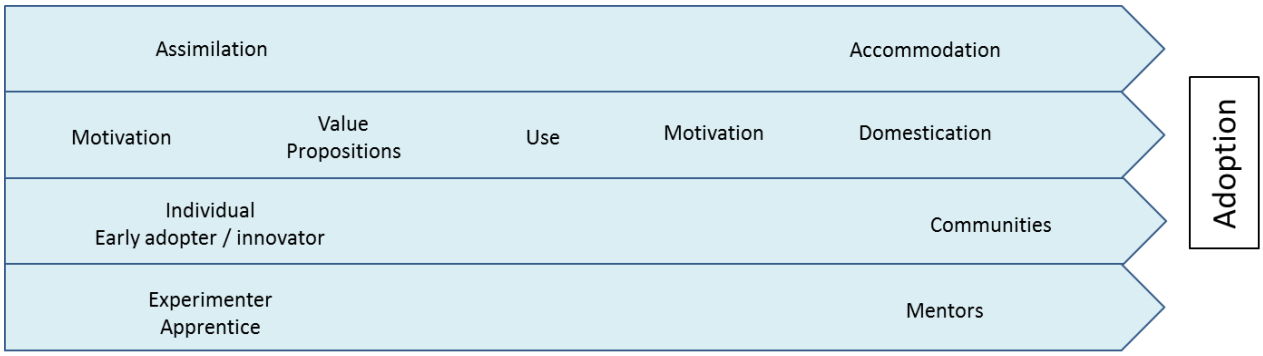
4.9.2.1 Continuum of Use



4.9.2.2 Continuum of Practice

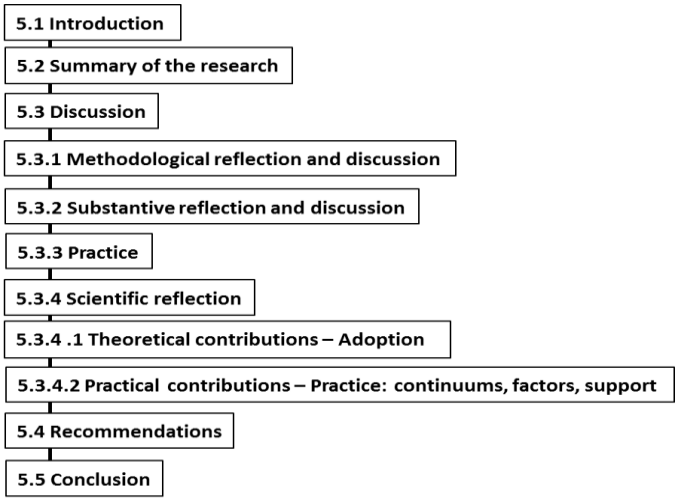


4.9.2.3 Continuum of Adoption



CHAPTER FIVE

Conclusions



Structure of Chapter Five

5.1 Introduction

Chapter 5 concludes this study on 'an exploration of e-Learning practices of teachers at selected schools in the Western Cape'. This chapter is structured in five sections: summary of the research, methodological reflection and discussion, substantive reflection and discussion, scientific reflection and discussion, and recommendations.

5.2 Summary of the research

This research commenced with the research problem as: the e-Learning practices at school level were not fully understood by e-Learning policy makers and implementers. The problem was underpinned by the under-utilisation and non-adoption of available technologies and varying levels of uptake of e-Learning.

This study thus sought to address the research problem through an exploration of **what** technologies teachers use and what they **used** these technologies for, the **patterns** in their **use and integration** of technologies, and the **reasons** they offered for their decisions to **adopt** and use certain technologies for e-Learning.

Researchers over the decades have suggested that technologies should be an integral part of a holistic teaching–learning process in e-Learning. There is however not sufficient knowledge of teachers' e-Learning practices as an integral holistic teaching–learning process in the available literature. As such the pattern of teachers' use of technologies in their work is not fully understood as selective attention has been given in research to the practice of using technologies for school education. There appear to be fewer studies that focus on e-Learning practice and concomitantly fewer on reasons for adoption and patterns of use. This has resulted in a gap that this study wanted to address.

The three research questions developed for the study were:

1. **What** technologies do teachers **use** and what do they **use** these technologies for?
2. **How** do teachers advance their **practices** for e-Learning?
3. **Why** do teachers **adopt** and use certain technologies in their e-Learning practice?

The study commenced with a review of local and international e-Learning-related literature. The reviews were examined along the lines of the research questions. The findings of the reviews were presented in Chapter 2.

In the literature review, teachers were found to use technologies for more than just teaching. The findings from the data highlighted that teachers used technologies for personal, administrative, teaching and learning purposes. These findings were consistent between the survey instrument and interviews.

Decisions to use technologies were found to be shaped by internal processes in the literature and the data. The same confirmation was evident in the finding that teachers' approach to use was incremental and progressive and consequently what teachers used the technologies for could be located on a continuum of use.

The way in which teachers used technologies was further reported as traditional use, with technologies as an 'add-on' to existing practices. The literature noted that there were some teachers who were progressing beyond the traditional level. This was

one of the major findings in the data as well. The range of ways in which teachers incorporated technologies into the teaching and learning process ranged from basic use for e-Teaching to blending traditional use with advanced uses, to innovative uses for e-Learning. Further to this, past literature highlighted that teachers used technology because of external tangible benefits focused mostly on its making their work easier and more interesting for the learners.

Further examination of the literature and the data showed that the key factor in e-Teaching, e-Learning and e-Learning practice is the teacher. The human element emerged in this and many previous studies as the most crucial part of the teaching and learning environment. This thread was carried through from the literature review stage into all subsequent chapters. The literature review yielded a conceptual framework for the study, which in turn provided the focus for the research questions, and shaped the design of the research, the data-collection instruments, the data-collection processes and eventual analysis.

The conceptual framework was rooted in the research focus, that is, to explore and understand e-Learning practices. All the findings from the literature review were summarised and plotted into a matrix. The adoption literature was a synthesis of many adoption theories, and the result was an adaptation to the TAM theory with the inclusion of concepts from socio-cognitive theories. The suggested adaptations were then mapped onto the axes in the framework. The final product that emerged was the conceptual framework of this study (see Chapter 2, Section 2.3). The next stage was to design the research.

Based on the conceptual framework, the research questions, the pervasive human element and the literature on research design, Chapter 3 was developed. The study was not strictly confined to one particular method, approach or strategy as the nature of the phenomena under investigation and the dynamics of the situation required adaptations. A selective blend of qualitative and quantitative approaches, explanatory and exploratory enquiry and, inductive and deductive techniques was employed. This study was closely aligned with the characteristics of theory building.

Data was collected through a survey instrument and face-to-face interviews. The purposeful sampling consisted of a final sample of 15 participants for the interviews and 76 for the survey questionnaire from a cross-section of public and private schools (see sampling in Chapter 3).

The data was collected and subjected to content analysis. The findings were presented according to the research questions. The following were the main findings (see Chapter 4).

- **What** technologies do teachers **use** and **what** do they use these technologies for?

Teachers use technologies for personal use, work-related administration, personal- and work-related communication and collaboration, for teaching, for own learning and for learners' learning, all along a continuum of personal – administration – teaching – learning.

- **How** do teachers advance their **practices** for e-Learning?

The way technologies are used by the teachers is evidenced along a continuum of traditional approaches / pedagogies to innovative approaches / e-Pedagogies and from using technologies to integrating technologies. Teachers use methodologies that they are comfortable with and which they believe are appropriate. Teachers' use and integration of technologies are progressive and at varying levels of intensity and frequency.

- **Why** do teachers **adopt** and use certain technologies in their e-Learning practice?

Teachers choose to use technologies on account of the benefits and value proposition that technology affords them in their personal and professional lives. Intrinsic motivation and self-efficacy appeared to be the main personal factors that enabled teachers' e-Learning practices. Support was found to be an enabler of

access. Cognitive access for use and integration of technologies appears more crucial as an enabler than physical access. Teachers' e-Capability for teaching and learning was found to be contingent on technological pedagogical content knowledge (TPACK).

Emanating from the findings were patterns of use, practice and adoption. These patterns were mapped onto continuums:

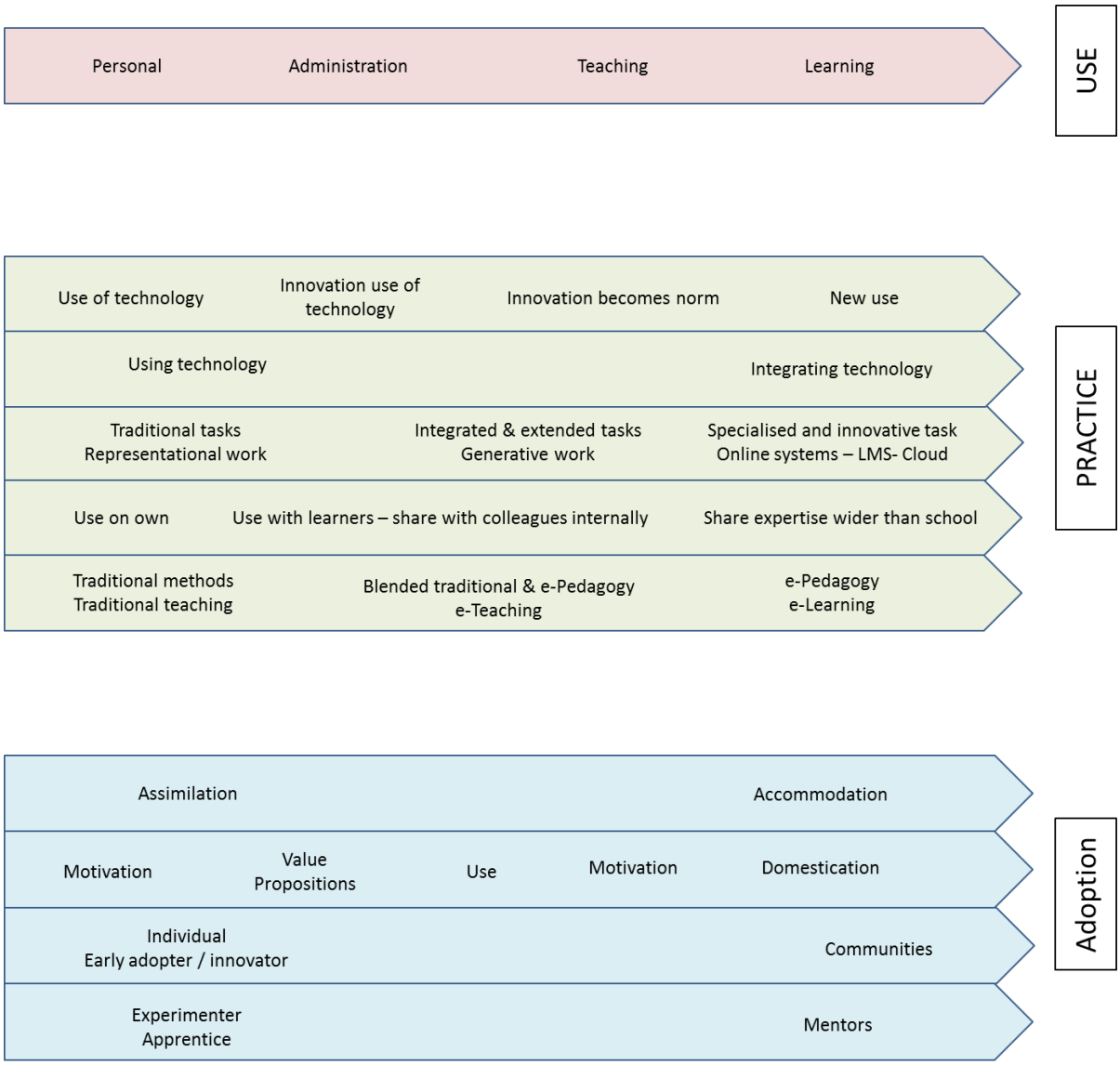


Figure 5.1: Continuums

5.3 Discussion

5.3.1 Methodological reflection and discussion

Interviews were selected to gather data from participants because the researcher wanted to hear from the teachers what they thought, felt and believed about what they were engaged in. This was well grounded in the phenomenological tradition. The alternative method of gathering the data would have been to have conducted a longitudinal study, following the teachers over a few years to observe their patterns of use. However the data gained through the interviews proved useful and valuable.

The interviews were conducted at the teachers' place of work. The researcher noted that when the interviews took place in the teachers' actual classrooms as opposed to the staffroom or set-up space for the interviews, their different behaviours were evident. In their own classrooms, some of them simply jumped up to show the researcher something or pointed out actual proof of what they were doing. Although guidelines for interviews speak of a quiet space, the vibrancy and comfort of the actual classrooms functioned well for this study (Cohen et al., 2007:363-364).

The survey instrument was developed early in the study based on previous research; hence it was confined to what was known. However a survey could also have been administered again to the same respondents with different questions with the new knowledge gained in the study. Since the survey was anonymous and open to anyone on the mailing list to respond, getting the same people to take it again would not have been possible. Surveys are a good and rapid way to gather data, and in this study, specifically for the purpose of eliciting current thinking, the survey proved to be more than adequate.

Of the instruments used, the interviews were found to be the most effective, yielding rich data that proved to be valuable. The survey instrument was more useful for the collection of baseline data and as a basis for a pilot study. The semi-structured face-to-face interviews with leads and probes were especially useful. In cases where these leads were mailed, the option to probe was absent. The respondents of the

mailed responses did not express themselves in the same way as they could have in a face to face interview.

The approach in this study was underpinned by the tradition of grounded theory using combined inductive and deductive methods. This was selected given the need for and nature of exploring a phenomenon such as e-Learning practice which is young as a practice in education and relatively unknown in many respects. As there are no e-Learning practice theories per se, adoption theories and known e-Learning models provided a sound starting point towards understanding why teachers would choose to adopt technologies and how they are using it.

The aim of this study was not to verify any theory, but to allow the data to determine the theory. Without blending related knowledge, and using an iterative research approach as was done in this study, the researcher could have simply been attempting to measure whatever was found using traditional knowledge as the filter.

