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MEd Research Project Report

"Beliefs of the district e-learning coordinators in the GDE about the pedagogical integration of ICTs in Gauteng Online schools".

Research Report submitted to the School of Education

Faculty of Humanities

University of the Witwatersrand

In partial fulfilment of the requirements for the degree of Masters in Education

Johannesburg, February 2013

Abstract

Using a Mixed Methods Convergent Parallel Design this study examines the Behavioural Intentions of the District eLearning Coordinators (DELCs) in the Gauteng Department of Education. The study posits that the educational beliefs of the DELCs are a significant factor in influencing their Behavioural Intentions with regard to their role regarding the integration of Gauteng Online into teaching and learning. Its purpose is to explore whether the DELCs intend to perform their roles in constructivist "Just-in-time" ways. It does this by examining their pedagogical beliefs, their knowledge about technology integration as well as other salient beliefs as formulated in the Theory of Planned Behaviour and by finding out whether these have a bearing on their intentions to provide support and professional development for teachers in the GDE. The study draws on key theories like the Theory of Planned Behaviour, theory about teacher knowledge for technology integration – Technological Pedagogical Content Knowledge (TPACK) amongst others to explore these beliefs and behavioural intentions.

Declaration

I declare that this research report is my own unaided work. It is submitted for the degree of Masters in Education (Educational Technology) at the University of the Witwatersrand, in Johannesburg. It has not been submitted before for any degree or examination at any other university.

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Date: Tuesday, 21 May 2013

Acknowledgements

I wish to thank the following

This study would not have been possible but for the guidance and patience of Dr Ian Moll.

More particularly this study is devoted to the GDE District eLearning Coordinators who are the focus of the study. I hope this supports you in your struggles and may the struggle continue.

And to my sons Mark and Christopher, thanks for putting up with me being buried in my study.

And to my son Chris' dog Buddy who is always my Buddy usually into the early hours of nearly every morning.

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Abbreviations and list of acronyms

ATB	Attitude Towards the Behaviour
BB	Behavioural Belief
CK	Content Knowledge
CON	Constructivist Beliefs
DELC	District eLearning Coordinator
GoL	Gauteng Online
JiC	Just-in-Case
JiT	Just-in-Time
JiTI	Just-in-Time Integration
JiTS	Just-in-Time Support
LC	Learner-centred
MC	Motivation to Comply
NB	Normative Beliefs
NLC1 & NLC2	Non-learner-centred
OE	Outcome Evaluation
PBC	Perceived Behavioural Control
PCK	Pedagogical Content Knowledge
PK	Pedagogical Knowledge
SN	Subjective Norm
TCK	Technological Content Knowledge
TK	Technological Knowledge
TPACK	Technological Pedagogical Content Knowledge
TPB	The Theory of Planned Behaviour
TPK	Technological Pedagogical Knowledge

1 CHAPTER 1 - Introduction

1.1 The Educational Contextual Problem

I am involved in the field of Educational Technology based here in the province of Gauteng and so I am keenly interested in what is going on regarding Educational Technology in the schools of the province. In the recent past I have been a senior manager in the GDE where I was involved in the processes of the integration of ICTs into teaching and learning. I am now involved in teaching pre-service student-teachers about the integration of ICTs into schooling. And I am also an ongoing life-long learner in the field of educational technology. I therefore have an intense interest in the dynamics relating to the integration of ICTs into teaching and learning in schools. The current study is part of the requirements for the completion of a Master in Education and it is in this latter capacity that the research is conducted.

The major Educational Technology initiative in the provincial schools has been the Gauteng Online (GoL) project. The main aim of the (GoL) project was to bring elearning to the schools through the pedagogical integration of ICTs. Starting in 2002 the Gauteng Department of Education began rolling out computer laboratories consisting of 25 networked computers to every school in the province (SAIDE, 2010). This was the first such initiative in the province and the largest of its kind on the entire African continent and the Gauteng Province has invested about R3 billion rand in the project (ITWeb, 2011), which has now become an ongoing programme, and will continue to invest more at a rate of about R300 million to R400 million per year for the foreseeable future (ITWeb, 2012). It was and is an ambitious project now turned programme.

In this introduction I outline the social and educational context (which is the Gauteng Online Project) of the beliefs, attitudes and knowledge of the Gauteng District eLeaning Coordinators (DELCs). I provide a description of the issues and problems that have arisen in the project that have emerged and which provide the context and rationale for engaging in this study. I use key statistical findings from an evaluation of the Gauteng Online project which was commissioned by the Gauteng Department of Education (GDE) to highlight the issues which indicate the need for this study.

Since its inception the project has been beset by serious problems which have mostly been of an infrastructural nature and this has seriously affected the ongoing functionality of the laboratories (ITWeb, 2011a). However the provincial government has made earnest attempts to address these infrastructural issues and on average at any one time about 60% of the laboratories have been fully functional (SA_IT_NEWS, 2012). In 2010 the GDE implemented a major evaluation of the project and it is this report which indicated, that despite the improved functionality of the infrastructure, the integration of the GoL laboratories into teaching and learning has been minimal (SAIDE, 2010). "The majority of teachers are either never using computers at school (42%) or are only using them monthly (15%)" (SAIDE, 2010). Of those who use the ICTs the following statistics indicate the type of use: Administration 64%; Classroom preparation 44%; Teaching 26%; Learning 25%. Using confidence levels the report indicated that about 50% of

teachers feel confident enough to use a computer on their own and about 40% feel confident if someone is there to support them. Fewer than 20% of teachers feel confident enough to help their colleagues. These statistics indicate a very high lack of use coupled with very low confidence levels. Where there is use a very low percentage is for teaching and learning purposes (about 25% of the 58%, which means only about 15% or less of teachers are using the technology for teaching and learning). Learner use is below 20% and the majority of this is for word processing for personal purposes and not necessarily for classroom purposes. These statistics indicate that there is very poor integration of GoL into teaching and learning. This lack of uptake by the schools and teachers is blatant despite a range of training and development activities for teachers and school principals which have been implemented over the course of the project. Of the 65% of schools that had a GoL lab at the time of the writing of the report 82% received some sort of training. 50% of the total number of schools in the province including those without a GoL lab indicated that they received no training at all and of those who did received training 76% received less than 4 hours training in a year. Along with this about 57% of teachers indicated lack of use due to a lack of training. An issue worth considering is to what extent is the poor uptake caused by a poor support and professional development methodology. Unfortunately the report does not deal with this. However with regard to support to teachers and learners of a technical nature there is an indication that 42% never receive any kind of support; 40% indicate some support as and when needed; about 2% reported only monthly support and another 2% weekly support; about 7% reported daily support. There is no indication whether this minimal technical support was to support the even more minimal use of the ICTs for teaching and learning purposes. Only 70% of schools with GoL labs indicate that they may have received some kind of technical support at all at some stage. From the above it is clear that there is very minimal integration of the GoL labs into teaching and learning. Furthermore there has not been much training provided at all and where it has been provided it has mostly only been for computer literacy purposes (45%) and not for teaching and learning. Very little technical support was provided and at the time the report was produced there is no indication at all whether pedagogical support for the integration of the labs into teaching and learning was provided. This is a very stark picture indeed.

The GDE management responded to this crisis by developing a two pronged strategic plan to deal with the problems which was to commence in early 2010 and continue for about three years. Firstly they established a core of eLearning coordinators with a unit at the head office in Johannesburg of about 7 people and small units of 2 to 4 people in each of the 15 education districts[1] whose primary aim was to ensure the effective utilisation of the GoL labs and to also ensure that the labs got integrated into teaching and learning at the schools (GDE, 2010). I will refer to these district based elearning coordinators as DELCs for the purposes of this study and ELCs which will cover the combination of head office and district office elearning personnel. The second prong of the strategy entailed an utilisation strategy which was only just beginning to be put into effect at the time that the research for this project began. This was a multi-dimensional strategy which included improved support and development for the use of the GoL labs to support teaching and learning.

[1] See Figure 18, the map under sampling below for a geographical spread of these coordinators.

I was interested in knowing what support and professional development methodology the DELCs would use to implement the new utilisation strategy given the dismal failure of the support and training strategy up to that point. In preliminary discussions I held with some of the DELCs at the time I discovered that there was no adopted methodology for support and professional development and that amongst the officials there were different opinions about what methodology to use. A number of newly appointed DELCs had no methodology in mind at all other than they would be visiting schools at some stage to promote the new strategy. It was from these rather intriguing discussions that I became interested in the thinking processes and belief systems that could possibly be motivating these personnel to develop and enact potential technology (GoL) integration support and professional development for the schools and teachers and it was then that this challenge became the focus of my research project. I wanted to see if I could anticipate or even predict the methods that the DELCs would be using in the future by first of all developing an understanding of their current knowledge and belief systems. And so the project idea was born.

There is a further contextual issue that has a bearing on the integration of ICTs into teaching and learning which needs a brief mention and this is the implementation of the new post-OBE curriculum encapsulated in the Curriculum and Assessment Policy Statements (CAPS) being implemented as from the beginning of 2012 on a phased in basis. In Oct 2009 the then Department of Education issued a report which provided a critique of the Outcomes Based Education (OBE) curriculum and proposed the implementation of a new curriculum called the National Curriculum Statement (NCS) (DoE, 2009). The primary critique of OBE contained in the report was OBE's somewhat incoherent and watered-down approach to subject matter content and it's over-emphasis on outcomes and a rather content free learner centred approach. The new NCS brought content to the fore. The report also criticised district based curriculum officials for over emphasizing the design features of the OBE curriculum almost to the point of it being promoted as an ideology when their support and professional development of teachers was provided. The Review Report called for a reform of district structures, roles and functions with a primary emphasis on providing support and professional development for a content focused instruction at the schools. I was also interested in seeing whether this greater focus on content in policy would have influenced the thinking and beliefs of the DELCs regarding their own support and professional development roles and methods and whether this had made them reconsider their own knowledge-base for the pedagogical integration of ICTs into the new NCS curriculum.

In this introduction I have shown that there is little or no integration of the GoL laboratories into teaching and learning and that the support and professional development that has been provided for teachers to date has had little or no effect on the integration of the technology. I have also identified two important changes in the environment which offer imperatives for looking at the support and professional development of teachers in new ways; these are the new strategic utilisation plans put in place by the GDE management as well as the introduction of the CAPS into the educational terrain. I indicate that this changing environment has implications for the beliefs, attitudes and practice of the DELCs and which now need to be studied.

1.2 The Research Problem (Part 1)

Almost all the literature relating to educational technology starts with a description of the fast-growing ubiquitous permeation of digital technology into nearly all aspects of social and economic life but this description usually follows with a mournful dirge about the lack of infusion of the technology into education. One reason for this that is mentioned in the literature is the unchanging and problematic beliefs of teachers which act as a barrier to the integration of technology into teaching and learning (Cox et al., 2003; Ertmer, 2005). In contrast, on the positive side teachers' beliefs have also been seen to play a significant role in the successful integration of technology. There is plethora of academic literature in educational technology on the beliefs of teachers (An & Reigeluth, 2011; Bai & Ertmer, 2008; Chen, 2008; Ertmer, 2005; Gül Baser, 2011; Higgins & Moseley, 2001; Judson, 2006; Palak, 2004). This literature focuses on a range of issues relating to teachers' beliefs and includes pedagogical beliefs, technological beliefs, integration beliefs, beliefs about the impact of ICTs on learner achievement, and so on. They are useful and interesting studies. However, there is little or no literature on the education beliefs of district based educators as it relates to educational technology or any other educational issue for that matter. In looking at the beliefs of the DELCs I will therefore be drawing substantially from the literature on the beliefs of teachers as a proxy for the study of the beliefs of district based educators (who were all once teachers anyway) and maybe this study could in some very small way contribute to filling this knowledge gap concerning the study of district educators and how their beliefs influence their intentions to provide support and professional development which are part of their overall role (if at all).

1.3 The Research Problem (Part 2)

In this section on the Research Problem I motivate why it is important to examine the beliefs, attitudes and knowledge as well as the behavioural intentions of the DELCs. I identify key theoretical frameworks which provide a warrant for the study of these realities. Notably I identify the Theory of Planned Behaviour, the theory relating to Technological Pedagogical Content Knowledge (TPACK) and theories relating to teachers' pedagogical beliefs which provide warrants for the study of these constructs and variables. I look at the research methods that have been advocated by the main proponents of these theories and I also look at the actual research methods that have been used in empirical studies in which these theories have been applied.

This section does an overview of the literature related to these theories and their methodologies. In this sense it is a partial Literature Review. However, I do not explicate these theories nor indicate in detail how they will be applied in the study. This will be done in the more detailed Literature Review that follows later on. At this stage I am more interested in looking at the methodologies that have been used for researching these theoretical constructs and variables because this will help to indicated in what way the research problem of this study will be tackled.

As has been stated in the introduction, the research problem of this study relates to the DELCs in the Gauteng Province. I want to look at the beliefs, attitudes and knowledge of the DELCs and to

see whether these beliefs, attitudes and knowledge have a bearing on the DELCs' intentions to enact their support and professional development functions in particular ways. To give an example, at this stage I am not interested in examining the actual support and professional development actions and activities that the DELCs currently engage in, rather I am interested in examining how specific beliefs like pedagogical beliefs may influence (if at all) the way the DELCs ***intend*** carrying out their support functions. A legitimate question would be: Why do this? What are some practical reasons for doing this? If one discovers that a huge public investment in ICTs in education as the one mentioned in the introduction above is not resulting in the use of those technologies for teaching and learning and if one discovers that the public officials who are mandated to ensure the integration of that technology into teaching and learning are not achieving that objective we then have a problem on our hands. If in examining this problem we find out that the knowledge and belief systems of the public officials are not conducive to ensuring the appropriate use of the technology by the teachers we then have a possible area (the beliefs and knowledge of the public officials) that could be focussed on to bring about some necessary change. So, if we are interested in explaining, changing or predicting certain behaviours (like a technology support programme for teachers) then it may be necessary to assess the beliefs, attitudes, motivation and knowledge of those enacting that behaviour (implementing the support programme). Icek Azjen, an organisational social psychologist has developed a theory which enables us to do that – it is the Theory of Planned Behaviour (Ajzen, 1985, 1991). Basically this theory looks at the relationship between beliefs and attitudes, behavioural intention, the behaviour itself, and the outcome of the behaviour. The following diagram provides a highly simplified model and an example pertaining to the DELCs.

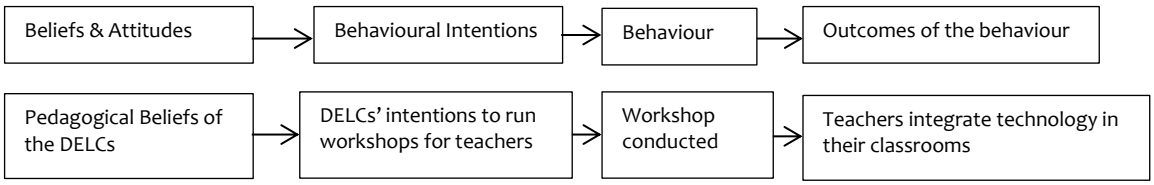


Figure 1: Basic Outline of the Theory of Planned Behaviour (TPB)[2]

At this stage I am interested in examining the first two steps in the process: Do certain beliefs, attitudes and knowledge of the DELCs have a bearing on their behavioural intentions?

There are many empirical studies that use the Theory of Planned Behaviour (TPB) which examine all sorts of behavioural intentions and enacted behaviour. However, a review of the literature has shown that there is no study based on the TPB that looks at the behaviour of district officials. There are a number of studies which look at the intentions of teachers to use technology in teaching and learning and I will be drawing on these studies (Lee, Cerreto, & Lee, 2010; Pierce & Ball, 2009; Salleh & Albion, 2004; Sugar, Crawley, & Fine, 2004a). There are also a number of studies which examine intended behaviour to implement constructivist pedagogical practices which are more germane to my study (Beck, Czerniak, & Lumpe, 2000; Haney & McArthur, 2002). The TPB behaviour was developed to be applied using quantitative methods (Ajzen, n.d.) and all the above mentioned studies use a quantitative method and so I will also use quantitative methods in my study. However, the first stage of the TPB entails the elicitation of salient beliefs using qualitative methods so in effect the TPB is a mixed method based theory using the Qual-

[2] See (Ajzen, 1985)

QUANT (Creswell & Clark, 2011) sequence with the emphasis being on the quantitative aspects, but as with all studies using quantitative methods the basic statistical requirements need to be in place (Field, 2009; Muijs, 2011). Despite the quantitative orientation of the authors of the TPB, the TPB has also been used very creatively as a theoretical framework for a few qualitative studies (Renzi, 2008; Renzi & Klobas, 2008). In my view this approach, which for obvious reasons does not have the statistical veracity of the TPB quantitative studies, nonetheless brings the dynamism of rich, in depth approaches to the theory thereby adding a new dimension. Furthermore, as Renzi (2008) and Renzi & Klobas (2008) explicitly state, this qualitative approach to the TPB comes into its own when the statistical requirements for inferential analysis cannot be met, especially as it relates to sample size. As I anticipated that sample size could be a problem in my study I opted for both a quantitative and qualitative approach – mixed methods. Furthermore mixed methods allows for the triangulation of results between (Creswell & Clark, 2011; Teddlie & Tashakkori, 2009) quantitative and qualitative methods and this is especially useful where the findings of the one method may not be entirely valid.

However, I want to go a little bit further than the Theory of Planned Behaviour (TPB). I also want to look at the relationship between forms of knowledge and behavioural intention and in particular a form of knowledge called Technological Pedagogical Content Knowledge (TPACK) (Mishra & Koehler, 2006) and the support intentions of DELCs. TPACK is a recently developed model (Mishra & Koehler, 2006) of teacher knowledge and is regarded as essential for the pedagogical integration of ICTs into teaching and learning. Since its emergence there has been an exponential growth in research relating to TPACK[3]. Although the preference for the originators of the model is for quantitative methods to be used (Mishra & Koehler, 2006) they do not refute the applicability of qualitative methods but consider qualitative methods to be less desirable because of their limited possibilities for replication and generalizability. Nonetheless the TPACK of teachers has been ascertained using quantitative, qualitative and mixed methods (Burgoyne, 2010; Burgoyne, Graham, & Sudweeks, 2010; Chai & Tsai, 2011; Graham, Cox, & Velasquez, 2009; Landry, 2010; Sahin, 2011; Schmidt et al., 2009) all in valid and reliable ways as validity and reliability applies within each of those methodological frameworks (Mishra & Koehler, 2006; Ronau & Rakes, 2012; Voogt, Fisser, Pareja Roblin, Tondeur, & van Braak, 2012). Once again I know of no TPACK studies as they relate to district officials but there are a vast number that relate to teachers in which the TPACK of the teachers is ascertained and measured and these studies can be effectively used as a reference criterion for the measurement and determination of the TPACK of the DELCs. As I have indicated there are a number of validated instruments that have been used to measure teachers' TPACK (Burgoyne, 2010; Burgoyne et al., 2010; Chai & Tsai, 2011; Graham et al., 2009; Landry, 2010; Sahin, 2011; Schmidt et al., 2009) and I will be using the instrument of Chai & Tsai (2011) for reasons I will explain in the detailed Literature Review. As mentioned above qualitative methods enrich and provide depth to a study (Creswell & Clark, 2011; Teddlie & Tashakkori, 2009) and so once again I will be using mixed methods to deal with the TPACK dimension of this study.

[3] Originally the acronym for Technological Pedagogical Content Knowledge was TPCK but has subsequently been changed to TPACK. The reader is warned of this, but both TPCK and TPACK refer to exactly the same construct and theory (Koehler, n.d.; Mishra, n.d.).

I also want to see what bearing the pedagogical beliefs of the DELCs have on their behavioural intentions (providing support and professional development) and explore whether there is any relationship between the TPACK of the DELCs and their pedagogical beliefs. There is a vast literature on the pedagogical beliefs of teachers. In the literature reviews of teachers' beliefs, all research methods are advocated (Fang, 1996; Munby, 1982; Pajares, 1992) and have been used in a range of studies with some focusing on pedagogy only (Fives & Buehl, 2005; Fox, 1983; McCombs & Whisler, 1997; McMillan & Schumacher, 2010; Ravitz, Becker, & Wong, 2000) and others focusing on the relationship between pedagogical beliefs and technological beliefs and technology use (An & Reigeluth, 2011; Bai & Ertmer, 2008; Chen, 2008; Ertmer, 2005; Gül Baser, 2011; Higgins & Moseley, 2001; Judson, 2006; Palak, 2004; Palak & Walls, 2009; Williams, 2007). I have identified one important study relating to district officials' pedagogical beliefs and the way these influence their support and professional development actions with teachers in implementing district curriculum policies (Spillane, 2002). This study played a large role in inspiring my research project. Although it uses both quantitative and qualitative methods it only uses qualitative methods to elicit beliefs and uses the quantitative methods for other aspects of the study. For my study I have opted for the quantitative instrument to be found in McCombs & Whisler (1997) and which was also used in an educational technology related study (Bai & Ertmer, 2008) in which pedagogical beliefs were used as a predictor of teachers' technology use and attitudes. However, as with the TPB and TPACK it is my view that mixed methods is the optimum approach for measuring pedagogical beliefs to ensure richness and depth?

In this section on the Research problem I have identified the major theoretical frameworks that will be associated with this study. I have not expounded on these theories – I will do this in the detailed Literature Review. However, the main purpose of this section of the report was to provide an overview of the methods used in studies associated with the nature of this study as well as the theoretical frameworks that will be applied in this study. Based on an analysis of the methods used in all the literature I have referred to in this section I am of the view that a convergent parallel mixed methods approach is the most appropriate method for dealing with the research problem of this study. I will elaborate on this option in more detail in the Literature Review and the Methodology sections.

1.4 Purpose of the research study

The intent of this study is to explore the likelihood that GDE DELCs will carry out their roles in a Just-in-Time / Constructivist manner. A convergent parallel mixed methods design will be used (Creswell & Clark, 2011), and it is a type of design in which qualitative and quantitative data are to be collected in parallel, analysed separately, and then merged. The purpose of this convergent parallel mixed methods study will be to ascertain the pedagogical beliefs and knowledge systems and other relevant key belief constructs of the DELCs with regard to the integration of ICTs and their relationship to the behavioural intentions of the DELCs using quantitative survey methods. This will be triangulated and merged with qualitative interview data which will explore similar constructs and themes. The reason for collecting and analysing both quantitative and qualitative data is to validate the two forms of data to bring greater insight into the problem of the type of

support and development that teachers need in the GoL environment than would be obtained by either type of data dealt with separately or on their own.[4] (Creswell & Clark, 2011).

1.5 Research Questions

I now present the research questions that will drive this study. These research questions are based on the nature of the contextual problem, and my conclusions relating to the Research Problem. They are also based on the mixed method approach that I will be using. The details of the mixed design will be elaborated upon in the methodology section. The questions are also base on the phenomenon to be studied which I have briefly touched on so far and will be further explained in the section on the Literature Review. The questions are also based on the theoretical frameworks being applied in this study and the constructs and variables derived from these theories. These theories and how they have shaped the questions will be alluded to in the Literature Review that follows. At the end of each question I have identified in brackets what kind of methodology will be used to answer each question. Where some questions are characterised as qualitative and quantitative this means that those questions will be answered separately using each methodology. The hypotheses indicated under questions categorised as qualitative and quantitative would only apply to the quantitative aspects of that question. Where a question is categorised as mixed method this means that inferences will be merged from the quantitative and qualitative strands relating to that question into a mixed answer model for that question.

1.5.1 Main Question (MM Question)

1. What is the likelihood that GDE District eLearning Coordinators (DELCs) will carry out their roles in a constructivist "just-in-time" manner with respect to the Gauteng Online laboratories? (MM question)[5]
    - MM hypothesis: The DELCs are likely to perform (or have a Behavioural Intention – BI - of providing) a JiT support and constructivist training (claim) if they have an appropriate level of TPACK, Learner-centred and constructivist beliefs as well as appropriate attitudes towards the BI.

1.5.2 Sub-questions

2. To what extent is it likely that GDE DELCs will carry out their roles in a constructivist "just-in-time" (JiT) manner? (Quantitative question)
   Hypotheses
    - Ha: The DELCs will carry out their roles in a JiT constructivist manner (The TPB model does predict BI) Regression Coefficient will be > 0.5 with $p < 0.05$
    - H0: The DELCs will not carry their roles in a JiT constructivist manner (The TPB does not predict BI) Regression Coefficient < 0.5 and $p > 0.05$
3. To what extent is it likely that GDE DELCs will carry out their roles in a constructivist "just-in-time" (JiT) manner? (Qualitative question)
4. What is the measure of the DELCs' constructivist beliefs? (Quantitative)
5. What pedagogical beliefs do the DELCs' espouse about constructivism and what is the strength of these beliefs? (Qualitative question)

[4] This purpose statement is based on a template presented in (Creswell & Clarke, 2011, loc 1701).
[5] Note: as a MM question the validity of the inference depends on how the qualitative and quantitative data are merged / combined / integrated.

6. What is the measure of the DELCs' learner-centred beliefs? (Quantitative)
7. What pedagogical beliefs do the DELCs' espouse about learner-centeredness and what is the strength of these beliefs? (Qualitative question)
8. What is the knowledge level (TPACK) of the DELCs about the pedagogical integration of ICTs? (Quantitative question)
9. What are the beliefs of the DELCs about GoL technology integration? (Qualitative question)
10. What is the relationship between the DELCs pedagogical beliefs, learner-centred beliefs and TPACK? (Quantitative)
11. What is the relationship between the DELCs pedagogical beliefs, learner-centred beliefs, TPACK and the behavioural intentions of the DELCs? (Qualitative question)
12. To what extent do the quantitative and qualitative results converge and validate each other? (MM question)

2 CHAPTER 2 – Literature Review and Conceptual Framework

2.1 Introduction to the Literature Review

This literature review builds from the section above that dealt with the Research Problem where in effect the literature review began. What follows is less of a classical literature review and more of a development of the conceptual framework and the identification and relationship of the constructs and variables to be addressed in the study.

It would be best if I begin this literature review by putting my conceptual cards on the table from the outset. Otherwise the writing and reading of this research report would be a bit like a game of cards and somewhat like the game Bridge. I want to avoid the situation in which little snippets of information are revealed to the reader as isolated clues which the reader could construe in wildly different ways from my intentions as we progress through the report. The reason for doing this at this stage is based on the sage advice provided by the wonderful book on research entitled The Craft of Research (Booth, Colomb, & Williams, 2008) which suggests that the basic premises of a research be made as transparent as possible to the consumers of the research. The authors (Booth et al., 2008) call this the "warrants" for the research. In explicating my warrants, my premises, at this stage I will be providing little, if any, references or citations for the warrants so as to allow the concepts of the premises to stand out on their own in a crystal clear fashion (I hope!) and not be muddied by references to and explanations of citations. References and citations will be revealed later on as we progress through the report.

The first and most basic premise of this study is that there is a relationship between mental states on the one hand and human action and behaviour on the other hand and in many instances mental states cause human action and behaviour.

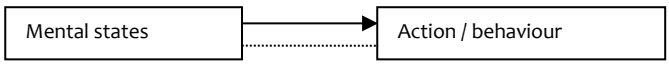


Figure 2: Basic premise

I concede that there are many other determinants of human action and behaviour like socio-cultural factors and education, but these are all mediated by the mind.

Taking the first premise to the next level and my next premise, my claim is that there is a relationship between beliefs, attitudes and knowledge (as aspects of mental states) on the one hand and human action and behaviour on the other hand and sometimes this relationship is a causal one. There are many other aspects of mental states that one could consider, but they are not of interest to me for the purposes of this study.

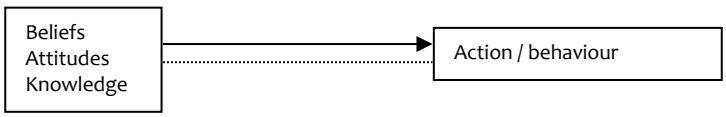


Figure 3: Basic premise 2

The solid arrow in between the boxes, which is generally representative of causation could also be replaced by a straight dotted line without arrow heads to indicate a correlational relationship where causation does not exist and vice versa.

As this is a study within the educational social space my next premise based on the previous one is that there is a relationship (and sometimes a causal one) between educational beliefs, attitudes and knowledge held by education roleplayers (especially educators like teachers and district officials) on the one hand and their educational actions and behaviour on the other hand.

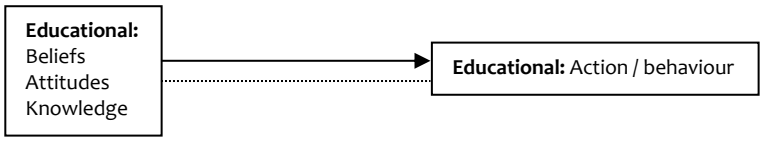


Figure 4: Basic premise 3

The next premise which is in fact a claim which I hope to demonstrate through the study is that there is a relationship (and sometimes a causal one) between the following more specific beliefs and related attitudes[6]: pedagogical beliefs, beliefs about the behaviours in question, beliefs about how other educational roleplayers view those behaviours (which I'll call Normative Beliefs for the moment), beliefs about whether factors shaping the behaviours are controllable, together with educational knowledge on the one hand and educational behaviour such as the enactment of specific educational roles like the role of a DELC on the other hand.

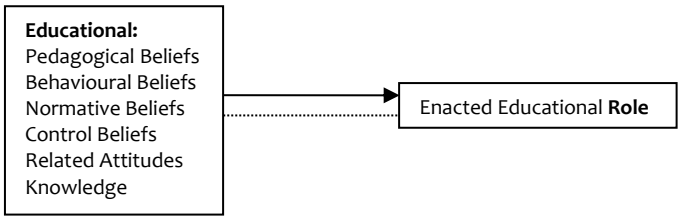


Figure 5: Claim 1

Given that I will be looking at the DELCs I will be considering the relationship between the following beliefs, attitudes and knowledge: Pedagogical Beliefs (Constructivist Beliefs and Learner-Centred Beliefs), beliefs about the role of DELCs (Behavioural Beliefs), beliefs about how others view that role (Normative Beliefs), beliefs about the extent of control over various influencing factors effecting the enactment of the role (Control Beliefs), Educational knowledge (Technological, Pedagogical, Content Knowledge – TPACK) and related attitudes on the one hand and the probable enactment of the Support and Professional Development functions of the DELC on the other hand.

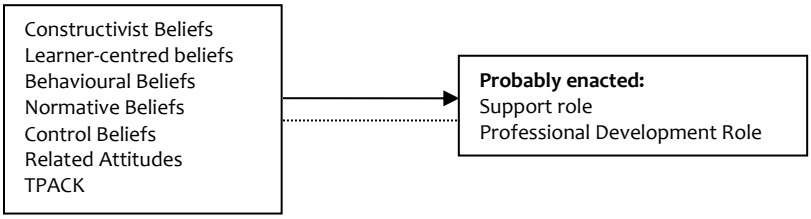


Figure 6: Claim 2

[6] The reasons for selecting these beliefs, attitudes and forms of knowledge will become clear later on in the literature review.