Hence not having followed traditional research tradition, the researcher's approach of *a sensible selective blend of qualitative and quantitative approaches, explanatory and exploratory enquiry and, inductive and deductive techniques,* stood the risk of being considered neither valid nor reliable. However this was a sound decision as the constant moving in and out of the data-collection and analysis process in a back and forth iterative process yielded sound results. This approach was preferred as opposed to attempting to understand the phenomena through a single theory.

In this study of e-Learning practice, the researcher has presented a conceptualisation that e-Learning practice is a holistic blend of elements. While the analyses appeared atomised, they were all examined in relation to other elements within e-Learning practice (see conceptual framework in Chapter 2). This approach produced findings that possessed internal coherence and coherence as part of each question being addressed as well as coherence across the questions themselves. Together they provided a rational representation of teachers' e-Learning practice.

5.3.2 Substantive reflection and discussion

5.3.2.1 Use – what technologies do teachers use and what do they use these technologies for?

The findings have revealed that teachers used technologies for personal, administration, teaching and learning. There is a comparable synergy with previous research which found that teachers used technologies for more than just teaching. In previous studies, it was reported that technologies were also used for administrative and personal purposes (Gibbons & Fairweather, 1998; Kellenberger and Hendricks, 2000). The analysis of the data in this study has revealed supplementary aspects related to use.

The data in this study provided the evidence necessary to extend the notion of personal use of computers only, to include the use of social networking services (SNS) and cloud services and systems. The data evidenced that technologies were used for both personal and work-related communication and collaboration as well as for personal learning and learners' learning.

There is an emergent blurring of the distinctions of the technologies that teachers use and what they use these technologies for, and the possibilities exist that it may reach a point where these separate elements will not be discernible. Emanating from this study is that technologies are pervasive in the lives of the teachers in this study with initial indicators of domestication. Domestication theory asserts that people may reject technologies completely or fit them into their everyday lives (Haddon, 2006:195). In this study teachers appeared to be incorporating them into their way of work.

5.3.2.2 Use – how are teachers using technologies: practice of use

There is a relationship between what teachers use technologies for and the manner in which this plays out. Teachers' practice of use has emerged as incremental, at varying intensities and with different frequencies. The findings in this study are congruent with those of other research that noted incremental and progressive use.

The progressive and incremental nature of implementation was noted by Thomas and Cronjé (2007) as characterised by a beginning and a culminating process. This was further supported by Pedretti et al. (1999), noting that the integration of technologies by teachers was incremental.

The progressive, incremental and transformative nature of teachers' actions found in this study correlate positively with the UNESCO (2002) and DoE (2007) levels of use and development. According to Stoddart and Niederhauser (1993), technology use could "fit into a spectrum of instructional approaches, varying from traditional to innovative" (cited in Amin, 2013:6). Dawes (2001) added an additional dimension that "change occurs" as teachers develop "professional expertise" "through stages" from "involved" to "integral users" ultimately" (cited in Hennesy et al., 2010:10).

The literature reported that teachers' practice mirrored methods of teaching that were similar to what they had always done. This was found to be partially true in this study as well, and confirmed that practices were aligned to their personal beliefs of teaching and how subjects are best learned. Teachers in this study were found to be doing things differently as well. Veen's (1993:139) work revealed: "Teachers adopt new media if they can use them in accordance with their existing beliefs and practices." As a result, teachers initially *transformed* technologies to suit their beliefs and comfort zones.

This however was found to be a first step of fledgling stages as noted by Hennessy et al. (2005:185), who found that "teachers were sensibly building on and extending existing practice, exploiting the new opportunities arising, yet not blindly jumping in".

> [R7]: "… a variety of different technologies and methods to see how it works … I tend to try and follow that pattern".

Wallace (2001) findings support the transformative nature of teachers' practice, where teachers were found to be changing what they obtain to fit into their teaching methods.

The findings in this study revealed that teachers maintained some traditional ways of doing things and were progressively advancing their practice when it made sense to them.

> [R3]: "… always open up with a little PowerPoint presentation, a message of inspiration, just to start off with, and then obviously we do the teaching … depending on the lesson … take a clip here and there".

These findings are supported by other studies which indicate that teachers are progressing incrementally from traditional practices towards changing practices (Sheingold & Hadley, 1990; Hennessy et al., 2005; Wilson-Strydom et al., 2005).

Examination of these transformations showed them to be the "add-on" referred to by Chigona et al. (2010). Transformations in this context were not viewed negatively. Teachers adapted technologies to suit their needs and this study, amongst others, has shown that this is an initial stage from which teachers launch. The affordances of technologies provide opportunities for transformation which sometimes represent innovative practices. Innovation is not necessary something completely new, but may be new to the person experiencing it. This is especially true when transformation is viewed as an adaptation for use of technologies in ways not initially intended, or in the case of practice, using technologies to do something that was not done before.

This information, together with the findings of the study, assists in understanding why teachers are found to be functioning at different points in the range of taxonomies available. Thus a natural link was found that bridged what teachers used technologies for and the manner in which this was approached. The researcher was able to locate these actions on a continuum of practice. Teachers could be active at different points on the continuum and could operate at different points simultaneously.

5.3.2.3 Use – decisions to use: implications of change

The human factor was found to be crucial in this and previous research. The introduction of technologies into school teaching and learning implied change. The relationship between the human factor and change is corroborated by Loucks (1983:2) in that "change is a personal process that individuals experience differently, each at his/her own pace and degree of trauma".

Change was, however, not found to be the same for all teachers in this study. The teachers in this study were individual units from different contexts, ages, genders, and experience, and all of them were accomplished users of technologies. They all evidenced different routes and experiences towards the common features of this study.

> [R8]: "*(my)* teaching has evolved since I started using ICTs".
>
> [R8]: "… it's just I use the different perks that come with the devices differently … as the technology evolved I adapted".

This finding is similar to Mumtaz (2000:324) report that "not all 'accomplished' technology-using teachers possess similar qualities, but that a diverse and complex combination of factors has had an impact on their path to success".

The key element in decisions concerning e-Learning were found to be the teachers themselves and this is confirmed by Mumtaz (2000:335). It is the human element that surpasses technology, and technical and other subjective factors. Veen's (1993:139) research found that teachers' "beliefs with respect to the content of their subject matter as well as to its pedagogy" influenced their decisions to use or not use computers. Veen (1993:139) furthermore contends that "teacher factors outweigh school-level factors". Decisions to adopt, use and integrate technologies were found to be based on personal reasons. These personal reasons were found to be primarily informed by cognitive and affective processes.

The decision to include the cognitive and affective domains as the human factors in the conceptual framework is validated in a range of studies: Hennessy et al. (2005) (attitude, beliefs, practice and resistance, confidence, resistance to change); Manson (2000:1) (significant factors are the teachers); Veen (1993:147) (teachers' beliefs, personal feelings, skills and attitudes); Mumtaz (2000:335) (teachers' own theories about teaching and learning being central to integration); Manson (2000; Lau & Sim, 2008; Bingimlas, 2009) (teachers' readiness, confidence, lack of competence, attitudes, expertise); Molotsi (2014) (teachers' ICT competencies).

5.3.2.4 Adoption – why do teachers actually use technologies based on adoption decisions?

The reasons why teachers used technologies were arrived at inductively from the data. TAM maintains that usefulness and ease of use are reliable predictors of adoption. This was validated in this study as well. However these two concepts alone did not sufficiently expand on why teachers found using technologies useful or beneficial.

This was evidenced by teachers' selective use of technologies for beneficial purposes. Technologies in themselves have an instrumental value of usefulness. The fact that a technology is useful is not a sufficient condition for use. However if the usefulness of the technology could be of benefit to the user, the chances of its being used are greater.

> [R6]: "You see it works and there is evidence it works …"

Ultimately it is the benefit that is gleaned from this technology that provides the value proposition. The teachers in this study affirmed this when they reported on what they believed they had gained by using the technologies.

> [R1]: "[A] sense of gratification when you see … that learners are able to grasp a difficult concept … and [are] able to do things quickly."

It is this value proposition that can only be assimilated and accommodated internally through a balanced interrogation in the cognitive and affective domains within an individual.

> [R8]: “Because I’ve learned, I’ve developed a skill to actually use that tool and now I know how to use it. Now it’s better.”

Should the value proposition be acceptable, the individual will use the technology. The overall value proposition of the technology affordances in this study were found to be teachers’ perceptions of a sense of accomplishment, of efficiency, of coping, and of being successful.

5.3.3 Practice

5.3.3.1 Practice: enablers

Given that it has been shown (Chapter 2, Section 2.1) that physical access to technology and technical support is not a guarantee of usage, the focus on support was examined through a cognitive lens. Support was not taken to be the traditional need for ‘training’ and ‘hands-on workshops’ (as is the cliché in South Africa), but support as a means of access to e-Learning. Access to e-Learning was additionally not taken as physical access to technology.

If teachers and learners do not know how to use technologies and what to do with them, then their chances of engaging in e-Learning are severely diminished. Support provides access and in this study it was found that cognitive access is necessary to engage in e-Learning. The implications of this are that the access that is more crucial is cognitive access. This would appear to be the case with many teachers who say they do not know how to integrate technologies for learning.

E-Readiness, on the other hand, highlighted the need for teachers to be at, or get to a position of strength, where they understand the e-Learning arena, and can respond swiftly to e-Teaching and e-Learning needs.

> [R11]: “I first familiarise myself with the ICT before I attempt to use it in the classroom.”

> [SR14]: “This is the digital era. Every teacher must equip her/himself with knowledge and skills in order to use ICT as a tool for teaching and learning.”

This study has found (as did other research) that learners themselves were not fully e-ready to engage meaningfully in e-Learning activities.

With respect to teachers, their needs were found to be located in the area of TPACK as the necessary knowledge and skills to be able to operate in a digital environment. Molotsi (2014) in her study found that the prerequisite technological knowledge and skills were lacking. Cantrell and Visser (2011:281) note that if “pedagogical assistance is provided” teachers would be more likely to try using technologies. However if the teachers themselves are not self-driven, then the situation of external locus of control, as noted by Bladergroen et al. (2012), may recur. This iteratively circles back to the human element as the key factor.

> [R7]: “And I basically go in and train myself and the familiarity gives me self-confidence.”

5.3.3.2 Practice: barriers

Many previous studies either focused on barriers, or resulted in barriers as factors for non-adoption and non-use of technologies in education (indications are that this has been a focus of research from the late 1900 to date) (Hadley & Sheingold, 1993; Pelgrum, 2001; Chigona et al., 2010; Drent & Meelissen, 2008; Bingimlas, 2009; Davids, 2009; Bytheway et al., 2010; Cantrell & Visser, 2011; Eickelmann, 2011; Bladergroen et al., 2012; Mohammad, 2012; Amin, 2013; Molotsi, 2014). These factors, regarded to be barriers, were found to be both external and personal.

External factors such as management, training, physical access to technology, and technical support were noted in this and other studies. However the findings of this

study have shown that external factors that normally return a negative finding were found to correlate positively with this sample. Personal factors included those of motivation, self-determination, self-efficacy and locus of control. These personal factors were evidenced in the sample in this study.

Some studies have supported that subjective norms affect adoption and use. Subjective norms are assumed to have two components that work in tandem: beliefs about how other people (presumably important such as managers or experts) would expect them to behave (normative belief), and motivation to comply with others as part of a social cohesive unit.

The findings in this study showed variations to this: in the instances of behavioural expectations by managers, many of the teachers worked in an environment where management was not supportive and few or no demands were made. In instances of compliance with the actions and activities of others, the teachers in this study were not found to be motivated to be followers, but rather to be early adopters and leaders. The findings in this study are confirmed by those of Kumar et al. (2008:611). In their study they found that in the "impact of the construct of subjective norm on use … there was no significant relationship between subjective norm and actual use of computers (AUC)".

The data from this study revealed that teachers in this study were self-driven, possessed an internal locus of control, were intrinsically motivated and possessed high self-efficacy beliefs. These findings are validated by the finding of Bladergroen et al. (2012:113) whose study attributed non-use of technologies to teachers who were "not self-motivated". Their teachers were reported to have "locus of control that was external", relying on others for their "own professional development", and "thus resisting learning through discovery".

Enabling factors in some studies appear to be the flip side of inhibiting factors in other studies. The teachers in this study encountered the same factors as teachers in other studies. So the researcher's attention was drawn to what else enables or influences teachers' use of technologies.

Factors for progressing e-Learning become evident when one focus on the personal enablers in this study: support for cognitive access, TPACK, internal locus of control, self-determination, intrinsic motivation, and self-efficacy. The factors that are said to inhibit technology adoption and use in many studies are the same factors that can encourage use, as evidenced in this study.

This research started out with the research problem as e-Learning practices in school education not being fully understood by e-Learning policy makers and implementers. This problem emerged from apparent varying levels from non-adoption to under-utilisation of available tools and technologies. This study has revealed the following:

- The use of technologies has become pervasive in the personal and professional lives of teachers.
- The motivating factor that determines actual use of technologies is its benefits and associated value propositions.
- E-Learning practices are fuelled through personal factors of self-determination and drive.
- E-Learning practices may be tracked along continuums of use, adoption and practice.
- Support as a means of cognitive access to e-Learning is more likely to result in use than physical access to technologies alone.

5.3.4 Scientific reflection

This study contributes to the body of knowledge of e-Learning theoretically and practically.

5.3.4.1 Theoretical contributions – Adoption

This study contributes to the TAM literature with its suggested adaptations to the TAM framework. The adaptations are concepts from social cognitive theory. These are the motivational variables of expectancy and self-efficacy as mediating factors to

understand expectancy–value relationships. The expectancy–value relationship is extended with two additional concepts of benefits and value propositions. The adapted TAM used in this study thus states:

> Self-efficacy beliefs influence one's perception of whether a technology is easy or difficult to use. One could find that a technology that is easy to use gives a sense of self-efficacy. The feelings of *self-efficacy* can thus be a *motivating* factor.
>
> Motivated individuals could experience feelings of self-efficacy based on their drive and locus of control. *Benefits* that can be derived from the technology affordances (usefulness) could influence a person's *motivation*. The *utility value* and *benefits* to be gained from the use of technologies could further provide *value propositions* as additional *motivating* factors.
>
> Such *value propositions* are based on the notion that a person will be *motivated* if he/she believes that a concerted effort with a technology will result in a good output (*expectancy*), and this output will earn him/her the desired rewards (*instrumentality*), and the value of the rewards is highly positive (*valence*). An individual is thus likely to use a technology based on the value he/she attaches to the outcome of the use of a technology.