More specifically I am interested in looking at the relationship, if any, between some of the beliefs and related attitudes and knowledge firstly amongst themselves and then as they may have a bearing on the Support and Professional Development roles as probably enacted as indicated in this diagram:

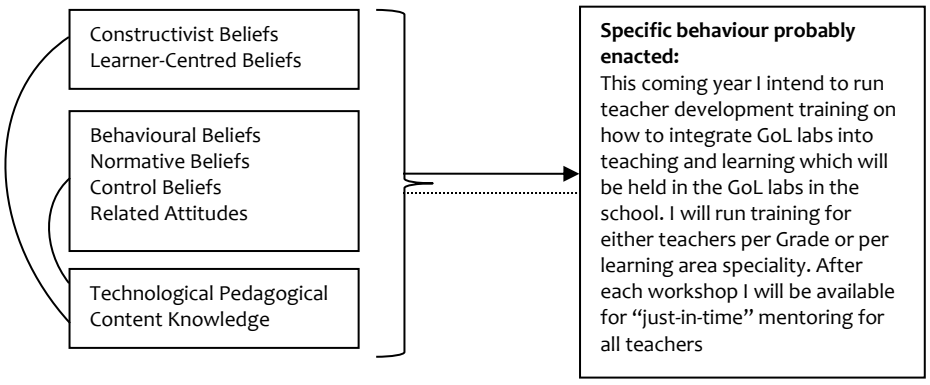


Figure 7: Claim 3

The constructs mentioned above are based on the following theories: Theory on Pedagogical Beliefs (Ertmer, 2005); Theory about Technological Pedagogical Content Knowledge (Mishra & Koehler, 2006); a Systems-based theory about technology integration (Kopcha, 2008); and a Theory of Planned Behaviour (Ajzen, 1991)[7] most of which were introduced in the Research Problem section above.

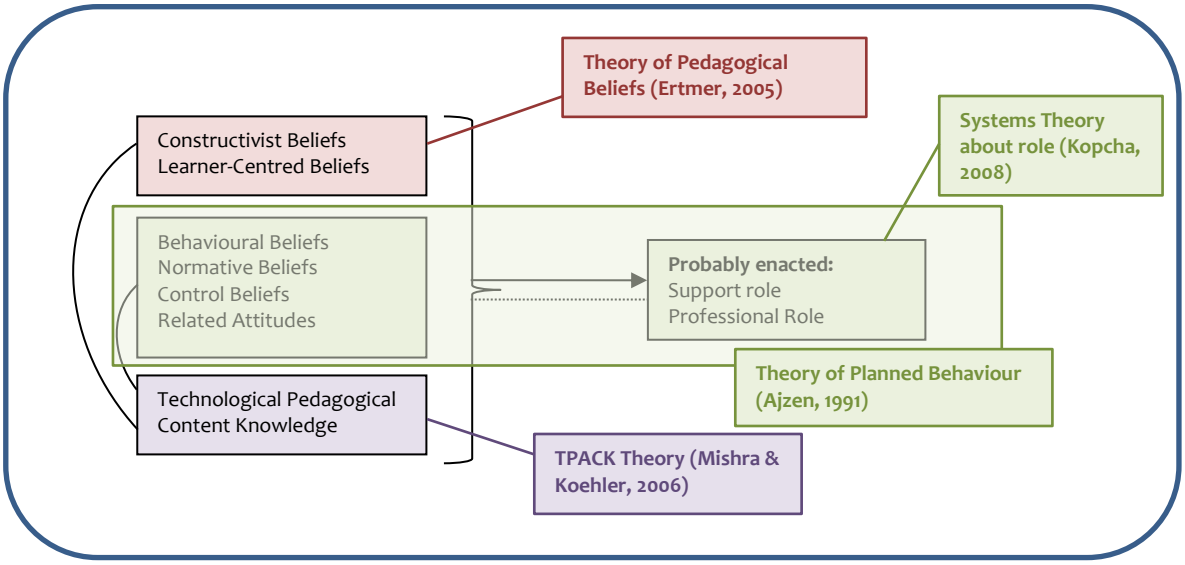


Figure 8: Theories Applied in the Study

At the centre of this conceptual framework is the Theory of Planned Behaviour the model of which in effect structures the entire study both qualitatively and quantitatively but the TPB does not provide an overarching theoretical framework for the study. Furthermore, the pictorial framing of the entire study in the diagram by the Theory of (Teacher) Beliefs is somewhat

[7] These referents are not the only theorists for these areas, but they are the main or seminal theorists in those areas.

misrepresentative. The Theory of Teacher Beliefs does not bring together or provide a meta-theory in any way at all for all the other theories that are mentioned in the conceptual framework. All the Theory of Teacher Beliefs does is posit a relationship between teacher beliefs and knowledge on the one hand and teacher practice (behaviour) on the other hand which is the fundamental premise of this study. All the other theories, in a progressively layered way, as more ontological contextual realities are brought into the picture, indicate how that fundamental premise will be dealt with in the context of these additional layered realities. As far as I know there is no over-arching theory which would do the job. The only way to see if there is any coherent relationship between the constructs and variables of these theories is through empirical study, which is what this study is about. However, it is not the purpose of this study to develop such a meta-theory or even to contribute to its development although some pointers may emerge which will be referred to at the end of the report. The purpose of this study, as is clearly stated in the Purpose section of this report above, is to see empirically, in the context of the GoL initiative, in the more or less here and now, whether the DELCs' behavioural intention regarding some aspects of their role can be determined or predicted by some of their beliefs and the associated theories are used to that end. Having presented the broad underlying conceptual framework of the study I will now go into a more detailed look at the relevant literature to see how the study has been set up and why.

And at the centre of the Theory of Planned Behaviour (TPB) is the probable behaviour which is being dealt with. In presenting a statement about the probable behaviour of the DELCs that underlies this study I want to stress that this study will not focus on the actual performance of the behaviour per se but rather on the antecedent to the behaviour which is the ***intention*** of the DELCs to enact this behaviour which for the purposes of this study will operate as a proxy for the actual enactment of the behaviour. This use of the intention as a proxy for the actual behaviour is at the centre of the TPB (Ajzen, 1985, 1991, n.d.). So I will present a description of that behavioural intention here but will explain its dimensions and the motivations for those dimensions in the course of the literature review. The intention is presented in the first person and so the "I" refers to the DELC. I will continue to construct and deconstruct this behavioural intention statement as I move through the study. I call this behavioural intention "Model 2012" in the study and also in the research instruments.

> "This coming year I intend to run teacher development training on how to integrate GoL labs into teaching and learning which will be held in the GoL labs in the school. I will run training for either teachers per Grade or per learning area speciality. After each workshop I will be available for "just-in-time" mentoring for all teachers."

2.2 Pedagogical integration of ICTs

In this section I first provide a reason for defining what the pedagogical integration of ICTs means. I then go onto looking at the distinction between "pedagogical integration of ICTs" and "technology integration". In doing so I consider the "pedagogical" in "pedagogical integration of ICTs". After that I introduce the ideas of constructivism and learner-centeredness and how

they inform the concept pedagogy. I draw out the implications of this for ascertaining and measuring constructivism and learner-centeredness in the study.

The reason why we need to look at what the notion "Pedagogical integration of ICTs" means is because it is expected that this will be one of the main outcomes of the behaviour of the DELCs (fourth box in Figure 9 below) that we are dealing with and it is what we will be looking for when we ascertain the DELCs beliefs as represented in box 1 in Figure 9 below. I re-present the summarised model of the TPB that I presented above as a heuristic device[8].

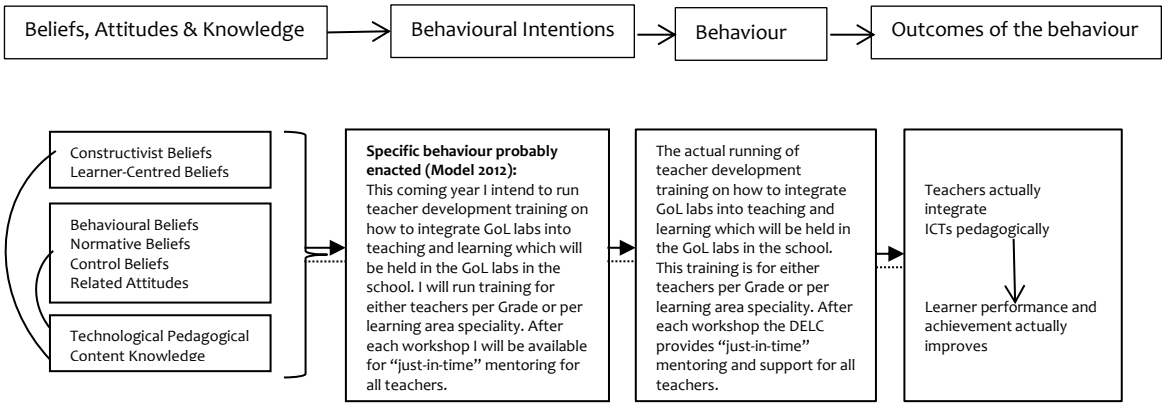


Figure 9: Inserting the behaviour into the model

As I have indicated a number of times, this study will not focus on the actual behaviour of the DELCs (box 3) above, or on the outcomes from that behaviour (box 4) but rather on the first two boxes – beliefs, attitudes, knowledge and intentions. Having said this, it is nonetheless important to understand the characterisation of the actual behaviour (which is also contained in the behavioural intention in box 3 in Figure 9 above, as well as the outcomes, because in using the intention (box 2) as a proxy for the actual behaviour, what this study is testing is whether the constructivist / learner-centred beliefs represented in box 1 will result in constructivist / teacher-as-student centred practice in box 3 and therefore create the possibility for constructivist / learner-centred pedagogical integration taking place by the teachers in box 4.

First I want to have a brief discussion on terminology. A number of terms have been used to cover the notion of the pedagogical integration of ICTs. The term "pedagogical integration of ICTs" itself, originates as far as I can tell, from the PanAfrican Research Agenda on the Pedagogical Integration of ICTs (Karsenti, Harper-Merrett, Traore, Mbangwana, & Toure, 2009; "PanAfrican Research Agenda on the Pedagogical Integration of ICTs," n.d.). On the other hand, most of the literature that originates from the USA uses the concept "technology integration" (Mishra & Koehler, 2006; Okojie, Olinzock, & Okojie-Boulder, 2006). Although in this study I will be using the terms interchangeably they are not unproblematic. The problems first need to be ironed out before they can be used interchangeably.

[8] Please note that this is not a complete model of the TPB nor is it a complete model of the constructs as used in this study. I am just using this simplified diagram as an example to make a point in the discussion at this stage.

Much of the literature about the integration of ICTs into teaching and learning has started from the technological perspective even though the pedagogical issues are considered at a later stage. This often results in a technicist approach or narrow integration approach (Okojie et al., 2006) to the pedagogical integration of ICTs; in other words technology affordances drive the pedagogical processes. A number of authors indicate that when considering the pedagogical integration of ICTs one should start from a pedagogical perspective (Cox et al., 2003; Okojie et al., 2006; Watson, 2001) rather than a technological perspective because a technicist approach does not result in the most successful learning and learner achievement.

What does it mean to say "we should start from a pedagogical perspective"? Alexander (1997) cited in (Cox et al., 2003) describes pedagogy as involving teaching methods and the organisation of learners in the classroom for teaching and learning purposes. He then goes on to say that pedagogy should be viewed as educational practice which has two dimensions: observable classroom practice and pedagogical reasoning. Classroom pedagogical practice deals with the what and how of teaching and learning (what should learners learn and how should they learn it) and involves the organisation of the curriculum into learning programmes, lessons and activities, teaching methods and learner organisation, and the management of the learning environment and teaching and learning resources to be integrated and used in the learning programmes. Pedagogical reasoning firstly requires knowledge of the curriculum content as well as knowledge about how the content should be taught, including knowledge of the resources and technologies to be integrated and used and also knowledge of learners and their circumstances, their current knowledge, their abilities and needs and the development pathway the learners should be following. The knowledge dimension includes knowledge of theories and philosophies of education as well as educational social contexts and the purposes and goals of education (the why learners should be educated about the what and how, and also the what of the kind of person the learner should become). Pedagogical reasoning puts all of this together in plans and practice in the classroom. The pedagogical reasoning process also includes the beliefs and attitudes of the teachers and how these get applied through the pedagogical reasoning process and actual practice in the classroom because there is now a vast body of evidence that teachers beliefs and attitudes, as well as their knowledge, influences their practice. (Fang, 1996; Pajares, 1992). The pedagogical integration of ICTs entails incorporating the technology itself and knowledge of technological affordances into the pedagogical processes mentioned so far. If this is what is meant by "technology integration" then we can use the terms "pedagogical integration of ICTs" and "technology integration" interchangeably and I will do so based on this assumption.

The concepts of "pedagogy", "technology", "pedagogical integration of ICTs" are not neutral, they are shaped and influenced by theories, philosophies and belief about learning and hence I take a brief sojourn into Constructivism and Learner-centred pedagogy. Whilst I do this I take a brief look at the implications of this for the beliefs of the DELCs and how I will address them in this study. Thereafter I will come back to the question of the pedagogical integration of ICTs.

2.3 Constructivist / learner-centred pedagogy

Constructivist / leaner-centred pedagogy underpinned the OBE and still underpins the new NCS but with a revised emphasis on subject matter content (DoE, 2009). Constructivist / learner-centred pedagogy have also been the dominant pedagogical philosophy associated with much of the recent literature on educational technology in general and the integration of technology more specifically and it is this pedagogical philosophy that underpins this study.

The approach to constructivism taken in this study is a social constructivist one in which the formal presentation of curriculum knowledge to learners plays a central role and is critical of discovery-based approaches in which no instruction is provided (Hausfather, 2001; Mayer, 2004; Richardson, 2003). Constructivism is a theory about knowledge, learning, pedagogy and teaching. Individuals build their own understandings and beliefs by linking new knowledge that they come into contact with, usually from a teacher, to what they already know. This can occur through direct instruction or through vicarious experience. Teachers can facilitate this process by helping learners link new knowledge that they introduce to leaners with what learners already know by making their prior knowledge explicit and by providing a scaffolded process whereby new knowledge is steadily built up on current knowledge – an iterative process of moving from the known to the unknown and looping back and moving from the unknown to the known. In formal constructivist education new content is delivered in a planned and well sequenced manner. Learner activity and interaction with the content, the teacher and with other learners is encouraged and facilitated by the teacher. Reflective activities are constantly built into the process so that learners are aware of what they are learning and how they are learning it. Teaching in this framework is interestingly characterised as mediated learning by Laurilard (2002).

In 1998 the Centre for Research on Information Technology and Organizations (CRITO) at the University of California, Irvine carried out a very large scale research project entitled Teaching, Learning, and Computing—1998 – A national Survey of School and Teachers which was " a study of teachers' use of computer technology, their pedagogies, and their school context." (Ravitz et al., 2000). Although its theoretical base was a form of constructivism which emphasized discovery learning it nonetheless produced some interesting questionnaires, surveys and reports. I extracted some useful questionnaire items from their validated research instruments to be used in the instrument that I designed to help measure the DELCs constructivist beliefs.

Constructivism incorporates learner-centred theories; however learner-centred theories are not only germane to constructivism. Richardson (2003) and Mayer (2004), who both advocate learner-centeredness, are critical of individualistic discovery-based approaches which downplay the role of the teaching of new knowledge but acknowledge the importance of "attention to the individual and respect for student's' background" (Richardson , 2003 , pg 1626). In a definition that seems to build on this, McCombs and Whisler (1997) defined learner-centred as: "The perspective that couples a focus on individual learners (their heredity, experiences, perspectives, backgrounds, talents, interests, capacities and needs) with a focus on learning (the best available knowledge about learning and how it occurs and about teaching practices that are most effective in promoting the highest levels of motivation, learning and achievement for all learners.)"

McCombs and Whisler, 1997, pg 9). McCombs and Whisler (1997) published a very useful Teacher Beliefs Survey for measuring teachers' learner-centred beliefs. This survey had two basic constructs "learner-centred beliefs" and "non-learner centred beliefs", with this latter construct being based on traditional instructivist pedagogies. The survey is validated and was also used in an important study by Bai & Ertmer (2008) on "Teacher Educators' Beliefs and Technology Uses as Predictors of Preservice Teachers' Beliefs and Technology Attitudes." The purpose of this study was to examine the relationship between the beliefs of teacher-educators and their students, who were pre-service teachers, and whether this relationship was a predictive one. The abstract to this article states: "The findings of this study revealed that teacher educators' learner-centred beliefs and nonlearner-centred beliefs about learning and teaching explained a small amount of variance in preservice teachers' learner-centred beliefs and nonlearner-centred beliefs about learning and teaching." (Bai & Ertmer, 2008). As their purpose for using the questionnaire was similar to my study and because the study indicated to a small degree that it was a valid and reliable instrument which could be used for predictive analysis, I then decided to use the entire survey in my instrument because it would enable me to establish the learner-centred and non-learner-centred beliefs of the DELCs. I am interested in seeing whether there is any correlational relationship between the beliefs of the DELCs and the manner in which they intend to conduct their support and professional development. I also want to explore whether there is any correlational relationship between these learner and nonlearner centred beliefs of the DELCs and their knowledge about the pedagogical integration of ICTs.

I now return to discussing the pedagogical integration of ICTs having established the pedagogical framework that should frame integration. The concept of the pedagogical integration as defined by the PanAf observatory does not view the isolated inclusion of technologically based activities into teaching and learning and classroom practice on an ad hoc basis as integration. Integration implies the sustained, systemic, systematic and ongoing incorporation of technology and that pedagogical practices and strategies are adapted to include this systemic incorporation of digital technology. There are therefore two dimensions to the pedagogical integration of ICTs; the first focuses on pedagogical practice in the classrooms and minds of the teachers and the second deals with systemic enabling factors like the provisioning of technology and infrastructure, professional development of teachers, pedagogical and technological support for teachers, the effective management of schools and technology, and so on. I will be concentrating on the first aspect as well as the enabling factors of support and the professional development of teachers in this study and I will be highlighting the role that knowledge, beliefs and attitudes play in the support for and professional development of teachers. It should also be noted that the primacy of curriculum content in the pedagogical integration of ICTs discussion above has been highlighted and this will be a recurring theme throughout this study.

Although I have spent some time describing and defining the pedagogical integration of ICTs there are no constructs from this review that I will be operationalizing in this study. However, it has been important to have applied some focus on the concept because it is the actual successful or failed practice of the pedagogical integration of ICTs by teachers in the classrooms and schools which is an outcome of the behaviour of the DELCs in the TPB model I will be using and furthermore the DELCs' attitudes and evaluation of the value of this outcome is measured as a key element in this model and I'll return to this later.

In the section above, I have demonstrated that the notion of pedagogy needs to be infused with the ideas of constructivism and learner-centeredness so as to make sense of the concept "pedagogical integration of ICTs". I have also identified instruments that have been validated and which can be used to measure the pedagogical beliefs of the District eLeaning Coordinators (DELCs) and hence in the next section I go on to looking at the notion of beliefs and the role they play in shaping the behavioural intentions that underpin the actual behaviour.

2.4 Beliefs

> "Little will have been accomplished if research into educational beliefs fails to provide insights into the relationship between beliefs and teacher practices, teacher knowledge, and student outcomes" (Pajares, 1992)

In this section I start by looking at why beliefs are important to study in the field of educational technology. I have indicated that the relationship between beliefs and practice is not simple and studies are plagued by complexity and inconsistency. I therefore examine some of the properties of beliefs and look at what bearing this has for the consistency of belief studies. I then propose that intervening variables from the Theory of Planned Behaviour (TPB) help to resolve the consistency / inconsistency problem at the conceptual level at the least.

2.4.1 Why beliefs are important in education and technology integration?

In the field of education and especially educational technology it is important to deliberate on beliefs because theoretically and empirically it has been established that teachers' educational beliefs have a great impact on their teaching practice (Bai & Ertmer, 2008) and more specifically pedagogical beliefs have shaped technology integration (Ertmer, 2005). In this study I am considering the extent to which the pedagogical beliefs, other salient beliefs and the TPACK of the DELCs influence the way the DELCs intend to enact their support and professional role for the purposes of getting teachers to pedagogically integrate ICTs into their teaching and learning.

More specifically there some studies that have shown a positive relationship between constructivist learner centred beliefs and the integration of ICTs (Baser, 2011). However, there are also many studies which do not necessarily demonstrate a direct positive correspondence between constructivist / learner-centred beliefs and technology integration (Chen, 2008; Fang, 1996). I will return to this later.

I have identified one substantive study in the literature on the relationship between the pedagogical beliefs of district officials and their practice. In this study Spillane (2002) used a combination of quantitative and qualitative methods which the contemporary literature on mixed methodologies (Teddlie & Tashakkori, 2009) would call a mixed study as opposed to a mixed methods study which means that the two methods were used to study two different aspects of the overall study and then the findings were compared. It was not a full mixed methods study where inferences from each strand were combined. In the study Spillane wanted to explore the methods and processes for implementing a policy reform regarding maths and science teaching which involved the professional development of teachers and also included

support and pressure to be applied on the teachers by the districts to ensure the implementation of the new polices. Using qualitative measures Spillane established the learning / pedagogical profile of districts as a group as well as of individual district officials. The results of this aspect of the study were that there were districts which he characterised as either predominantly behaviourist, situated or cognitive. Using a combination of quantitative and qualitative methods he then examined the practice of the teachers in the schools to see if they complied with the policy standards that the district had implemented through their various support and professional development strategies. His conclusion was that "the evidence suggests that district officials operating from a behaviourist perspective may not be as effective in supporting teachers' implementation of the mathematics standards as those operating from a situated perspective." (Spillane, 2002, p. 409) However, he went on to say that this finding was not conclusive.

I can take a number of keys issues from the Spillane study for my study. Firstly, it is possible to develop a pedagogical profile based on pedagogical beliefs through research both for individuals and as an organisational culture. In my study I will be developing a pedagogical profile (learner-centred / nonlearner centred and constructivist – high or low) of the DELCs using both quantitative and qualitative methods. Secondly, it is possible to correlate pedagogical profiles with practices and outcomes of practices. The implication for my study is that through the TPB and standard correlation techniques I will be trying to link beliefs with intentioned practices. Thirdly, due to the inconclusive nature of Spillane's findings I have learnt that the correspondence theory of belief and practice is not a neat one and there are many contingencies that impact on the way that beliefs get put into practice which could either produce inconclusive results or even negative results.

The field of educational technology is also not short of inconsistency studies. Chen (2008) using a qualitative methodology found that the teachers that he studied had constructivist beliefs but their methods of technology integration were inconsistent with those beliefs. Palak & Walls (2009) using a classical sequential mixed methods design found that teachers' pedagogical belief systems did not predict their classroom strategies and student use of ICTs.

Why do these types of results occur? Fang (1996), in a review of research on teacher beliefs and practices attempts to address this question. From his review he developed a consistency vs inconsistency thesis. There are many studies that show a consistent relationship between belief and practice and there are also many studies that show inconsistent results. In each case it is important to explain and justify the results. One cannot assume consistency and then only have to explain inconsistency. Fang argues that whether one gets either a consistent or an inconsistent result in both cases the results have to be explained and justified and therefore I need to take cognisance of this for both the analysis and the making of inferences for this study.

With regard to the studies I have cited above (Chen, 2008; Palak & Walls, 2009; Spillane, 2002) results which are not entirely consistent were reported. Some of the results reported are either only partially inconsistent or consistent. I think that Fang's (1996) dichotomy of consistency vs inconsistency should be a continuum and not be bipolar. Most studies will lie somewhere in between the poles of the continuum as these studies do. As Spillane mentions in his article - these are not laboratory conditions under which these studies are being conducted. In all the

studies a range of other exigencies and factors impacted on and intervened somewhere between the beliefs of the actor and the enactment of the behaviour. Any belief-practice study is unlikely to be purely consistent and therefore all studies should be considering the degree of consistency / inconsistency rather than some absolute positive value. All studies should be contextualising their studies in the real world and bring factors other than beliefs into play. Furthermore, there is one design factor which bedevils all these types of studies and that is the self-report techniques and measures that are used in the surveys and interviews. Mental states are difficult to measure and so researchers have to rely on what informants say and make inferences from that and with this method there is likely to be a high error rate.

Having looked at how personal beliefs have influenced practice it is also important to consider shared and collective beliefs because, as in any organisation, DELCs' beliefs, whether shared or purely individual, are part of the organisational culture which in turn influences organisational effectiveness and which can improve the roles that have to be enacted by the district. Organisational culture plays a role in shaping and forming beliefs which in turn help in shaping and forming the organisational culture. Janney (2010) found this to be the case in her study on the roles of educational districts. As I am focusing on the intended role enactments of the DELCs her study of beliefs has a direct significance for this study. However, it is beyond the scope of this study to consider organisational socio-cultural issues.

In her important theoretical article on the nature of teachers' pedagogical and technological beliefs Ertmer (2005) raises some issues which also have a bearing on the issues of consistency / inconsistency and belief-practice. Specific beliefs are part of a belief system and structure and they do not operate as discrete entities. There is the issue of belief strength (strong-weak beliefs) and location (core-surface) and all beliefs function along a continuum between the poles of these axes. Some beliefs are core-strong and are difficult to change whereas others are surface-weak and are easier to change and most beliefs are somewhere in between. This dynamic nature of beliefs makes it difficult to measure and it also makes it difficult to change deeply held strong core beliefs. Beliefs that are formed over a long period of time and based on many experiences like schooling and education means that that the most important "source of teachers'….beliefs about teaching and learning was their personal experience with school and instruction" (Bai & Ertmer, 2008, pg 95). In other words pedagogical beliefs are formed over a long period of time and are considered to be strong-core beliefs and are very difficult to change. Furthermore, people can hold conflicting beliefs about the same thing (Ertmer, 2005). A teacher can espouse a constructivist / learner-centred beliefs because they have recently learnt about it in pre-service education and because it is the latest hegemonic thinking with this becoming a weak-surface belief but still retain the instructivist / teacher-centred beliefs formed as a strong-core belief over years of schooling and education at college. What the teacher could end up practicing in the classroom could be based on her instructivist / teacher-centred beliefs but what the same teacher espouses in the interview is their constructivist / learner centred beliefs and this is possibly why many teachers do not practice what they "believe". The self-reported beliefs that interviewees mention may only be weak-surface and not strong-core hence resulting in an apparent inconsistency but in fact represents a consistency because the teacher is in fact acting upon strong-core beliefs.

There is another dimension about beliefs that relate to the consistency / inconsistency issue. The model that I presented when I was discussing the warrants for this study is over simplistic and incomplete and was only offered as a heuristic device and I reproduce it below.

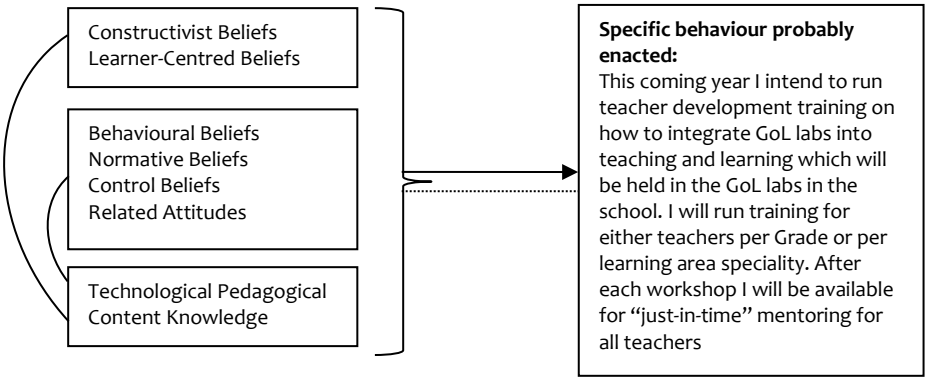


Figure 10: Relationship between Beliefs, Knowledge and Behavioural Intention

What is missing from this model are intentionality (a decision to act) as well as attitude (which are both mental states). Many theorists point to intervening variables between Beliefs / Knowledge and actual behaviour. The first is attitude. Fishbein & Azjen, (1975, pg 11) refer to attitude as "the amount of affect for or against some object" which means that the object[9] is evaluated and a desire for the object is then developed. The second, intentionality, is sometimes referred to as a decision at act in a particular way by theorists of educational beliefs (Higgins & Moseley, 2010; Munby, 1982). However, Fishbein & Azjen, (1975, pg 12) term this conation or "behavioural Intention" and also just call it "intention" which is "the person's subjective probability that he will perform the behaviour in question" and which means that an individual assesses herself and projects whether she is likely to perform the behaviour or not.

Because many of the educational studies do not incorporate and operationalize these intermediate variables in the belief-practice research their results end up being inconsistent. This is one reason why I have opted for the TPB, because it incorporates all the relevant variables in the process of moving from beliefs to actions. What follows is a simplified version of this more complete model based on a slightly more complex model from Fishbein & Azjen (1975, pg 15) which I will return to below when I discuss the TPB in more detail.

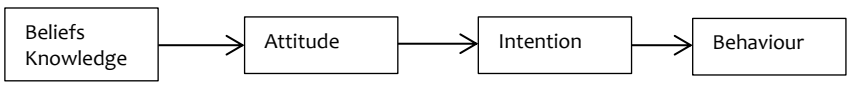


Figure 11: TPB Simplistic model

I need to make one final point about beliefs at this stage and that concerns the relationship between belief and knowledge because I'll be considering how both belief and knowledge influence behavioural intention. According to Calderhead (1996), teacher beliefs, as well as teacher knowledge and teacher thinking, comprise the broader concept of teacher cognition. For Fishbein & Azjen (1975, pg 12) knowledge is a form of belief, "whereas attitude refers to a

[9] By "object" Fishbein & Azjen (1975) refer to anything such as physical objects, ideas, possible behaviour, etc.

person's favourable or unfavourable evaluation of an object, beliefs represent the information he has about the object… (and)… .links an object to some attribute". For Ertmer (2005) quoting Calderhead (1996) "beliefs generally refer to 'suppositions, commitments, and ideologies,'" and which are held to be true by the believer, whereas "knowledge refers to 'factual propositions and understandings'" (Ertmer, 2005, pg 28) which are often referred to as declarative and procedural knowledge. Knowledge held to be true becomes belief, belief together with evaluation becomes attitude, attitude with affect becomes intentionality, and intentionality with control becomes the actual behaviour. And all along the route there are internal and external extraneous variables influencing the process. However, "beliefs are far more influential than knowledge in determining how individuals organize and define tasks and problems. This, then, makes them stronger predictors of behaviour than knowledge." (Calderhead, 1996). What is likely to produce more highly correlated results – the relationship between TPACK and behavioural intention or beliefs about constructivism / learner-centeredness and the same behavioural intention? I'll be looking for this when I analyse the data below and I will take this into account when I analyse the respective correlations between belief, knowledge and behavioural intention. I now turn my attention to the specific form of knowledge that is theorised to influence actual integration of ICTs into teaching and learning – TPACK.