This study explored **why** teachers **adopt** and use certain technologies in their e-Learning practice. The findings in this study were that it was on account of what was of value to them – the value propositions. Usefulness of a technology could result in some benefits. If the benefit is meaningful to an individual, he/she may consider its use. It is however the value position of using the technology that determines actual use. A technology may be perceived useful and beneficial, but if the value proposition is not palpable, then it may not be used. Figure 5.2 shows the original TAM, and Figure 5.3 the researcher's suggested adaptations.

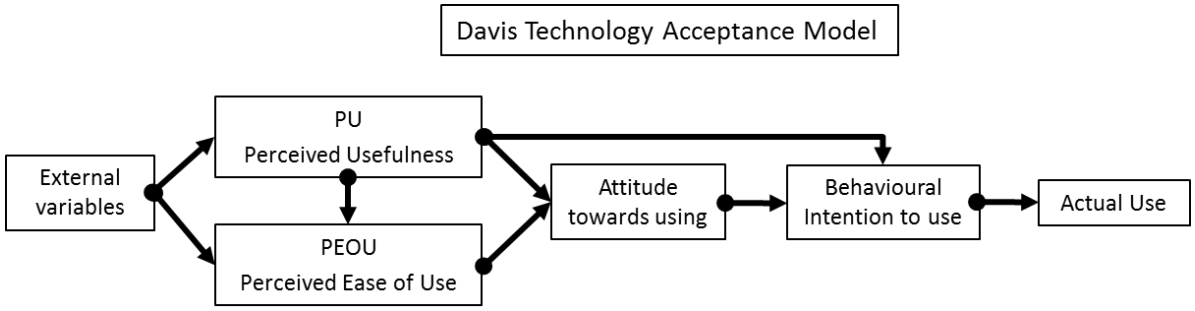


Figure 5.2: Original TAM (Davis, 1989)

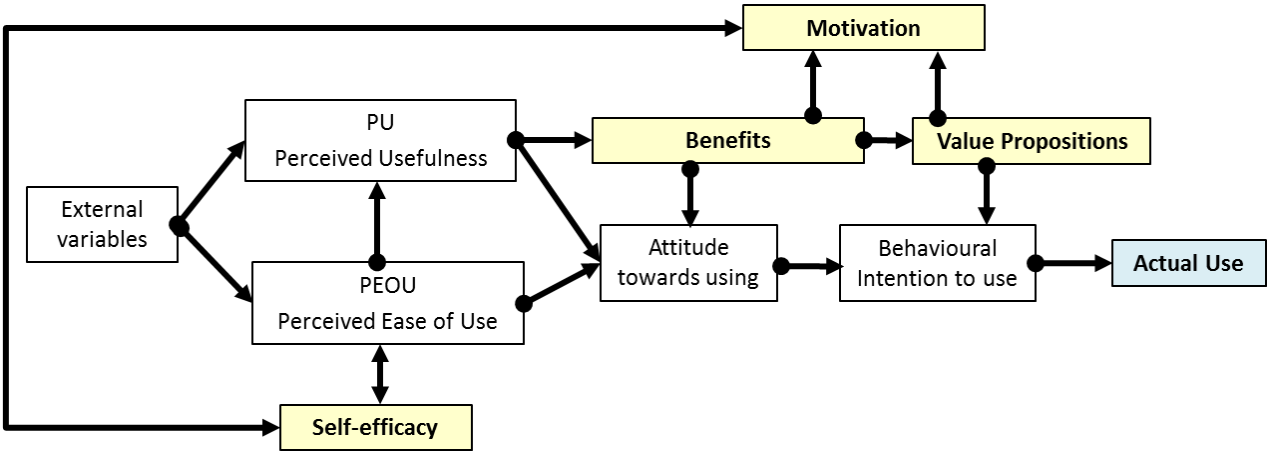


Figure 5.3: Suggested adaptation to TAM

5.3.4.2 Practical contributions – Practice: continuums, factors, support

This study contributes the continuums of use, practice and adoption which run from basic launch points to deeper and advanced levels of engagement. Continuums provide indicators of ranges or scales which comprise levels of complexity of singularities. From the findings of this study the researcher concludes that individuals can be located at different points of a continuum simultaneously and they can move incrementally and freely within the range. The points are not fixed descriptions of final destinations, but rather levels of operation / engagement at these points. An individual can be located at any indicative point but be operating at different levels of complexity at these points within the continuum and indeed across the continuums. When viewed together, the continuums progress our understanding of what e-Learning practice is, that is, a blend of methodologies, models and methods working together.

The understanding of *factors* is progressed in this study by the aggregation of previous research and this study that has shown that all factors are potentially enablers and inhibiters. The epistemological beliefs of these factors and what they represent is dependent on the individual teacher. Uptake and use are thus impacted upon by the very same factors that impact on non-uptake or non-use.

The understanding of support as a cognitive entity is a further contribution of this study to the body of knowledge. This study showed that cognitive support was aimed at providing access, and that this cognitive access enabled teachers and learners to engage with technology for teaching and learning.

The practical contributions of this study are summarised as: all factors can equally progress or retard e-Learning; cognitive support is crucial for access to using technology for teaching and learning; adoption and use is grounded in value propositions; and patterns of use, practice and adoption are incremental and progressive along continuums. These contributions to the body of e-Learning knowledge have the potential to inform evaluative and exploratory studies and assist when designing and developing e-Learning interventions.

5.4 Recommendations

A range of complex elements and factors was encountered in this study. The findings showed the incremental progress the teachers in this study made, some of them in a debilitating environment. This is juxtaposed against other teachers reported not to have engaged in e-Learning in the same environments. Flowing from these findings, two recommendations are suggested, one on policy and one for practical implementation.

5.4.1 Policy recommendations

Lim (2013:63) notes that “it is still difficult to judge the success of technology implementation because there is still a lack of specific goals or models to emulate”. This study found that teachers operated in an environment characterised by loosely articulate policies, guidelines and indicators for e-Learning, both in the Western Cape and nationally. Emanating from this the following are recommended for staged levels of implementation and accountability:

- A revision of the current White Paper 7 on e-Education (DoE, 2004) to include a set of richer and more concise guidelines, and clear detailed implementation

standards and indicators for e-Learning, for professional development for e-Learning in the South African public schooling sector.

- Provincial education departments should develop implementation plans based on the revised e-Education policy. These should include professional development plans, target setting, monitoring and accountability of progress.
- Schools should develop their own operational plans, guidelines, indicators and strategies for e-Learning based on the provincial operational plans.

The teacher has been highlighted in this research and previous research as a crucial factor. A practical suggestion from this research is the following:

- The development of a professional development programme that is comprehensive and flexible. The national, provincial, district and school-level plans for a teacher development plan should attend to support for cognitive access and TPACK. Such a programme should include modules that focus on e-Learning methodologies, models and methods as part of the programme for e-Teaching and e-Learning.

5.4.2 Suggested further research

The findings of this study highlighted the need to question critically why technologies are said to be under-utilised. What are the factors that impact on and influence e-Learning? This study found that the factors were the same, but the teachers in this sample adopted and used technologies subject to the same factors. The question that remains is what other reasons might there be from those teachers who don't use technologies? Research on strategies to promote and enable use of technologies should thus be undertaken.

The suggested adaptation to the TAM (inclusive of TAM 2 and TAM 3) model represents a move away from the acceptance of perceived usefulness as a predictor towards use. This study suggests two additional constructs to the model, benefits and value propositions. Additional empirical studies to validate these constructs in TAM are needed.

This study yielded continuums of use, practice and adoption. It did not test the continuums in other contexts and fields of education. Further research is needed to test the utility value of the continuums of use, practice and adoption in evaluative studies.

The pedagogical dimension in e-Learning is under-researched at school level. Additional valid and reliable research should be undertaken in the area of teacher professional development that focuses on cognitive access and e-Pedagogies for e-Learning.

This study did not explore in depth the impacts of policy on e-Learning practice. It also did not include learners as an influencing factor. Further studies that include learners and policy could add value to the e-Learning body of knowledge.

5.5 Conclusion

This chapter concludes the exploration into teachers' e-Learning practices. The summaries of each of the chapters provide a point of reference of the progress of the study. The exploration found a range of factors and elements that constitute e-Learning practice. Many of these were outside the scope of this study. Of those that were addressed, the individual teacher who represents the human factor emerged as crucial in all e-Learning endeavours.

The researcher found that one could not ask a complex question about e-Learning practices and expect a simple answer. Complex questions provide complex answers. The euphoria lies in looking at, exploring, learning, making connections, breaking old ideas, debunking myths and reconstructing a new reality.

The findings in this research, with their tentative answers, simply raise more questions. Good research should highlight the 'WHY' question.

REFERENCES

Adelman, C., Kemmis, S. & Jenkins, D. 1980. Rethinking case study: notes from the Second Cambridge Conference. In Simons, H. (ed.). *Towards a science of the singular: essays about case study in educational research and evaluation*. Norwich: Centre for Applied Research in Education, University of East Anglia: 45-61.

Ajzen, I. 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2):179-211.

Ajzen, I. & Fishbein, M. 1980. *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice Hall.

Allen, S.J. 2007. Adult learning theory and leadership development. *Leadership Review*, 7:26-37.

Amin, S.N. 2013. An effective use of ICT for education and learning by drawing on worldwide knowledge, research, and experience: ICT as a change agent for education: a literature review. http://www.nyu.edu/classes/keefer/waoe/amins.pdf
Viewed November 2015.

Atherton, J.S. 2013. Learning and teaching: assimilation and accommodation. http://www.learningandteaching.info/learning/assimacc.htm
Viewed February 2016.

Babbie, E.R. 2010. *The practice of social research*. 12th ed. Belmont, CA: Wadsworth Cengage Learning.

Babbie, E.R. & Mouton, J. 2001. *The practice of social research*. Cape Town: Oxford University Press Southern Africa.

Bagozzi, R.P. 2007. The legacy of the technology acceptance model and a proposal for a paradigm shift. *Journal of the Association for Information Systems*, 8(4):244-254.

Bagozzi, R.P., Baumgartner. J. & Yi, Y. 1989. An investigation into the role of intentions as mediators of the attitude–behavior relationship. *Journal of Economic Psychology*, 10(1):35-62.

Balanskat, A., Blamire, R. & Kefala, S. 2006. The ICT impact report. A review of studies of ICT impact on schools in Europe.
http://colcct.colfinder.org/sites/default/files/ict_impact_report_0.pdf
Viewed April 2016.

Balula, A. & Moreira, A. 2014. SCAI: a three-dimension model for e-teaching evaluation in higher education. In Balula, A. & Moreira, A. (eds). *Evaluation of online higher education: learning, interaction and technology.* Cham: Springer: 3-44.

Bandura, A. 1982. Self-efficacy mechanism in human agency *American Psychologist,* 37(2): 122-147.

Bandura, A. 1996. Social cognitive theory of human development. In Husén, T. & Postlethwaite, T.N. (eds). *International enclyclopedia of education.* 2nd ed. Oxford: Pergamon Press: 5513–5518.

Bandura, A. 2001. Social cognitive theory: an agentic perspective. *Annual Review of Psychology*, 52:1-26.

Bassey, M. 1999. *Case study research in educational settings*. Buckingham: Open University Press.

Becker, H.J. & Riel, M.M. 2000. Teacher professional engagement and constructivist-compatible computer use. Teaching, learning, and computing: 1998 survey, report no. 7. Center for Research on Information Technology and Organizations, University of California, Irvine. http://www.crito.uci.edu/tic/findings.html
Viewed September 2012.

BECTA (British Educational Communications and Technology Agency). 2003. What the research says about using ICT in maths.
http://partners.becta.org.uk/page_documents/research/wtrs_maths.pdf
Viewed December 2014.

Beetham, H. & Sharpe, R. (eds). 2013. *Rethinking pedagogy for a digital age: designing for 21st century learning*. 2nd ed. New York, NY: Routledge.

Bendassolli, P.F. 2013. Theory building in qualitative research: reconsidering the problem of induction. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 14(1), Art. 25.
[Online] http://nbn-resolving.de/urn:nbn:de:0114-fqs1301258
Viewed March 2015.

Bhalla, J. 2013. Computer use by school teachers in teaching-learning process. *Journal of Education and Training Studies*, 1(2):174-185.

Biggs, J. 1996. Enhancing teaching through constructive alignment. *Higher Education*, 32(3):347-464.

Bingimlas, K.A. 2009. Barriers to the successful integration of ICT in teaching and learning environments: a review of the literature. *Eurasia Journal of Mathematics, Science and Technology Education*, 5(3):235-245.

Bladergroen, M.C., Chigona, W., Bytheway, A., Cox, S., Dumas, C. & van Zyl, I. 2012. Educator discourses on ICT in education: a critical analysis. *International Journal of Education and Development Using Information and Communication Technology (IJEDICT*), 8(2):107-119.

Bless, C. & Higson-Smith, C. and Kagee, A., 2006. *Fundamentals of social research methods: An African perspective*. Juta and Company Ltd.

Bowen, G.A. 2005. Preparing a qualitative research-based dissertation: lessons learned. *The Qualitative Report*, 10(2):208-222.

Brown, J.S., Collins, A. & Duguid, P. 1989. Situated cognition and the culture of learning. *Educational Researcher*, 18(1):32-42.

Burkett, B. 2012. Developing a personal theory of teaching practice: the role of reflection. *Korea TESOL Journal*, 11(1):19-32.

Bytheway, A., Sadeck, O., Dumas, C., Chigona, W., Chigona, A., Mooketsi, B., Rega, I. & Fanni, F. 2010. Integrating ICTs into the classroom: assisting teachers in disadvantaged primary schools. In Cunningham P. & Cunningham M. (eds). *eSkills Summit Proceedings, Cape Town, 26–28 July*. Cape Town: eSkills Summit, 12pp.