Having looked at how the concepts of the TPB could help to resolve the inconsistency studies of belief-practice, and finished off by arguing that knowledge is an important aspect of belief and that both have implications for practice, this leads on to the next section about knowledge.

2.5 Knowledge

> "All beliefs include a cognitive component representing knowledge, an affective component arousing emotions and a behavioural component guiding actions. Therefore, knowledge is a component of belief." (Chen, 2008, pg 66)

In this section I basically explicate the theory of knowledge for technology integration – TPACK - and argue that an understanding of TPACK as a cognitive property of educators is necessary to understand their practice. I examine ways in which TPACK can be measured.

As I had discussed in the earlier section on beliefs there is a strong relationship between beliefs and knowledge. The quote from Chen (2008, pg 66) above indicates that beliefs go beyond knowledge, but knowledge is required for the pedagogical integration of ICTs. The extent to which knowledge shape beliefs are a personal matter and can only be explored on a one to one basis with the holder of the beliefs. Nonetheless, knowledge is a good indicator of beliefs as well as being a key determinant of practice. So what knowledge will promote the pedagogical integration of ICTs?

Schulman (1986) in examining the nature of teacher knowledge in the 1980's argued that the emphasis had swung away from content knowledge and was a "missing paradigm" and elucidated the concept of pedagogical content knowledge to redress this imbalance. Reacting to much teacher education in technology education as being technocentric, Mishra & Koehler (2006) building on Schulman's concept of pedagogical content knowledge argued for the need

for a dynamic interplay between the concepts of content, technology and pedagogy as a way to think about effective technology integration and proposed a concept of technological pedagogical and content knowledge (TPACK). Following on Schulman's concern that content was not central enough in the required teachers' knowledge TPACK also argued for the centrality of subject matter content being the main driver of the other dimensions of teacher knowledge as well as in the pedagogical integration of ICTs with pedagogy being the way to teach that content and technology being an enabler to enhance the pedagogical teaching of content. Using a Venn graphic organiser Mishra & Koehler (2006) diagrammatically represented their concept and its component parts in the following manner:

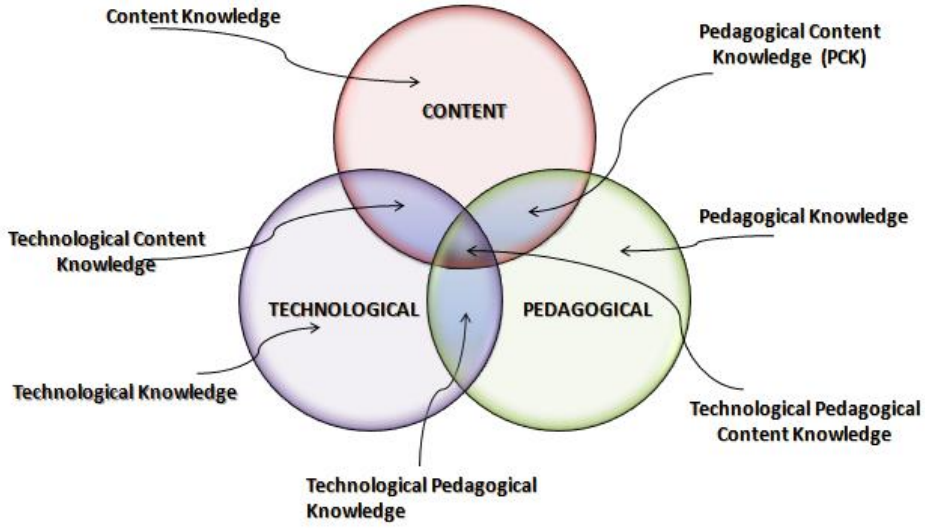


Figure 12: The TPACK model

Technological Pedagogical Content Knowledge (TPACK) is not just an amalgam of the other forms of knowledge, but in its synthesized form represents a new paradigm of knowledge which is required for the successful pedagogical integration of ICTs. The following table (Table 1) provides more detail of the content the different types of knowledge contained in Fig. 12 above.

Table 1: TPACK

Knowledge Area	Knowledge about
Content Knowledge (CK)	The actual subject matter that is to be learned or taught: • Curriculum content • Facts • Concepts • Theories • Procedures • Explanatory Frameworks • Rules of evidence
Pedagogical Knowledge (PK)	Learning theories • Behaviourist • Cognitivist • Constructivist

Knowledge Area	Knowledge about
	Methods of teaching and learning • Processes • Practices How students • Learn • Construct knowledge • Acquire skills • Develop attitudes Learning environments • Student learning • Classroom management • Lesson planning • Lesson implementation • Assessment
Pedagogical Content Knowledge (PCK)	• What teaching approaches fit the content • How content can be organised, represented and presented • Formulation of concepts • Representation of concepts • Pedagogical techniques that make subject content easy to learn • Students prior knowledge • Learning difficulties and subject matter misconceptions • Subject matter teaching strategies
Technological Knowledge (TK)	• Install and remove o Peripheral devices o Software programmes • Operating systems • Software • Hardware • Create and save documents • Word processors • Spreadsheets • Presentation software • Email • internet • Digital images • Education software • Digital video
Technological Content Knowledge (TCK)	• Affordances of technology for subject content • Constraints of technology for subject content • How different technologies can represent different concepts • How subject matter can be transformed by different technologies
Technological Pedagogical Knowledge (TPK)	• Pedagogical uses of ICTs o Design Based Learning (DBL) o (Learning Technology by Design) o Project Based Learning o Inquiry Based Learning o Problem Based Learning o WebQuests o Online learning using Learning & Content (LCMS) Management Systems • Affordances & Constraints of technology for pedagogical purposes • Digital tools and techniques for pedagogical purposes • How teaching should change with the use of technologies e.g. Online learning
Technological Pedagogical and	• Interweaving of all three sources of knowledge

Knowledge Area	Knowledge about
Content Knowledge (TPACK) "TPACK represents a class of knowledge that is central to teachers' work with technology. This knowledge would not typically be held by technologically proficient subject matter experts, or by technologists who know little of the subject matter or of pedagogy, or by teachers who know little of that subject or about technology" (Mishra & Koehler, 2006, pg 1029)	○ Technology ○ Pedagogy ○ Content ▪ Goes beyond the other forms of educational knowledge

The following figure outlines the relationships between the constructs of TPACK.

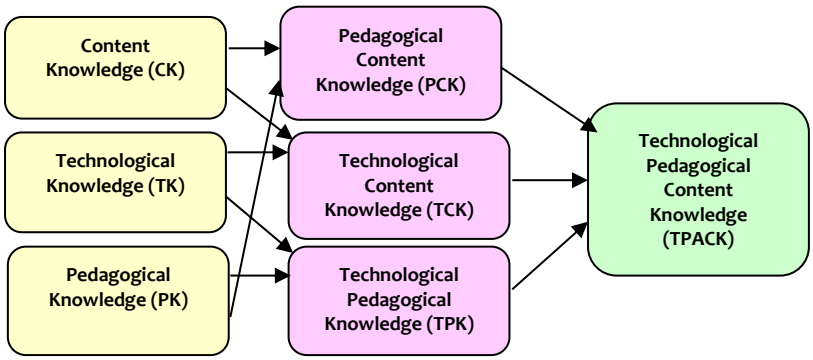


Figure 13: Relationships of the TPACK constructs

TPACK is a theoretical framework that allows for "the thoughtful integration of technology into education" (Mishra & Koehler, 2006, pg 1044). As a theoretical framework about teacher knowledge it therefore lays a foundation for the professional development of teachers as well as providing a roadmap for how technology should be integrated. If teachers are developed using this approach it will have a significant impact on the beliefs of teachers. As a framework it does not spell out a methodology for teacher development but a perspective in the literature is starting to emerge which is both looking at how teachers could acquire this new form of knowledge as well as how teacher development could be researched using this model. (Harris et al, 2009)

TPACK should not only be an element in the armoury of a teacher trying to integrate technology, but should also form part of the knowledge toolkit of the DELCs. It provides a useful framework for how district officials could provide support and professional development for teachers.

In the context of this study it makes eminent sense to expect the DELCs to have some form of TPACK whether it is derived from formal contact with the concept or whether through ongoing study of related concepts or through their own vicarious experiences and it this knowledge which could have an impact on the form and content of their support and professional development roles which flow from that. One of the roles of the DELCs is as teacher-educators.

In their study Bai & Ertmer (2008) found a predictive relationship between the beliefs of teacher educators and the beliefs and technology integration of the preservice teachers they were teaching and so it is not too much of a stretch of the imagination that this could also be the case in this study. I will therefore be correlating TPACK with behavioural intention and I will be doing this by correlating TPACK with one of the other constructs that make up the TPB (the determinant called Perceived Behavioural Control about which I will elaborate more below when I discuss the TPB).

I am not expecting that the TPACK of the DELCs to be pedagogically neutral and what I want to explore is the relationship between the constructivist / learner-centred beliefs of the DELCs and their pedagogical and technological knowledge. Earlier on I have discussed the constructivist / learner-centred beliefs of the DELCs. I expect that there should be a correlation between these constructivist / learner-centred beliefs and some of the pedagogically related constructs of TPACK. More specifically I expect there to be a relationship with Pedagogical knowledge (PK), Pedagogical Content Knowledge (PCK), Technological Pedagogical Knowledge (TPK). In other words the stronger the constructivist / learner-centred beliefs of the DELCs the greater should be their PK, PCK and TPK be in order for the DELCs to provide a constructivist / teacher-as-student centred support and professional development.

I will be looking at the TPB below. However, to pre-empt that a bit I must indicate now that I intend to see if there is a relationship between TPACK and behavioural intention. In other words what I'll be trying to establish is whether the greater the TPACK of a DELC there is also a greater intention to perform the behaviour which I've called Model 2012.

There is a growing literature on how TPACK could be measured (Burgoyne, 2010; Burgoyne et al., 2010; Chai & Tsai, 2011; Graham et al., 2009; Landry, 2010; Sahin, 2011; Schmidt et al., 2009). Knowledge, unlike beliefs, is considered to involve declarative and procedural knowledge which is more easily measured in a valid and reliable way than beliefs. However, all of these studies use self-report techniques and it this technique which has limitations that I have alluded to throughout this report (Paulhus & Vazire, 2010). It is my view that one can measure knowledge in a more objective way than using self-report measures by using conventional testing methods, however this type of measurement would not be appropriate for this kind of study nor would the DELCs be too open to such an invasive measurement technique and so I am stuck with self-report measures. It is my view that self-report measures of knowledge would be more like beliefs than actual knowledge and given that this study is about the relationship between beliefs and practices this is not a serious problem for the study as a whole.

After analysing all the instruments, their rationales, validities and reliabilities and consulting two articles providing overviews of ways of measuring TPACK (Abbit, 2011; Rowan et al., 2001) to develop and apply criteria for evaluating instruments I opted for the Chai & Tai (2011) instrument for the following reasons. Firstly it covered all the constructs of the TPACK model as outlined in my explication of the theory above. Most of the other instruments did not achieve reliability and validity for all the TPACK constructs in a reasonable way. The overall reliability for this instrument was 0.95 which is significant at the 0.01 level and which is a good result. Confirmatory Factor Analysis yielded satisfactory results ($\chi^2 = 905.98$, χ^2 / df = 2.09, $p<0.001$, TLI = .909, CFI = .992, RMSEA = 0>071) (Chai & Tsai, 2011, pg 601) indicating that all the constructs were properly

covered and correlated with each other in a statistically significant manner. Secondly, some of the instrument items in this instrument were designed to cover constructivist pedagogical knowledge and so this creates the possibility for a more meaningful correlation with the constructivist / learner=centred instrument identified earlier on that I will be using for the constructivist / learner-centred beliefs. Thirdly, some of the items were designed to put greater emphasis on subject-content knowledge which is a core theme of my study. I am looking to see if the DELCs have a high self-reported content knowledge and whether this correlated with the emphasis on content in the intended behaviour which is the focus of my study (Model 2012).

In this section I have examined the TPACK concept as a knowledge structure for the pedagogical integration of ICTs and I have revealed the details of the kind of knowledge that makes up TPACK. I have postulated that a relationship between TPACK, constructivist / learner-centred beliefs and behavioural intention should exist and this needs to be explored and measured. I have identified and motivated for a TPACK instrument which is geared towards a subject-content and constructivist pedagogical knowledge. This knowledge should have a bearing on the role of the DELCs and so in the next section I go on to examining this role.

2.6 The role of the DELC

I need to look at the role of the DELCs because this will provide a rationale for the definition of the behaviour (Model 2012) that underpins this study. Firstly, I outline the role of district officials as provided by the Department of Basic Education (DBE) and the Gauteng Department of Education (GDE). I then look closely at two aspects of this role that have the strongest bearing on the pedagogical integration of ICTs by teachers – their support and professional development roles. I examine a model for providing a constructivist type training and Just-in-Time (JiT) mentoring support. I argue why I think this is likely the most effective model to promote the pedagogical integration of ICTs by DELCs. I conclude by explaining the dimensions of the intended behaviour (Model 2012) which underpins this study.

Recently, the South African Department of Basic Education, DBE (2011) issued a policy guideline document on school districts which included inter alia the role and functions of the district. The role as outlined involves Support, Accountability and Public Information. The support role, which is the primary focus of this study, includes providing an enabling environment for institutions, assisting principals and teachers to improve the quality of education, serving as an information node for institutions and providing an enabling environment for the professional development of teachers. The assistance and professional development roles have a direct significance for this study, and this study will only touch on the other aspects of the roles as they may have relevance on the key focus for this study.

Although the DELCs are not curriculum specialists as such and are not specifically covered by the DBE guideline, the organisational division to which the DELCs belong in the GDE is part of a Section called Support Services which is closely aligned to curriculum services. The functions of the DELC will be closely associated with those of the curriculum specialists and these are outlined in the Guideline document. Annexure 2 of the Guideline document fleshes out the responsibilities of these functionaries in more detail and this includes leadership, communication,

planning, formulation and implementation of operational policy, curriculum delivery and staff development of school based personnel. To fulfil these functions officials are expected to use what McLaughlin & Talbert (2002) call data-based strategies; conduct school visits and engage directly with teachers and school management; provide support at the schools, and conduct capacity building training for teachers as well as other functions and activities.

All of these roles, functions and activities are generally identified in the South African as well as the international literature on districts as being important for quality education and improved learner achievement (Hightower et al, 2002; Janney, 2010; Marazano & Waters, 2009; Narsee, 2006; Ramaisa, 2004). Whilst much of the literature has demonstrated the importance of these roles and functions for improved education quality and learner achievement there has been little detailed focus on the models and processes that underlie these activities. Janney (2010) in her review of the literature on districts pointed to support and professional development as being two of the key roles that impact positively on the improvement of instruction. Strudler & Hearrington (2008) took this further and said that without quality support and professional development for teachers the pedagogical integration of ICTs was unlikely to occur.

2.6.1 The model of support and professional development

There is a growing body of evidence that if ICTs are appropriately integrated into teaching and learning in constructivist and learner-centred ways these approaches "can positively affect student performance" (Kopcha, 2008). However, it is not merely the use of technology that brings about the improvement; rather it is the concomitant enhanced integration of technology, pedagogy and subject content that produces the better outcomes. A combination of quality constructivist student-centred pedagogy, quality content delivery and the effective and appropriate use of technology are the ingredients that together result in improved teaching and learning (Jonassen, et al., 2008; Mishra & Koehler, 2006). Technology used poorly does not result in improved teaching and learning indicating that it is not the mere presence of technology that results in the improvements. Not only must technology be utilised, but pedagogy and content need change and improvement at the same time. These principles do not only apply to the education of children but to adults as well including the education and development of teachers (Schrum, 1999). The support and professional development of teachers should incorporate and operationalize these principles so as to improve the quality of teaching and learning and hence result in improvement in learner achievement. But the question still remains as to what is the best model for support and professional development for teachers so as to facilitate the pedagogical integration of ICTs in the schools.

All the literature that I will be citing in the discussion on the model of support and professional development which follows indicates that for these functions to have the greatest impact, support and professional development should be operationalized and implemented in a seamless and integrated manner by the district office under a common teacher support and development framework. This will ensure that there is alignment of the approach and resources of the district and that the teachers will experience the process in a coherent, systematic and sustained fashion. This need for coherence and alignment is also supported by Fleisch (2003) who studied the South African context.

2.6.2 The professional development model

The primary method of professional development of teachers for GoL to date has been through workshops (all interviewees for this study reported this) which have generally been off the school site for most of the participants and which were mainly lecture-listen based and seldom followed up afterwards by the district officials. However, one day stand-alone workshops have failed dismally around the world in in-service professional development generally (Stein & D'Amico, 2002; Villegas-Reimers, 2003) as well as in development for technology integration into teaching and learning (Glazer, Hannafin, & Song, 2005; Kopcha, 2008). It is clear that a new model is needed.

Education, training and development for the applied use of technology should not follow normal methods for purely knowledge and conceptually based education and training. Learning to use technology requires greater use of tacit knowledge than explicit knowledge and requires different methods of transfer than does learning pure conceptual knowledge (Polanyi, 1983). Teaching and learning how to integrate technology pedagogically requires the strong use of both tacit and explicit knowledge and appropriately associated methods (Ertmer, 2005) and support and professional development for teachers in the pedagogical integration of ICTs should take this into account.

Teaching teachers how to teach with technology is a complex mix of pedagogical, technological and subject-content related issues (Mishra & Koehler, 2006) and these dimensions should be taught and learnt together in an integrated way as much as possible using a mix of methods (Harris, 2008). The TPACK model advocated by Mishra & Koehler (2006) and explicated by Harris (2008) for the adult teacher-as-student context, whilst providing a clear framework for the overall knowledge content of technology integration for teacher development, does not offer a methodology or model for in-service teacher development other than to propose a principal for the approach. The methodology of teacher development in TPACK should model the content that it aims to teach as well as the teaching methodology that the teachers are expected to use when they teach their learners. For this to occur, in-service professional develop of teachers needs to have the power to directly influence teaching and learning in the classroom (Stein & D'Amico, 2002). Professional development strategies need to reach into the classrooms themselves and integrate these strategies into classroom practice to have the greatest effect.

Kopcha (2008) presents a cogent model for teacher development and support based on the guiding principles of constructivist teacher education (Richardson, 1997 & 2003) coupled with a teacher-as-student-centred approach. It is these principles which also inform this study. This means that the student should be central to the development process and that knowledge and skill development is built by the student but under the leadership and mentorship of the teacher developer. Richardson's (1997 & 2003) approach to constructivism and student centred pedagogy does not downplay the important role of teaching and learning conceptual content and therefore instruction or direct teaching also has a role to play in teacher development for technology integration.

Kopcha's (2008) model is based on the notion of mentorship and just-in-time support and he calls his approach "A systems-based approach to technology integration using mentoring and

communities of practice" but which I'll refer to as a mentorship/just-in-time (JiT) model. By mentorship Kopcha means "a developmental partnership through which one person shares and (transfers) knowledge, skills, information and perspective to foster the personal and professional growth of someone else" (Program, n.d). "Using a systems-based approach to technology integration creates a teacher-centred process for integrating technology. The mentor provides just-in-time support, modelling, and apprenticeship that are situated in the context of the teachers' classrooms. This is important because it could translate into more complex and substantial uses of technology for learning." (Kopcha, 2008, pg 186). In the literature on the pedagogical aspects of technology integration the concept of "just-in-time" has two dimensions. The notion of just-in-time teaching methods has its roots in cognitive load theory (which I won't go into here) and is especially applied in contexts where learning to use technology is involved and basically means that both the requisite knowledge and skills are offered and developed as and when they are needed by the student in authentic learning environments by a mentor or teacher. For Kopcha just-in-time is not simply ad hoc and demand driven but is part of a "systems based approach to technology integration". Kopcha provides a number of references and citations to validate this theory in practice and posits it as an advanced form of technology integration development. However in this study I will not be focusing on all elements of his system, but for the purposes of the focus of this study I will only focus on the mentoring and just-in-time aspects.

I will itemise my adapted version of some aspects of Kopcha's (2008) model which I have fused with Harris' (2008) approach to teacher development for the purposes of this study. In the course and stages of technology integration development programme a mentor would enact the following functions which I now itemise:

- Training and development should be provided at the schools and in the classrooms / laboratories where the teachers teach
- Model simple yet effective ways of teaching with technology
- Provide support in the form of modelling practices with technology
- Provide leadership needed to integrate technology into curriculum
- Get teachers to design activities that are learner-centred in nature and which integrate pedagogy, technology and subject content
- Form teacher technology leaders who will become technology mentors for their peers and continue to support those leaders
- Provide ongoing just-in-time pedagogical, technological and subject content related support through systematic school-based workshops, school and class visits
- Use a data-based systematic approach to teacher development (McLaughlin & Talbert, 2002; Janney, 2010) based on a sound development or growth model (Sandholtz, et al, 1997)

The last bulleted point needs a little elaboration. A mentoring just-in-time model may in some quarters conjure up an image of a laissez faire mentor sitting back waiting for the requests to come in in an uncoordinated manner. This is not Kopcha's model at all. Kopcha (2008) as with most of the authors in the excellent book on the role of districts in instructional renewal (Hightower, et al., 2002) advocate a data driven approach to teacher development. This means that as the mentor monitors and evaluates the development programme (and it must be a systematic programme in Kopcha's view) he/she should be collecting and analysing information

in an appropriate manner relating to the development of the teachers. The data should be framed within an appropriate development model so as to promote growth. Based on the successful implementation of the ACOT (Apple Classrooms of Tomorrow) programme Sandholtz, et al (1997) expounded a teacher growth model which entailed five stages of growth which they called the Stages of Concern: Entry stage; Adoption stage; Adaptation stage; Appropriation Stage. This development framework has become very popular and has been applied extensively in many areas of educational technology (Trinidad et al., 2005). The ACOT development model has also been adopted in the South African policy documents relating to eEducation (DoE, 2004) and Teacher Development (DoE, 2007) and was also used to help frame part of the official evaluation of GoL (SAIDE, 2010).

It is based on these concepts and principles that I have defined the behavioural intention that is the focus of this study which I have called "Model 2012". I now go on to describe and define the behavioural intention.

2.6.3 Model 2012

Table 2: "Model 2012"

The behaviour of interest that I am looking at is defined as: "This coming year (2012) the DELC will run teacher development training on how to integrate GoL labs into teaching and learning which will be held in the GoL labs in the school. The DELC will run training for either teachers per Grade or per learning area speciality. After each workshop the DELC will be available for "just-in-time" mentoring for all teachers." I have called this "Model 2012" in the survey questionnaire.

This description of the behavioural intention is based on the principles of what Ajzen (2006) calls "TACT" which stands for Target, Action, Context and Time. The Target is teachers in schools, the Action is development training followed up by Just-in-Time mentoring support, the Context is GoL labs with teachers from specific grades or subjects and the Time is sometime in 2012. A range of TPB studies have concentrated on technology integration and the TPB salient beliefs that determine this (Pierce & Ball, 2009; Salleh & Albion, 2004; Sugar et al., 2004; Sugar, Crawley, & Fine, 2005). Azjen (2012) indicated that the TPB can be applied to complex social behaviour as well as simple single actions behaviours (like stopping smoking). However, a number of these studies have been statistically inconclusive because the definition of the behaviour in question has been defined too broadly and vaguely. Lee, et al. (2010) therefore proposed that behaviour must be defined with a high degree of granularity and if necessary retain complexity. I have attempted a definition of the behaviour which incorporated complexity as well as granularity. The content focus of the behaviour is the pedagogical integration of ICTs and not computer literacy as has been much the case in the past. The behaviour (Model 2012) incorporates the role of the DELC because "development training" and "support" are included in the behaviour definition. Providing the training in the GoL labs where the teachers teach is reflective of constructivist / learner-centred thinking because this is an authentic learning environment where real problems can be raised and dealt with. The participants of the workshops are suggested to be grade and subject specific because this would reflect the need to emphasize the importance of content in technology integration. In the past all training and professional development has

been done with mixed groups across subjects, across phases and across schools. Because of those highly diverse participants the professional development has tended to be very broad and generic with no inclusion of subject-content examples and practice. For example, Foundation Phases teachers were trained alongside Grade 12 Maths teachers. The resulting content of the generic training therefore tended to be low on both pedagogy and subject-content knowledge and subsequently tended to mainly focus on technology skills. Ensuring that the workshop participants are more Grade and subject specific creates the possibility to focus more closely on relevant pedagogy and subject content. This would also create greater potential to address the specific needs of individual teachers thus giving expressing to a learner-centred approach. Workshops, if provided, should be tied into Just-in-Time mentoring support and development as outlined in the role above and therefore, even more so, giving expression to constructivist / learner-centred principles. There is a range of constructivist / learner-centred principles like modelling and design-based learning which I would have liked to have included in the behaviour definition, but this would have overloaded the definition. However, I have included those types of questions in the qualitative interview questions and I will correlate the statistical results of the quantitative aspects of the TPB with the findings of the interviews using a mixed method comparative approach.

In this section I have described the role of the DELC and framed this within a model for promoting the pedagogical integration of ICTs as formulated by Kopcha (2008). I argue that Kopcha's model incorporates constructivist / learner-centred principles and is most effective for technology integration. I concluded by deconstructing the intended behaviour for this study (Model 2012) which leads on to the next section, the Theory of Planned Behaviour (TPB) which provides a framework for how the behaviour could be anticipated and explained.

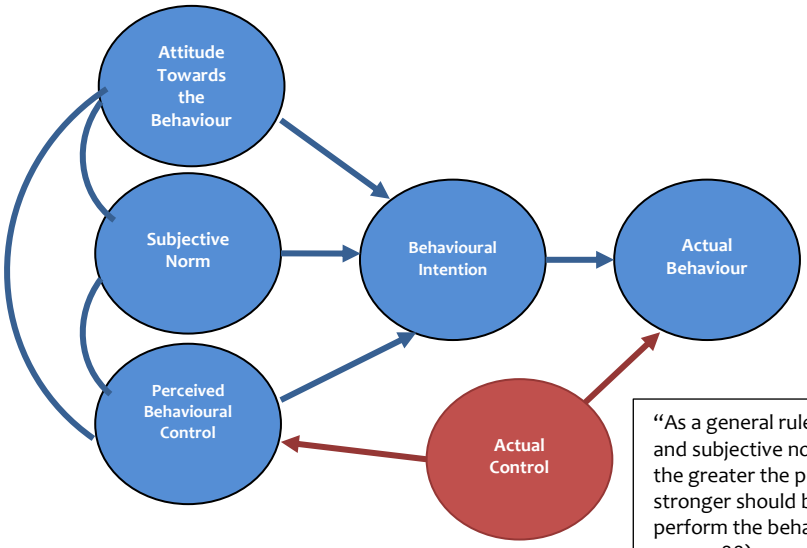
2.7 The Theory of Planned Behaviour (TPB)

A brief vignette would help to explain how I came to meet the TPB for this study. In my proposal for this study I expressed the need to explore what personal theories the DELCs' held about the pedagogical integration of ICTs because I wanted to establish whether they had moved from a computer literacy approach to technology integration and onto a pedagogical type of integration. I had a hunch that there must be a link between the theories that the DELCs held and the type of support and development they would give teachers, but I did not have a theory which would allow me to make the link between the personal theories of the pedagogical integration of ICTs of the DELCs and how they would perform their roles. I wanted to see if the DELCs would be providing different support and professional development from the traditional one of computer literacy training. The external examiner then made a suggestion that I use the TPB. I knew that "personal theories" were considered to be a type of belief (Pajares, 1992) and so I moved onto the idea that I could link beliefs and intentionality in a theoretically sound way rather than in a speculative way by using the TPB.

The TPB is a socio-psychological theory for explaining, "understanding, predicting and changing human behaviour" (Ajzen, 2012, p. 438). The TPB deals with volitional behaviour and it states that "***intention*** is the immediate antecedent of behaviour", (Ajzen, 2012, pg 438; my emphasis) in other words action is driven by motivational factors like intention. "The stronger the intention to

engage in a behaviour, the more likely should be its performance." (Ajzen, 1991, pg 181) goes on to say "It should be clear, however, that a behavioural intention can find expression in behaviour only if the behaviour in question is under volitional control". And here by control Ajzen means "**Actual Control**" (e.g resources, time, money, etc.) as well as the individuals' perceptions of that control. Perceptions of control are called **Perceived Behavioural Control** and are compatible with Bandura's (1997) notion of self-efficacy. Perceived Behavioural Control includes an individual's perceptions of their own ability to perform the behaviour in question and this includes the individual's perception of whether they have the required knowledge to perform the behaviour. This is where TPACK comes in. It is my contention that the DELCs need TPACK to be able to perform the behaviour I am presuming for this study and furthermore I am also expecting, based on the theoretical propositions (Ajzen, 1991) about Perceived Behavioural Control, that with greater TPACK the DELCs will have increased intentionality to perform the behaviour I am considering in this study. I will therefore be doing a correlational analysis between TPACK, Perceived Behavioural Control and Intentionality to see if this proposition is valid.

According to the TPB, besides Actual Control and Perceived Behavioural Control there are two other antecedents of behavioural intention which are all conceptually independent from each other but which work in concert with each other to produce the behavioural intention. "The first is the **Attitude Toward the Behaviour** and refers to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question." (Ajzen, 1991, pg 188, emphasis mine). In the context of this study this would involve the degree to which the DELCs evaluate the constructivist / teacher-as-learner centred support and professional development as a good thing and whether it will produce the desired outcome of the implementation of the pedagogical integration of ICTs by the teachers. The more convinced a DELC is that constructivist / teacher-as-student centred support and professional development will produce the required and expected outcome the greater the intention to perform the behaviour will be. "The second predictor is a social factor termed **Subjective Norm**; it refers to the perceived social pressure to perform or not to perform the behaviour." (Ajzen, 1991, pg 188, emphasis mine). In other words are there relevant roleplayers and stakeholders that expect and approve of the DELCs providing a constructivist / teacher-as-student centred approach to support and professional development e.g. do the curriculum specialist officials in the district approve of this type of support. A pertinent question therefore is: Are the DELCs responsive to this approval and pressure in a positive way? The more the DELC thinks that these roleplayers expect and approve of the behaviour the greater will be the intentionality for the behaviour. So now we have a model that looks like this.



"As a general rule, the more favourable the attitude and subjective norm with respect to a behaviour, and the greater the perceived behavioural control, the stronger should be an individual's intention to perform the behaviour under consideration" (Ajzen, 191, pg188).

Figure 14: First stage of the TPB

The model has a further dimension. The attitudes which directly influence behavioural intention are themselves shaped by what Azjen (1991) calls salient beliefs. Earlier on I argued that beliefs give rise to attitudes but one could put this the other way around; attitudes are determined by underlying beliefs. Azjen (1991) identifies a corresponding set of beliefs which are "prevailing determinants" of the attitudes and therefore by implication of the behavioural intention as well. The beliefs are salient because they are the most significant ones which determine attitude and intention, ***but they are not the only beliefs*** which determine intention. (I will return to this emphasized point later).