Cantrell S. & Visser, L. 2011. Factors influencing the integration of technology to facilitate transfer of learning processes in South African, Western Cape province schools. *Quarterly Review of Distance Education*, 12(4):275-285.

Cheung, R. & Vogel, D. 2013. Predicting user acceptance of collaborative technologies: An extension of the technology acceptance model for e-Learning. *Computers & Education*, 63:160-175.

Chigona, A. & Chigona, W. 2010. An investigation of factors affecting the use of ICT for curriculum delivery in the Western Cape, South Africa. In *18th European Conference on Information Systems (ECIS) 2010 Proceedings.* Paper 61.
http://aisel.aisnet.org/ecis2010/61
Viewed March 2016.

Chigona, A., Chigona, W., Kausa, M. & Kayongo, P. 2010. An empirical survey on domestication of ICT in schools in disadvantaged communities in South Africa. *International Journal of Education and Development Using Information and Communication Technology (IJEDICT)*, 6(2):21-32.

Cohen, S. 2003. Report on the use of ICTs in schools research project. Johannesburg: South African Institute for Distance Education (SAIDE).

Cohen, L., Manion, L. & Morrison, K. 2005. *Research methods in education*. 5th ed. London: RoutledgeFalmer (Taylor & Francis e-Library edition).

Cohen, L., Manion, L. & Morrison, K. 2007. *Research methods in education*. 6th ed. London: RoutledgeFalmer.

Conole, G., Dyke, M., Oliver, M. & Seale, J. 2004. Mapping pedagogy and tools for effective learning design. *Computers & Education,* 43(1-2):17-33.

Cooper, S. 2013. Theories of learning in educational psychology. http://www.lifecircles-inc.com/Learningtheories/learningmap.html
Viewed December 2015.

Cox, M., Preston, C. & Cox, K. 1999. What factors support or prevent teachers from using ICT in their classrooms? Paper presented at the British Educational Research Association Annual Conference, University of Sussex, Brighton, 2–5 September.
[Online] http://www.leeds.ac.uk/educol/documents/00001304.htm
Viewed September 2013.

Creswell, J.W. & Plano Clark, V.L. 2011. *Designing and conducting mixed methods research.* 2nd ed. Thousand Oaks, CA: Sage.

Cronjé, J. 2006. Paradigms regained towards integrating objectivism and constructivism in instructional design and the learning sciences. *Educational Technology Research and Development*, 54(4):387-416.

Cronjé, J. 2013. What is this thing called 'design' in institutional design research? The ABC Instant Research Question Generator. In Moereira, A., Benavides, O. & Mendes, A.J. (eds). *Media in Education: Results from the 2011 ICEM and SIIE Joint Conference*. New York, NY: Springer Science+Business Media: 15-28.

Crook, S.J., Sharma, M.D. & Wilson, R. 2015. An evaluation of the impact of 1:1 laptops on student attainment in senior high school sciences. *International Journal of Science Education*, 37(2): 272-293.

Cuban, L. 1993. Computer meet classrooms: classrooms wins. *Teachers College Record*, 95(2)
[Online] Available: http://web.b.ebscohost.com/ehost/detail/detail?sid=d37d7f92-48f6-4455-aabd1d60180be62f%40sessionmgr115&vid=50&hid=109&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=9403037556&db=ehh
Viewed online April 2016

Cuban, L. 2001. *Oversold and underused: computers in the classroom*. Cambridge, MA: Harvard University Press.

Czerniewicz, L. & Brown, C. 2005. The uses of information and communication (ICT) in teaching and learning in South African higher education practices in the Western Cape. *Perspectives in Education*, 23(4):1-18.

Dasgupta, S., Granger, M. & McGarry, N. 2002. User acceptance of e-collaboration technology: an extension of the technology acceptance model. *Group Decision and Negotiation,* 11(2):87-100.

Davids, Z. 2009. The educators' perspective of the factors that influence the success of ICT school initiatives within the Western Cape. Unpublished MCom (Information Systems) dissertation, University of Cape Town, South Africa.

Davis, F.D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3):319-340.

Davis, F.D. & Venkatesh, V. 1996. A critical assessment of potential measurement biases in the technology acceptance model: three experiments*. International Journal of Human–Computer Studies*, 45(1):19-45.

Davis, F.D., Bagozzi, R.P. & Warshaw, P.R. 1989. User acceptance of computer technology: a comparison of two theoretical models. *Management Science*, 35(8):982-1003.

Davis, F.D., Bagozzi, R.P. & Warshaw, P.R. 1992. Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology,* 22(14):1111-1132.

Davydov, V.V. 1995. The influence of L.S. Vygotsky on education theory, research, and practice. *Educational Researcher*, 24(3):12-21.

Dawes, L. 2001. What stops teachers using new technology? In Leask, M. (ed.). *Issues in teaching using ICT*. London: RoutledgeFalmer: 61-79.

De Corte, E. 1990. Learning with new information technologies in schools: perspectives from the psychology of learning and instruction. *Journal of Computer Assisted Learning*, 6(2):69-87.

Denzin, N.K. & Lincoln, Y.S. 1994. *Handbook of qualitative research*. Thousand Oaks, CA: Sage.

Denzin, N.K. & Lincoln, Y.S. (eds). 2005. *Sage handbook of qualitative research*. 3rd ed. Thousand Oaks, CA: Sage.
Dewey, J. 1938. *Experience and education*. New York, NY: Macmillan.

Dillon, A. & Morris, M. 1996. User acceptance of new information technology: theories and models. In Williams, M.E. (ed.). *Annual Review of Information Science and Technology*, *Vol. 31.* Medford NJ: Information Today: 3-32.

DoE *see* South Africa. Department of Education.

Drent, M. & Meelissen, M. 2008. Which factors obstruct or stimulate teacher educators to use ICT innovatively? *Computers & Education*, 51(1):187-199.

Dwyer, D.C., Ringstaff C. & Sandholtz, J.H. 1991. Changes in teachers' beliefs and practices in technology-rich classrooms. *Educational Leadership,* 48(8):45-52.

Dzakiria, H. 2006. Researching distance learning using a qualitative case study approach: tackling the issue of generalisation – To generalise or not to generalise. Paper presented at the Fourth Pan Commonwealth Forum on Open Learning (PCF), Ocho Rios, Jamaica, 30 October–3 November.
http://www.col.org/pcf4/viewpaperdf0c.html?id=232&print=1
Viewed March 2015.

Eickelmann, B. 2011. Supportive and hindering factors to a sustainable implementation of ICT in schools. *Journal for Educational Research Online*, 3(1):75-103.

Ellaway, R. 2011. E-learning: is the revolution over? *Medical Teacher*, 33(4):297-302

European Commission. 2013. *Survey of schools: ICT in education: benchmarking access, use and attitudes to technology in Europe's schools*. Luxembourg: Publications Office.

Eynon, R. 2011. On the periphery? The social and educational implications for those who are not savvy Internet users. Presentation at a workshop, New Media, New Literacies, and New Forms of Learning, Institute of Education, University of London, 15 December.

Finlay, L. 2008. Introducing phenomenological research.
http://www.lindafinlay.co.uk/phenomenology.htm
Viewed August 2013.

Fishbein, M. & Cappella, J.N. 2006. The role of theory in developing effective health communications. *Journal of Communication*, 56(Suppl.):S1-S17.

Ford, M. & Botha, A. 2010. A pragmatic framework for integrating ICT into education in South Africa. In Cunningham, P. & Cunningham, M. (eds). *Proceedings of the 2010 IST-Africa Conference, Durban, South Africa, 19–21 May.* Danvers, MA: IIMC: 10 pp.

Fox, D. 1983. Personal theories of teaching. *Studies in Higher Education*, 8(2):151-163.

Fullan, M. 1991. *The new meaning of educational change*. 2nd ed. New York, NY: Teachers College Press.

Gachago, D., Ivala, E. & Chigona, A. 2012. Disrupting teaching and learning with emerging technologies: lecturers' experiences at a university of technology in South Africa. Paper presented at the Online Emerge2012 Conference, 9–20 July. https://www.academia.edu/8561879/Disruptive_use_of_emerging_technologies_in_teaching_and_learning_Lecturers_experiences_at_a_University_of_Technology_in_South_Africa Viewed September 2015.

Gage, N.L. & Berlinger, D.C. 1988. ***Educational psychology.*** 4th ed. Boston, MA: Houghton Mifflin.

Gagné, R. 1985a. Conditions of learning. http://tip.psychology.org/gagne.html Viewed March 2006.

Gagné, R. 1985b. Nine steps of instruction. http://www.nwlink.com/~donclark/hrd/learning/id/nine_step_id.html Viewed June 2015.

Garbers, J.G. (ed.). 1996. *Effective research in the human sciences: research management for researchers, supervisors and masters' and doctoral candidates.* Pretoria: Van Schaik.

Gibbons, A.S. & Fairweather, P.G. 1998. *Computer-based instruction: design and development*. Engelwood Cliffs, NJ: Educational Technology Publications.

Glaser, B.G. & Strauss, A.L. 1967. *The discovery of grounded theory: strategies for qualitative research.* Chicago, IL: Aldine.

Gong, M., Xu, Y. & Yu, Y. 2004. An enhanced technology acceptance model for web-based learning. *Journal of Information Systems Education,* 15(4):365-374, Winter.

Goodson, I.F. & Mangan, J.M. 1995. Subject cultures and the introduction of classroom computers. *British Educational Research Journal*, 21(5):613-628.

Goodyear, P. 2001. Effective networked learning in higher education: notes and guidelines. http://www.csalt.lancs.ac.uk/jisc/guidelines_final.doc Viewed October 2006.

Grandon, E., Alshare, O. & Kwan, O. 2005. Factors influencing student intention to adopt online classes: a cross-cultural study. *Journal of Computing Sciences in Colleges*, 20(4):46-56.

Greene, J.C., Benjamin, L. & Goodyear, L. 2001. The merits of mixing methods in evaluation. *Evaluation,* 7(1):25-44.

Guest, G., Bunce, A. & Johnson, L. 2006. How many interviews are enough? An experiment with data saturation and variability. *Field Methods,* 18(1):59-82.

Hadley, M. & Sheingold, K. 1993. Commonalities and distinctive patterns in teachers' integration of computers. *American Journal of Education*, 101(3):261-315.

Haddon, L. 2006. The contribution of domestication research to in-home computing and media consumption. *The Information Society: An International Journal*, 22(4):195-203.

Hall, G.E. 1974. The Concerns-Based Adoption Model: a developmental conceptualization of the adoption process within educational institutions. Research and Development Center for Teacher Education, University of Texas, Austin, TX.

Hall, G.E., Dossett, W.F. & Wallace, R.C. 1973. A developmental conceptualization of the adoption process within educational institutions. Research and Development Center for Teacher Education, University of Texas, Austin, TX.

Harvey, B. & Beards, D. 2004. E-learning in Scottish further and higher education. *Education + Training,* 46(6-7):353-360.

Hennessy, S., Harrison, D. & Wamakote, L. 2010. Teacher factors influencing classroom use of ICT in sub-Saharan Africa*. Itupale Online Journal of African Studies*, 2:39-54. https://www.academia.edu/4861299/Teacher_Factors_Influencing_Classroom_Use_of_ICT_in_Sub-Saharan_Africa
Viewed October 2015.

Hennessy, S., Ruthven, K. & Brindley, S. 2005. Teacher perspectives on integrating ICT into subject teaching: commitment, constraints, caution, and change. *Journal of Curriculum Studies*, 37(2):155-192.

Henning, E., Van Rensburg, W. & Smit, B. 2004. *Finding your way in qualitative research*. Pretoria: Van Schaik.

Hitchcock, G. & Hughes, D. 1995. *Research and the teacher: a qualitative introduction to school-based research*. 2nd ed. London: Routledge.

Hokanson, B. & Hooper, S. 2000. Computers as cognitive media: examining the potential of computers in education. *Computers in Human Behavior*, 16(5):537-552.

Holmes, B. & Gardner, J. 2006. *E-learning: concepts and practices*. London: Sage.

Holmes, B., Tangney, B., FitzGibbon, A., Savage, T. & Meehan, S. 2001. Communal constructivism: students constructing learning for, as well as with, others. In Price, J.D. (ed.). *Proceedings of the 12th International Conference of the Society for Information Technology and Teacher Education (SITE 2001), Orlando, FL, 5–10 March.* Norfolk, VA: Association for the Advancement of Computing in Education: 3114-3119.

Hoover, W.A. 1996. The practice implications of constructivism. *SEDL Letter,* 9(3):1-12.

Hord, S.M., Rutherford, W.L., Huling-Austin, L. & Hall, G.E. 1987. *Taking charge of change.* Alexandria, VA: Association for Supervision and Curriculum Development.

Hossain, L. & De Silva, A. 2009. Exploring user acceptance of technology using social networks. *Journal of High Technology Management Research*, 20(1):1-18.

Huysamen, G.K. 1994. *Methodology for the social and behavioural sciences*. Halfway House: Southern.

Illeris, K. 2003. Towards a contemporary and comprehensive theory of learning. *International Journal of Lifelong Education*, 22(4):396-406.

IMS Global Learning Consortium. 2002. IMS learning design: best practice and implementation guide.
Available: http://www.imsglobal.org/learningdesign/ldv1p0pd/imsld_bestv1p0pd.html
Viewed October 2006.

Isaacs, S. 2007. ICT in education in South Africa. Survey of ICT and education in Africa: South Africa country report.
http://www.infodev.org/infodev-files/resource/InfodevDocuments_429.pdf
Viewed April 2016.

Jarvenpaa, S.L. & Staples, D.S. 2000. The use of collaborative electronic media for information sharing: an exploratory study of determinants. *Journal of Strategic Information Systems,* 9(2):129-154.

JISC. 2009. Effective practice in a digital age. A guide to technology-enhanced learning and teaching. Bristol: JISC. http://usir.salford.ac.uk/2796/2/effectivepracticedigitalage.pdf
Viewed April 2016.

Johnson R.B. & Onwuegbuzie, A.J. 2004. Mixed methods research: a research paradigm whose time has come. *Educational Researcher,* 33(7)14-26.

Juries, J. 2014. World of e-Learning. Presentation at Overberg Education District e-Learning Indaba, Caledon, South Africa, 18 October.

Kahiigi, E.K., Ekenberg, L., Hansson, H., Tusubira, F.F. & Danielson, M. 2008. Exploring the e-Learning state of art. *Electronic Journal e-Learning*, 6(2):77-88.

Kalpana, T. 2014. A constructivist perspective on teaching and learning: a conceptual framework. *International Research Journal of Social Sciences*, 3(1):27-29.

Kellenberger, D.W. & Hendricks, S. 2000. Predicting teachers' computer use for own needs, teaching and student learning. *Journal of Educational Computing Research*, 16(1):53-64.

Kerr, S.T. 1991. Lever and fulcrum: educational technology in teachers' thought and practice. *Teachers College Record*, 93(1):114-136, Fall.

Koehler, M.J., Mishra, P. & Yahya, K. 2007. Tracing the development of teacher knowledge in a design seminar: integrating content, pedagogy and technology. *Computers & Education*, 49(3):740-762.

Kong, S.C., Chan, T.W., Griffin, P., Hoppe, U., Huang, R., Kinshuk., Looi, C.K., Milrad, M., Norris, C., Nussbaum, M., Sharples, M., So, W.M.W., Soloway, E. & Yu, S. 2014. E-learning in school education in the coming 10 years for developing 21st century skills: critical research issues and policy implications. *Journal of Educational Technology & Society*, 17(1):70-78.

Koper, R. 2001. Modelling units of study from a pedagogical perspective: the pedagogical meta-model behind EML.
Available: http://www.learningnetworks.org/downloads/ped-metamodel.pdf
Viewed October 2006.

Kumar, N., Rose, R.C. & D'Silva, J.L. 2008. Teachers' readiness to use technology in the classroom: an empirical study. *European Journal of Scientific Research*, 21(4): 603-616.

Lagrange, J.B., Artigue, M., Laborde, C. & Trouche, L. 2001. A meta study on IC technologies in education: towards a multidimensional framework to tackle their integration. In Van den Heuvel-Panhuizen, M. (ed.). *Proceedings of the 25th Conference of the International Group for the Psychology of Mathematics Education, Utrecht, The Netherlands, 12–17 July.* Utrecht: Freudenthal Institute, Faculty of Mathematics and Computer Science, Utrecht University. Vol. 1:111-122.

Lau, B.T. & Sim, C.H. 2008. Exploring the extent of ICT adoption among secondary school teachers in Malaysia. *International Journal of Computing and ICT Research,* 2(2):19-36.

Laurillard, D. 1993. *Rethinking university education: a framework for the effective use of educational technology.* London: Routledge.

Laurillard, D. 1996. The changing university. https://www.researchgate.net/publication/228938368_The_changing_university Viewed March 2016.

Laurillard, D. 2002a. Rethinking teaching for the knowledge society. *EDUCAUSE Review,* 37(1):16-25.

Laurillard, D. 2002b. *Rethinking university teaching: a conversational framework for the effective use of learning technologies*. 2nd ed. New York, NY:RouteledgeFalmer.

Laurillard, D. & McAndrew, P. 2002. Virtual teaching tools: bringing academics closer to the design of e-learning. In Banks, S. (ed.). *Networked Learning 2002 : A Research-Based Conference on E-Learning in Higher Education and Lifelong Learning: Proceedings of the Third International Conference on Networked Learning, Sheffield, England, 26–28 March 2001.* Sheffield: University of Sheffield: 11-16.

Laurillard, D. & McAndrew, P. 2003. Reusable educational software: a basis for generic learning activities. In Littlejohn, A. (ed.). *Reusing online resources: a sustainable approach to e-learning.* London: Kogan Page: 81-93.

Laverty, S.M. 2003. Hermeneutic phenomenology and phenomenology: a comparison of historical and methodological considerations. *International Journal of Qualitative Methods,* 2(3):21-35.

Lee, M.K.O., Cheung, C.M.K. & Chen, Z. 2005. Acceptance of Internet-based learning medium: the role of extrinsic and intrinsic motivation. *Information & Management*, 42(8):1095-1104.

Leedy, P.D. & Ormrod, J.E. 2005. *Practical research: planning and design.* 8th ed. Upper Saddle River, NJ: Prentice Hall.

Lim, C.P., Zhao, Y., Tondeur, J., Chai, C.S. & Tsai, C.C. 2013. Bridging the gap: technology trends and use of technology in schools. *Journal of Educational Technology & Society*, 16(2):59-68.

Lincoln, Y.S. & Guba, E.G. 1985. *Naturalistic enquiry*. Beverly Hills, CA: Sage.

Liu, S., Liao, H. & Peng, C. 2005. Applying the technology acceptance model and flow theory to online e-learning users' acceptance behavior. *Issues in Information Systems*, 6(2):175–181.

Loucks, S.F. 1983. The concerns-based adoption model. Chapel Hill Technical Assistance Development System, University of North Carolina, Chapel Hill, NC.

Lundall, P. & Howell, C. 2000. Computers in schools: a national survey of information communication technology in South African schools. Education Policy Unit, University of the Western Cape, Bellville, South Africa.

Lunenburg, F.C. 2011. Expectancy theory of motivation: motivating by altering expectations. *International Journal of Management, Business, and Administration*. 15(1):1-6.

Mann, B.L. 2006. Technology adoption and the internet. In Mann, B.L. (ed.). *Selected styles in web-based educational research*. Hershey, PA: Information Science Publishing: 35-50.

Manson, C. 2000. Schools with a future – A model for IT investment effectiveness. Paper presented at the 16th Australasian Computers in Education Conference (ACEC 2000): Learning Technologies, Teaching and the Future of Schools, Melbourne, Australia, 4–6 July.

Mason, M. 2010. Sample size and saturation in PhD studies using qualitative interviews. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research,* 11(3), Art. 8. http://nbn-resolving.de/urn:nbn:de:0114-fqs100387
Viewed August 2013.

Mason, R., Pegler, C. & Weller, M. 2005. A learning object success story. *Journal of Asynchronous Learning Networks,* 9(1):97-105.
http://oro.open.ac.uk/6624/1/v9n1_mason.pdf
Viewed March 2006.

Maxwell, J.A. 1992. Understanding and validity in qualitative research. *Harvard Educational Review,* 62(3):279-300, Fall.

Maxwell, J.A. 1996. *Qualitative research design: an interactive approach*. Thousand Oaks, CA: Sage.

Mayes, T. & De Freitas, S. 2004. Review of e- earning theories, frameworks and models. London: Joint Information Systems Committee.
http://www.jisc.ac.uk/uploaded_documents/Stage%202%20Learning%20Models%20(Version%201).pdf
Viewed October 2006.

McDougall, A. & Squires, D. 1997. A framework for reviewing teacher professional development programmes in information technology. *Journal of Information Technology for Teacher Education*, 6(2):115-126.

Mdlongwa, T. 2012. Information and Communication Technology (ICT) as a means of enhancing education in schools in South Africa: challenges, benefits and recommendations. Africa Institute of South Africa (AISA) Policy Brief, no. 80.

Means, B. & Roschelle, J. 2010. Technology and learning: overview. In Baker, E., McGaw, B. & Peterson, P. (eds). *International Encyclopaedia of Education*. 3rd ed. Oxford: Elsevier: 1-10.

Merriam, S.B. 1998. *Qualitative research and case study applications in education.* 2nd ed. San Francisco, CA: Jossey-Bass.

Merriam, S.B. 2002. Introduction to qualitative research. In Merriam, S.B. *Qualitative research in practice: examples for discussion and practice.* San Francisco, CA: Jossey-Bass: 1-17.

Merriam, S.B. 2009. *Qualitative research: a guide to design and implementation*. San Francisco, CA: Jossey-Bass.

Mezirow, J. 1997. Transformative learning: theory to practice. *New Directions for Adult and Continuing Education*, 74:5-12, Summer.

Miller, L., Naidoo, M., Van Belle, J.P. & Chigona, W. 2006. School-level ICT adoption factors in the Western Cape schools. In Lund, H.H., Sutinen, E., Duveskog, M., Kinshuk; Mkocha, A.N.E. (eds). *Proceedings of 4th IEEE International Workshop on Technology for Education in Developing Countries, Iringa, Tanzania, 10–12 July*: 57-61.

Mishra, P. & Koehler, M.J. 2006. Technological pedagogical content knowledge: a framework for teacher knowledge. *Teachers College Record*, 108(6):1017-1054.

Mlitwa, N.B.W. 2007. Technology for teaching and learning in higher education contexts: activity theory and actor network theory analytical perspectives. *International Journal of Education and Development Using Information and Communication Technology (IJEDICT)*, 3 (4):54-70.

Mödritscher, F. 2006. E-Learning theories in practice: a comparison of three methods. *Journal of Universal Science and Technology of Learning (JUSTL),* 0(0):3-18.

Mohammad, M. 2012. The impact of e-Learning and e-Teaching. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, 6(2):229-234.

Molotsi, A.R. 2014. Secondary-school teachers' information communication technology competencies in classroom practices. Unpublished D.Ed. (Curriculum Studies) thesis, University of South Africa, Pretoria, South Africa.

Moran, P. 2012. A personal theory of teaching practice. Marlboro College Graduate and Professional Studies Program, Brattleboro, VT.

Mouly, G.J. 1978. *Educational research: the art and science of investigation*. Boston, MA: Allyn & Bacon.

Mumtaz, S. 2000. Factors affecting teachers' use of information and communications technology: a review of the literature *Journal of Information Technology for Teacher Education*, 9(3):319-342.

National Centre for Technology in Education (NCTE). 2009. *Planning and implementing e-Learning in your school: handbook for principals & ICT coordinating teachers*. Dublin: NCTE.

Ndlovu, N.S. & Lawrence, D. 2012. The quality of ICT use in South African classrooms. Paper presented at Towards Carnegie III: Strategies to Overcome Poverty & Inequality, Cape Town, 3–7 September.

Ndubisi, N.O. 2006. Factors of online learning adoption: a comparative juxtaposition of the theory of planned behaviour and the technology acceptance model. *International Journal on e-Learning*, 5(4):571-591.

Neuman, W.L. 2002. *Social research methods: qualitative and quantitative approaches*. Boston, MA: Allyn & Bacon.

Niederhauser, D.S. & Stoddart, T. 2001. Teachers' instructional perspectives and use of educational software. *Teaching and Teacher Education,* 17(1):15-31.

Nisbet, J. & Watt, J. 1984. Case study. In Bell, J., Bush, T., Fox, A., Goodey, J. & Goulding, S. (eds). *Conducting small-scale investigations in educational management*. London: Harper & Row; Open University: 79-92.

Nwokeafor, C.U. 2015. Information Communication Technology (ICT) Integration to Educational Curricula: A New Direction for Africa. *Chapter 12. ICT as a facilitator of a new breed of educational modalities.* University Press of America.

Oliveira, T. & Martins, M.F. 2011. Literature review of information technology adoption models at firm level. *Electronic Journal of Information Systems Evaluation (EJISE)*, 14(1):110-121.

Onwuegbuzie, A.J. & Leech, N.L. 2006. Linking research questions to mixed-methods data analysis procedures 1. *The Qualitative Report,* 11(3):474-498.

Ormrod, J.E. 1999. *Human learning.* 3rd ed. Upper Saddle River, NJ: Merrill.

Owston, R.D. 2003. School context, sustainability, and transferability of innovation. In Kozma, R.B. (ed.). *Technology, innovation and educational change: a global perspective*. Eugene, OR: International Society for Educational Technology: 125-162.

Parijat, P & Bagga, S. 2014. Victor Vroom's Expectancy Theory of Motivation: an evaluation. *International Research Journal of Business and Management (IRJBM)*, 7(9):1-8.

Park, S.Y. 2009. An analysis of the Technology Acceptance Model in understanding university students' behavioral intention to use e-Learning. *Journal of Educational Technology & Society*, 12(3):150-162.

Pedretti, E., Mayer-Smith, J. & Woodrow, J. 1999. Teaming technology enhanced instruction in the science classroom and teacher professional development. *Journal of Technology and Teacher Education*, 7(2):131-143.

Pelgrum, W. 2001. Obstacles to the integration of ICT in education: result from a worldwide educational assessment. *Computers & Education*, 37(2):163-178.

Phiri, A.C., Foko, T. & Mahwai, N. 2014. Evaluation of a pilot project on information and communication technology for rural education development: a Cofimvaba case study on the educational use of tablets. *International Journal of Education and Development Using Information and Communication Technology (IJEDICT)*, 10(4):60-79.

Pintrich, P.R. 2003. A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology*, 95(4):667-686.

Pituch, K.A. & Lee, Y.K. 2006. The influence of system characteristics on e-learning use. Computers & Education, 47(2):222-244.

Powell, K.C. & Kalina, C.J. 2009. Cognitive and social constructivism: developing tools for an effective classroom. *Education,* 130(2):242-250.

Prensky, M. 2001. Digital natives, digital immigrants: Part 1. *On the Horizon*, 9(5):1-6.

Richardson, V. 2003. Constructivist pedagogy. *Teachers College Record,* 105(9):1623-1640.

Riddle, E.M. & Dabbagh, N. 1999. Lev Vygotsky's social development theory. http://members.iinet.net.au/~aamcarthur/4_Mar_2008_files/Vygotskys_Social_Development_Theory.pdf
Viewed April 2016.

Ritchie, J. & Lewis, J. (eds). *Qualitative research practice: a guide for social science students and researchers*. London: Sage.

Ritchie, J., Lewis, J. & Elam, G. 2003. Designing and selecting samples. In Ritchie, J. & Lewis, J. (eds). *Qualitative research practice: a guide for social science students and researchers*. London: Sage: 77-108.

Robertson, S.I., Calder, J., Fung, P., Jones, A., O'Shea, T. & Lambrechts, G. 1996. Pupils, teachers and palmtop computers. *Journal of Computer Assisted Learning,* 12(4)194-204.