"Three kinds of salient beliefs are distinguished: **Behavioural Beliefs** which are assumed to influence attitudes toward the behaviour, **Normative Beliefs** which constitute the underlying determinants of subjective norms, and **Control Beliefs** which provide the basis for perceptions of behavioural control." (Azjen, 1991, pg 189). And so we have the nearly complete model (Ajzen, n.d.)[10].

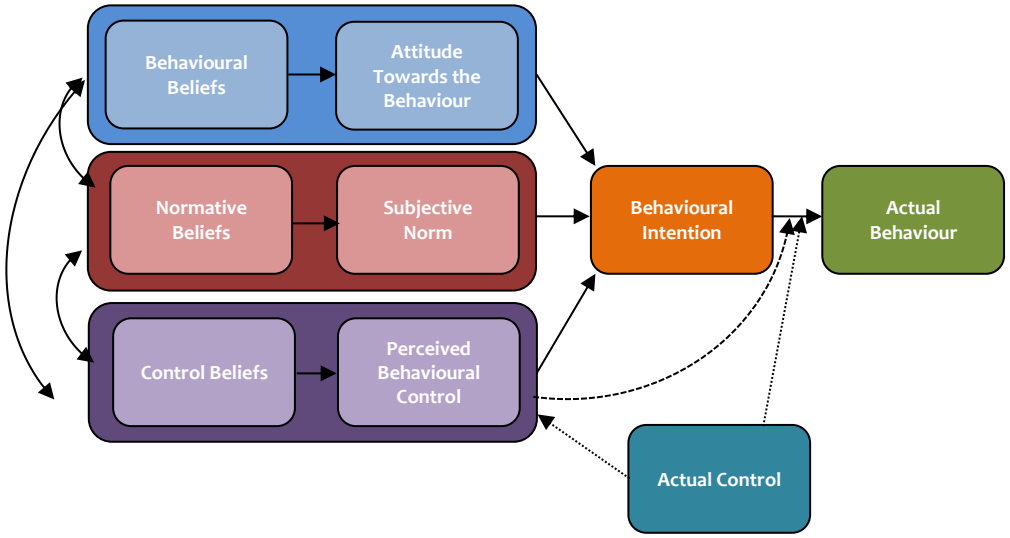


Figure 15: TPB Model

[10] For a more detailed look into the model with definitions and formulae for calculating the relationships in the model see Appendix B. The diagram in Figure 15 is based on the diagram at http://people.umass.edu/aizen/index.html (Ajzen, n.d.).

The **Behavioural Belief** is about the behaviour and it is an evaluation of whether the actual behaviour is likely to produce the desired outcomes. The belief here has two components, strength and outcome evaluation and both elements need to be measured. **Normative Beliefs** are the perception that key roleplayers would have about the need for the performance of the behaviour to be performed. It also includes the motivation of the individual to comply with these expectations. Normative beliefs entail both the strength of the beliefs as well as the motivation to comply and both need to be calculated to determine the subjective norm. **Control Beliefs** are beliefs about whether factors are present that may enable or constrain the performance of the behaviour. This also consists of two elements. The first is the belief that the enabling or constraining factor is present and secondly whether the factor is powerful or not. All these beliefs determine their respective attitudes or perceptions which in turn determine the likeliness of the intention to perform the behaviour.

In the "behavioural" channel of the TPB model I focus on issues like whether GoL labs are the best venues for training, whether Grade / Phase specific training is more effective, whether JiT mentoring or JiC support is more effective (See Figure 15 above). To evaluate the outcome I ask whether the behaviour and its outcome of improved technology integration are likely to result in learner performance improvement. In the normative channel I focus on whether all the key roleplayers relating to technology integration would approve and support the intended behaviour and whether the DELCs would comply with the expectations of these significant others. In the control channel I focus on all the factors that could enable the behaviour, like the functionality of GoL, whether teachers' morale and capabilities would have a positive or negative influence and also whether their own knowledge and skills would allow them to perform the behaviour in question. All of these constructs will be measured, scored and analysed using validated recommendations and guidelines for setting up and analysing a TPB questionnaire and survey (Ajzen, 2006; Francis et al., 2004a, 2004b). Questions during the interview would also elicit the beliefs and attitudes of the DELCs about these constructs and issues.

In this section on the TPB I have described the key constructs of the theory and indicated how they will be operationalized in the study. I have also indicated how the key constructs of the theory of TPACK and pedagogical beliefs will be related to the constructs of the TPB. The next section will clearly outline these relationships.

2.8 Bringing all the constructs and their relationships together

Figure 16 below includes all of the constructs that have emerged from the literature review and conceptual framework. Figure 16 also indicates the relationships between the key constructs which are represented by the directional arrows. These relationships (arrows) are at the heart of this study. What I have done in the literature review is to define the constructs and their sub-constructs and I have also postulated possible relationships between these constructs, in other words I have begun to define the arrows.

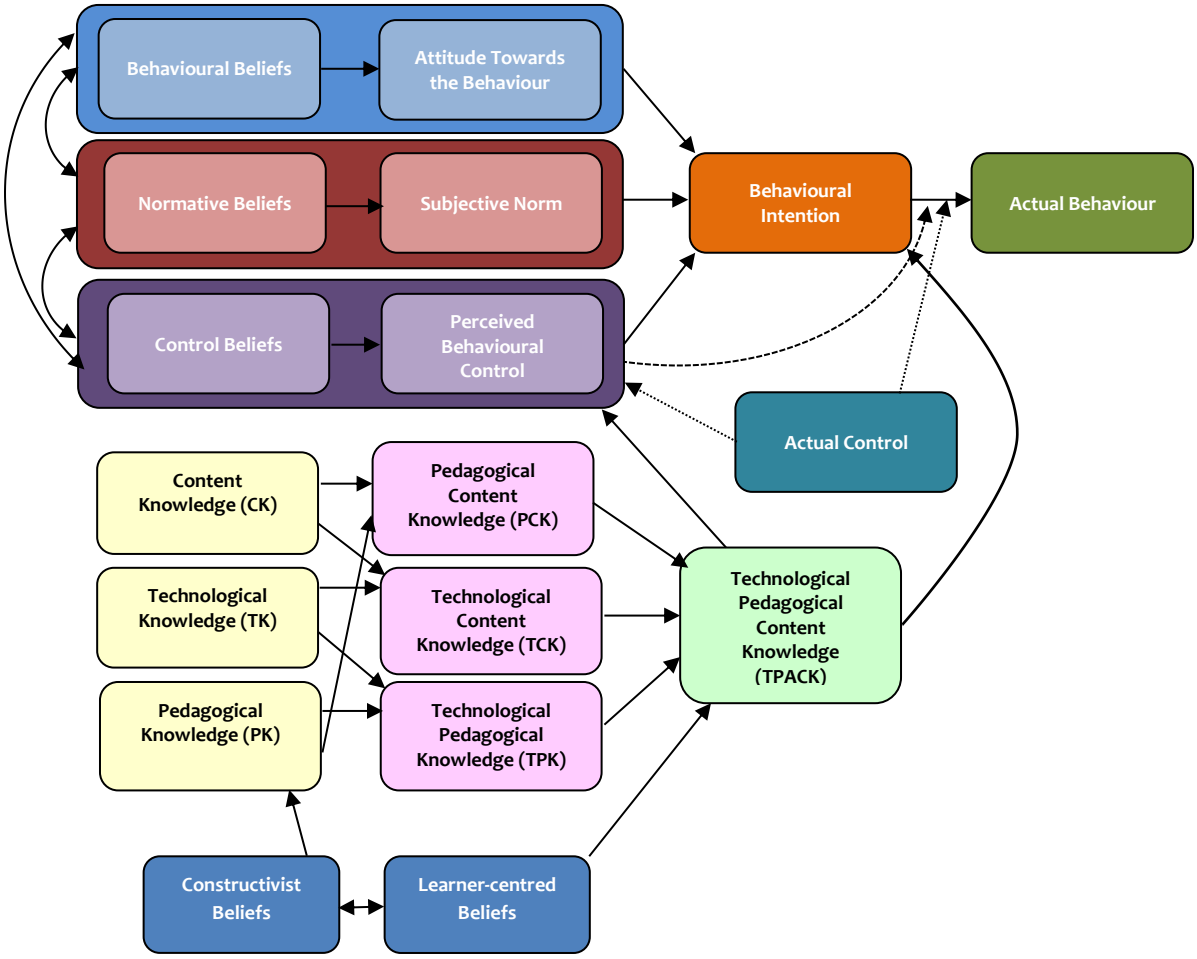


Figure 16: Synthesis of all the key constructs and their relationships

These constructs will be measured and ascertained in the empirical section of the study which follows in the next chapter. Relationships will be inferred from these measures and then the "likelihood" that the intended behaviour will be carried out will finally be inferred. In Table 3 that follows I bring together the research questions, the constructs that help to answer the questions, the type of relationship expected to be found between the constructs and the type of methodology to be used and it is this table which will guide the rest of the study.

Table 3: Linking Research Questions, Constructs, Relationships.

	Research Question	Relevant Constructs	Relationships	Methodology	Analysis / Inferential Methods
1	What is the likelihood that GDE District eLearning Coordinators (DELCs) will carry out their roles in a constructivist "just-in-time" manner with respect to the Gauteng Online laboratories? (MM question)	Behavioural Intention Attitude Towards the Behaviour Subjective Norm Perceived Behavioural Control Behavioural Beliefs Normative Beliefs Control Beliefs TPACK Constructivist / Learner-centred Beliefs	Predictive Correlational	Mixed Methods	Convergence Triangulation
2	To what extent is it likely that GDE DELCs will carry out their roles in a constructivist "just-in-time" (JiT) manner? (Quantitative question [TPB])	Behavioural Intention Attitude Towards the Behaviour Subjective Norm Perceived Behavioural Control Behavioural Beliefs Normative Beliefs Control Beliefs	Predictive Correlational	Quantitative	Descriptive Statistics Regression Correlation
3	To what extent is it likely that GDE DELCs will carry out their roles in a constructivist "just-in-time" (JiT) manner? (Qualitative question [Decision Tree])	Behavioural Intention Attitude Towards the Behaviour Subjective Norm Perceived Behavioural Control Behavioural Beliefs Normative Beliefs Control Beliefs		Qualitative	Coding Quantitising of the Qualitative results
4	What is the measure of the DELCs' constructivist beliefs? (Quantitative)	Constructivist Beliefs		Quantitative	Descriptive Statistics
5	What pedagogical beliefs do the DELCs' espouse about constructivism and what is the strength of these beliefs? (Qualitative)	Pedagogical beliefs		Qualitative	Coding Quantitising of qualitative results
6	What is the measure of the DELCs' learner-centred beliefs? (Quantitative & Qualitative question)	Learner-centred Beliefs		Quantitative	Descriptive Statistics
7	What pedagogical beliefs do the DELCs' espouse about learner-centeredness and what is the strength of these beliefs? (Qualitative)	Pedagogical beliefs		Qualitative	Coding
8	What is the knowledge level (TPACK) of the DELCs about the pedagogical integration of ICTs? (Quantitative question	TPACK PCK CK TCK TK TPK PK	Correlational	Quantitative	Descriptive Statistics Correlation
9	What are the beliefs of the DELCs about GoL technology integration? (Qualitative question)	GoL Pedagogical Integration of ICTs		Qualitative	Coding
10	What is the relationship between the DELCs pedagogical beliefs, learner-centred beliefs and TPACK? (Quantitative)	Constructivist beliefs Learner-centred beliefs TPACK PCK TPK	Correlational	Quantitative	Correlation
11	What is the relationship between the DELCs pedagogical beliefs, learner-centred beliefs, TPACK and the behavioural intentions of the DELCs? (Quantitative and Qualitative question	Constructivist beliefs Learner-centred beliefs TPACK PCK TPK Behavioural Intention	Correlational	Quantitative	Correlation
12	To what extent do the quantitative and qualitative results converge and validate each other?			Mixed Methods	Mixed Methods

3 CHAPTER 3 - Methodology

3.1 Introduction to Methodology

The study uses a Mixed Methods approach which "involve(s) the combining of quantitative and qualitative methods, approaches and concepts" (Onwuegbuzie & Johnson, 2006, p. 51). My rationale for using a Mixed Methods approach is multifaceted and I will cover the reasons in what follows. I have chosen to use a Mixed Methods approach because it is suited to my ontological as well as epistemological disposition. It is also suited to the nature of the problem and issues that I am investigating. I will deal with each of these issues in turn. Firstly I must state that my understanding of Mixed Methods is that it brings together quantitative and qualitative approaches to research so as to facilitate breadth and depth in the production of knowledge (Creswell and Clark, 2011, loc 265; Teddlie & Tashakkori, 2009, loc 614). The manner in which the quantitative and qualitative aspects could be brought together can vary and I'll deal with this later on.

3.2 Rationale for a Mixed Methods design derived from the Problem, Purpose and Literature review

As my problem statement and purpose of this report state, I am centrally concerned with the relationship between beliefs and practice and in particular discovering the relationship between the two in the context of technology integration and support and development for teachers in the Gauteng schools context. "Emotions, beliefs, values and so on are part of reality; they are not simply abstractions from behaviour or constructions of the observer." (Maxwell & Mittapalli, 2010, p. 156). However I am interested in predicting certain behaviours from beliefs without having to observe the actual performance of the behaviours themselves because of scope and time constraints on the research project. Coupling the study of the knowledge and belief systems of the DELCs with ethnographic observational studies of the DELC's actual practice would be a better option, but because of logistical and scope constraints ethnographic qualitative research is not a viable option at this stage. As we shall see both numbers (quantitative methods) and text (qualitative methods) are useful ways of discovering and representing these phenomena and Mixed Methods research is the pre-eminent way of bringing together quantitative and qualitative methods (Maxwell & Mittapalli, 2010) in studying mental processes as well as physical processes. Furthermore beliefs are deep-seated human phenomena and sometimes individual people themselves are not always fully conscious of their own beliefs and therefore externalised manifestations (answers to questions) may not reflect deep-seated and core beliefs. This exacerbates the challenge of producing valid findings when researching beliefs. Beliefs are difficult to get at, to measure (Munby, 1984). A variety of methods and diverse pathways are needed to get at people's beliefs. When researching beliefs there is always the challenging question of whether the methods used (in the case of this study – interviews and questionnaires) solicit answers which actually reflect the beliefs of the respondent or whether the interview process itself infuses the beliefs into the mind of the interviewee. In other words

the issue of whether the research methods and the inferences derived from them are valid comes to the fore. Using a variety of methods so as to triangulate findings from differing methods is one way of dealing with this threat to validity. The nascent mixed methods research methodologies have developed a specific method which facilitates this interest.

However, I need to state that I am not attempting to establish a regulatory rule-like causal link in a positivistic sense between pedagogical beliefs and constructivist behavioural intentions of the DELCs. Rather I am trying to establish to what extent certain types of pedagogically held beliefs as well as certain types of knowledge are likely to be possible reasons for the kind of support and training a DELC is likely to give teachers. "Realism can deal with the apparent dissimilarity of reason explanations and cause explanations by showing that reasons can plausibly be seen as real events in a causal nexus leading to action." (Maxwell & Mittapalli, 2010, pg 157). Mixed Methods underpinned by critical realism can help to delve into these possible reasons.

3.3 Philosophical and theoretical foundations

I take a critical realist attitude to the world including research, which means that I believe there is a reality out there to be known and which impacts on our consciousness and through our actions, senses and consciousness we impact on the world. Or to put it slightly differently "…critical realism retains an ontological realism while accepting a form of epistemological relativism or constructivism." (Maxwell & Mittapalli, pg 151)[11]. We are made by the world and we make the world. Our knowledge and perception are always an approximation to that external reality and we only know the world through our perceptions and consciousness. Quantitative and qualitative methodologies each represent approaches to understanding both the external and internal worlds. Numbers (quantitative) and texts (qualitative) are both meaningful human and cognitively credible ways of discovering and representing these truths and carefully used can together or separately play a meaningful role in discovering reality and consciousness and the relationship between the two in a holistic manner. Maxwell & Mittapalli (2010) make a strong case for critical realism as the ontological and epistemological basis for Mixed Methods research and I draw on this to develop the MM approach in this study.

3.4 Mixed Methods Research

In combining quantitative and qualitative methods I have a number of purposes. Greene et al. (1989) as referred to by Onwuegbuzie & Johnson (2006, pg 53) identified five general purposes of mixed methods research: (a) triangulation (seeking convergence and corroboration); in this study I will be triangulating the findings; (b) complementarity; I will be attempting to elaborate and illustrate the quantitative findings from the qualitative findings; (c) development; I will not be using this method; (d) initiation; I will be attempting to discover any paradoxes or

[11] Maxwell, J. A., & Mittapalli, K. (2010). Realism as a stance for mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), SAGE handbook of mixed methods in social & behavioural research (2nd ed.). Thousand Oaks, CA: Sage.

contradictions between the quantitative and qualitative methods and will reformulate the research approach used in this study for any further study of this nature; (e) expansion; I will be attempting to extend the quantitative findings with the qualitative findings. Onwuegbuzie & Johnson (2006, pg 54) have added more purposes some of which are pertinent to what I hope to achieve: instrument fidelity (assessing the appropriateness of the instruments that I have used) and significance enhancement which entails augmenting inference and interpretation of the data. In looking at these purposes the question arises as to what model of mixed methods would be most appropriate.

Teddlie & Tashakkori (2009) point out that unlike quantitative methods there is not a fixed set of mixed methods types from which to choose, in fact nearly every mixed method author has their own typology. (Creswell & Clark, 2011; Teddlie & Tashakkori, 2009). This is affected by the various approaches taken in each of the strands of a mixed methods approach. Although there is a fixed set of quantitative methods, in qualitative research there are a set of broad approaches but qualitative methodologists have been resistant to finalise a set of qualitative research types. Therefore "…methodologists cannot create a complete taxonomy of MM (mixed method) designs due to the designs' capacity to mutate into other forms" (Teddlie & Tashakkori, 2009, loc 2364). Despite this challenge I will be opting for a particular type based on my perceived needs of this study and be using it as a guideline for the research methodology of this study. Creswell (2011), a prominent research methodologist, outlines six mixed methods designs: the Convergent Parallel Design, the Exploratory Sequential design, the Explanatory Sequential Design, the Embedded Design, the Transformative Design and the Multiphase Design. I have opted for the Convergent Parallel Design (Creswell, 2012, pg 540; Creswell 2011, Loc 965) or synonymously called Concurrent Triangulation Design (McMillan & Schumacher, 2010, pg 403) as the primary mixed method design because it basically addresses the research problem and the associated questions that the study will be addressing. This design essentially entails *collecting* the quantitative and qualitative data at the same time and the analysis involves doing the quantitative ***analysis*** first followed by the qualitative analysis for the purposes of examining whether the two sets of data converged or diverged and also whether the qualitative data confirmed the quantitative data or not. The qualitative data is also examined to see if it deepens and extends what is inferred from the quantitative data. Given this latter point the mixed method designs I will be using whilst being primarily a Convergent Design will also contain fleeting elements of an Explanatory Sequential Design. However, I also decided to precede the quantitative data collection with a number of interviews to help me sharpen the items that I wanted to use in the quantitative instrument. In this sense, the design contained some evanescent elements of an Exploratory Sequential design. Besides assisting in item definition the first few interviews were also used as part of the overall qualitative analysis.

Moreover, believing that mixed methods provide a more holistic research method than purely quantitative or qualitative methods, there are also some pragmatic issues which provide a rationale for its use. Creswell and Clark (2011, loc 316) have identified some of these pragmatics which have relevance for this research project. They are:

- A need exists because one data source may be insufficient or difficult to reliably validate the outcomes
- A need exists to explain initial results

- A need exists to generalise exploratory findings

I was aware from the outset that there would be a number of potential threats to the credibility of the research especially relating to the development of those aspects of the instrument relating to the Theory of Planned behaviour as well as relating to the nature of the participants that I wanted to study. It is notoriously difficult to solicit the cooperation of officials in the public sector for a number of reasons and this is especially the case in relation to a contentious project like Gauteng Online. I was reliably informed by a number of potential participants that they were instructed not to say anything about Gauteng Online to the press and researchers even though my research project had the official support of the relevant section in the GDE. I do not think however that this warning was specifically directed at my research, but was general in nature. Sometimes they feel their opinions may get back to their authorities and possibly land them in trouble and so avoiding the prying eyes of researchers is one route that some participants took. Furthermore education officials are heavily overworked and the time at their disposal for such "side-lines" is minimal.[12] Therefore a major threat to the credibility of my findings would be a low response rate either to the interviews or to the online survey so I needed the quantitative and qualitative to supplement each other.

Creswell & Clark (2011, loc 869) outline a number of considerations that need to be taken into account when designing a mixed methods study and where decisions need to be made in a mixed methods design.

3.4.1 The level of interaction between the quantitative and qualitative strands (independent vs interactive)

I had decided that the quantitative and qualitative data will be collected independently although simultaneously. However, when analysing the data, I record and report the data independently but move interactively from one data set to the other in interpreting the data. This is based on my philosophical assumptions as well as the pragmatics of the research project which will be highlighted in what follows.

3.4.2 The relative priority of the strands

I had decided that equal weight should be given to both strands in the analysis of the results. The main research question is phrased in such a way that it could be answered by either approach independently or interactively, but I would give equal weight to my findings in the final analysis.

3.4.3 The timing of the strands

Due to practical constraints of accessing the participants I decided that the qualitative (interviews) and the quantitative (survey) data collections should occur more or less simultaneously, but with the quantitative being slightly preceded by the qualitative. I would use

[12] I deal with the issue of workload as a factor in predicting behaviour based on beliefs in my discussion on the Theory of Planned Behaviour later on in the report.

the initial interviews to elicit the salient beliefs as required in the Theory of Planned Behaviour (TPB) methodology which were to be included in the questionnaire which is also required in the TPB method (Ajzen, 2006). I was also hoping that the one method would stimulate the other in getting responses from the participants. I decided that I would use convenience sampling in both the quantitative and qualitative aspects and that if there were overlaps between participants in each strand of the study this would not discredit the findings but would in fact enhance the confirmatory dimension of the study (Creswell, 2011). This is due to the different content of the questions and items in each strand although both strands would be covering the same constructs.

I decided to conclude my analysis of the quantitative strands of the data first because I am aware that there are quite stringent requirements on the statistical testing and my sampling and responses may not produce valid and reliable statistical results and in this case could be supplemented by the qualitative results. Moreover, positive statistical results could be reinforced by the qualitative findings as well. But whatever results I would get from the statistical results I would triangulate and confirm these with qualitative findings.

3.5 The procedures for mixing the strands

I decided to keep the quantitative and qualitative findings relatively independent but at the point of interface (Creswell & Clark, 2011, loc 894) I would connect the two results where necessary to answer the research questions. The following diagram adapted from Creswell & Clark (2011, loc 933) graphically indicates the style and process:

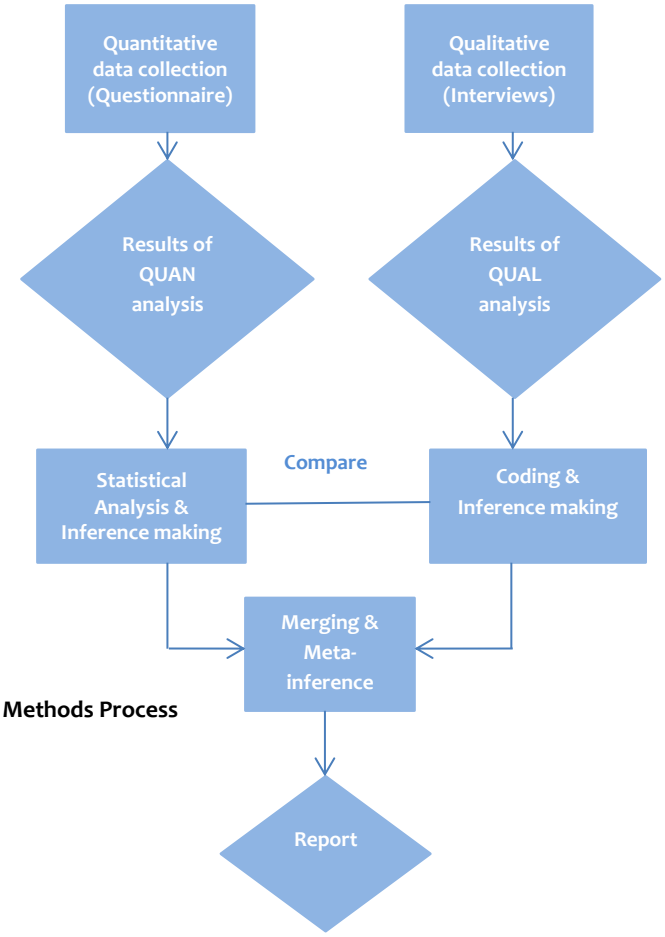


Figure 17: Mixed Methods Process

3.6 Validity, reliability and generalisability

Validity, reliability and generalizability are important concepts in research (Creswell, 2009). To make research conclusions credible and legitimate, validity and reliability need to be attended to so that generalizability becomes a possibility (Creswell, 2012; McMillan & Schumacher, 2010). Issues around mixed methods are more complex because each of the component methodologies has its own approaches to tackling these issues, and within each methodology there are differing approaches. Mixed methods also have an approach to validity, reliability and generalizability but are dependent on their application in each of the strands based on the methodological framework of that strand. (Teddlie & Tashakkori, 2003). In the contemporary literature validity and reliability apply to the entire research process, that is the design, implementation and inference making processes and not just to some design elements within the

research design (McMillan, 2012). Validity refers to whether a study reflects and represents the underlying constructs and variables that are being studied. In quantitative research one should ensure content, construct and criterion validity. In qualitative research one should ensure that the recording and presentation of data is an accurate reflection of the process of data collection itself (in my case interviews) (Silverman, 2006). Reliability refers to the credibility and trustworthiness of the approach taken and its ability to allow for generalisation to a population or transferability to other contexts. In the quantitative strand of this study I will be using an internal consistency statistical test to measure reliability (Cronbach's Alpha) (Muijs, 2011). In quantitative research to be able to do inferential analysis the sample and data need to fulfil certain requirements. Samples should be random probability samples and data should fulfil the conditions of linearity, normality and homoscedasticity (Lee et al., 2010)

In quantitative research there are certain tests and procedure that allow for generalizability from a sample to a population and in qualitative research the criteria of quality, credibility and trustworthiness need to be applied but there are no ground rules for generalizability in qualitative research. The degree to which the inference of research are transferable to other situations not only depends on the quality of the inferences made but also on the perspective that the consumer of the research takes to the research (Silverman, 2006). In mixed methods validity and reliability refers to the manner in which the quantitative and qualitative data and their inferences are related to each other and to the veracity of the inferences made by bringing the data and inferences form each strand together (Teddlie & Tashakkori, 2009)

3.7 Ethical Considerations

All ethical considerations were complied with for this study. Approval was obtained from the ethics committee as well as the GDE. The GDE officials participating in the research were given a letter explaining the purpose of the research and the interview and research methods that were to be used. The letter also included a draft schedule of the interview questions that were to be posed. The interviewees were also given a consent form to complete in which they agreed to be interviewed and recorded and where they were informed that all names and information would be kept confidentially (see Appendix E and F).

3.8 Participants and Sampling

3.8.1 Population size

The GDE has a total of 44 eLearning Coordinators. Four are located centrally at the GDE Head Office in Johannesburg and 38 are distributed across 15 districts. This represents the population of the study.

Table 4: Distribution of District Elearning Coordinators in Gauteng

Ekurhuleni North	Ekurhuleni South	Gauteng East	Gauteng North	Gauteng West	Jhb Central	Jhb East	Jhb North
2	4	1	1	3	3	3	3
Jhb South	**Jhb West**	**Sedibeng East**	**Sedibeng West**	**Tshwane North**	**Tshwane South**	**Tshwane West**	**Head Office**
3	3	2	3	2	4	3	4
Total Population: 44							

3.8.2 Sample Size

Before embarking on the data collection exercise I contacted a number of ELCs to see if probabilistic sampling would be possible for the quantitative aspects of the study. Due to a variety of factors of which the most common were busyness and wariness about being interviewed it became apparent that I would have to rely on convenience sampling; in other words I would have to deal with those who volunteered. Consequently I used convenience sampling for both the quantitative and qualitative aspects of this mixed methods study. Although the literature generally recommends Purposeful Sampling for the qualitative strand to promote "persuasive" qualitative methods (Creswell, 2009) and probabilistic sampling to promote rigorous quantitative methods neither was practical for this study and I had to rely on those that were available and willing from whom to collect data. By convenience sampling I mean that I sent out an email request to the all 44 of the ELCs and asked for volunteers for the semi-structured interviews first. I did this because I wanted to begin the qualitative interview process slightly before starting the quantitative survey. I wanted to use the first few interviews to help me sharpen the constructs and items of the quantitative survey. As expressions of willingness came in I contacted the volunteers and set up the interviews.

3.8.3 Problems and challenges that emerged and consequences for the credibility of the design and the possible findings

A total of 13 ELCs volunteered for the interviews. I decided that all those that volunteered for the interview should be interviewed. The purposes of the interviews were threefold. Firstly I wanted to confirm or triangulate the data received from the quantitative methods; secondly I wanted to obtain additional data in case the quantitative data was not credible enough; and thirdly I wanted to deepen and expand the findings that could be inferred from the quantitative strand.

The geographical spread of those who volunteered for each aspect of the study (I = Interview; Q = Questionnaire) is shown in the table (Table 5 & Figure 18) and map below. The resulting convenience sampling for both methods together did produce an even spread across the districts and the province with only 4 out of the 15 districts not represented in either the interviews or the questionnaire processes and from a mixed methods perspective would enhance the possibility of generalising to the entire population of DELCs in the Gauteng Province. Getting an even and representative spread of districts (11/15 = 73%) could mean that the combined quantitative and qualitative findings could be generalised to all districts. It was also important to get a spread across the province because it is highly likely that the views of officials from the same district would be similar because those district-based officials would be working intensely together on a daily basis and a spread could possibly offset this concentration of opinions within districts. However, there is no way of knowing whether the opinions of the specific district officials that participated from districts where not all the local DELCs participated were representative of all the DELCs in the district or not.

Table 5: Research Sample

Ekurhuleni North	Ekurhuleni South	Gauteng East	Gauteng North	Gauteng West	Jhb Central	Jhb East	Jhb North
I: 2/2 **Q: 0/2**	I: 0/4 Q: 1/4	I: 1/2 Q: 1/2	I: 0/2 Q: 2/2	I: 2/3 Q: 1/3	I: 2/3 Q: 2/3	I: 0/3 Q: 0/3	I: 3/3 Q: 2/3
Jhb South	**Jhb West**	**Sedibeng East**	**Sedibeng West**	**Tshwane North**	**Tshwane South**	**Tshwane West**	**Head Office**
I: 0/3 **Q: 1/3**	I: 0/3 Q: 0/3	I: 0/2 Q: 1/2	I: 1/3 Q: 2/3	I: 0/2 Q: 0/2	I: 1/4 Q: 2/4	I: 0/3 Q: 1/3	I: ¼ Q: 2/4
Totals **I: 13** **Q: 18**							

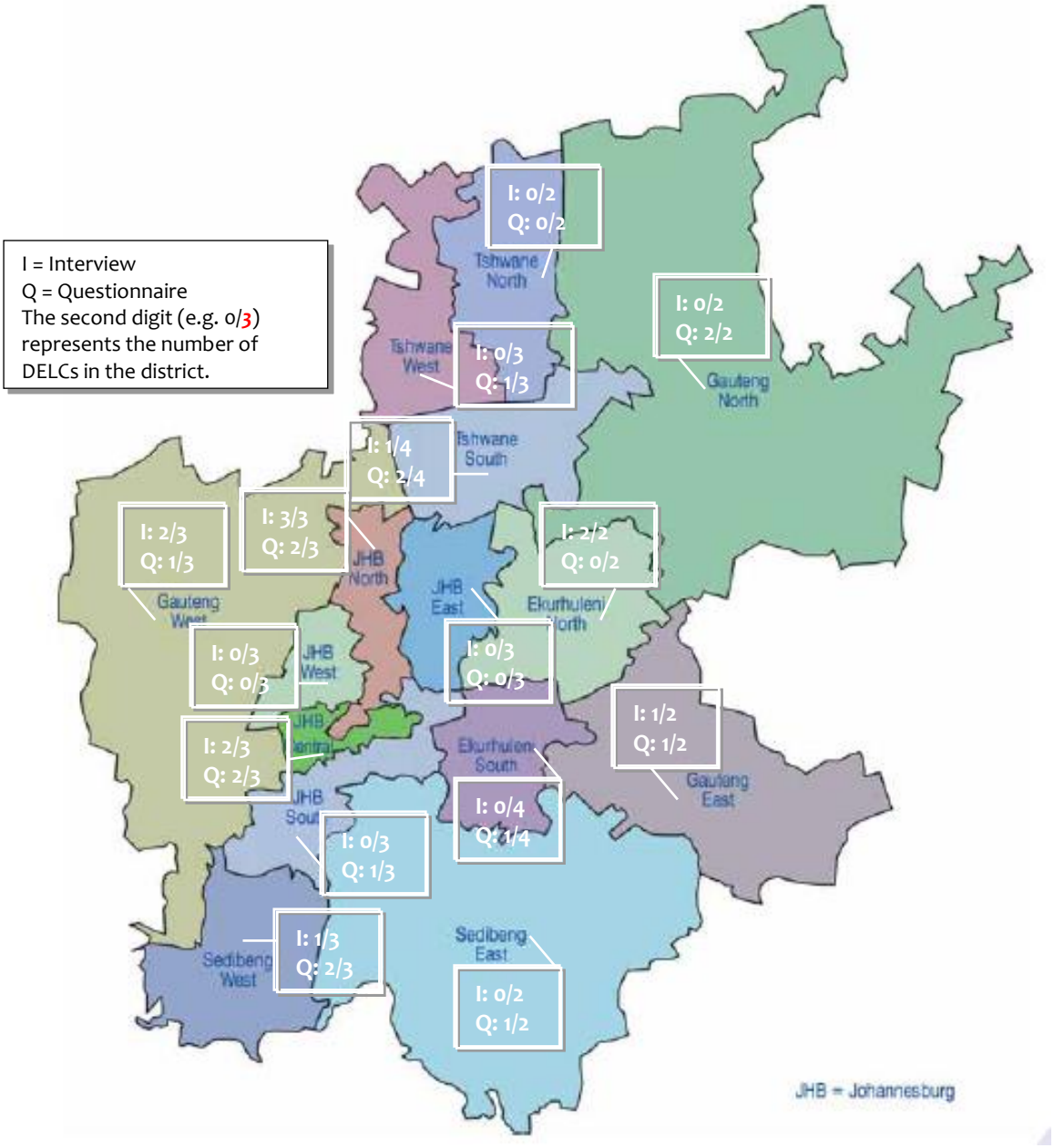


Figure 18: Distribution map of the research participants

For the quantitative aspects I decided to target the entire set of ELCs because the number is small and they are concentrated in the small geographic area of Gauteng. The online request survey was sent out to all 44 ELCs which is the sampling frame. My expectation was to try and get at least 30 responses to the survey to fulfil one of the requirements for conducting inferential statistics (Field, 2009)[13] but the response was only 25. However, only 18 out of the 25 completed the questionnaire/Despite repeated requests (using SMSs to their cell phones as well as emails) I was only able to get the complete 18 responses. Using the **sample size calculator at http://www.raosoft.com/samplesize.html** which is based on a sampling error formula the calculator indicated that my margin of error would be about 18% which is 13% more than the generally accepted error of 5% (Creswell, 2012, pg 610) and therefore the results of the statistical tests would have a very restricted range of statistical significance if the statistical results prove valid at all. As I also indicate further on, this small sample had a negative impact on specific statistical tests that were required for some of the constructs. I nonetheless decided to continue with the statistical tests that I had planned from the outset but to regard their results as indicative only but unlikely to fulfil the requirements of statistical significance.

3.8.4 Summary of the biographical detail of those who completed the questionnaires and interviews.

This is a composite of those who completed the questionnaire, those who were interviewed, and those who were interviewed but did not complete the questionnaire. The profiles of two who were interviewed but did not complete the questionnaire are not available.

Table 6: Biographical data about the research participants

Gender	
Male	14
Female	7
Race	
Black (African)	15
Indian	1
Coloured	1
White	4
Age	
36 – 40	6
41 – 45	3
46 – 50	8
51 – 55	2
56 – 60	1
Post level	
SES	12
DCES	9
Qualifications	
Three year teachers' diploma	4
Four year teachers' diploma	2
Four year teachers' degree	2
Bachelor degree + Post Grad Certificate	6
Honours	13
Masters	5
Number of years in this post	

[13] A sample size of 30 or even a population size is generally regarded as the minimum size to apply inferential statistics.

1 – 3	5
4 – 6	12
7 - 9	3
Phase and learning area / subject specialisation	
Foundation Phase	2
GET Languages	8
GET Creative Arts	1
GET Economic and Management Sciences	7
GET Life Orientation	5
GET Mathematics	4
GET Natural Sciences	5
GET Social Sciences	5
GET Technology	4
FET Languages	5
FET Accounting	2
FET Business Studies	3
FET Computer Applications Technology	2
FET Economics	2
FET Geography	1
FET History	1
FET Information Technology	2
FET Life Orientation	2
FET Life Sciences	1
FET Mathematics	3
FET Physical Sciences	1
Years of experience as a teacher	
1 – 5	1
6 – 10	7
11 – 15	4
16 – 20	4
21 – 25	2
26 – 30	3
30 – 35	0
Years of experience as a school manager	
None	6
1 – 5	8
6 – 10	2
11 – 15	2
16 – 20	3
Use of ICTs when you were a teacher / school manager	
Not at all	3
Personal (non-professional) use	13
Administration (Word or Excel or other)	17
Typing and formatting lesson plans and or class worksheets (Word or Excel or other)	14
Lesson delivery using a data projector (Word or Excel or PowerPoint or other) (Teacher use only)	10
Online research for lesson information	14
Teaching classes with ICTs fully integrated in teaching and learning (Teacher and Learner use)	7
Use of subject content specific software in teaching and learning	10
Use of ICT integrative pedagogies (Cyberhunts, WebQuests, Project-based Learning, ThinkQuests, etc.)	3
Classroom based use of ICTs	7
Laboratory based use of ICTs	6

3.8.5 Sample for the Qualitative aspects

One of the requirements of a convergent parallel mixed methods design is that the two strands should have the same participants (Creswell & Clark, 2011; Teddlie & Tashakkori, 2009) to ensure valid and reliable results because the purpose of the results from each strand is to confirm (or not) and merge the inferences from each strand. Of the 13 DELCs that participated in the

interviews 8 also completed the questionnaire and 5 did not. I decided to use the data from all 13 interviews because the community of DELCs is a small and tight knit group which means that the perspectives of each person is likely to be similar. The analysis of the interviews bore this out.

3.9 Quantitative data collection methods, data analysis methods and tests to be used

3.9.1 Survey Study (collection method)

Besides designing the study to be a correlational study as was mentioned earlier on, the design is also based on survey design principles using questionnaires (quantitative) and interviews (qualitative) because these are the best tools for eliciting beliefs (Creswell, 2012). I will first deal with the design of the questionnaire instrument used in the survey.

The design of the instrument was based on the principles of a cross-sectional survey design (Creswell, 2012, pg 377) which is used "to collect data about current attitudes, opinions, or beliefs" at a single point in time which is exactly what I wanted to do with the DELCs. I decided to design the questionnaire as a web-based instrument for two reasons: the first being pragmatic logistics because it is easy and efficient to administer and collect the data, and the second being wanting to create the space for the participant to be able to reflect on the questions at their own pace without an interviewer hovering over them and restricting their time making them feel they had to answer in particular ways. Logistically web-based surveys are an easy way to distribute and collect data. Online survey software like the one that I used (SurveyGizmo at http://www.surveygizmo.com/) not only provides efficient ways of collecting data but they also obviate the need to capture the data at a later stage. Preliminary analysis can also be done using the tools provided by SurveyGizmo and it is compatible with software like SPSS to allow for easy transfer of data and deeper analysis.

3.9.2 Constructs / variables contained in the survey

Educators' beliefs and knowledge cannot be accessed directly and so indirect measures have to be used. Using self-report measures to measure knowledge is tantamount to measuring belief. Verbal declarations of opinion and attitudes are regarded as an indirect method of measuring dispositions and beliefs (Likert, 1932 , pg 9). Survey instruments using Likert Scale items to measure beliefs is a common practice (McMillan & Schumacher, 2010), although self-report measures do have limitations (Paulhus & Vazire, 2010) and will always contain error.

The survey instrument was designed to measure constructs derived from the following theoretical models mentioned in the list below. (Go to Appendix F to see a copy of the full instrument that was used in this study entitled "District eLearning Coordinators' Beliefs (II)".). The questionnaire measures the DELCs knowledge, salient beliefs, pedagogical beliefs and behavioural intentions.

- Constructivist / Instructivist Pedagogical Beliefs (Becker, 2000; Becker & Anderson, 1998; Ravitz et al., 2000)
- Learner Centred Beliefs (McCombs, 1997; Bai & Ertmer, 2008)
- Theory of Planned Behaviour (Ajzen, 2006; Francis et al., 2004)

- Technological Pedagogical Content Knowledge (Chai & Tsai, 2011)

The manner in which the constructs from these theoretical models were brought into the instrument varied and so I will deal with each one separately

3.9.2.1 Constructivist / Instructivist Pedagogical Beliefs (Becker, 2000; Becker & Anderson, 1998; Ravitz et al., 2000)

In 1998 a national survey of teachers was conducted in the USA to ascertain their computer use and pedagogical beliefs (Becker & Anderson, 1998). A range of instruments were developed and validated and which used a number of techniques to measure pedagogical beliefs. One such technique was the use of vignettes and semantic differentials which are considered to be a more useful way of getting at complex and hard to measure mental states such as beliefs compared to direct Likert scale type questions of a self-reporting nature (Hurworth, 2012). Reliability analysis of the section of the survey from which I took the items for this survey produced an index with a reliability alpha of 0.83 which is a good measure of reliability. Questions 13 – 39 in the instrument District eLearning Coordinators' Beliefs (II) (Appendix F) deal with this construct. However, when items are extracted from a validated instrument and used in another instrument the reliability and validity status of the original instrument is not automatically carried through (Creswell, 2012). Due to time constraints related to this study I was not able to establish new reliabilities and validities and this represents a weakness of the instrument used in this study. The construct being measured by these items is the Constructivist Pedagogical Beliefs of the DELCs. All the items measure this single construct.

The 27 items comprising the Constructivist Pedagogical Beliefs section consists of:

- One vignette followed up by three five point Likert Scale questions
- Ten standard Likert Scale type items using a six point scale
- A scenario followed by five sematic differential items using a five point scale
- Six scenarios each using a seven point scale structured along semantic differential lines

3.9.2.2 Learner Centred Beliefs (McCombs, 1997; Bai & Ertmer, 2008)

I decided to use the full instrument that was published by McCombs (1997) and which was effectively used in the study by Bai & Ertmer (2008) in their study on teacher beliefs and technology use to measure the learner-centred beliefs of the DELCs. Bai & Ertmer (2008) report reliabilities 0.75, 0.63 and 0.73 for the three constructs measured by the instrument which is high enough for reliability purposes to enable further use of the instrument. Once again one cannot assume the same reliabilities even when full instruments are transposed, especially because the population I am dealing with (district officials) is not the same as the population of the original study (teachers). Nevertheless, the original instrument, which was originally developed by an organisation called Mid-Continent Regional Educational Laboratory (McREL) in 1994 (McCombs & Whisler, 1997 , pg 23) has been used in a vast number of studies with a range of populations from the field of education. The items from this instrument are numbers 74 – 107 in the District eLearning Coordinators' Beliefs (II) in Appendix F of this study. The instrument would measure the following constructs:

- Learner-centred beliefs about learners, learning and teaching (14 items) (0.75)

- Non-learner-centred beliefs about learners (9 items) (0.63)
- Non-learner-centred beliefs about learning and teaching (12 items) (0.73)[14]

All items use a standard four point Likert Scale

3.9.2.3 Technological Pedagogical Content Knowledge (TPACK) (Chai & Tsai, 2011)

As I have already indicated in the literature review there are a number of studies which measure TPACK. I have opted for a validated instrument which includes questions relating to constructivism and an emphasized subject-content knowledge. This instrument is also internally consistent it that all the measures of all the constructs achieved statistically significant reliability results. The overall reliability coefficient is 0.95 which is a very high reliability statistic making this instrument a good choice. However, the original population (pre-service teachers) is different to the population of my study (district officials) thus limiting the value of the instrument to some degree. The reliability coefficients for each of the sub-constructs are provided in brackets at the end of each sub-construct name in this list:

- Technological Knowledge (TK, 6 items) (0.87)
- Content Knowledge (CK, 6 items) (0.85)
- Pedagogical Knowledge (PK, 6 items) (0.93)
- Pedagogical Content Knowledge (PCK, 4 items) (0.87)
- Technological Pedagogical Knowledge (TPK, 3 items) (0.90)
- Technological Content Knowledge (TCK, 4 items) (0.92)
- Technological Pedagogical and Content Knowledge (TPACK, 5 items) (0.94)

3.9.2.4 Theory of Planned Behaviour (Ajzen, 2006; Francis et al., 2004a, 2004b)

Instruments based on the Theory of Planned Behaviour abound in virtually every field of social and psychological study and has been established as a valid and reliable way of measuring behaviour and behavioural intention in the field of social psychology including the field of educational technology (Ajzen, 1991; Lee et al., 2010). Very tight specifications and guidelines are available for the construction of TPB measurement instruments (Ajzen, 2006, n.d.; Francis et al., 2004a, 2004b; Lee et al., 2010) and if one follows these specifications the results are very likely to be valid and reliable. Because I could not find an existing instrument which suited the needs of this study I developed this aspect of the instrument myself. However, due to the small population (n= 46) of this study and the small sample that completed the full questionnaire (n = 18) I was not able to fully establish reliability and validity before the final instrument was operationalized. Nevertheless I was able to achieve the following in designing and operationalizing the TPB aspects of my instrument.

The first requirement in the design process is to conduct a qualitative salient belief solicitation exercise using interviews and a qualitative analysis process to arrive at the final set of salient belief items to be measured. I did this by beginning the qualitative strand of this study shortly before I finalised the quantitative instrument. I ensured that I posed the appropriate questions in my interviews which would enable me to determine the salient belief items for the Behavioural Beliefs, Normative Beliefs and Control Beliefs constructs within the TPB. The very same interviews were also used to collect the rest of the data for the qualitative strand of this study.

[14] The reliability measures are contained in the brackets at the end.

Using these salient beliefs I then designed the question items using the required phrasing and terminology for each item as prescribed in the TPB guidelines (Ajzen, 2006; Francis et al., 2004a, 2004b). Once I completed all the items for the TPB aspects of the instrument I then combined all the items from all the pre-existing instruments mentioned above together with the items I had designed for the TPB. The next step that is required in the TPB questionnaire design process is to conduct a pilot and a minimal sample of about 30 is recommended for this exercise. Because that number would have already more than consumed the number of DELCs that were willing to complete the questionnaire this was not feasible. In lieu of this, I sat down with one DELC and asked him to attempt to complete the questionnaire and as he did this to "think aloud" (Schmidt et al., 2009) and to tell me his concerns as he went through the questionnaire. Based on his comments and concerns I made some adjustments to the questionnaire. The questionnaire then went live to all the DELCs.

The TPB aspects of the questionnaire covered the following constructs which are necessary for TPB measurements and are found in question numbers 109 – 166 in District eLearning Coordinators' Beliefs (II) in Appendix F :

- Behavioural Intention (BI) (10 items)
- Behavioural Beliefs (BB) (8 items)
- Outcome evaluation (OE) (4 items)
- Attitude towards the Behaviour (ATB) (6 items)
- Normative Beliefs (NB) (4 items)
- Motivation to comply (MC) (4 items)
- Subjective Norm (SN) (5 items)
- Control Beliefs (CB) (4 items)
- Power of the factor – Control Beliefs (PF) (4 items)
- Perceived Behavioural Control(PBC) (9 items)
- Actual Control (AC) (4 items)

Azjen (2006) specifies that it is not necessary to establish internal consistency for the indirect measures of behaviour intention (BB, OE, NB, MC, CB, PF) because of the nature of the latent variables that underlie those constructs, but that it is important to have internal consistency for the direct measures of BI (ATB, SN and PBC) as well as for BI itself. Azjen (2006) recommends a minimum level of 0.6 as reasonable to ascertain reliability. Overall the instrument got a 0.6 making it a reasonably reliable aspect of the instrument, however the ATB was 0.4 which is cause for concern and it is therefore possible that the predictive relationship between ATB and BI could also be affected.

Table 7: Reliability measures for the TPB aspects of the instruments

Construct	Cronbach's Alpha
BI	0.6
ATB	0.4
SN	0.7
PBC	0.8
Overall	**0.6**

3.9.2.5 Additional items

The overall questionnaire also contained biographical information (12 questions) which is contained in the District eLearning Coordinators' Beliefs (II) instrument in numbers 1 – 12. I also added 4 items which relate to the TPB Behavioural Intentions construct, but would not be used in the TPB calculations. I intended to use the information from these four items to triangulate with the related data from the qualitative strand (numbers 167 – 170 in the questionnaire). Finally I added two items which measure how the DELCs rank the functions in their role. This would be used to see what functions they ranked high and low (question 171 and 172 of the questionnaire)

The final questionnaire contained 172 items which does exceed the recommended number of items for instruments. However, when I conducted the pilot test with the one DELC he felt it was doable. It took him about 75 minutes to complete the questionnaire and this time included discussion on the items. That being so, the length did prove to be an inhibiting factor. 25 attempted to complete the questionnaire and only 18 completed the entire questionnaire. When I contacted one of those who did not complete the questionnaire he indicated that it was too time consuming. However, this reason was also coupled with the fact that the bandwidth at his district office was very limited and slow resulting in his online questionnaire constantly timing out.

3.9.3 Content validity (use of research)

The content validity of the final questionnaire was covered in two ways. Firstly, I used three pre-existing instruments which had already met the requirements of content validity in the context of the studies for which they were developed. With regard to the TPB, all the major constructs were used exactly as specified by the theory and questionnaire guidelines. The items for the TPB constructs were based on salient beliefs derived from the DELCs themselves which means they are highly representative of the latent variables that the instrument attempts to expose. I can therefore conclude that the formulation of the constructs was such that they validly represented what needed to be measured.

3.9.4 Administration of the instrument

The questionnaire was designed as an online instrument using SurveyGizmo (http://www.surveygizmo.com/). I chose Survey Gizmo because its available question structures were more flexible and powerful than other survey offerings. Emails were sent to all DELCs explaining what the survey was all about, ensuring confidentiality and asking them to complete the survey. At the same time I sent out an SMS to all the DELCs with the link to the survey and with the same information as the email. Thereafter I followed up with five further emails and SMSs asking for completion. I also made one telephone call to as many of the DELCs that I could get hold of telephonically. Out of the 44 DELCs, 25 attempted the questionnaire, 18 completed it and 13 agreed to be interviewed. This persistent following up was done to try and ensure a sample of at least 30 which would be required as one of the conditions for inferential statistical validity.

3.10 Quantitative data analysis to be used

Before proceeding any further it is necessary to establish the codes that will be used for each of the constructs and their factors in the discussion.

Table 8: Construct / Factor Codes

Construct / Factor name	Code (Acronym)
Constructivist Pedagogical Beliefs	CON
Learner-centred beliefs about learners, learning and teaching	LC
Non-learner-centred beliefs about learners	NLC1
Non-learner-centred beliefs about learning and teaching	NLC2
Technological Knowledge	TK
Content Knowledge	CK
Pedagogical Knowledge	PK
Pedagogical Content Knowledge	PCK
Technological Pedagogical Knowledge	TPK
Technological Content Knowledge	TCK
Technological Pedagogical and Content Knowledge	TPACK
Behavioural Intention	BI
Behavioural Beliefs	BB
Outcome evaluation	OE
Attitude towards the Behaviour	ATB
Normative Beliefs	NB
Motivation to comply	MC
Subjective Norm	SN
Control Beliefs	CB
Power of the factor – Control Beliefs	PF
Perceived Behavioural Control	PBC
Actual Control	AC

The quantitative strand of the study uses a Correlational Survey Design (Creswell, 2012, pg 337 - 375). However before doing any correlations I will use descriptive statistics to determine the following:

- The TPACK of the DELCs (which will answer Question 7)
- The CON of the DELCs (which will answer Question 3)
- The LC, NLC1 and NLC2 of the DELCs (which will answer question 5)

This will be done by summing the scores of each item for each of the constructs and then calculating the mean and the standard deviation. Following this procedure will help to answer three of the quantitative questions will I will refer to later in more detail. Thereafter I will do a correlation analysis of key constructs.

A correlational design allows for the exploration of the relationships amongst constructs and variables as well as providing a basis for making predictions about certain outcomes, although a correlational relationship does not automatically imply a causal relationship (Creswell, 2012, pg 338). Although a correlational study does not necessarily indicate a causal relationship between two or more constructs, there has to at least be some sort of correlation for cause and effect to be present in the relationship between variables. A prediction research design, if a correlation and predictive relationship exists, can establish cause and effect. So through a correlational design I will first of all establish whether an effective correlation exists between key constructs and then also see whether a predictive relationship exists between some of these constructs -

notably the constructs relating to the Theory of Planned Behaviour. Based on my conceptual framework I am interested in establishing whether there is a correlational relationship between the following constructs.

3.10.1 Correlation study (and other statistical methods) to be used and rationale

Based on the conceptual framework in Figure 17 on page 43 I will be exploring the following relationships using correlation analysis.

Table 9: Correlational relationships to be explored

TPACK	BI
LC	BI
CON	BI
LC	CON
LC	BI
LC	PK
LC	PCK
LC	TPK
LC	TPACK
CON	BI
CON	PK
CON	PCK
CON	TPK
CON	TPACK

Exploring these relationships will help to answer Questions 9 and 10.

As the Theory of Planned Behaviour plays a central role in my conceptual framework I will be exploring the relationships between the following constructs which make up the theory. (Figure 15 is reproduced again for ease of reference).

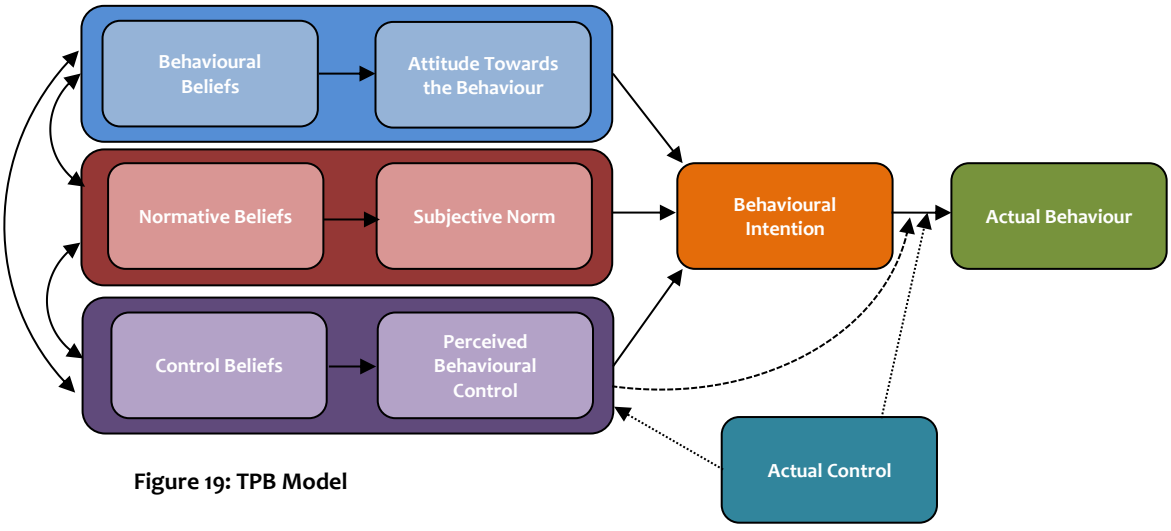


Figure 19: TPB Model

Azjen (2006), Francis et al., (2004b) and Lee et al., (2010) indicate that regression analysis using a path analysis should be used to establish the predictive relationships between the indirect measures (BB → ATB; NB → SN; CB → PCB) and the direct measures and that multivariate analysis be performed between the direct measures (ATB, SN, PCB) and BI. This would help to answer questions 1 and 2.

However, when a correlational statistical test is applied to the data in a correlational design the following assumptions have to be met:

For a Pearson correlation to be applied the data must be interval or ratio ***and*** must follow a normal distribution. If not, a Spearman Rho or Kendal-tau test must be applied. (Cohen, 2007 , Loc 28537; Field, 2009, pg 181)

For a prediction study to be applicable the following assumptions must be in place:

- "The data derive from a random or probability sample.
- The sample size be a minimum of 30 for validated instruments (Field, 2009) and over 150 to validate an instrument
- The data are interval or ratio (unless ordinal regression is used).
- Outliers are removed.
- There is a linear relationship between the independent and dependent variables.
- The dependent variable is normally distributed (the bell-shaped Gaussian curve of distribution).
- The residuals for the dependent variable (the differences between calculated and observed scores) are approximately normally distributed.
- Collinearity is removed (where one independent variable is an exact or very close correlate of another)." (Cohen, 2007 , Loc 28537)

Although the instrument produced a statistical reliability for internal consistency, unfortunately the data does not meet most of these keys requirements listed above. The sample was not random and its size is below 30 (n = 18). A frequency distribution of some of the key data indicates that the distribution is not normal (e.g. this was clearly the case with the TPACK scores outlined below). Linearity was also violated. Therefore the only legitimate statistical test that is available that helps the analysis of the data so that the questions can be answered are non-parametric correlation tests, and in this case I will be using Spearman Rho as suggested by Field (2009, pg 181). Nevertheless I continued to apply regression analysis to the TPB for heuristic purposes whilst fully understanding that the results would not have statistical validity. It is also my understanding this this limits the generalizability of the findings of the study, even for the broader population of DELCs who were not part of the study, although whilst making inferences questions of transferability of those inferences will still be raised. However, in saying that the findings will not be generalizable I run the risk of making a Type II error, which means we are rejecting any possible application in the broader population from which the sample came yet there may in fact be such an applicability or transferability into the population. Nevertheless a Type II error is not as serious as a Type I error which is the type of error which says there is an applicability in the population when there is fact not (Muijs, 2011, pg 66).

3.10.2 Data analysis plan

All the statistical data was captured into SurveyGizmo when the participants completed their questionnaires. This data set was downloaded directly into SPSS and all the data analysis was done on SPSS. The data analysis plan is the following. I will first look at descriptive statistics for key constructs that have a bearing on the study. I will then explore any relationships between

these constructs using non-parametric correlation tests. I will then apply regression analysis to the TPB model for heuristic purposes and to enrich the discussion of this study.

3.11 A report on the Qualitative data collection methods decided upon and rationale as well as the data analysis methods

3.11.1 Rationale for use of semi-structured interviews

I decided to use a semi-structured interview approach (or as some methodologists call General interview guide approach) (Teddlie & Tashakkori, 2009, Location 3844)). See Appendix G for the interview schedule. I also decided to use one-on-one interviews to prevent interviewees from being inhibited by their colleagues and maximise the space for honest answers and discussion. I also wanted to elicit beliefs individually and then from the analysis determine the extent to which the beliefs are shared which would also allow me to triangulate with the quantitative data. Semi-structured interviews afford free ranging and in-depth and discussion. Semi-structured questions allow the interviewer to apply pre-determined categories, based on relevant theory, to the interview and to include these categories in the questions and direct the discussion towards the categories, but at the same time it allows the interviewer to phrase the questions as open-ended which allows the interviewee to express their own perceptions of their beliefs in their own way thus providing rich data (Silverman, 2006 , loc 2592). Also by having an interview schedule I would be able to ensure that all the DELCs got more or less the same questions in a similar order thus enhancing reliability, but I allowed for flexibility and allowed the discussions to take their own direction if necessary.

Although I had finalised the first draft of the quantitative questionnaire by the time the interviews started I used information from the first three interviews to help me sharpen some of the constructs used in the questionnaires. This was in lieu of not having conducted a full elicitation pilot for the salient beliefs for the TPB aspects of the questionnaire. The interviewees were not informed of this and the data from these interviews were included in the analysis of the qualitative data.

The survey questionnaire was sent out after about three or four interviews had been concluded and the rest of the interviews were conducted at roughly the same time as the questionnaires were being completed.

3.11.1.1 Construction of interview schedule from research and the nature of the problem

The questions that comprised the interview schedule were roughly shaped by the applicable theories relating to the information that was needed to answer the qualitative questions of the study. The schedule was divided into the following categories (see Appendix G for the full schedule:

- About the Pedagogical Integration of ICTs
- About GoL laboratories
- About the role of e-learning coordinator
- About teachers and principals
- About the levels and processes of integration of GoL

- About the impact of ICTs and GoL
- About the DELC being interviewed
- About the new curriculum reforms
- District e-Learning Coordinator Action Decision Tree

When I first started interviewing I intended to triangulate with the quantitative aspects the TPACK model. However as the interviews progressed and as some of the responses to the questionnaires started coming in I saw that it would be best to focus on TPACK as a quantitative aspect only. I was not interested in their beliefs about the type of knowledge they felt they had or teachers needed for the pedagogical integration of ICTs. I wanted a more direct measure of the knowledge that they had regarding technology integration.

As can be seen from the above list the categories of the interview schedule do not exactly match the categories of the quantitative questionnaire. I was of the view that if the two schedules (the interview schedule and the quantitative questionnaire) matched each other exactly this may result in interviewees simply trying to replicate their answers from the one mode to the other mode. In the qualitative interviews I wanted to try and go deeper than what the limitations of the quantitative questionnaire allowed. And so I identified categories and question types that I thought the interviewees would be more familiar with and relate to more easily and thereby operate as a generative mechanism for eliciting a deeper and more honest revelation of their beliefs. I would then attempt to obtain the relevant beliefs from the narrative of the interview during the analysis of the data.