Rogers, E.M. 1962. *Diffusion of innovations.* New York, NY: Free Press.

Rogers, E.M. 1995. *Diffusion of innovations*. 4th ed. New York, NY: Free Press.

Salmon, G. 2000. E-moderating: the key to teaching and learning online. London: Kogan Page.

Sanchez-Franco, M.J. 2009. WebCT: the quasimoderating effect of perceived affective quality on an extending Technology Acceptance Model. *Computers & Education,* 54(1):37-46.

Saunders, M., Lewis, P. & Thornhill, A. 2003. *Research methods for business students*. 3rd ed. Harlow: Pearson Education.

SchoolNet South Africa. Overview of courses. http://www.schoolnet.org.za/teacher-development/overview-of-courses/
Viewed December 2012.

Schram, S.F. & Caterino, B. (eds). 2006. *Making political science matter: debating knowledge, research, and method*. New York, NY: New York University Press.

Schreuder, G.R. 2014. Teacher professional development: the case of quality teaching in accounting at selected Western Cape secondary schools. D.Ed. thesis, Cape Peninsula University of Technology, Mowbray, Cape Town, South Africa.

Sfard, A. 1998. On two metaphors for learning and the danger of choosing just one. *Educational Researcher,* 27(2):4-13.

Sheingold, K. & Hadley, M. 1990. A*ccomplished teachers: integrating computers into classroom practice*. New York, NY: Center for Technology in Education, Bank Street College of Education.

Shuldman, M. 2004. Superintendent conceptions of institutional conditions that impact on teacher technology integration. *Journal of Research on Technology in Education,* 36(4): 319-343, Summer.

Shulman, L.S. 1987. Knowledge and teaching: foundations of the reform. *Harvard Educational Review*, 57(1):1-21.

Simons, H. 2009. *Case study research in practice*. London: Sage.

Smeets, E. 2005. Does ICT contribute to powerful learning environments in primary education? *Computers & Education,* 44(3):343-355.

Smeets, E., Mooij, T., Bamps, H., Bartolom, A., Lowyck, J., Redmond, D. & Steffens, K. (eds). 1999. *The impact of Information and Communication Technology on the teacher.* Nijmegen: University of Nijmegen, Institute for Applied Social Sciences.

Smith, J. & Brown, A. 2005. Building a culture of learning design: reconsidering the place of online learning in the tertiary curriculum. In Gross, H. (ed.). *Balance, Fidelity, Mobility: Maintaining the Momentum? Proceedings of the 22nd Australasian Society for Computers in Learning in Tertiary Education (ASCILITE) Conference: Brisbane, Australia, 4–7 December.* Brisbane: Queensland University of Technology: 615-623.
http://eprints.qut.edu.au/3046/1/3046.pdf
Viewed March 2016.

Soloway, E., Norris, C., Blumenfeld, P., Fishman, B., Krajcik, J. & Marx, R. 2001. Log on education: handheld devices are ready at hand. *Communications of the ACM,* 44(6):15-20.

South Africa. Department of Education. 2004. *White Paper 7 on e-Education: transforming learning and teaching through Information and Communication Technologies (ICTs).* Pretoria: DoE.

South Africa. Department of Education. 2007. Guidelines for teacher training and professional development in ICT. Pretoria: DoE.

Stake, R.E. 1978. The case study method in social inquiry. *Educational Researcher*, 7(2):5-8.

Stake, R.E. 1994. Case studies. In Denzin, N.K. & Lincoln, Y.S. (eds). *Handbook of qualitative research*. Thousand Oaks, CA: Sage: 236-247.

Stake, R.E. 1995. *The art of case study research.* Thousand Oaks, CA: Sage.

Stoltenkamp, J. 2012. An integrated approach to e-learning implementation in a complex higher education setting: a case study of the University of the Western Cape. Unpublished PhD (Information Systems) thesis, University of Western Cape, Bellville, South Africa.

Stoltenkamp, J. & Kasuto, O.A. 2011. E-Learning change management and communication strategies within a HEI in a developing country: Institutional organisational cultural change at the University of the Western Cape. *Education and Information Technologies*, 16(1):41-54.

Straub, E.T. 2009. Understanding technology adoption: theory and future directions for informal learning. *Review of Educational Research*, 79(2):625-649.

Strauss, A.L. & Corbin, J.M. 1990. *Basics of qualitative research: grounded theory procedures and techniques*. Newbury Park, CA: Sage.

Thomas, H. & Cronjé, J. 2007. Computers in schools: implementing for sustainability. Why the truth is rarely pure and never simple. *South African Journal of Higher Education*, 21(6):759-780.

UNESCO. 2002. Information and communication technology in education: a curriculum for schools and programme of teacher development. Paris: UNESCO.

UNESCO. 2008. ICT competency standards for teachers: implementation guidelines. Paris: UNESCO.

UNESCO. 2011. ICT competency standards for teachers: version 2.0. Paris: UNESCO.

Usher, A. & Kobe, N. 2012. Student motivation: an overlooked piece of school reform. Center on Education Policy, George Washington University, Washington, DC. http://cep-dc.org/publications/index.cfm?selectedYear=2012
Viewed June 2015.

Van der Merwe, H. 1996. The research process: problem statement and research design. In Garbers, J.G. (ed.). *Effective research in the human sciences: research management for researchers, supervisors and masters' and doctoral candidates*. Pretoria: Van Schaik: 277-291.

Van Eerde, W. & Thierry, H. 1996. Vroom's expectancy models and work-related criteria: a meta-analysis. *Journal of Applied Psychology*, 81(6):575-586.

Van Wyk, K. 2011. Khanya Position Paper: Transfer of skills and processes to permanent structures of the WCED.

Veen, W. 1993. The role of beliefs in the use of information technology: implications for teacher education, or teaching the right thing at the right time. *Journal of Information Technology for Teacher Education,* 2(2):139-153.

Venkatesh, V. & Bala, H. 2008. Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences*, 39(2):273-315.

Venkatesh, V. & Davis, F.D. 1996. A model of the antecedents of perceived ease of use: development and test. *Decision Sciences*, 27(3):451-481.

Venkatesh, V. & Davis, F.D. 2000. A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science*, 46(2):186-204.

Venkatesh, V. & Speier, C. 1999. Computer technology training in the workplace: A longitudinal investigation of the effect of mood. *Organizational Behavior and Human Decision Processes*, 79(1):1-28.

Venkatesh, V., Morris, M.G., Davis, G.B. & Davis, F.D. 2003. User acceptance of information technology: toward a unified view. *MIS Quarterly*, 27(3):425-478.

Vroom, V.H. 1964. *Work and motivation.* New York, NY: John Wiley.

Wallace, R. M. 2001. Teaching with the internet: A conceptual framework for understanding the teacher's work and an empirical study of the work of three high school science teachers. *Dissertation Abstracts International,* 61(10): 3884

Western Cape Government. 2012. WCED vision for e-Education: e-Learning and e-Teaching in schools of the future. http://wced.pgwc.gov.za/documents/e-Vision/WCED-Vision-for-E-Education.pdf
Viewed March 2016.

Wiley, D.A. 2002. Connecting learning objects to instructional design theory: a definition, a metaphor, and a taxonomy. In Wiley, D.A. (ed.). The instructional use of learning objects. Bloomington, IN: Agency for Instructional Technology: 1-35.
http://www.reusability.org/read/
Viewed March 2006.

Wilson-Strydom, M., Thomson, J. & Hodgkinson-Williams, C. 2005. Understanding ICT integration in South African classrooms. *Perspectives in Education. Special Issue: Research on ICTs and Education in South Africa,* 23(4):71-86.

Yin, R.K. 2003. *Case study research: design and methods*. 3rd ed. Thousand Oaks, CA: Sage.

Zille, H. 2015. Free high-speed internet at all Western Cape schools by end 2016: e-Learning game changer. Media release. Western Cape Premier Helen Zille. 8 September 2015.
http://wced.pgwc.gov.za/comms/press/2015/50_8sep.html
Viewed April 2016.

Zimmerman, B.J. & Cleary, T.J. 2006. Adolescents' development of personal agency: the role of self-efficacy beliefs and self-regulatory skill. Pajares, F. and Urdan, T.C. (eds). *Self-efficacy beliefs of adolescents*. Greenwich, CT: Information Age Publishing: 45-70.

APPENDIX A

Directorate: Research

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Private Bag x9114, Cape Town, 8000
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REFERENCE: 20130208-0000
ENQUIRIES: Dr A T Wyngaard

Dear Mr Sadeck

RESEARCH APPROVAL LETTER:
e-Learning Practices of Teachers at Schools in the Western Cape

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.

2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.

3. You make all the arrangements concerning your investigation.

4. Approval for projects should be conveyed to the District Director of the schools where the project will be conducted.

5. Educators' programmes are not to be interrupted.

6. The Study is to be conducted from the 1 March 2013 and 31 July 2013.

7. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).

8. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number.

9. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.

10. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.

11. A brief summary of the content, findings and recommendations is provided to the Director: Research.

12. The Department receives a copy of the completed report/dissertation/thesis addressed to:

The Director: Research
Western Cape Education Department
Private Bag X9114
CAPE TOWN
8000

We wish you success in your research.

Kind regards.

Signed: Dr Audrey T Wyngaard
Directorate: Research
DATE: 8 February 2013

APPENDIX B

Background of e-learning in South Africa and the Western Cape

Brief overview of the e-Learning unit's activities

It should be noted that from 2008 to 2012 there was an un-coordinated approach to ICTs and e-Learning in the province. The e-Learning unit under the leadership of the director and deputy director sought to address all six objectives of the national policy (White Paper 7).

The focus of this unit was on e-Learning and innovative strategies that would enable this. Among the aspects put in place were the following: the introduction of a learning management system (LMS) for school education; a digital repository of learning objects; the introduction of open educational resources and freeware; an increased focus on and practical implementation of ICT-integrated training in line with the 2007 draft policy on teacher professional development in ICTs; and the introduction of a blended face-to-face/online mode of training.

These are considered evolutionary in some respects, and to some it appeared revolutionary. Such an approach had not been implemented in the Western Cape or in any other province in South Africa.

As at the time of this thesis, the e-learning unit recorded training and development sessions to 26 753 teachers and department officials. These numbers were spread over the various course offerings. The training programme was designed and developed along the principles of: levels (basic – integration – specialisation); focus systems (towards integration) – content (towards integration and creating content) – pedagogy (towards teaching and learning).

The courses themselves were pegged at cognitive levels. The understanding was that teachers and officials could on completion of a course apply training at the identified level, but could also operate at lower or higher levels than those which the course identified.

In 2012 the WCED embarked on an evolved strategy for e-Learning. The WCED through the e-Learning unit has set out a new e-Learning vision and strategy. The vision is new and is scoped towards e-Education in the next twenty years. This strategy was the first officially documented strategy for e-Learning in the province. The e-Vision, translated into six streams, comprises: e-Teaching, e-Learning, curriculum / education, systems, environment and e-Administration.

In addition to this is the Western Cape government initiation of a wide area network (WAN) for the province. To leverage the potential of the WAN for education, wireless local area networks were included in the WAN project.

In 2014 the e-Learning unit introduced its first exclusive online course on e-Pedagogy to complement the existing training and professional development programme in place. This was one of the significant steps towards implementing the e-Vision. However political interest in the e-Vision saw the initiative being taken on as what is now referred to as a ‘game changer’.

The design of the strategy is thus taking an alternative trajectory. As such, activities and sub-projects are instituted and initiated that did not take heed of warnings and cautions from local, national and international best practice. The instantiation of a technology heavy push without the concomitant professional development and support is among the first of the techno-centric, technical skills-based initiatives dubbed ‘smart classrooms’.

The smart classrooms consist of a document viewer, a device to render a white board interactive, a wireless data projector and a laptop. The deployment of in excess of 3300 sets of teaching technology accompanied mass technical training (two persons from each school with the understanding that they would cascade skills) on ‘how to operate’ the devices. The laptops themselves were supplied without any programs for content creation or any preloaded content. The initial implementation steps of the e-Vision appear to move against logic and common sense

The intrinsic motivation and drive of teachers at this early stage of e-Learning in the Western Cape contribute greatly to the bold strides in what is currently considered innovative use of technology. There does not appear to be evidence of the achievement of a critical mass towards making innovation the norm at all schools in the Western Cape through either the Khanya project or the recent e-Vision.

Background of e-learning in National Department of Education – South Africa

The South African government acknowledged that the "expansion of ICTs is driving significant changes" (DoE, 2004:8). The Department of Education's response to this was the White Paper 7 on e-Education (DoE, 2004). It subsequently stated that e-Education "revolves around the use of ICTs to accelerate the achievement of national educational goals" (DoE, 2004:14).

Implementation was delegated by the national department, as a provincial responsibility, to the nine provincial education departments. The response from the provinces was an attempt to get technology into schools first. This represented a tangible asset that could be quantified and counted as progress towards one of the objectives in White Paper 7. A range of ICT pilot projects, internet connectivity to schools, and training in the use of technology and computer literacy typified the start of e-Education in South Africa. The e-Education policy has been in place since 2004, and to date (2015) there does not appear to be much progress in implementation of the policy nationwide.

The White Paper 7 is clear and concise as it is a gazetted policy document. It however does not specify in necessary detail in itself or supplementary documents, standards, levels, or implementation strategies. The closest to this is the draft paper on teacher development (DoE, 2007). This professional development has a policy document feel and resembles a position paper. Levels of development are stated, but again, no clear direction is provided, especially for e-Pedagogies.

A wide range of reasons have been proposed for this situation. These traverse teacher, organisational, access and technical factors. At the heart of this, one could argue, is the readiness of the education system as a whole. The initial approach to e-

Learning in schools, though well intended, may not have considered the contextual realities of South Africa as a developing country, nor the realities of education as a human activity constrained by politics and institutionalised practices.

The nature of educational practices and policies in South Africa and in many parts of the world remains essentially the same. Teaching and learning take place in physical classrooms where a teacher instructs groups of learners. The content is set, graded by levels of complexity and age levels, boxed into subject groupings, and set in time spans. Learners are expected to learn content, write examinations and achieve pre-determined marks to pass. These practices are institutionalised in the majority of educational systems.