The section of the interview schedule entitled "District e-Learning Coordinator Action Decision Tree" warrants some further explanation. The model of the intended behaviour that is the focus of this study that I put together was based primarily on theory and not on the past practices of the DELCs. I wanted to see if the DELCs intended moving in a constructivist / learner-centred direction with their support and training. I thought a more direct response to the question of whether they actually intended that behaviour under study in a face-to-face environment during the interviews would by conducive for this approach. Furthermore Model 2012 as formulated in the questionnaire was presented as a single package. I was aware that the DELCs may intend to only perform some aspects of the package and not other aspects of the package and so I wanted a situation where I could decompose the intended behaviour (Model 2012) and see which aspects were strongly intended and those that were not. And so I developed a cognitive aid for the interviews to get at this aspect of the study. Hurworth (2012) provides advice for a range of techniques that could be used in interviews to tackle complex issues. One such technique involves graphics and flow diagrams. I designed a graphical flow diagram to assist the interviewee in decomposing the intended behaviour and therefore provide a way of discussing aspects of the model and what the DELC actually intended or not[15].

3.11.1.2 Semi-structured interviews and how they were conducted

Nearly all the interviews were conducted in meeting rooms at the premises of the offices of the DELCs. This was intended to make the interviewees as comfortable as possible. The interviews were recorded with a small unobtrusive digital recorder with the permission of the interviewee. I

[15] See "District e-Learning Coordinator Action Decision Tree" at the end of the schedule in Appendix G.

decided to take as few notes as possible during the interviews so that I could concentrate on the interview and so try and establish rapport with the interviewee and create an atmosphere of a conversation more than a question-answer situation so as to facilitate better access to the DELCs' actual beliefs. After the interview when I got to my car I would write done some notes I felt were important or else I recorded my thoughts about the interview into the recorder. Although I opted for a semi-structured approach my actual interviews followed a three stage approach. At first I started with some free flowing general open-ended questions which was followed by the core of the interview that used a semi-structured approach and then ended with some highly structured questions using the District e-Learning Coordinator Action Decision Tree

Interviews have a number of potential threats to validity which in this context means that I may be getting at interviewees' ideas other than their true beliefs. The first is the Hawthorne effect (McMillan, 2012 , pg 221) whereby the interviewee may wanting to appear intelligent and competent and give the "correct answer". In my case as interviewer this was a real possibility. In my past I had been a senior manager in the GDE dealing with ICT integration matters, but most of the DELCs were not in place by the time I left the GDE. However, some of the DELCs would have known this and it could have allowed for the Hawthorne effect. Furthermore I had been an online facilitator for three of the interviewees in an online course and this too may have had an effect. The way that I dealt with this was to say that what we were talking about was their beliefs and that there were no right or wrong answers. I was constantly on the lookout for mannerisms or forms of expression which convey a desire to answer "correctly" and if I was aware of this I would subtly try and steer the discussion back to their actual beliefs and I would try and get the conversation to flow naturally and spontaneously. However in doing this I had to avoid another threat to validity which is interviewer bias. (Cohen, Manion, & Morrison, 2007). I tried to avoid too much probing and using logical argument thereby inadvertently steering the interviewee in a direction away from their beliefs.

3.11.1.3 Decisions about how the interviews were to be analysed

I decided to use a standard coding method to analyse the interview transcripts which McMillan & Schumacher (2010 , pg 368) characterise as a combined Template and Editing analytical style. A template analysis style "applies derived sets of codes and categories to the data; however these classifications are frequently revised during the data analysis" (McMillan & Schumacher, 2010 , pg 368). This approach would allow me at the outset of the analysis to apply codes derived from the theoretical models that informed my approach but adjust these or add new ones if necessary. In the editing analysis style "the interpreter searches the data for parts to illustrate categories of meaning and writes memos during the process" (McMillan & Schumacher, 2010 , pg 368). I also decided to couple this with a number of techniques outlined by Leech & Onwuegbuzie (2007) and these included "key-word-in-context" and "word count".

I also decide to quantitise some of the qualitative data (Leech & Onwuegbuzie, 2007; Sandelowski, 2001; Sandelowski, Voils, & Knafl, 2009). This is often done in mixed methods when quantitative and qualitative data needs to be compared, merged or triangulated (Onwuegbuzie & Combs, 2011). In particular I would quantitise answers from questions posed in the District e-Learning Coordinator Action Decision Tree section of the interview schedule by counting the number of answers in certain categories. I would also be applying an interpreters score to each

interviewee relating to the likelihood that they would implement the behaviour which is the focus of this study (Model 2012).

I decided to use NVivo Version 10 software to do all the analysis of the qualitative interview data (Bazeley, 2007). First of all the recordings of the interviews were uploaded into NVivo with their typed transcripts alongside the audio recording. Silverman (2006) strongly recommends including transcription symbols in the transcripts because the meaning of interviews does not only lie in the text but also in the language tone, inflections, hesitations and other related cues. Due to time and cost constraints these symbols were not included in the transcripts. However having the audio and textual transcript alongside each other enables the interpreter to listen for those cues whilst coding the transcripts. This method was supplemented with the notes taken after interviews as well as the recorded annotations after the interviews.

NVivo has a feature called "nodes" into which data is coded by selecting the chunk of relevant data and coding it in the node. These nodes can be organised into a hierarchy which allows coded data to be organised into themes and patterns that have been identified by the interpreter. Coded data could belong to more than one node or theme at a time allowing for what Corbin & Strauss (2008) call axial coding. Axial codes are patterns or themes that don't emerge vertically from codes but emerge horizontally across codes. In NVivo axial codes can also code at nodes, in other words lower order nodes can be coded into higher order nodes. So nodes represent coded data, patterns and themes ordered into a hierarchy. NVivo also has other features like links, relationships and queries which allow for the linking of data and codes which enables the interpreter to develop higher order patterns and themes. However, NVivo does not have any in-built methodology. It only has a set of tools which have to be used by the interpreter in a methodologically sound way based on the model of analysis been used (Bazeley, 2007).

The manner in which the data was coded was based on three main criteria. These criteria are developed based on the nature of the ideas being analysed which is "beliefs". As mentioned in the literature review I am focussing on two key characteristics of beliefs, viz, core and strength. In doing the analysis I looked for core educational beliefs of a pedagogical nature and salient beliefs as they relate to the Theory of Planned Behaviour. In analysing the transcripts I looked for words, phrases or meanings associated with these aspects. If I found content for which a code did not already exist I created a new node and linked that node to an existing node either up or down the hierarchy. This dealt with the category or type of belief. Secondly I looked for words or phrases that represented the strength of a belief and coded at a node accordingly. I did not code all education beliefs. If any belief or category was not relevant to the study I did not code it and if a belief was very weak I may have not coded it. I ended up with the following first and second code / node level set. See a section of the code and node set at Appendix C. I will be elaborating on this further in the results section below.

Beliefs

- Gauteng Online (GoL)
- Integration
- Pedagogical Beliefs
- Schools

Role

- Collaboration with Colleagues
- DELC Development
- Goals
- ICT Coordinator at School
- Learners - working with learners
- Monitoring and Evaluation
- Obstacles – Constraints
- Planning
- Policies – Implement
- Pressure
- Time allocation

Theory of Planned Behaviour

- Actual Behavioural Control (ABC)
- Attitude towards the Behaviour (ATB)
- Behavioural Beliefs (BB)
- Behavioural Intention (BI)
- Control Beliefs (CB)
- Normative Beliefs (NB)
- Outcome Evaluation
- Perceived Behavioural Control (PBC)
- Subjective Norm

3.11.1.4 Mixed Method data analysis techniques

Mixed Methods data analysis begins with the analysis of the data in each of the strands using the analytical methods that are appropriate for each of those strands. This has been covered above. Once the data has been analysed in each of the strands and decisions are made about how the data will be presented the researcher then has to scan the findings and make an assessment of how the preliminary findings address the research questions. This begins the inference making process. Creswell & Clarke (2011) present further steps in the mixed method analytical approach for concurrent convergent designs.

They suggest that then the researcher must specify how the data will be merged and compared. In the case of this study I will then identify the key themes and questions that require the preliminary inferences to be compared within. To do this I will be using a table in which the key findings will be summarised and presented according to those themes so that the data and their findings from each strand can be easily compared. The table that I use will be an adaptation of one presented by Creswell & Clarke (2011, loc 2420). Key inferences from each strand will also be presented (Teddlie & Tashakkori, 2009). Based on analysis of the inferences from each strand for a particular theme a mixed methods meta-inference will be developed for that theme. This meta-inference will then be recorded in the table. Once all the themes have been covered and all the sub-questions have been addressed a further step in the inference process will be required to answer and tackle the main research question.

One way of comparing quantitative and qualitative data is to quantitise some aspects of the qualitative data (Creswell & Clark, 2011). I will be quantitising some qualitative data that emerged from the interviews when the District Elearning Coordinators Decision Tree was used. This data will be used to make a rough statistical estimate of the extent to which the DELCs will perform Model 2012. This rough estimate will then be used to compare with the more rigorous statistical findings that may emerge from the quantitative strand.

4 CHAPTER 4 - Data presentation, analysis and findings

In this chapter I will be presenting data for both the quantitative and qualitative strands. I will start with the quantitative strand first and then complete my analysis of that first. I will conclude the analysis of the quantitative strand with inferences which are relevant to that strand but which will then be used to compare, contrast and triangulate with the qualitative strand once that is complete. I will then present the results from the qualitative strand and make inferences relevant to that strand. Finally I will then merge key data and key inferences from each strand into a mixed methods table so that the data can be easily compared and triangulated. Mixed Methods meta-inferences will then be made and recorded in the table.

4.1 Quantitative results

4.1.1 TPACK scores

The following table represents the mean scores and the standard deviations for the TPACK related constructs.

Table 10: TPACK Scores (questions 36 – 73) (n = 18)

Construct	Mean	Std Dev
TPACK	4.50	0.56
TK	4.85	0.35
TPK	4.38	0.62
CK	4.35	0.62
PCK	3.79	0.96
PK	4.41	0.55
TCK	4.43	0.67
Overall	4.34	0.62

The total score for each construct is a 5 and so the scores in this table are high, which means the DELCs scored themselves very highly on these constructs. The standard deviation is very low which indicates that the scores are very closely grouped together. A high score with a low SD could mean that the DELCs are of a strong like-mind about what knowledge and skills they have to facilitate technology integration. It is interesting that TK (Technological Knowledge) is scored the highest whilst PCK is scored the lowest with CK (Content Knowledge) scored the second lowest. It is possible that the DELCs are aware of their relative weaknesses in the subject content areas and therefore turn away from responsibilities in this area and as a number of the DELCs indicated in the interviews, they are not subject experts, they would rather leave that to the curriculum experts. It is also of interest because in the interviews the primacy of content integration was expressed by the DELCs. The overall score of 4.34 with a SD of 0.62 would be the statistical answer to question 7.

4.1.2 Constructivist beliefs scores

The following is the score attained for the constructivist beliefs construct:

Table 11: Constructivist beliefs score (questions 12 – 34) (n = 18)

Construct	Mean	Std Dev
CON	3.40	1.29

Because there were three different scales (5 , 6 and 7 point scales) amongst the questions for this construct all the scores were standardised to a five point scale. So the above score represents a standardised score. A low score means that there would be a tendency towards traditional instructivist beliefs whereas a high score means highly constructivist beliefs. What is of interest here is the fairly large standard deviation which means that, unlike with the TPACK where there was considerable conformity, there is a wide spread of views ranging from highly instructivist to highly constructivist.

4.1.3 Learner-centred beliefs

The following table has the scores for the learner-centred beliefs.

Table 12: Learner centred beliefs (questions 74 – 108) (n = 18)

Construct	Instrument Mean	Standardised mean	Population mean	Std Dev	Standardised Std Dev	Population Std Dev
LC	3.20	4	3.22	0.68	0.85	0.40
NLC1	2.47	3.09	2.28	0.81	1.01	0.56
NLC2	2.79	3.5	2.31	0.89	1.1	0.49

The constructs for this section of the instrument are defined in the following way in McCombs (McCombs & Whisler, 1997 , pg 229):

- LC beliefs: Learner-centred beliefs about learners, learning and teaching (items 74, 77, 80, 83, 86, 92, 95, 98, 101, 104, 106, 108, 110, 111)
- NLC1 beliefs: non-learner-centred beliefs about learners (items 75, 78, 81, 84, 87, 90, 93, 96, 99)
- NCL2 beliefs: non-learner-centred beliefs about learning and teaching (items 76, 79, 82, 85, 88, 91, 94, 97, 100, 102, 103)

As the questionnaire items were based on a four point scale, scores standardised to a five point scale are provided in the standardised column in Table 12 above to allow for ease of comparison with scores from the other constructs. The population mean and population Std Dev are provided by the originators of the instrument for comparative purposes and are based on the four point scale.

McCombs & Whisler (1997, pg 231) indicate: "In general, teachers with learner-centred beliefs are those with means above 3.4 on [LC Beliefs] and below 2.0 on [NLC1] and [NLC2] beliefs. Teachers with non-learner-centred beliefs are those with means below 2.8 on [LC Beliefs] and above 2.4 on [NLC1] & [NLC2] beliefs." From this we could say with confidence that the DELCs have leaner-centred beliefs and this is in stark contrast to the low Constructivist belief score suggesting that learner-centred-beliefs and constructivist beliefs are not necessarily tied together.

4.1.4 Relationships between key constructs.

Table 12 above presented the constructs and the possible relationships between them that have been at the centre of this study. The correlation coefficients are presented in the same table below. This table below does not represent the full extent of the relationships which could be studied using the data at hand. See Appendix A for more detail.

Table 13: Correlations

Correlations (Spearman's rho)				
TPACK	BI	.355 .149	Correlation Coefficient Sig. (2-tailed)	No significant relationship, but one of the more promising ones
LC	BI	-.057 .822	Correlation Coefficient Sig. (2-tailed)	No significant relationship
CON	BI	.142 .574	Correlation Coefficient Sig. (2-tailed)	No significant relationship
LC	CON	.245 .328	Correlation Coefficient Sig. (2-tailed)	No significant relationship
LC	PK	.028 .911	Correlation Coefficient Sig. (2-tailed)	No significant relationship
LC	PCK	.423 .080	Correlation Coefficient Sig. (2-tailed)	Possible relationship. Using Pearson's coefficient this becomes statistically significant
LC	TPK	.229 .360	Correlation Coefficient Sig. (2-tailed)	No significant relationship
LC	TPACK	.239 .340	Correlation Coefficient Sig. (2-tailed)	No significant relationship
CON	PK	-.317 .200	Correlation Coefficient Sig. (2-tailed)	No significant relationship
CON	PCK	.058 .820	Correlation Coefficient Sig. (2-tailed)	No significant relationship
CON	TPK	-.039 .878	Correlation Coefficient Sig. (2-tailed)	No significant relationship
CON	TPACK	.027 .916	Correlation Coefficient Sig. (2-tailed)	No significant relationship
**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).				

For a relationship to be statistically significant the correlation coefficient should be greater than about 0.6 with the significance statistic $p < 0.05$. None of the above sets of relationships which are the focus of this study indicates a statistically significant relationship. The table above does not say there are no relationships, but where there is an inkling of a relationship the statistical significance is prohibitive. The table in Appendix A which explorers the fuller extent of the constructs which are outlined in the table above shows that there are significant relationships between the TPACK constructs themselves. This is not unexpected, however, the focus of this study was not on these relationships internal to TPACK and so they do not have a bearing on the outcome of this study. Nevertheless the two relationships which have some significance in the table above are of interest. The first, the relationship between TPACK and BI is understandable. The greater the belief of the DELCs in their TPACK one would expect there to be a concomitant enhancement in their willingness and intention to perform the type of behaviour under question. The second relationship that emerges from this correlation table, that between LC and PCK is

also not unexpected. Given the relatively high scores of the DELCs for the LC construct as well as the high scores for the TPACK constructs as a whole it makes sense to assume that the stronger their beliefs in learner-centeredness so too would their perceptions of their own PCK also grow. Both learner-centeredness (McCombs & Whisler, 1997) as well as Pedagogical Content Knowledge (Mishra & Koehler, 2006) are major concepts in the field of education where the relationship between the concepts is theorised. As part of the mental states of educators one would expect the one set of beliefs to influence the associated knowledge structure. What is surprising about the above table is that given there is a relatively strong relationship between LC and PCK so too would one have expected greater correlations between LC and the other pedagogically related TPACK concepts. Why there is virtually no relationship between LC and PK and yet there is some relationship between LC and PCK is difficult to fathom? It may be that the DELCs can make a clear and easy link between pedagogical beliefs and knowledge relating to the teaching of content, but are unconfident about how to teach with technology in learner-centred ways.

What is also another surprise in the above table is the inverse relationship between CON and PK. This either means that as constructivist beliefs get stronger, PK (pedagogical knowledge) moves in the other direction. Or it could mean that as PK increases constructivist beliefs move more to instructivist beliefs. In the qualitative strand of the study a strong theme emerged around the need to promote the primacy of content in the process of technology integration and some teacher-centred tendencies emerged in that data and it is possible that this was playing itself out in the quantitative strand of the study. However, what the above table does indicate is that there is no necessary, no determining relationship between aspects of pedagogical beliefs and knowledge which are not imbued with any technological references, but that when technological issues start emerging in their belief systems they find it difficult to make the pedagogical links. It may be that the DELCs are only just beginning to integrate pedagogical and technological thinking in their minds. Only further investigation would really help to address this conundrum.

4.1.5 Predicting the Behavioural Intention

The central proposition of this study has been that I would be able to predict the behavioural intentions of the DELCs by analysing their salient beliefs and attitudes. This notion is based on the TPB which requires that a regression analysis be applied to the data which represent the constructs of the theory. However, as I have indicated earlier on my data has violated the principles of inferential statistical analysis upon which a regression analysis is dependent. Nevertheless what follows is the application of the regression analysis to the data at hand. I do this for heuristic as well as accountability purposes, because without this analysis it will not be possible to answer the research questions, either positively or negatively. Please refer to Appendix B for a list of definitions of the TPB and the formulas that are used to calculate the value of the constructs associated with the theory. Linear regression was applied to each of the predictor variables and the variable they were predicting, the dependent variable (Field, 2009; Muijs, 2011)

4.1.6 Regression of Behavioural Intention onto Attitude Towards the Behaviour, Subjective Norm and Perceived Behavioural Control.

4.1.6.1 Behavioural Beliefs (BB) & Outcome Evaluation (OE) as a Predictor of Attitude Towards the Behaviour (ATB)

Table 14: BB & OE as a Predictor of Attitude Towards the Behaviour (ATB)[16]

	Adjusted R Square	Standard Error	F-test	B (regression coefficient)	SE	Beta	Sig
BB&OE	.238	3.18	6.305	.022	.009	.532	.023

Since Adjusted R Square is .238 this makes this a reasonable model for this prediction. $F(1, 18) = 6.305$, $p < 0.05$ and accounted for 23.8% of its variance. In other words BB & OE is a reasonable predictor of ATB.

4.1.6.2 Normative Beliefs (NB) & Motivation to Comply (MC) as a Predictor of Subjective Norm (SN)

Table 15: NB & MC as a Predictor of Subjective Norm

	Adjusted R Square	Standard Error	F-test	B (regression coefficient)	SE	Beta	Sig
NB & MC	0.032	3.18	1.558	0.011	.009	.298	.230

Since Adjusted R Square is 0.032 this makes this a poor model for this prediction. $F(1, 18) = 1.558$ and $p > 0.05$ and accounted for 3.2% of the variance. In other words NB & MC is a poor predictor of SN.

4.1.6.3 Control Beliefs (CB) & Power of the Factor (PF) as a Predictor of Perceived Control Belief

Table 16: CB & PF as a Predictor of Perceived Control Belief

	Adjusted R Square	Standard Error	F-test	B (regression coefficient)	SE	Beta	Sig
CB & PF	-0.051	5.07	0.172	0.008	0.019	0.103	.684

[16] The model of reporting regression here is based on the model used in the TPB study from Lee et al., (2010)

Since Adjusted R Square is -0.051 this makes this a very poor model for prediction. F(1, 18) = 0.172 and p > 0.05 and accounted for -5.1% of the variance (which is meaningless). In other words CB & PF does not predict PBC at all.

4.1.6.4 Attitude Towards the Behaviour (ATB), Subjective Norm (SN), Perceived Behavioural Control (PBC) as predictors of the Behavioural Intention (BI)

Table 17: ATB, SN, and PBC as predictors of the Behavioural Intention.

	Adjusted R Square	Standard Error	F-test	B (regression coefficient)	SE	Beta	Sig
Model	-0.079	3.87	0.587				.391
ATB				0.023	0.270	0.022	.934
SN				0.102	0.437	0.060	.820
PBC				0.238	0.198	0.316	.249

Since Adjusted R Square is- 0.079 this makes this model unable to predict behavioural intention. F (3, 18) = 0.587 does not explain any variance. ATB, SN, PBC in this model do not predict the behavioural intention.

The disappointing results achieved from the regression analysis could be due to a number of factors.

- The sample size was too small. This point has been covered extensively up to this point
- The data from the sample did not meet the criteria of linearity, normality and homoscedasticity as is required for inferential analysis to take place (Field, 2009; Lee et al., 2010; Muijs, 2011).
- There was too little variance in the data associated with the small sample thereby preventing linear regression from producing meaningful results.
- The items for the constructs in the questionnaire did not meet the requirements of validity, in other words content validity was violated. Although this is a possibility many of the items were based on data received from the DELC population itself and the basic concepts were rigorously based on the theoretical model itself.
- The intended behaviour (Model 2012) as formulated was too complex, had too many dimensions allowing the DELCs to agree with some aspects of the behaviour whilst disagreeing with other aspects of the behaviour. The information from the qualitative strand could bear this out. A number of the DELCs agreed with most aspects of the behaviour except for the aspect which stipulated homogeneous as opposed to mixed groups. There are a number of possible reasons for why this aspect of the behaviour may have drawn contradictory responses to the behavioural statement itself. For instance a DELC may be committed to JiT mentoring as a form of support but disagreed with having homogeneous

groups and could therefore have disagreed with the behaviour model as a whole because he disagreed with only one aspect of the Model 2012.

- The participant themselves were providing vastly contradictory responses to survey questions.

4.1.7 Inferences drawn from the quantitative data

The quantitative strand of the study has produced a contradictory set of results. In the two instances where questionnaire items were based on validated and reliable instruments which have been produced elsewhere, firm results were produced. This related to the LC beliefs and the TPACK of the DELCs. The application of these instruments elicited data which showed that the DELCs have high self-reported TPACK as well as strong learner-centred beliefs. However, in the case where questions items were lifted out of a previously existing validated instrument the results seem to start becoming a little woolly as is the case with the CON results. The CON results seem to imply that the DELCs have more of an instructivist or teacher-centred set of beliefs when it comes to the issue of constructivism and this stands in contrast to their learner-centred beliefs. Of course it may well be the case that the DELCs hold these apparent contradictory sets of beliefs, because that is the nature of belief systems, they are not always consistent (Pajares, 1992), they are a "messy construct" and difficult to measure. The lack of a relationship between the LC beliefs of the DELCs and their beliefs relating to constructivism is clearly highlighted in the correlation analysis. Furthermore, there is much in the literature which indicates that knowledge for technology integration and pedagogical beliefs should be closely related (Bai & Ertmer, 2008; Becker, 2000; Ertmer, 2005; Ertmer, Addison, Lane, Ross, & Woods, 1999) but once again in this instance the correlation analysis only indicated a very tenuous relationship at best or no relationship at all. This poor set of results seemed to flow into the results relating to the TPB as well. Basically the measurement of the TPB model did not work at all. The results do not indicate that the TPB and its suppositions are problematic. Nor do the results indicate that the DELCs salient beliefs do not predict the behavioural intention. The small sample and the non-normative nature of the data at hand make it impossible to make any significant conclusion about whether the beliefs and attitudes do or do not predict what their behavioural intentions and consequently their actual behaviour will be. There are a number of studies in the field of educational technology where the application of the TPB have proved to be inconclusive (Salleh & Albion, 2004; Sugar et al., 2004a), however none of these inconclusive results stemmed for the same set of problems that this study has faced, viz. a poor sample size which could not produce statistically valid results.

It is possible that the poor set of quantitative results may be rescued by the qualitative data. This was one of the reasons why I decided to use a I mixed method study, because I was aware that sample size and the quality of the data may threaten any validity or reliability of the results and the inferences that could be drawn from those results.

4.2 Qualitative Results

The results of the coding process are provided in the following coding frame which is listed below. This coding frame only represents the first two levels of the node hierarchy that I ended up with in NVivo. The detailed coding frame sometimes went down to five levels. Go to Appendix C to see a section of the finalised coding frame.

Beliefs
- Gauteng Online (GoL)
- Integration
- Learner-Centred Beliefs (LC)
- New type of learner
- Pedagogical Beliefs (Constructivist)
- Schools

Role
- Collaboration with Colleagues
- DELC Development
- Goals
- ICT Coordinator at School
- Learners - working with learners
- Monitoring and Evaluation
- Obstacles – Constraints
- Planning
- Policies – Implement
- Pressure
- Time allocation

Theory of Planned Behaviour
- Actual Behavioural Control (ABC)
- Attitude towards the Behaviour (ATB)
- Behavioural Beliefs (BB)
- Behavioural Intention (BI)
- Control Beliefs (CB)
- Normative Beliefs (NB)
- Outcome Evaluation
- Perceived Behavioural Control (PBC)
- Subjective Norm (SN)

This coding frame needs some explanation. The top level categories are Beliefs, Role and Theory of Planned Behaviour. Although all of the results of the coding process broadly cover the beliefs of the DELCs as solicited by the interviews I decided on these three categories for the reasons that follow. The first category called Beliefs covers all the types of beliefs that are relevant to this study and which are not covered by beliefs under Roles and the Theory of Planned Behaviour. The types of beliefs sub-categories that ended up in the broad category "Beliefs" were inter-related and mainly dealt with beliefs dealing with GoL, integration of technology more

broadly speaking and pedagogical beliefs as they especially related to constructivist beliefs and beliefs about learner-centeredness. The category "Role" dealt with all role related beliefs of the functions of the DELCs that did not have a very direct bearing on the behavioural intention and so most of the beliefs relating to the role aspects of the behavioural intention are dealt with under that category in the broad category called the "Theory of Planned Behaviour". However, I will not be elaborating on a number of sub-categories of the broad category Role because, although they emerged in the interview process, most of them do not have a direct bearing on the study and the research questions that need to be answered, but the categories are presented for illustrative purposes.

4.2.1 Beliefs

Most of the beliefs that emerged in the interview process gravitated around GoL, Integration and pedagogical beliefs. I will now deal with each of these in turn.

4.2.1.1 Gauteng Online

The main sub-categories that emerged around the broader category of "Gauteng Online" are listed below. They are in a more or less order of priority. Priority is determined loosely by the frequency with which the topic came up as well as the intensity with which the beliefs were expressed and not because of the priority relevance to the research questions and the study as a whole. (The number in brackets represents the frequency with which data was coded at that node category).

- Learning (48)
- Functionality (30)
- Subject Content (31)
- Teaching (18)
- Types of activities (17)
- Utilisation (17)
- Timetable (10)
- Technology focus (11)

4.2.1.1.1 Learning

The beliefs of the DELCs did not stop with teaching but also included learning and a sub-theme of this element was that there should be evidence for learning in the GoL lab.

"I know learning with technology in Gauteng on Line labs is taking place when there is proof that learners has participated in lesson that took place in the Gauteng on Line lab".

There was a definite move away from just using the labs for computer literacy training with just a focus on learning about the technology and how to use it, but the primacy of subject-content was emphasized.

"We shouldn't be seen as you know teaching ICT's but we should be learning using ICT's you know, and it will assist us in bringing the subject matter and making it easier for the learners to understand much better and also assist our educators to be able to transfer information easier because learners will be able to visualise the situations that are being taught."

4.2.1.1.2 Functionality

The issue of the functionality of GoL was briefly mentioned in the introduction to this study and has been the subject of many press reports. It is an obvious issue that affects the possibility of the integration of GoL into teaching and learning and is a source of great frustration and anxiety for the DELCs. The lack of functionality on an ongoing basis does have a negative impact on their work. The degree to which this is a priority for the DELCs is expressed in the following quotes taken from the interviews.

"The most important goal for my Gauteng on Line labs is to get them functional ... and being used for the purposes of teaching as well as integrated learning."

"It's the same. I think its time consuming -Gauteng online, but if maybe if it was done in the other lab - Gauteng online - because of the way it is, it's very slow and not reliable."

For a number of the DELCs the mere presence of a functioning lab was tantamount to integration itself.

"I know GoL integration has taken place when it is online and the GoL lab is online and the learners are occupying the classroom and they are learning ICT's."

The functionality of GoL is not the issue here but rather the effect it has on the work of the DELCs. The functionality of GoL comes up again in the section dealing with "Control Beliefs" under the Theory of Planned Behaviour where the discussion about the how the functionality of GoL has a bearing on the behavioural intentions of the DELCs and so I will not discuss this any further at this point.

4.2.1.1.3 Subject-content

The theme of moving away from teaching about technology to teaching and learning with technology continued.

"I know learning technology using Gauteng on Line Labs is taking place when learners deal with subject matter related to what that they do at school."

"I know good teaching is taking place in the Gauteng Online lab 1 when the learners are practically guided towards reaching curriculum subject orientated goals using the lab."

4.2.1.1.4 Teaching

In some of my earlier contact with GoL officials prior to this study I found that their vision about GoL was limited to functionality and basic utilisation. However, this proved different in the interviews. One of the key themes that emerged was that normal lessons should be conducted during normal lesson time utilising the facilities of the lab.

"I know good teaching is taking place in a Gauteng on Line lab when the learning, rather when the teachings that are taking place in the lab is structured according to what the teacher has planned for the learners for that particular learning area or subject."

"I know how .. Gauteng Online integration is taking place when its functional and educators are using the lab by teaching in the lab and I think that when all their subjects are being taught through the lab, I think that there is an integration."

4.2.1.1.5 Types of teaching and learning activities

Some DELCs envisaged teaching and learning actives as going beyond normal didactic teaching and learner engagement and activity-learning was emphasized.

"My most important goal for my Gauteng online lab is the lab that is a hive of activity in as far as teaching and learning is concerned. Notwithstanding technical challenges and technical problems that arise, non-connectivity, but the lab as it is it would serve a purpose of it's a hive of activity, non-stop learners being busy with the educators, then we would say we have a lab."

Teaching and learning activities included constructivist approaches like project-based learning, online research (which was a very popularly cited activity) and online collaboration. However there was strong view that teachers were not ready for this type of approach because they could not even practice it in their normal classes.

"I don't think it's [project-based learning] going to work because they, the teachers, they are not even implementing in the class and if they use the Gauteng online lab to get them to use it, it's impossible at the moment. We are struggling. It's a very long term programme, long term project."

However the need for computer literacy was still emphasized for those who did not have basic skills.

"My thinking would be we have actually tried to bypass computer literacy in a way and I think somehow it has backfired because we thought that perhaps computer literacy will happen incidentally while they are busy using those computers but we have picked up that somehow there are actually tools that they actually should be taught first how to use those even now we don't go into depth but we should give them the basics in terms of computer literacy, both teachers and learners, and then find a subject that perhaps will interest them to use computers further"

Nonetheless the overall tendency was away from computer literacy only towards a more integrated approach.

4.2.1.1.6 Utilisation

Where GoL was functional the next belief concern of the DELCs was whether the lab was being utilised at all even if it was functional. For some DELCs mere utilisation was an indicator of integration without any reference to the nature or content of that utilisation. Low utilisation statistics were also presented in the introduction at the beginning of this study.

"I know learning with technology in GoL labs is not taking place when the lab is always closed."

"A Gauteng Online lab is like a white elephant because they are standing there and not being used."

The actual lack of utilisation of the labs, when functional, is not a negatively controlling factor on the DECLs behavioural intentions, but rather it acts as a stimulus to ensure that the labs get used for teaching and learning purposes.

"My most important goal for myself is the least that we have in terms of the GoL-lab, it should be fully utilised"

"I know Gauteng on Line integration is taking place when learners do use the lab for teaching and learning purposes."

"My most important goal for my Gauteng On Line Labs is to make sure that there are fully functional. They are being utilised fully. I don't like to see them being closed, either for learners or for community. I would like to see them being utilised even by educators. During contact time, even after contact time."

4.2.1.1.7 Timetabling

Another aspect of GoL that emerged strongly was that if a school had an effective timetable for GoL which was a part of the overall school timetable and in which teachers were required to take their learners into the labs during normal lesson times, this would be a sign of integration:

"How do they integrate computers into teaching and learning in terms of time tabling, in terms of time. The best way we believe with e-learning is that the best model will be that the teacher uses their lab in their own teaching time so that when they go to the lab they don't do anything different than they would be doing in class. So the best way of using the GoL of the ICTs is for the teacher to take their learners in their own teaching time, and do what they would be doing in class, but then using ICTs"

4.2.1.1.8 Technology focus

Another theme which emerged revolved around what I have called a technology focus. However, this is a minor theme that emerged. Most of the ideas that arose around technology centred on the functionality of GoL and many of the DELCs addressed this concern and indicated that dealing with the functionality of GoL was one of their priority functions. The functionality of GoL as an emergent theme has been discussed earlier on. The focus on GoL functionality did not stem, however, from a commitment to the primacy of technology in the teaching and learning process. Rather it stemmed from a pragmatic perspective that to facilitate teaching and learning GoL simply had to be fixed and made functional. Technology was seen as an enabler and facilitator of teaching and learning.

"The life has changed. Everything is done through technology. Then to me, if we don't do that, we'll be missing the Learners. The Learners are into technology and are being confronted by technology, because the world is about technology, so it is important that we do integrate technology."

"Teaching with technology, yes, it's like enhancing teaching and learning. It's like you have to have something to support your teaching. It's assisting the Educators to make sure that Learners are excited about teaching. It shouldn't be teaching which is boring, or in the olden days, the time when we didn't have this technology. So if you teach with technology and enhance teaching and learning, it's like having a motor-car. Nowadays you can't survive without having a motorcar. It's no more a luxury, it's a necessity. So teaching with technology is a necessity."

4.2.1.2 Pedagogical Beliefs

A central claim in this study is that pedagogical beliefs, and more particularly constructivist and learner-centred beliefs, will have an influence on the likelihood of the behavioural intentions of the DELCs. So after having established a clear set of themes relating to the integration of GoL which encompassed the centrality of the integration of technology and subject-content into

teaching and learning the question arises as to whether an equally strong set of pedagogical themes emerged regarding the way this integrated technology and subject-content should be taught and in what way learning could occur.

A distinct set of beliefs emerged around a learner-centred pedagogy. The categories that were finalised based on the analysis and coding of the data are presented below. This list is organised into a priority order based on the frequency with which the belief was expressed as well as the strength of the belief as manifested in the types of words used as well as the emotional commitment to that category (the number in brackets represents the relative frequency with which that dimension was expressed as an important aspect of teaching and learning).

- Multimedia (15)
- Discovery learning (13)
- Information processing (12)
- Activity-based learning (11)
- Motivation (10)
- Nurturing (10)
- Collaborative learning (6)
- Teacher as facilitator rather than instructor (4)

Although all of these dimensions are not exclusive to theories of learner-centred education they are all associated with it (Jonassen, Howland, Marra, & Crismond, 2008; Mayer, 2009; McCombs & Whisler, 1997).

4.2.1.2.1 Multimedia

Multimedia was important because it enabled learners to develop mental images and models of what they were learning which facilitated memorization and internalisation. The dimension of multimedia was often linked with some of the other dimensions, especially motivation, discovery-learning, activity learning and activity-based learning.

"When you are always being told and then you are made to imagine about what the teacher is saying to you, the telling method to me, it's not effective, but the Learners, when they are learning, they are participating practically, so and also when they are allowed to discover things on their own, they become very, very happy and proud about that. They own what they have discovered. So through research and using the audio-visual material, I think they learn best."

"So they learn exactly what is seen. Like immediately they researching on something. Maybe it's an object. They can see the picture of that object."

"I think learning can happen in real time. Instead of showing a picture in a classroom you can show a motion on ICTs, and given the type of learners that we are dealing with, that is more ideal than showing them a picture, or just explain something that is abstract not there but in the GoL they can actually see how the process happens or unfolds. ICTs can bring something that happens over 20 years in two minutes and leaners could see what really happened. The impact is huge."

4.2.1.2.2 Discovery-based learning

There was a strong belief amongst the DELCs that ICT integration afforded discovery-based learning which entailed exploration and self-discovery rather than through the instruction of a teacher. This latter point seems to contradict the subject/content centred approach highlighted in the section dealing with GoL beliefs above. However, as Ertmer (2005) and Parajes (1992) point out, 'beliefs' is a "messy construct" and people can hold varying beliefs about the same object.

"But the role of the educator, I believe, that all the time it has got to be available. Maybe it could be just to introduce them to that concept so that they learn on their own or perhaps to do it for out of the lesson."

"A learner learns through discovery and through experience and experimenting …. Because in [GoL] he would still discover you know more than he thought he knows and discover within time … it's another world."

4.2.1.2.3 Information processing

The belief that ICTs afforded research and information processing coupled with self-directed exploration was prevalent and strong.

"Learners can be given exercises where they have to do the research"

And take careful note of this one – leaners don't learn anymore (emphasis mine, but it may very well be the DELCs' emphasis because this came up three or four time): *"We now come into contacts into a situation where there are now strong beliefs* ***that the learner no longer learns*** *but that he arranges information in a way in which he can then utilise that information to improve his lifestyle or condition of living."*

4.2.1.2.4 Activity-based learning

Another strong theme to emerge was activity-based learning which was afforded by ICT integration.

This quote encapsulates a number of the learner-centred dimensions being discussed here: *"A teacher would plan in such a way that they allow teaching and learning to happen in a way that learners are given an opportunity to engage on the material, on their own, at their own pace and at their own time. The teacher really becomes what we call in Outcomes Based Education in education called a facilitator of learning; that not all information you will get from a teacher; and that learners have the capability and capacity to learn, given the environment and the information that they have access to"*

Another multi-dimensional quote highlights the interrelated manner in which these issues were perceived: *"When you are always being told and then you are made to imagine about what the teacher is saying to you, the telling method to me, it's not effective, but the Learners, when they are learning, they are participating practically, so and also when they are allowed to discover things on their own, they become very, very happy and proud about that. They own what they have discovered. So through research and using the audio-visual material, I think they learn best."*

4.2.1.2.5 Improved motivation

Despite persistent functionality issues ICTs were seen to be a significant motivator in the learning process.

"I think when a learner is presented with this subject matter that they have got to learn and they show....Motivations to learn and also their concentration also to learn so that they in the process are able to grasp what is being taught and internalise it, in other words, up putting it at to the back of their minds and then so that it is in embedded view and then they will be able to show in future what they have learnt."

"What we have experienced is that Learners become happy, but that doesn't mean that they are learning. Yes, they become excited. In my view, I think they are learning, because the things that they did not know, they could not even see them, they see them through the computers and for instance, if you are using Encarta, you open it, you want to look, you search for a frog and you see it, I think that's, what they have seen, is going to be in their minds longer than the thing that they have been told about it"

Beliefs about learner-to-learner collaboration were also expressed as was the learner-centred nurturing and caring role that a teacher needs to play I will not however, provide any quotes for these categories due to space constraints. What is interesting, however, about these beliefs contained under the category of 'learner-centeredness' is the role of the teacher which stands in some contrast to the role of the teacher as identified in the themes that emerged around the GoL cluster where teacher and content-centeredness was stressed.. Although in some constructivist models learner-centeredness and content-centeredness as provided by the teacher are not in principle contradictory (Laurillard, 2002; Mayer, 2004; Richardson, 2003), in some of the DELCs' beliefs the content role of the teacher is explicitly de-emphasized and self-discovery and activity is emphasized.

"To me actually there, the teaching it's more learner centred. It's not more of teacher centred. Because there the only thing that the teacher can do is just to guide the learners on how to navigate through different problems in the activities. It's just to guide them on how they go through those activities. He is not taking an active, a much active role, but the learners are the ones who are just doing this active role. So I can say the teacher there, in short, it's that he is there as a guider"

It must be said that beliefs relating to constructivism did not emerge as a strong and distinctive theme as did learner-centeredness in the interviews. If one scans the interview schedule (Appendix G) one can see that no direct questions such as "Do you believe in constructivism?" or "Do you believe in learner-centred teaching and learning with technology?" were asked. This was deliberate. Questions were phrased in more general terms and I wanted to see if beliefs relating to constructivism and learner-centeredness would emerge naturally. The question "How do learners learn?" caused great consternation amongst the DELCs when it was posed and DELCs had great difficulty tackling this question. This question did elicit one response relating to constructivism and which included a direct reference to constructivism. However, I was not looking for explicit references to the word 'constructivism' but rather the underlying concepts as outlined in the literature review:

"Constructivism will say that whatever the learners are learning, it is what they have gone through before or what they know but the learning process confirms what they already, not knew, but make it better for them to be able to internalize it and then maybe be able to carry it out."

The respondent does not commit to this statement one way or the other.

The belief about building on from current knowledge mentioned in the quote above was supported with the view that teaching should ensure a progressively sequenced guided approach: *"The learner must be guided through all the programmes and he must know what every step is, and the next step. There must be somebody that assists him in that programme whilst he is busy there. And they must start on basic level, going through all the steps and get the learner interested into that programme or set up of software that is going into then."*

All the above represent the results of the qualitative analysis as it relates to GoL and pedagogical beliefs. The discussion of these results will be taken further in the section dealing with inferences that arise from the qualitative strand of this mixed methods study and will be referred to when the inferences and supporting data are merged and triangulated for the mixed methods analysis and inference making part of the study. What follows are salient beliefs (Ajzen, 1991) relating to the constructs of the Theory of Planned Behaviour. Remember, we are examining the extent of the influence of pedagogical beliefs, TPACK and other salient beliefs on the behavioural intentions of the DELCs. As has also been mentioned earlier, the TPB model is usually based on a quantitative methodology, so what I am reporting on here is not the quantitative measures of the TPB constructs but are the salient beliefs described in qualitative terms (Renzi, 2008; Renzi & Klobas, 2008) and from this I will speculate on the extent to which these will influence the BI of the DELCs before I merge this with the qualitative data for triangulation purposes. Unlike the data analysis that was done to cover GoL, role and pedagogical beliefs where most, but not all, of the categories emerged through a coding inductive process the codes, themes and patterns will be strongly bound by the constructs of the TPB but an inductive process would still be followed in linking what emerged qualitatively from the analysis to these broader constructs.

I should elaborate on the method we are dealing here in a somewhat repetitive manner at this stage. The TPB does not postulate the reading off of the behaviour that is likely to be performed from the salient and other beliefs alone. Rather the behavioural intention is defined in a manner as I have done above and then the relevant salient beliefs and attitudes are elicited and abduced and the relationship between the two (salient beliefs and attitudes) on the one hand and behavioural intention on the other hand is explored. It is postulated that there is a likelihood of the behaviour being performed in the manner defined is based on the salient beliefs and attitudes.

The following diagram (Figure 20) based on the TPB also contains criteria in each of the boxes that I use to analyse and code the data from the interview process. (This diagram with a bigger scale is at Appendix D)

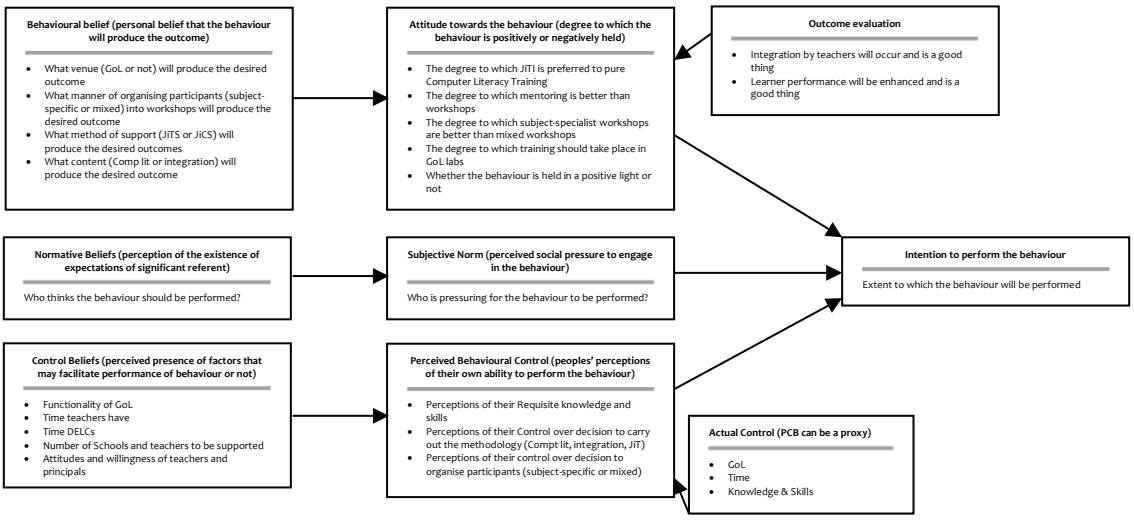


Figure 20: Criteria for evaluating the qualitative data relating to the TPB

In this study the behavioural intention is also determined by counting the indications of preference for the type of behaviour to be performed that were derived from the use of the interview instrument called "District e-Learning Coordinator Action Decision Tree". I will describe these results before I proceed with the presentation of the results of qualitative analysis relating to the TPB constructs.

Table 18: Results of the count of the "Yes" in the "District e-Learning Coordinator Action Decision Tree"[17]

	DELC 1	DELC 2	DELC 3	DELC 4	DELC 5	DELC 6	DELC 7	DELC 8	DELC 9	DELC 10	DELC 11	Total y
I intend running teacher development in my district this year	y	y	y	y	y	y	y	y	y	y	y	11
On how to integrate GoL labs into t & l	y	y	y	y	y	y	y	y	y	y	y	11
On Content	n	y	y	n	n	n	n	n	n	n	y	3
On Pedagogy	n	n	y	n	n	n	n	n	n	n	y	2
Computer Literacy	y	y	y	y	y	y	y	y	y	y	y	11
On ICT Integration	y	y	y	n	y	y	n	n	y	y	y	8
In GoL labs in schools	y	y	y	y	y	y	y	y	y	y	y	11
Per School	n	n	n	y	n	y	n	n	n	n	n	2
Across schools	n	y	y	y	y	y	y	y	y	y	y	10
Mixed Grades and Subject Areas	y	y	y	y	y	y	y	y	y	y	y	11
Per Grade level	n	n	n	n	n	y	n	y	n	n	n	2
Per subject	n	n	n	n	n	y	n	y	n	n	n	2
JiT Mentoring	y	y	y	n	n	n	n	n	y	n	y	5
Other (please state):	n/a	n/a	n/a	y	y	y	y	y	n/a	y	n/a	6
Total for Model 2012	**4**	**4**	**4**	**4**	**3**	**6**	**3**	**5**	**4**	**3**	**4**	**44**
(1) When teachers are given training which of the following methods will be used (tick only those that apply):												
Lectures or talks or presentations	y	y	y	y	n	n	y	y	y	y	y	9
Skills and /or methods and / or techniques and / or content and / or concepts that are demonstrated and / or modelled using ICT (by the instructors)	y	y	y	y	y	y	n	y	y	y	y	10
Learning by design and or practice using ICTs (e.g. teachers design and demonstrate their designs – e.g. of lesson plans; activities, etc)	y	y	y	y	y	n	y	y	y	y	y	10
Drill and practice on ICTs (e.g in computer literacy)	n	n	n	y	n	y	y	y	y	y	y	7
Other (please state):												
Total constructivist methods	**3**	**3**	**3**	**4**	**2**	**2**	**3**	**4**	**4**	**4**	**4**	

Legend: ☐ = Model 2012

[17] Only 11 of the 13 interviewed completed this Action Decision Tree.

The rows in pink in the table represent the intended behaviour (Model 2012), which is the focus of this study. The total number of "yes"' for each DELC is irrelevant here, because a "yes" in one option could contradict a "yes" in another option; e.g. a yes for Per Grade Per subject attendance could be in conflict with a yes for Mixed Groups. However, DELCs had a yes for both mixed and per grade / per subject options. I know from the interview with this DELC he intends to do both. Nevertheless, the scores in the row "Total for Model 2012" are only based on the Yes' in the pink rows. The total score for implementing Model 2012 as it has been defined would be a 7. In looking at the scores in this table a score of 5 and below means that the DELC is unlikely to run workshops in which subject-curriculum content will be integrated. Secondly, the propensity for mixed groups means that the DELC is likely to run a generic "one-size-fits-all" type training and support rather than a "teacher-as-student centred" approach. The bottom half of the table represents constructivist methods that could be used in any workshop training. This part of the table is not covered in the intended behaviour definition (Model 2012), but is illustrative of whether the DELC intends using these constructivist methods or not. Generally 3 means constructivist methods and a 4 means constructivist methods plus drill and practice. At one level this table answers the main research question. The result indicates that there is a 57% likelihood that the DELCs will implement Model 2012 as defined in this study. However, this measure of likelihood is not based on the TPB – it is just one measure based on quantitised qualitative data that we can use at a later stage for triangulation purposes. We first of all need to proceed with the analysis of the remaining qualitative data which was gathered from the interviews as they relate to the TPB.

4.2.1.3 Behavioural belief (personal belief that the behaviour will produce the outcome)

- What venue (GoL or not) will produce the desired outcome?

All DELCs believed that training and support for the pedagogical integration of ICTs should take place in "a" GoL lab, but from the above table, because of the propensity for having workshop participants from across schools and grades this would imply that most teachers would not be trained and supported in their own labs at their own schools thus violating the authentic learning environment and JiT support principles of constructivist / teacher-as-student-centred approaches.

- What manner of organising participants (subject-specific or mixed) into workshops will produce the desired outcome?

We have seen the varied responses with a propensity for mixed groups for this from the table above. This diversity was also reflected in the interviews and which is neatly quantified in the table. The significance of this issue relates to the belief that integration that involves both technology and content would be educationally more effective. However, one DELC put his support for the Model 2012 in this manner:

"That's ideal. That's pretty much it, because I think it will be a better approach because then you are able to focus on one school and know that if they actually attended to all aspects of their training needs. If you want to support and monitor them, then you know pretty much covered the bulk of the educators at that school. The level of the ICT usage then might be visible, because then unlike

when you train 3, 4 then they come back as 20 plus just to need training, so the impact is just a bit long. So the idea would be to train the actual schools."

At about the same time that the research for this project was being done the GDE Head Office had initiated a programme called eLessons which integrated Maths and English content with Microsoft Word and Excel. However most of the interviewed DELCs were unsure what the implications of this would be for their training and support methodology.

- What method of support (JiTS or JiCS) will produce the desired outcomes

In the table above 5 out of 11 DELCs went for JiT mentoring and the rest opted for some other kind of support. From the literature review we have seen that JiT mentoring is a very effective form of support which is based upon constructivist / leaner-centred principles. However, the variable numbers in the table on this issue reflects the inconclusiveness regarding JiT mentoring as a form of support that was reflected in the interviews.

"R: I think on a whole that is what we will be engaged in.
I: Just-in-case visits?
Yes. Although the way we want to do it is let schools know that we are coming and we are coming for one, two, three which I think covers the just-in-time mentoring because they know that we are coming and that we are coming for one, two, and three. If something that we have never planned for or we come across it then we attend to it."

But JiT mentoring is also firmly believed as a method of support for teachers:

"…ja I think we are already doing that, we are mentoring those educators, like I'm saying, after we train them, we don't just leave them on their own, we take them to the classroom and demonstrate to them this is how we expect it to be done and we always play a supporting role before we leave them on their own to do it."

- What content (Computer Literacy training or JiTI) will produce the desired outcome?

The issue with this category is not whether teachers need to have basic computer skills developed or not, but rather what is the best method for doing this – with standalone computer literacy training first or with JiTI basic computer integration from the outset. Two views were expressed in support of either pole of the debate with most DELCs somewhere in between along a continuum and taking a pragmatic view rather than a principled view on the matter. This is also reflected in the numbers from the table above with some DELCs still intending to provide basic computer literacy training and others not but opting for an integrated approach.

"I have moved to a point where I understand that the focus should be more on integration, the other part comes automatically. I normally say to educators when they say they don't know what to teach I say you are an English teacher, you want learners to write a simple thing like a letter, they've never been in front of a computer so their computer skills are say minimal, give them the piece of paper with the letter, the normal way that we write letters we know that the address has to be on the right etc, let them type the letter, let them figure out how to put in a full-stop, how to make a capital letter, those are basic computer skills, but they wouldn't be done outside"

"R: On "just in time." Ja, no, no, it must be, in my opinion they must be trained in advance..

I: Ja I want your beliefs. Or whatever you want to call it. No, no that's fine. Ja?
R: Definitely, they must be trained on the basic concepts. The learners as well the educators.
I: First?
R: Ja, first and then they can, because they will sit there "just in time" is not worth it, or so efficient as it should be.
I: Do you know what the just in time is often contrasted to? It's called "just in case!" Ja. Sometimes it's called, you know, in the debates.
I: Ja, "just in case." So I mean, maybe just in case is not doing justice to it. So you are saying it's important to have those skills first so they can apply them at a later stage?
R: Yes, yes. And Gauteng online is training them, but they are making such a mess of that programme. The teachers don't attend that. But we've started with our own basic computer training, and we've done ..For teachers and learners and SGB members as well."

In concluding the finding of the qualitative aspects relating to behavioural beliefs (i.e. the personal beliefs of whether the behaviour (Model 2012) will produce the desired outcome (technology integration)) there is a general belief that in an ideal world Model 2012 may be the most effective, but that a range of practical constraints limit the possibility. These limiting factors will be discussed below.

In the TPB the strength of the behavioural beliefs coupled with the evaluation of the outcome give rise to the attitude towards the behaviour. So I will briefly look at Outcome Evaluation first before moving on to Attitude towards the Behaviour.

4.2.1.4 Outcome Evaluation

The outcomes of the implementation of Model 2012 are considered to be "the actual pedagogical integration of ICTs" by teachers as a result of the implementation of Model 2012 and flowing from that "improved learner performance". The TPB requires a view on whether the outcomes are considered to be valuable or not. It goes without saying that the DELCs consider these outcomes to be highly valuable and they also hold strong beliefs that Model 2012 or some variant of it would assist in achieving these outcomes.

"Where there is evidence of Gauteng on Line used at schools yes, there is evidence that the learner's performance does improve. Because over and above what they get from the text books the teacher, they actually go to the extent of being an independent learner. So indeed I can say yes, there is a positive contribution as far as their performance is concerned using the Gauteng on Line."

4.2.1.5 Attitude towards the behaviour

The behavioural beliefs coupled with the outcome evaluation gives rise to the attitudes towards the behaviour which is the degree to which the behaviour is positively or negatively held. Now the concept of degree is essentially a quantitative concept and we'll be dealing this this in the quantitative strand. So, how do we identify "degree" qualitatively? The first would be the use of rich adverbs and adjectives (which contain positives, comparatives or superlatives like very, more than, etc.) and the second would be the use of persuasive terms (surely this is the case, evidence has proved, etc.). Analysis of qualitative data in which words and terms are analysed and counted is best done using qualitative methods like content analysis or discourse analysis or language analysis (Silverman, 2006). However, embarking on such a path would have been to overload an already heavily methodologically loaded study. So I did a rough count of the superlatives and persuasive terms (which had to be done manually and interpretively and not

using the NVivo word count which just did not work for this) relating to the following dimensions of the data:

Model 2012	Traditional
JiT Integration	Computer Literacy
Mentoring	Workshops
Subject-specialist workshops	Mixed workshops
In home based GoL labs	In any available lab
72	**51**

From the above I can concluded qualitatively and not with any quantitative rigour that Model 2012 is held slightly more positively than what I have called the traditional model above.

4.2.1.6 Normative beliefs and Subject Norm

Normative beliefs and Subject Norm both deal with the expectations and social pressure from significant roleplayers about the performance of the behaviour. Normative beliefs refers to the beliefs that the expectations actually exist whereas subjective normal refers to the belief that pressure is being applied by these roleplayers that the behaviour should be performed and is a function of the motivation of the DELCs to comply with these expectations and pressures.
The key roleplayers that were identified by the DELCs included:

- Fellow DELC colleagues from the same district as well as other districts
- The ELC officials from head office
- The curriculum officials from the district
- Circuit Managers (IDSOs) from the same and other districts
- The DELCs' unit supervisor and the head of the district
- Teachers and principals from the schools
- School Governing Bodies

The scope of this study does not allow for a detailed analysis of the expectations of and the possible pressure that could be brought to bear on the DELCs regarding the behaviour (Model 2012) for each of these roleplayers and so I will just provide a general overview. The DELCs believed that none of the key roleplayers would disapprove of the model except for possibly some teachers themselves. The exception here relates to the visitation by district officials into teachers' classrooms which a JiT mentoring role would require. There are historical precedents to this concern about visitations and observations in their classrooms which I will not go into here. However, nearly all the DELCs believe that this obstacle was not insurmountable with the exception of maybe one district.

Despite the DELCs believing that there would be little disapproval of the behaviour they also believed there was not great pressure to perform the particular model of support and professional development in question. Pressure did exist, and the DELCs believed that this pressure existed as well as actually feeling the pressure, for training and professional development to be delivered for the pedagogical integration of ICTs. This was part of the GDE's strategic plan, as I mentioned in the introduction and the motivation for the DELCs to comply with these expectations and pressures was high. The content of the training, the eLessons and Guidelines on the Management and Usage of ICTs in Public Schools in Gauteng, was specified, however the training methods in the workshops and the model of support was not. This was generally left up to each district as they planned for these activities.

Given this fairly open ended organisational culture regarding the behaviour in question and based on a qualitative analysis of the data from the interviews I interpreted normative beliefs and subjective norms not to be a significant factor in determining the likelihood of the behavioural intention under study (Model 2012). To put this more qualitatively; motivation to comply with the broad mandate was high but enactment of the model was under the control of the DELCs themselves and so would be more determined by the control factors which I deal with next.

4.2.1.7 Control Beliefs (perceived presence of factors that may facilitate performance of the behaviour or not)

The DELCs believed that the following constraining factors existed and had a bearing on the behaviour which I derived from the interview data (the relative frequencies with which these came up as constraints are indicated in brackets:

- Functionality of the GoL labs and lack of technical support(21)
- Inflexibility of the GoL "image" (11)
- Time and resources at the disposal of the DELCs (11)
- Number of Schools and teachers to be trained and supported (10)
- Time at the disposal of the teachers (6)
- Attitudes, willingness and predisposition of teachers and principals (5)

The DELCs had strong beliefs that the dysfunctionality of GoL was an ever present reality. Besides having a general effect on the ability of the DELCs to provide training in the labs (which are a feature of the Model 2012) dysfunctional labs put pressure on the DELCs to provide mixed across schools training as opposed to school specific training. This is exacerbated by the lack of technical support. (As I have dealt extensively with this issue earlier on I will not elaborate on this further here but the following quote is graphically illustrative of this problem and how this effects the DELCs beliefs on the matter.)

"R: Ja, my most important goal for Gauteng online lab is to serve the schools. To get integration of the curriculum into the classroom. And, but I hope it's ... But sometimes it's not functional because these school are offline more than online and we are a little bit distanced from Jo'burg and they don't really come and fix and help us. And getting all schools with the Gauteng online lab, because we are lacking with that still. We are in certain phases.
I: I was interviewing someone from Johannesburg Central yesterday, and they said they've just got a list from Gauteng ..Ja, of schools that were functional and not functional.
R: Ja, but their list is not correct. We've got the correct stats
I: How many schools do you have in your district? And what did the SMMT [Service Provider] list say? How many of those were functional?
R: They say ... Almost ... They are lying because they are telling us
I: Ja, but just tell me what their number is?
R: Round about 142
I: So nearly 100%?
R: Ja, no but we are
I: And according to you?
R: Round about 60/65%. We've got the exact list who is functional, who is opened
I: What are their criteria for saying that it is functional?
R:I don't know what their criteria is, but they say it's working, it's functional, but it's offline, it's not online. They are not replacing the burglaries, because there are a lot of burglaries taking place.
I: Okay?

R: And then they leave those schools. They are not coming to replace them.
I: Okay. Right.
R: There is one school that's now for three years been burglarised, and nothing has been replaced. If they can upgrade a little bit their service ... I don't want attack them, but if they can give better service then ..
I: No, no, that's not the purpose of this. But it's quite interesting to see how that would affect the programmes that you want to ...
R: Definitely. Because we can't implement, sending out a memo and say: "Go to the website, it's on the web, the Sedibeng West web, that we've designed." Because all school can't access that because ... And that's a bad thing, because that's the main ... If it's functional, yes we can get electronics information through to them and all that on that website. But that's the negative things."

The GoL "image" refers to the networked operating system that drives all the GoL computers and is controlled centrally by a service provider. The image is locked down which basically means that changes to the applications on the computers could not be made without the computers being opened up from a central level. Whereas in principle this opening up of the computers to allow for new software was a possibility, in practice it never occurred. Given the new emphasis on the integration of GoL with curriculum content, subject specialist software was to play a central role in this development. However, the belief by the DELCs that this was an inflexible arrangement made them despondent about local innovation regarding software and content and compelled them to revert back to the severe limitations that the GoL infrastructural arrangement allowed.

"With Gauteng online, I'll go back to bureaucracy, there still are restrictions in terms of software uploading and other things, so you use what is there only available."