Aligned with the above, JISC (2009:49) noted that designing for learning practices is "inclined to be variable and influenced by factors such as established norms in the sector, institution or subject discipline". Cuban (1993: online) explains that cultural beliefs "dominate views of proper schooling" and that "age-graded" schools are an "organizational invention". Means and Roschelle (2010:1) further state that "formal education systems…reinforce continuity in educational approaches". Hennessy et al. (2005:160) note Selwyn's (1999) argument that the "dominant construction of educational computing is indeed techno-centric and coercive, limiting integration and educational effectiveness".

Linked to the discourse on schooling is the domination of curricula. The South African Curriculum and Assessment Statements (CAPS), the educational curriculum for all public schools in the country, is a rigid content based and time bound (pace set) curriculum. It is constraining and teachers are hard pressed to complete the mandatory curriculum, let alone have time for e-Learning or for the use or integration of technology. The outlook is bleak in terms of policy, and this is further exacerbated by political pressures.

The national department has embarked on a new programme named 'Operation Phakisa: ICT in Education'. This was officially launched in November 2015. The intention of this programme is to rapidly set up and implement key enablers for e-Education (at the time of writing this thesis, the details were not officially published).

Background of Education in the Western Cape and the National Department of Education – South Africa

The educational landscape in South Africa is relatively unstable. This instability in the last 21 years (since democracy in 1994) could be attributed to the jostling for power of political parties. Education has been a convenient pawn in this situation. Curriculum reforms have closely followed national and provincial elections. Since 1994 South Africa has had four education ministers (their term of office lasts four years until the next national election unless the minister is relieved of his/her duties prematurely) and each minister has changed the national curriculum in some form or other.

The first minister implemented the most radical reform in the history of the country. During this period the government introduced a new curriculum based on the outcomes-based education (OBE) philosophy and the re-organising of subjects into learning areas. The second minister, four years later, felt it necessary to review the implementation of OBE and the national curriculum statement (NCS) was born. The next minister revised this curriculum, and while still based on OBE principles, the learning areas were redefined with further changes in implementation. This curriculum was referred to as the revised national curriculum statement (RNCS). It was during this period that the White Paper 7 on e-Education was formulated (DoE, 2004). The current minister has once again changed the curriculum. The most recent reform, like the 1994 introduction of OBE, is considered radical in many ways. The aspects of note are that OBE has in effect been scrapped. The content was narrow but widely described and the implementation was specified through a very constricting design. The latest curriculum is similar, in many respects, to that of the pre-1994 era and is typical of the old syllabus colonial education that South Africa had emerged from.

The Western Cape province itself has not escaped political manipulations in education. The period since democracy has seen power change to three different political parties. The province employed six education ministers during this time. Each provincial minister from the governing party of that period made widespread

structural and organisational changes. This led to instability in the Western Cape Education Department (WCED) as an organisation.

These organisational changes have had an effect on policies and direction within the organisation. Of specific interest in this research are the issues around ICTs in education. An educational media technology (EMT) unit has been in existence 1994. In 2002 the Khanya project was introduced and scoped until 2012.

As part of a re-design of the organisation, the e-Learning & Library Services directorate was established in 2007. A change in government in 2010 brought a re-structuring that resulted in the splitting of the e-Learning and library services. After a period of six months the e-Learning directorate was disbanded and the e-Learning unit became a sub-directorate in the curriculum branch. The researcher is the current head of this e-Learning sub-directorate.

South Africa continues to face challenges in the provision of education at all levels. Educational changes and advancements are a given in the world and in South Africa, given the political situation and the entrenched nature of education, even more so. Schools remain largely the same in South Africa. There is however an increase in the number of independent and religious schools. There continues to be a large migration of learners across the provinces, and in the Western Cape a number of learners migrate from the Eastern Cape and Gauteng. South Africa continues to experience an influx of learners from neighbouring African countries.

APPENDIX C

Laurillard's conversational model (L)

The Conversational framework of Laurillard focuses on interaction between learners and teachers, that is, the "continually iterative dialogue between teacher and students is essential if the students are to be sure that they have understood the teacher's concept" (Laurillard, 2002b:144-145). Laurillard's analysis of academic learning sees learning as mediated through interaction between teacher and individual learners as opposed to situated in direct experience. The model sees interaction on two levels, that is, a "discursive, theoretical, conceptual level" (Laurillard, 2002b:144) and the "active, practical, experiential level" (Laurillard, 2002b:144).

The core tenet of this model is the concept of feedback, either directly from the teacher or from others, or from a digital tool. Implications for e-Learning include designing activities and opportunities for learners to engage with content and obtain feedback on their progress. This sets up opportunities for cognitive development and the options to build on previous knowledge.

Application or implementation of this model is via a teaching strategy. The conversational framework provides a description of five teaching and learning events. These are: acquisition, discovery, dialogue, practice, and creation. These are events that take place at different times and as required in different configurations (Czerniewicz & Brown, 2005:4). They are essentially teaching strategies which imply learning experiences. Exploration of the content or subject is a personal activity; the teacher is there to continually monitor the progress and provide detailed feedback on developing skills and knowledge so that they may continue to improve (Fox, 1983: 156-157).

IMS Learning Design (IMS)

Learning design, according to Koper (2001), is modelling "units of study". This has been taken up and developed by the IMS Learning Design group (IMS Global

Learning Consortium, 2002). IMS Learning Design specifies “a time ordered series of activities to be performed by learners and teachers, within the context of an environment consisting of learning objects or services” (IMS Global Learning Consortium, 2002:50).

The units of learning here include resources, instructions for learning activities, templates for structured interactions, conceptual models, learning goals, objectives and outcomes and assessment tools and strategies (Mayes & De Freitas, 2004). The core of this model is focused on structure. It can be likened more to a management of the learning situation than a teaching or learning model.

One of its drawbacks is that it does not factor in the different needs of learners or their abilities sufficiently. Although the IMS model may not appear appealing, given the context of the South African school curriculum (CAPS) with its time-ordered approach to the syllabus, this model could be implemented. The model does, through its structured approach, include and by implication provide for a range of aspects inherent in the teaching and learning literature.

Salmon’s five-stage model (S)

Salmon’s five-stage model (Salmon, 2000) provides a framework for good practice in engaging learners in online discussion through five incremental steps. These steps form a scaffolding of learning. As a practice it can be applied to non-online environments as well. It focuses on the progression in the quality and intensity of interaction between learners–learners and learners–teacher.

The model describes how to motivate online participants, to build learning through online tasks (eTivities), and to pace e-learners through stages of training and development (Mayes & De Freitas, 2004). Given its focus, the model is characterised as being sequenced and structured much like the IMS model as opposed to Laurillard’s model, which appears more teaching-approach focused. Salmon’s model is a teaching and learning model. It displays social methodologies and is indicative of scaffolded learning with the chances of cognitive development at each stage.

Gagné's (1985b) nine steps of instruction (G)

Gagné's nine steps of instruction is a framework that serves as a guideline for designing activities. As Salmon's five-stage model speaks to online learning, Gagné's nine steps can be implemented in both online and off-line learning. The one notable difference is that these nine steps are not necessarily applied sequentially.

The core tenet of Gagné's nine events is learning and instruction. Gagné's nine events provide instructional guidelines for directing instruction that combine information processing and behavioural learning theories. The nine events of instruction are enumerated below (Gagné, 1985b):

1. Gaining attention (reception)
2. Informing learners of the objective (expectancy)
3. Stimulating recall of prior learning (retrieval)
4. Presenting the stimulus (selective perception)
5. Providing learning guidance (semantic coding)
6. Eliciting performance (responding)
7. Providing feedback (reinforcement)
8. Assessing performance (retrieval)
9. Enhancing retention and transfer (generalization)

The DialogPlus project (DP)

This model emphasises social processes, facilitated by the interactions of learners and tutors. DialogPlus adopts a dimensional approach to learning approaches, along the axes: reflection–non-reflection, experiential–informational, and individual–social. It is essentially a toolkit that is informed by learning objects, inter-operability and metadata, and theories of learning and instruction.

DialogPlus was developed by Grainne Conole and her group at the University of Southampton (Conole et al., 2004) and is an adaptation to the work of Kari Kuutti

(1995) which was focused on activity theory as a framework for research into human–computer interaction (Mayes & De Freitas, 2004).

Mayes and De Freitas (2004:32) note that the toolkit has been developed from learning approaches so that learning activities can be "organised around activity, context, actions and co-ordinating actions". It is a comprehensive model whose core tenet is fit for purpose, learner centred and learning centred. It displays elements for applications to learner-designed, concept/content-designed and context-designed curricula. Environmental and contextual factors of subject pedagogy and learning styles appear to be factored in. As a toolkit it attempts to cover all bases.

The CSALT Networked Learning Model (CNL)

This model demonstrates the transformational and personal development aspects of networked learning. It proposes a distinction between the tasks that are designed and the actual activities carried out by the learner. This refers to how learning outcomes can be associated with specific supported learner groups, and their activities need to be designed with these outcomes in mind.

It has a strong focus on collaborative learning from a community of practice (CoP) perspective and suggests that activities should be designed so that the achievement of learning outcomes is facilitated through networking opportunities. The CSALT networked learning model (Goodyear, 2001) was developed by Peter Goodyear and his colleagues at Lancaster University. The core tenet of the CSALT model is social learning.

The activities are less individual activities as they are activities that must be done in collaboration with others. Examples of this are the commonly known group work activities. The model has merit, although it does not cover the needs of school education adequately. Its application must be in tandem with other approaches.

The Learning Objects model of learning (LO)

This model is based on the notion of the 'learning object' as "any digital resource that can be reused to support learning" (Wiley, 2002:3). According to Wiley (2002), the model is instructional and technological, to the extent that learning objects (LOs) have been described as "an instructional technology" rather than a model or approach to learning per se.

The objective of this model is to sequence learning materials and activities for predetermined outcomes as its learning design approach (Mayes & De Freitas, 2004). The core tenet in this model is structured learning. A variation of the learning object is the OU (IET) Extended Learning Objects approach by Mason et al. (2005).

The difference is that it represents a holistic learning experience through a learning object. The object is a complete unit of study, that is, learning objects used on their own or within a larger course. It includes a discursive element, an interactive element, an experiential element and a reflective element. It could be regarded as a lesson, or a mini-module (Mayes & De Freitas, 2004).

The approach to designing learning engagements in this model is to retrieve LOs from a central repository and to organise them into an integrated course. The implications of using learning objects have a fundamental impact on e-Learning. The nature of learning objects as digital entities means that they can be used on their own or mediated by teaching. They epitomise e-Teaching and e-Learning and can be used in conjunction with a range of approaches.

APPENDIX D

Table of Findings:

Research question			
1. **What** technologies do teachers **use** and **what** do they use these technologies **for**? 2. **How** do teachers advance their **practices** for e-Learning? 3. **Why** do teachers **adopt** and use certain technologies in their e-Learning practice?			
Investigative question	**Objective/s**	**Instrument**	**Findings**
Research question 1: **What** technologies do teachers **use** and **what** do they use these technologies for?			
Sub-question 1.1 What do individual teachers use technologies for?	To understand what technologies are used by teachers and to explore the pattern of what they used these technologies for.	Questionnaire; interviews.	1. Teachers use of technologies is progressive along a continuum of: personal, administration, teaching, learning 2. Teachers use technologies for the following: • Personal: social; communication • Administration: school work; collaboration; communication • Teaching: e-Teaching • Learning: own studies; learners curriculum learning • Communication: Social; administration - with parents; with learners • Collaboration: with colleagues; learners

Research question 2: **How** do teachers advance their **practices** for e-Learning?			
Sub-question 2.1 How do teachers use technologies for teaching and learning?	To explore and understand how e-Learning models, methods and techniques are applied, that is, how teachers integrate technological, pedagogical and content knowledge (TPACK) into teaching and learning.	Questionnaire; interviews.	3 Contextual realities determine the methods and methodologies that will be employed with technologies. 4 Teachers use technologies in ways that are aligned to their comfort zones. 5 Teachers employ pedagogical approaches that they believe are relevant and appropriate for learning. 6 Teachers' practices comprises the use of technologies for e-Teaching and e-Learning 7 There was a pattern of progressive application of methodologies from teaching to e-Teaching and from learning to e-Learning. 8 There was a pattern of progressive approaches from traditional f2f – to blended f2f/online – to online in their use of technology. 9 SNS was used progressively less by the teachers from personal to teaching to learning. 10 Teachers' use of technologies through different approaches and methodologies can be positioned at different points of the continuum simultaneously.
Sub-question 2.2 What are teachers' dependence on and interest in using technologies?	To understand teachers' orientations, experiences and perceptions of the outputs, benefits and value of the use of technologies.	Literature search; questionnaire; interviews.	11 Teachers are dependent on technologies in all spheres of their lives. 12 Use of technologies for personal purposes influences its use for professional purposes. 13 Teachers have assimilated the use of technologies into their normal way of work on account of its benefits and value add.

Research question 3: **Why** do teachers **adopt** and use certain technologies in their e-Learning practice?			
Sub-question 3.1 What informs teachers' decisions to adopt, use and integrate technologies into their e-Learning practices?	To understand the cognitive and affective reasons for actions and decisions taken to adopt and use technologies. To understand the value that teachers attach to using technologies in their e-Learning practices.	Questionnaire; interviews.	14 Value propositions are the topmost reasons for adoption and use of technologies. 15 Usefulness and the affordances of technologies determine benefits and benefits in turn were the main determinants of value propositions. 16 Expectancy is linked to value propositions 17 Observability, trialability, compatibility exert a strong influence on the usefulness and benefits of technologies. 18 Motivation and self-efficacy are key to adoption, whilst intrinsic motivation was found to exert a stronger influence. 19 The cognitive and affective domains are the bridge between intent and actual use. 20 The evidence of satisfaction of teachers' needs contributed to adoption decisions. 21 Teachers were more inclined to internal rewards as opposed to external or societal expectancies.
Sub-question 3.2 How do technical and non-technical factors affect teachers' e-Learning practice?	To understand how technical and non-technical factors impact on adoption, use and practice.	Questionnaire; interviews.	22 Non-technical factors included e-Readiness, e-Capability, support, curriculum requirements and policy. 23 Non-technical factors are more decisive as enablers of actual use and integration of technologies than technical factors. 24 e-Capability for e-Teaching and e-Learning is contingent on technological pedagogical content knowledge (TPACK) as an enabler.

			25 Technical factors were confined to access to technology and where technology was available, technical support was necessary. 26 Access to technologies affects contextual factors that determine the approaches and methodologies to be used. Quality time with physical technology is necessary to build confidence and expertise towards domestication. 27 The options to trial, experiment, use, observe and experience provided evidence of benefits and value add which was a contributing factor to adoption and use. 28 Intrinsically motivated teachers are not negatively affected by lack of management support.
Sub-question 3.3 How does support and professional development enable e-Learning practice?	To understand how support and training affects e-learning practice.	Questionnaire; interviews.	29 There is a relationship between access and support. Support provides cognitive access for use. 30 Support needs are physical and cognitive – support is about access. 31 Support needs included: pedagogical support; learners' technological skills and cognitive access. 32 Support for cognitive access is more crucial as an enabler than physical access.

APPENDIX E

Interview Questions

An Exploration of e-Learning Practices of Teachers at Selected Schools in the Western Cape

Osman Sadeck
Student No: 209239395
D Tech: Informatics

This research deals with teachers' e-Learning practices.

The focus is on WHY you engage with e-Learning (why you are doing it) and the research seeks to understand WHAT motivates you and keeps you going in e-learning.

To do this there are questions about:

- **What** you are doing,
- **How** you doing it and,
- **Why** you choose to do what you do.

All information will be confidential and you will not be identified in any way

Do you agree to this face to face / online interview? Please select

YES	NO

Participant's basic information:

School	Primary				High school				Combined			
Institution	Public						Private					
Province	W. Cape		Gauteng		N. Cape		Free State					
Gender	Male						Female					
Grades	1	2	3	4	5	6	7	8	9	10	11	12
Subjects												
How long they have been teaching?	years											

Main research question:

What are teacher's e-Learning practices: what are they doing, how are they doing it, and why do they do it?

Introduction - Research focuses on teachers' e-Learning practices.

My focus is on WHY you are doing it?
I want to understand WHAT motivates you and keeps you going – what makes you tick with e-Learning.

To do this I need to listen to what you have to say about the points below:

What you are doing, How you doing it, and Why you choose to do what you do.

Introductory points/questions to set the scene and to ascertain specifically common understanding of ICT, e-Learning and e-Teaching.

1. **Tell me how you use ICTs in your classroom?**
   Response:……..

2. **In your opinion what are the different resources/systems/technologies that could be used for e-learning?**
   Response:……..

3. **Could you please share some of your success stories of your use of ICT for teaching – for e-Learning?**
   Response:……..

4. **From your experiences, what do you think is not happening in e-Learning?**
   Response:……..

Research question 1	**What are teachers doing with technology?**
Sub-question 1.1 What do individual teachers do in e-Learning	1. **What has changed in the way (approach) you use ICT and what ICT you use?** Response:…….. 2. **What would you consider as challenges in using ICTs in the classroom** Response:…….. 3. **In your experiences, which ICTs do you find most useful to use?** Response:……..

	4. **What have you found to be the best ways to use these ICTs?** Response:……..
Research question 2	**How are they doing it?**
Sub-question 2.1 How do teachers engage in e-Learning?	1. **What do learners do with ICTs when they are learning (in the classroom)** Response:…….. 2. **What do you do with ICTs when you are teaching (in the classroom)** Response:……..
Research question 3	**Why do they choose to do it?**
Sub-question 3.2 What are the personal and cognitive reasons that teachers use to make decisions to use certain products, processes, systems, services and technology for their e-Learning practices?	1. **How did you get started in using ICT in your work?** Response:…….. 2. **What motivates / excites / influences you to use ICT for e-Learning?** Response:…….. 3. **Are you part of any professional body, interest group, network, etc. - has this had any effect on your adoption / decisions to use ICT?** Response:…….. **If yes - How useful was it to be a part of the body…if no – Do you think you would have benefited from being part of such a body** Response:…….. 4. **What value / benefit / do you think you are getting from using ICT for teaching…for e-Learning?** Response:……..
Sub-question 3.3 What is the adoption profile of teachers and what are their	1. **What role does the use of ICT play in your work and in your personal life?** Response:…….. 2. **Why did you start to use ICTs in your work?** Response:……..

dependence on and interest in technology use?	
Sub-question 3.4 What are the technological and non-technological factors that affect e-Learning practice?	1. **How do management or school policies AFFECT your decisions to use ICT for e-Learning?** Response:…….. 2. **What are the other factors that influence your decisions to use ICTs?** Response:……..
Sub-question 3.5 To what extent are the technology push and educational pull determinants of e-Learning practice?	1. **Given your years of experience how has the changes in technology and educational requirements influenced what resources to use, what to do** Response:……..

APPENDIX F

Survey Instrument

Mode: Anonymous

(*)Answers are required to starred questions.

1. Please select Gender*
   - Not selected
   - Female
   - Male

2. Which province do you teach in?*
   - Not selected
   - Kwa Zulu Natal
   - Eastern Cape
   - Western Cape
   - Northern Cape
   - North West
   - Free State
   - Mpumulanga
   - Limpopo
   - Gauteng

3. What type of school do you teach in?*
   - Not selected
   - Primary
   - High
   - Combined
   - Special
   - MultiGrade
   - Independent
   - Other

4. Which area do you teach in?*
   - Not selected
   - Urban
   - Rural

5. Please choose all the grades that you teach?*
   - GR
   - G 1
   - G 2
   - G 3
   - G 4
   - G 5
   - G 6
   - G 7
   - G 8
   - G 9
   - G 10
   - G 11
   - G 12

6. Which social network services (SNS) do you use for personal purposes? *
   - BBM
   - WhatsApp
   - MIXIT
   - Facebook
   - Twitter
   - LinkedIn
   - None
   - Other

7. Which of these social networking services do you use for your own learning / studies? *
   - Google Docs
   - DropBox
   - Sky Drive
   - LinkedIn
   - Facebook
   - Twitter
   - BBM
   - WhatsApp
   - Mixit
   - None
   - Other

8. Do you use any social network site for professional development / networking with your peers?
   - Not selected
   - Yes
   - No

9. Select all the responses that indicate why you choose to use social service for your personal learning?
   - I can get easy access to information
   - I can collaborate on my work with friends
   - I can get help whenever I need it
   - I can be in contact with peers and lecturers at all times
   - I do not use SNS for my personal learning
   - Other reasons

10. Select from the list all that you use in your own learning?
    - Technology (e.g. computer/laptop/tablet/smart-phone)
    - Digital resources
    - LMS (e.g.Moodle/Sakai/WebCT)
    - SNS (e.g. Face-book/LinkedIN)
    - Cloud Services
    - None

11. Select all the options that you believe are the benefits that you gain from using technology / digital resources / LMS for your own learning?

- ☐ It makes learning easier
- ☐ I have more easy access to resources
- ☐ It keeps me on the cutting edge of the use of ICT in education
- ☐ It puts me in power in the classroom
- ☐ It puts me at a higher level than the learners
- ☐ It helps me cope with modern technology savvy learners

12. Which of the following are aspects that motivate your use of ICTs for yourself and/or your learners?

- ☐ It is aligned with the way the learners learn
- ☐ It helps me teach better
- ☐ I can make learning more exciting for the learners
- ☐ It is the way that learning takes place currently

13. Who do you think benefits MOST from your use of ICTs for teaching/ learning?

- ◉ Not selected
- ○ Your Learners ○ You

14. What technologies (ICTs) do you use to teach with?

- ☐ Data Projector
- ☐ Document Viewer
- ☐ Laptop / computer
- ☐ Tablet
- ☐ Smart-phone
- ☐ Interactive White Board
- ☐ None
- ☐ Other

15. Select the most important aspect that reflect why you choose to use technologies for teaching

- ☐ The learning experience is enhanced
- ☐ It allows anywhere - anytime learning
- ☐ It allows self paced learning
- ☐ Teaching is more exciting

16. What type/s of digital resources do you use for e-Learning (in the lessons with your learners)?

- ☐ Video
- ☐ Podcast
- ☐ Simulations
- ☐ Virtual worlds
- ☐ Power Point / Presentations
- ☐ Gaming
- ☐ Animations
- ☐ None
- ☐ Other

17. Select the most important aspect that reflect why you choose to use digital resources for e-Learning

- ◉ Not selected
- ○ The learning experience is enhanced
- ○ You get to see and do things that you cannot do in the traditional way
- ○ Teaching is more exciting

18. Which of the following social network services do you use for teaching/learning at school?

- ☐ LinkedIn
- ☐ Facebook
- ☐ Twitter
- ☐ BBM
- ☐ WhatsApp
- ☐ Mixit
- ☐ None
- ☐ Other

19. What Virtual Learning Environment (VLE) / Learning Management System (LMS) do you use for teaching/learning at school?

- ☐ Moodle
- ☐ WebCT
- ☐ Sakai
- ☐ Edmodo
- ☐ None of the above
- ☐ Other

20. Indicate the most important factors only that motivate you to use ICT for teaching?

- ☐ It is convenient
- ☐ Can bring the world into the classroom
- ☐ It is a fast means to access information
- ☐ It makes my work easier
- ☐ It allows simulation of real world experiences
- ☐ It is aligned with the learners way of working
- ☐ It is mandatory at my school that we use ICT for teaching
- ☐ There are many resources available to enhance my teaching
- ☐ I found that it works for me in my teaching
- ☐ I found it works and the learners learn better

21. Which of the following reflects how you use technology (ICT) and digital resources for teaching and learning in your classroom?

- (•) Not selected
- ( ) I teach learners how to use the technology
- ( ) I use the data projector to present my lessons
- ( ) I use the interactive white board (IWB)to present and demonstrate my lessons
- ( ) I get the learners to follow the instructions of the computer program
- ( ) I get the learners to use the technology to complete their work (e.g. do a presentation, type a document, complete a worksheet)
- ( ) I get the learners to use the camera or microphone to create their assignments

22. Which of these are typical of how you use social network services (SNS); a LMS-VLE systems or cloud services for teaching and learning in your classroom?

- [ ] I respond to questions and request for help online
- [ ] I send reminders of homework and tasks to be done
- [ ] I set out questions and exercises
- [ ] I use the drop-box or upload facility to get work sent to me
- [ ] I engage in discussions in a forum with the learners
- [ ] I get the learners to use the forum or blog to discuss their work
- [ ] I set out lessons with information, assignments and assessment for the learners
- [ ] I put out information for learners to access on their own

23. Which of these are typical of why you choose to use these social networking services (SNS); virtual environments and cloud services?

- (•) Not selected
- ( ) Helps manage teaching
- ( ) Helps manage learning
- ( ) It is useful if a learner is absent
- ( ) The Learner can work on his/her own pace
- ( ) A virtual system like a LMS is a useful all in one management system
- ( ) It is more convinient to access documents and information from the cloud
- ( ) Using the cloud means I don't have to use a LMS or any internal system
- ( ) It is easy for me to get a message to the learners using a SNS
- ( ) The SNS is useful for short quick messages
- ( ) The SNS is useful for rapid responses
- ( ) With the SNS I am connected to my class all the time
- ( ) My school has made it compulsory to use one or all of these options for teaching and learning
- ( ) There is pressure from the learners for me to use it at our school

24. What methodology (approach) do you use in your lessons when you integrate technology and digital resources?

- [ ] Constructivist
- [ ] Instructivist
- [ ] Connectivist

25. Which one of the following best represents what motivates you to use e-Learning for your learners?

- (•) Not selected
- ( ) It is the way of the future
- ( ) It is how learners learn
- ( ) It is easy to use
- ( ) It is a better way of learning
- ( ) It makes my work easier

26. Do you think the learners learn better with or without ICTs?

- (•) Not selected
- ( ) With ICT
- ( ) Without ICT

27. How does access to technology affect your decisions to use it for teaching/learning?

- (•) Not selected
- ( ) I don't use it because I do not have access.
- ( ) No affect - I make a plan to get access.
- ( ) I use it only if I can get access.

28. How does technical support for technologies and systems affect your decisions to use technology for teaching/learning?

- (•) Not selected
- ( ) I don't use it because I do not get support if something goes wrong or does not work.
- ( ) No affect - I find a way to make it work.
- ( ) I use it if I know that there will be technical support.

29. How does the availability of digital resources affect your decisions to use it for teaching/learning

- (•) Not selected
- ( ) I don't use it because I do not have any and cannot get access to these resources.
- ( ) No affect - I make a plan to get resources.
- ( ) I will only use it if I and get it from somewhere or someone.

30. How does support of management / peers / department affect your decisions to use ICTs for teaching/learning?

- (•) Not selected
- ( ) I will not do it because there is no support at school or from the department.
- ( ) No affect - I will make a plan to do it without any support.
- ( ) I will be willing to use it if I get the support that I need.

31. Please state what are the things that prevent you from using ICTs for e-Learning / teaching?

32. What do you think is more useful to help learning: having the latest technology, or, having good digital resources?

- (•) Not selected
- ( ) Having the latest technology
- ( ) Having good digital resources

33. Do you think we should be using tablets or cell phones in classrooms?

- [ ] Tablets - Yes
- [ ] Tablets - NO
- [ ] Cellphones - Yes
- [ ] Cellphones - No

34. Do you think interactive digital resources (e.g. simulations, virtual gaming) are more useful that having an interactive white board?

- (•) Not selected
- ( ) Interactive digital resources is more useful.
- ( ) Interactive white board is more useful.

35. Please type any comments thay you may have in the space provided.

APPENDIX G

Interview transcripts

Available:

https://www.dropbox.com/sh/fiod64z2lq8c1cy/AACK1N0x_Oyvvo82b_uOucDsa?dl=0

APPENDIX H

Survey transcripts

Available:

https://www.dropbox.com/sh/hrj975r2l373zgx/AAApD3pEjAZMEJxmgd3bMqAFa?dl=0