"R: Because of the content that is on the image may not be - [interrupted]
I: Can you just elaborate a little bit on why the image curtails the possibilities for other subjects other than Maths and English?
R: For now there was nothing like [Encarta] for example but I know with time they will put something like [Encarta] in the image where other subjects will be, but for now if such an icon is not there then other subjects may not be catered for; other than going through the internet and so on. I am just saying on the image itself, because Maths and [Science] are on the image. Which is an important point because what we call the image or the software that is on our computer, That creates the difficulties; it is really the image which is at the heart of what the possibilities are."

Time and resources at the disposal of the DELCs and the number of schools and teachers to be trained and supported also proved to be a central control factor.

During the interviews I spent some time discussing the time constraints that a DELC would face in trying to implement the model. The following table, based on figures provided by the districts is indicative of the enormity of the task on the hands of the DELCs.

Table 19: DELC School & Teacher Ratio

District	Schools	DELCs	School Ratio	Teacher Ratio
EN	235	2	118	1175
ES	210	4	53	263
GE	181	2	91	905
GN	75	2	38	375
GW	175	3	58	389
JC	231	3	77	513
JE	238	3	79	529
JN	217	3	72	482
JS	181	3	60	402
JW	166	3	55	369
SE	97	2	49	485
SW	146	3	49	324
TN	160	2	80	800
TS	274	4	69	343
TW	167	3	56	371
	2753	42	66	1311

At an average of about 66 schools per DELC and 1311 or more teachers per DELC the challenge for JiT mentoring becomes almost impossible. The DELCs have therefore developed an approach whereby each school appoints a school-based ICT coordinator and Model 2012 would then be applied to that person who would be expected to be trained in and apply the same method in the school. However, the ICT Coordinator at schools is a full-time teaching position with no teaching duties being credited for the coordination role thereby putting the model at jeopardy at the school level.

"I: How many teachers do you have? Have you divided your schools amongst the four of you?
R: Actually, each one
I: Have you allocated a particular set of schools?
R: Yes, 68
I: Okay, because of your responsibilities.
R: Yes, because of my responsibilities.
I: Okay, but let's say, you've got even 50 schools. Let's say you've got as little as 50, average 20 teachers per school, that's a thousand teachers. Can you provide just in time mentoring
R: That's why you….
I: Yes, no, absolutely
R: I have to be realistic."

It is these enormous logistical constraints which are out of the control of the DELC and which makes them believe that the JiT mentoring model of support as well as school-based professional development is not really feasible.

4.2.1.7.1 Time available to the teachers

The amount of time available to the DELCs for access to the teachers especially for professional development after normal schools hours is severely curtailed by competing training demands that are placed on the teachers by other functions within the GDE. But this is a general problem

and does not have a specific bearing on the professional development aspect of the model. In fact it is the limited amount of training time which conversely provides greater impetus for JiT mentoring as this could be done with teachers whilst they are teaching during normal school hours.

4.2.1.7.2 Attitude and willingness of the teachers

The following quote is illustrative of the despair that DELCs often feel.

"Sometimes you feel throttled, stifled somehow. Because if you go into a school you would know that you would be speaking Greek to most of the people, there will be few that will understand, then you would have those who don't even want to hear what you're saying. You get a situation where an educator would say don't tell me about computers, I have got three years remaining, then you ask yourself in that three years how many learners suffered because you are leaving the system in 3 years, it doesn't make sense, but those responses we do get, don't tell me about it in three years, and then you analyse the three years three sixty five days times three this educator waking up to the same school, how many learners could he have helped at least before he or she leaves."

This was echoed by a number of the DELCs in the interviews, but felt that their own despairing and demotivated feelings were something that they could control and overcome.

4.2.1.8 Perceived Behavioural Control (DELCs' perceptions of their own ability to perform the behaviour).

Perceived Behavioural has two dimensions. The first is that it is a function of the DELCs' belief that the controlling factor, for example the functionality of the GoL labs, is a powerful factor as well as the strength of the belief, for example does the DELC believe strongly and emotionally that the functionality of the labs will affect her work. Coupled with this is the second dimension and this refers to the DELCs' own self-efficacy in having the requisite knowledge and skills to perform the behaviour in question. During the interviews I did not ask the DELCs to rate their own self-efficacy because I thought the TPACK measurement instrument that would be used in the quantitative strand of this study would be more effective in gauging the actual self-reported knowledge of the DELCs. However, on hindsight I think it this was a mistake not to have included this in the interviews as well. Nevertheless I did ask the DELCs what they believed the type of knowledge and skills a DELC would need to have to perform the task to be. After analysing and coding the interviews the following knowledge types emerged from the data and are presented in order of priority based on my interpretation of the strength of their beliefs that the particular knowledge / skill type is important as well as the frequency of the occurrence of that knowledge / skill type in the data based on a word count and manual concept frequency count:

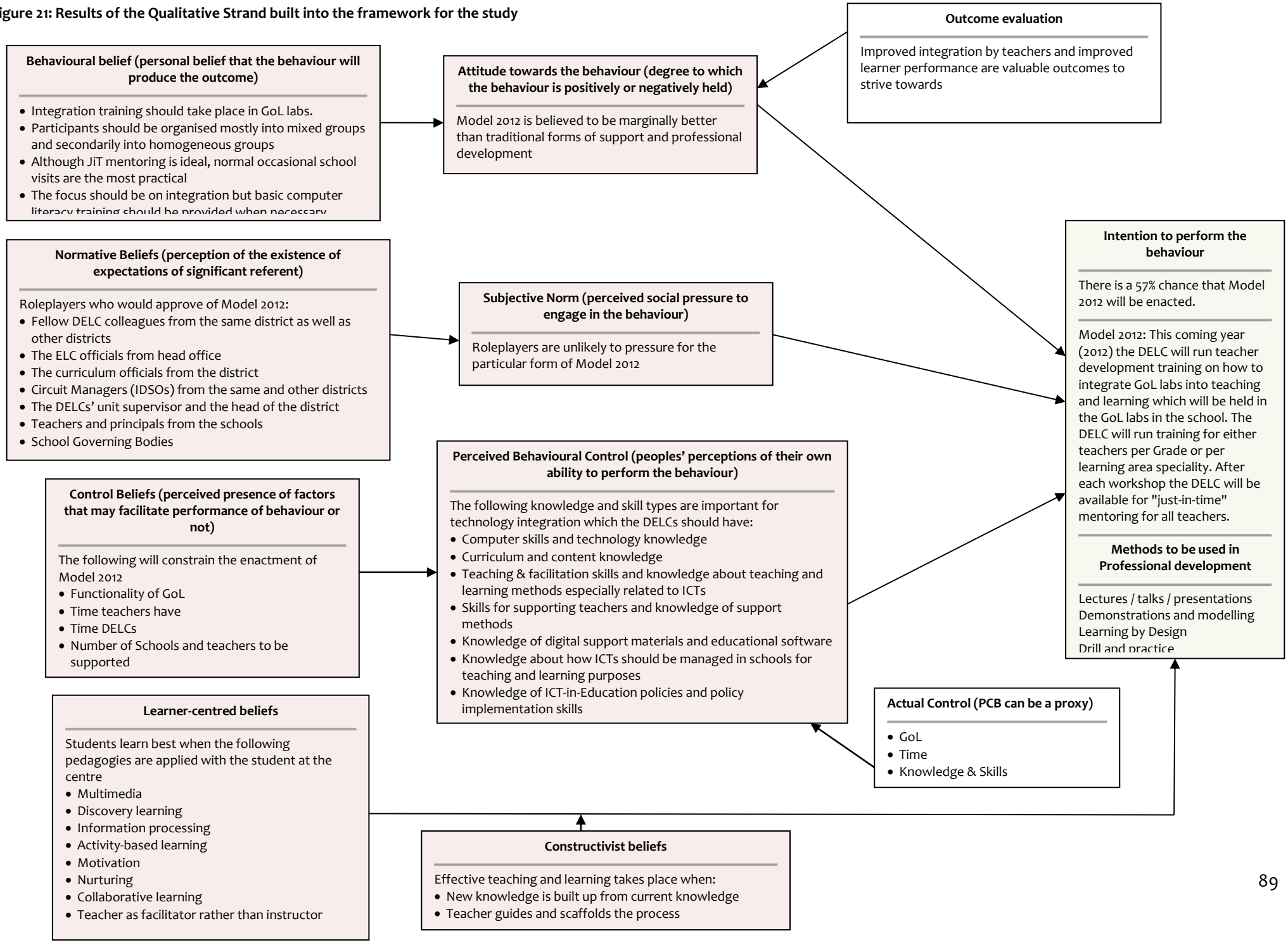
- Computer skills and technology knowledge (12)
- Curriculum and content knowledge (9)
- Teaching & facilitation skills and knowledge about teaching and learning methods especially related to ICTs (7)
- Skills for supporting teachers and knowledge of support methods (7)
- Knowledge of digital support materials and educational software (6)
- Knowledge about how ICTs should be managed in schools for teaching and learning purposes (5)

- Knowledge of ICT-in-Education policies and policy implementation skills (5)

4.2.1.9 A synthesis of the results of the qualitative strand

A diagram is presented below which reflects the composite conceptual framework that was put together for this study (See Figure 4) and includes all of the results from the qualitative strand brought into a relationship with each other based on this study's conceptual framework.

Figure 21: Results of the Qualitative Strand built into the framework for the study



4.2.2 Inferences drawn from the results of the qualitative data analysis and the answers to the questions relating to the qualitative strand.

There are three qualitative questions that need to be answered from these results.

Question 8: What are the beliefs of the DELCs about GoL technology integration? (Qualitative question)

The significance of this question and its answers for the overall study is that it provides a broader context for looking at the significance of the other questions and their answers. The answer does not play any detailed role in answering the main question of the study, but elements of the answer would inform the inferences from the other questions.

The short answer to the question is that the DELCs believe that integrating GoL into teaching and learning with an emphasized focus on subject-content is an important contribution to improving the quality of teaching and learning as well as improved learner achievement in the Gauteng province. However, the DELCs also believe that promoting the integration of GoL is an enormous challenge. The ongoing functionality issues of GoL dominated the work of the DELCs who believed that they therefore had to prioritise getting functionality as one of their goals even though this aspect of GoL was not their responsibility. There was a strong belief, that if used properly GoL could enhance teaching and promote learning. However, they would need to see teachers teaching curriculum content in normal lesson times for this to occur. They believed that the schools should have timetables which integrated GoL into the day-to-day teaching and learning activities of the school. The DELCs believed that they themselves had to increase their support for teachers in promoting the integration of the labs and that more intense ongoing professional development was required to achieve this objective.

Question 6: What pedagogical beliefs do the DELCs' espouse about learner-centeredness and what is the strength of these beliefs?(Qualitative)

The findings of the research indicate that the DELCs hold strong pedagogical beliefs which can be broadly characterised as learner-centred beliefs. They believe that learner-centeredness as applied in GoL integration result in improved teaching and learning. The DELCs believe that GoL affords dynamic multimedia teaching and learning which can encourage learner discovery through learner engagement with digital and other resources and as well as by collaborative activity. The DELCs would like to see teachers playing an active facilitative role in the GoL labs and also caring for and nurturing the potential of the learners.

Question 4: What pedagogical beliefs do the DELCs' espouse about constructivism and what is the strength of these beliefs? (Qualitative)

The DELCs, whilst conveying some constructivist principles, did not express them as strongly as their learner-centred beliefs. They believed that subject-content should be given more emphasis in the integration of GoL into teaching and learning and that the teaching of this content should be related to and built up from the current knowledge of the learners. The DELCs believed that teachers needed to guide learners through a progressively sequenced set of activities so as to achieve higher learning.

Question 2: To what extent is it likely that GDE DELCs will carry out their roles in a constructivist "just-in-time" (JiT) manner? (Qualitative question [Decision Tree])

This question is based upon the Theory of Planned Behaviour (Ajzen, 1991) as well as educational theories that state that there is relationship between the pedagogical beliefs of educators and their practices (Ertmer, 2005; Pajares, 1992; Spillane, 2002) and moreover that constructivist learner-centred beliefs would spawn constructivist learner-centred practice. The TPB is in alignment with this educational theory. Kopcha (2008) developed a systems theory that advocated a constructivist / teacher-as-student centred approach as being a very effective form of practice for support and professional development of teachers for technology integration. Based upon these theories and also based on the constructivist and learner-centred beliefs of the DELCs one would have expected the DELCs to opt for Model 2012 as a behavioural intention. However, when focusing directly on the model or behaviour in question the DELCs, whilst indicating their support for the model as an ideal, in reality they did not have intentions to enact all elements of the model and especially the more constructivist / teacher-as-student centred aspects would present greater challenges in practice. This ambivalence about the behaviour, about the full implementation of the model is borne out by the salient beliefs and attitudes that the TPB indicates are relevant for explaining and predicting behaviour. Whereas there is a slightly more than 50% chance that the DELCs would enact the behaviour, there is also a only slightly less than 50% chance that they would not (See Table 18 on page 79 and the discussion that follows the table). This ambivalence may be explained, by some of the factors of the TPB model itself . Ambivalence towards the behavioural intention may have been affected by two key elements: firstly the DELCs are negatively affected by a range of constraining factors (like GoL functionality, high DELC-to-teacher ratio, etc) which seem to have a negative bearing on their control beliefs. Secondly, whilst there is widespread approval for the nature of the behavioural intention by significant roleplayers, there is little actual pressure to perform the type of model in question. Rather roleplayers mostly want to see some sort of support and development rather than a particular kind.

So do constructivist / learner-centred pedagogical beliefs determine constructivist / learner-centred practice? From the conclusions of the qualitative strand of this study it would seem not. This is in line with Fang's (1996) theory that there are many instances where pedagogical beliefs and practice are consistent with each other but that there also many instances when they are not consistent with each other These findings need to be triangulated with the quantitative strand of the study to see if the same conclusions would be ascertained there.

4.3 Mixed Methods Results

The mixed methods results are based on merging key results and related inferences from each strand of the study. The degrees to which the results and inferences converge or diverge are examined and then a mixed method inference is made. These inferences will then linked to the main research question that needs to be answered in the final chapter (Creswell & Clark, 2011 , loc 2408).

Table 20: Mixed Methods - Convergence and Divergence of Quantitative and Qualitative results and inferences

<table>
<tr><th>Issues that have merged in the quantitative and qualitative strands</th><th>QUAN Results</th><th>QUAL Results</th></tr>
<tr><td>Knowledge of the DELCs</td><td>The following emerged as the TPACK knowledge levels of the DELCs

<table><tr><th>Construct</th><th>Mean</th><th>Std Dev</th></tr><tr><td>TPACK</td><td>4.50</td><td>0.56</td></tr><tr><td>TK</td><td>4.85</td><td>0.35</td></tr><tr><td>TPK</td><td>4.38</td><td>0.62</td></tr><tr><td>CK</td><td>4.35</td><td>0.62</td></tr><tr><td>PCK</td><td>3.79</td><td>0.96</td></tr><tr><td>PK</td><td>4.41</td><td>0.55</td></tr><tr><td>TCK</td><td>4.43</td><td>0.67</td></tr><tr><td>Overall</td><td>4.34</td><td>0.62</td></tr></table></td><td>The following emerged as the DELCs' perceptions of the type of knowledge required for technology integration

• Computer skills and technology knowledge (12)
• Curriculum and content knowledge (9)
• Teaching & facilitation skills and knowledge about teaching and learning methods especially related to ICTs (7)
• Skills for supporting teachers and knowledge of support methods (7)
• Knowledge of digital support materials and educational software (6)
• Knowledge about how ICTs should be managed in schools for teaching and learning purposes (5)
• Knowledge of ICT-in-Education policies and policy implementation skills (5)</td></tr>
<tr><td>Related inference</td><td>The DELCs have a strong self-reported level of TPACK which would most probably play a role in the nature of support and professional development they give teachers. The strongest knowledge measured was TK and the lowest PCK.</td><td>Although the knowledge types do not reflect the DELCs' self-efficacy in these areas they do reflect what they consider to be most important. Technological knowledge and skills emerged as a dominant requirement for the DELCs</td></tr>
<tr><td>Mixed Method inference</td><td colspan="2">The quantitative and qualitative data seem to converge quite well around the issue of TPCK. The quantitative and qualitative results and their inferences both stress that an integrated pedagogical, technological and content knowledge set is important for DELCs to carry out their support and professional development role. The DELCs believed their technological skills to be the strongest in the knowledge and skills set and this was borne out by the high level of importance the DELCs gave to technological knowledge. However, the DELCs have also emphasized the importance of content in the process of integration and it cannot therefore be inferred that the type of support and professional development that the DELCs would provide would only be of a technological nature, for instance like computer skills training.</td></tr>
<tr><td>Learner-Centred related beliefs of the DELCs</td><td>The following emerged as the relative strengths of the pedagogical beliefs of the DELCs as they related to learner-centeredness

<table><tr><th>Construct</th><th>Standardised mean</th><th>Standardised Std Dev</th></tr><tr><td>LC</td><td>4</td><td>0.85</td></tr><tr><td>NLC1</td><td>3.09</td><td>1.01</td></tr><tr><td>NLC2</td><td>3.5</td><td>1.1</td></tr></table></td><td>The following emerged as the learner-centred related beliefs of the DELCs

• Multimedia (15)
• Discovery learning (13)
• Information processing (12)
• Activity-based learning (11)
• Motivation (10)</td></tr>
</table>

Issues that have merged in the quantitative and qualitative strands	QUAN Results	QUAL Results
		• Nurturing (10) • Collaborative learning (6) • Teacher as facilitator rather than instructor (4)
Related inferences	When compared to international standards the beliefs of the DELCs were strongly learner-centred	The nature of the pedagogical belief set that emerged for the DELCs was significantly learner-centred
Mixed Method inference	There is a strong convergence between the quantitative and qualitative data and inferences around the issue of learner-centred beliefs. With regard to the pedagogical beliefs of the DELCs the quantitative and qualitative results and inferences indicate that the DELCs have a firm belief in learner-centeredness. The qualitative strand does indicate that the DELCs would use teacher-as-student centred methods like "learning by design" therefore giving some credence to the view that pedagogical beliefs play a role in shaping practice	
Constructivist related beliefs of the DELCs	The following emerged as the measure of the DELCs constructivist related beliefs **Construct** **Mean** **Std Dev** CON 3.40 1.29	Constructivism involves teachers recognising and building on learners' current knowledge and should then proceed with a guided and sequenced approach to teaching
Related inferences	The international literature does not provide a norm against which the measure of the constructivist related beliefs of the DELCs can be measured. Nevertheless we could infer this result indicating a moderate to fair set of constructivist beliefs	The DELCs did espouse constructivist beliefs but they were not very firmly expressed and did not contain much form or substance. However there is alignment between the pedagogical beliefs and the DELCs' GoL beliefs where they indicated that subject-content should play more of a role in integration.
Mixed Method inference	The moderate measure of the DELCs' constructivist beliefs as well as the moderate expression of these beliefs in the qualitative strand would seem to indicate that the findings in these two approaches do converge, but they converge around weak constructs in each of the strands. There is some alignment between the learner-centred beliefs of the DELCs and their constructivist related beliefs as well as their beliefs about GoL and this is likely to translate into some type of constructivist support and professional development to be given to teachers but which would not necessarily be exactly the same as Model 2012. However the espoused primacy of content in technology integration may not translate into practice when the training and support is given.	
The relationship between the DELCs' knowledge and pedagogical beliefs and the type of support and professional development to be provided.	The quantitative data does show some tenuous and statistically insignificant relationship in these two areas, but for the rest, the data does not show a relationship. TPACK – BI Coefficient .355 (p = 0.149) LC – PCK Coefficient 0.423 (p = 0.080)	The quantitised qualitative data indicates that the majority of the DELCs that were interviewed would use demonstration, modelling, learning by design techniques for teacher development (10 out of 11). Only 5 out of 11 indicated that they would use JiT mentoring. The qualitative data does show an alignment and links between the DELCs' GoL, Learner-centred and constructivist beliefs as well as aspects of their support and development functions
Related inferences	The inferences that could emerge from a	From the interview data it can be

Issues that have merged in the quantitative and qualitative strands	QUAN Results	QUAL Results
	statistical examination of the constructs are that there is only a very tenuous link between the knowledge of the DELCs and their only minor intention to perform the behaviour in question. There is obviously a stronger link between the learner-centred beliefs of the DELCs and their pedagogical content knowledge. However this inference is not statistically valid.	ascertained there is a relationship between the pedagogical beliefs of the DELCs and the type of support they will provide. The qualitative data does not demonstrate in any way that this relationship is a determining or predictive one.
Mixed Method Inference	The quantitative data does not establish a relationship between pedagogical beliefs and the kind of support and professional development that the DELCs will give teachers. However the qualitative data does indicate that there is a relationship. The data do not converge at this point. However, the qualitative takes the issue further where the quantitative fails to establish a relationship. When thinking about the kind of support and development that they need to give teachers the DELCs are thinking about effective ways of doing this so that they can get teachers to integrate technology	
The predictive power of BB, OE, ATB, NB, MC, CB, PF, PBC and BI	Valid statistical regression tests could not be run because of violations to the requirements for inferential validity, so it is impossible to say whether the regression texts that were run can carry any weight at all. Having said this the regression tests that were run only showed BB & OE as a predictor of ATB. However ATB was not a predictor of BI.	The qualitative results do show that relationships exist between the constructs of the TPB model although it is not possible to say whether these are predictive relationships or not.
Related inferences	It is not possible to make any quantitative meaningful inferences because the basic validity and reliability requirements for inferential analysis were violated. It is not possible to show the predictive relationships between the constructs and behavioural intention.	From a qualitative perspective the TPB does provide a useful model for looking at behaviour. It brings together attitudes towards the behaviour which is based on educational evaluations of the kind of outcomes that could be achieved by the behaviour together with social and logistical concerns.
Mixed Methods inference	In this particular study the constructs of the TPB have proved to be more useful for the qualitative strand than for the quantitative strand. However, they do not give a qualitative approach to the TPB predictive power. Rather they give it a well-structured approach to describing and explaining complex human behaviour.	

5 CHAPTER 5 - Conclusion

5.1 Discussion, conclusion and future directions

Having answered all the subsidiary questions in some manner it is now time to answer the main question. I re-present the main question here.

What is the likelihood that GDE District eLearning Coordinators (DELCs) will carry out their roles in a constructivist "just-in-time" manner with respect to the Gauteng Online laboratories? (MM question)

MM hypothesis: The DELCs are likely to perform (or have a BI of providing) a JiT support and constructivist training (claim) if they have an appropriate level of TPACK, Learner-centred and constructivist beliefs as well as appropriate attitudes towards the BI.

It is not usual or necessary to have a hypothesis linked to a mixed methods question, but I find it a useful heuristic to assist me in answering the question.

The type of answer that should go into this final section of a mixed methods research report should be a meta-inference, an inferences of inferences (Creswell & Clark, 2011; Teddlie & Tashakkori, 2009) and this is what I will attempt to do in trying to answer the research question without simply repeating what I have already answered. I will attempt to go to the next level of abstraction. The first point that I want to make is that I prefer the way the main question is phrased compared to the way I posed the questions to the DELCs. Let me explain. But first I should re-present my Model 2012 here, which in my view is partly to blame for the quantitative problems I have faced in this research.

> The behaviour of interest that I am looking at is defined as: "This coming year (2012) the DELC will run teacher development training on how to integrate GoL labs into teaching and learning which will be held in the GoL labs in the school. The DELC will run training for either teachers per Grade or per learning area speciality. After each workshop the DELC will be available for "just-in-time" mentoring for all teachers." I have called this "Model 2012" in the survey questionnaire.

Early in the report I provided a motivation for why I constructed this "behaviour" in this way. To me it represented a model of teacher support and professional development that reflected constructivist learner-centred principles where instruction and the teaching of curriculum content play the central role in technology integration. It is based to some extent on the work of Harris (2008), Kopcha (2008), Richardson (2003) and Mishra & Koehler (2006) in their approach to teacher development for technology integration. The second factor that influenced the formulation of the behaviour was contextual which I have alluded to early on in the report – GoL, CAPS and the new strategic approach of the GDE management as well as some of the strivings of a few DELCs for a new teacher development model to suit this changing environment. A challenging question would be: Is this the only constructivist teacher-as-student centred model of teacher development for technology integration for our times? And did this model emerge organically from amongst the DELCs themselves? The answer to the first question is no, and to the second only partly no or partly yes.

Model 2012 as formulated in the box above operated as a proxy to assist in answering the main question as the main question is formulated. The main question does not refer to Model 2012, it refers to roles being performed in a constructivist JiT manner. Model 2012 is only one concrete expression of a district role being performed in a constructivist JiT manner. But the TPB does not like the behaviour that it studies being formulated in such broad terms as roles and functions, it wants concrete granular expressions of behaviour (Ajzen, 1991; Lee et al., 2010) like "Will I use a particular piece of hardware when I teach my classes this semester?" Broader formulations do not seem to have had great success with the TPB (Salleh & Albion, 2004; Sugar, Crawley, & Fine, 2004b).

But to go back to the main question and the hypothesis that I have attached to it, I first want to start with the hypothesis. Do the DELCs have an appropriate level of TPACK? The research has at least given a very positive answer to that question – it is a yes. Do the DELCs have strong learner-centred constructivist beliefs? With some very slight reservations, I would once again say yes. And do the DELCs have a positive attitude to the BI as formulated, i.e. Model 2012? The research says that the DELCs have an ambivalent attitude towards that particular model of teacher support and development. Some of the reasons for the ambivalence relate to what Azjen (1991) has called control beliefs (time, human resources, work overload, etc.) – the usual complaints from public servants. Some of the reasons for the ambivalence relates to whether some of the DELCs think it will actually work in practice. As one DELC said in his interview: *"I think that would be ideal. Now what is happening is not really that, because we integrate across…."*.

I want to pose a couple more questions to assist in answering the main question.

Do the DELCs have the intention to perform Model 2012? The answer is that some do and some don't. And for those that don't, most if not all, have intentions to perform at least some aspects of Model 2012. And for those that do have intentions to perform Model 2012 it is only likely that they will only be able to actually perform some aspects of the behaviour anyway.

As I have said, the behaviour, Model 2012 is merely a proxy for constructivist JiT district support and development roles. So in saying that the DELCs have an ambivalent attitude towards the behaviour as formulated does that mean the DELCs will also have an ambivalent attitude towards their a broader DELC role being performed in a constructivist JiT manner? And I think the answer to that question is likely to be a no. I think the DELCs have an intention to perform their broader role in a JiT constructivist manner. Why do I say that now that I have released myself from the shackles of the TPB? Firstly the DELCs have a strong TPACK and the theory and empirical research says that with a strong TPACK, technology integration practice will improve (Harris, Mishra, & Koehler, 2009; Voogt et al., 2012). Secondly, the DELCs have a strong set of learner-centred constructivist beliefs. And once again the literature, both for teachers as well as district officials says that there is a strong positive relationship between pedagogical beliefs and practice (Ertmer, 2005; Ertmer et al., 1999; Hightower, Knapp, Marsh, & McLaughlin, 2002; Palak, 2004; Palak & Walls, 2009; Spillane, 2002; Stein & D'Amico, 2002) even though this research sometimes shows a consistent relationship between pedagogical beliefs and practice and other times an inconsistent relationship (Fang, 1996). And thirdly, I believe the DELCs will perform their roles in a constructivist JiT manner is because the DELCs have more or less said so themselves. In the online survey I posed the following question to the DELCs

"172. What do you believe are the priority functions of the District eLearning Coordinator in the district? Put the following into order of priority." I presented the following functions to the DELCs in a scrambled way and this is how they prioritised there answer:

Table 21: Priority role of the DELCs

Item	Total Score	Overall Rank
Professional development of SMTs and teachers	175	1
Implementing national, provincial and district policy	161	2
Integration support	153	3
Communicating the integration message	139	4
Pedagogical support	139	5
Institutional support	135	6
Subject Content support	111	7
Monitoring and evaluating	104	8
Providing resources	95	9
Technical support	79	10
Applying pressure on schools	33	11
Getting schools to account	33	12

Note that in this priority list professional development is at the top, integration support is high up the list and pedagogical and subject content supports are higher up the list than technical support. Yes I do believe that the DELCs are more than likely to perform their roles in a constructivist just-in-time fashion in relation to the integration of GoL laboratories.

Having answered the main research question (I hope) I will now turn to a brief discussion of the research project itself. Firstly I want to comment on TPB which is the theoretical model of behaviour that drove this study. The TPB has it strengths and weaknesses. Firstly, it is a psychological theory and this is both a strength and a weakness. It is strong because it focuses on the individual and explains and predicts the behaviour of individuals. However, that is also its weakness. It does not look to broader social and cultural practices as determinants of behaviour. DELCs operate within an organisational culture and this culture is imbued with collective beliefs of its membership. These beliefs as social structure, as social "facts" as Durkheim would call it also play a role in determining practice. And even though Azjen brings this in to some extent through his ideas of Normative Beliefs and Subjective Norm this does not, in my view capture the strength of organisational culture as practice (Burrell, 1979). Secondly, it focuses on behaviour and action in isolation from other behaviours and actions that are part of the individuals make up. Just as beliefs are part of a mental system as well as a cultural system so too are behaviours part of a system both for the individual as well as socially. It is some of these weaknesses of the TPB, I believe led to some, not all, of the difficulties I experienced with the quantitative data. In making the theoretical model work statistically the TPB has sanitised itself from complexity. It is easy to measure whether I am going to give up smoking or not, but it not so easy to measure whether I am going to provide JiT support or not.

Having said that, my study was severely limited by the statistical dimensions and these challenges have nothing to do with the TPB but with the conduct of the research itself. Sample size is crucial to short out for a study of this nature. Not being able to get valid and reliable statistical results negatively impacted on the design of this mixed research model used for the study. Proper triangulation could not take place because of the limited quantitative results of this study. The

quantitative was supposed to be merged with the qualitative, but this is not really possible with faulty quantitative results. However, as I indicated in the report, I was aware of the possible threat to statistical validity and this was one of the reasons I opted for the mixed methods approach (Creswell & Clark, 2011; Teddlie & Tashakkori, 2009). The weaknesses of the quantitative strand of the project were compensated for by the strength of the qualitative side.

The last point leads me on to a discussion about mixed methods approaches. Johson & Onwuegbuzie (2004) argue strongly that there is too much of a bipolar dichotomy between the notions of quantitative and qualitative and the two should be viewed as poles on a continuum and not poles apart. I agree with this argument. For instance the manner in which Renzi (Renzi, 2008; Renzi & Klobas, 2008) enhanced the typically quantitative basis of the TPB was refreshing and innovative and brought a new dimension to the TPB and is a reason why I also decided to use quantitative and qualitative methods together in dealing with the TPB. Using mixed methods is challenging and does add complexity to the research process, but life is complex and research that does not reflect that complexity is most probably off target.

This study has attempted to make a number of contributions to the research agenda. Firstly it has tried to enhance the profile of district officials as an important area of research. The literature on the role that districts could play in improving the quality of teaching and learning is sparse and certainly needs enrichment (Janney, 2010) but more importantly research on the pedagogical role of districts is in very short supply and there is no research that I know of that focuses on the role of district officials in promoting the pedagogical integration of ICTs. This is a very important area to focus on as the role of ICTs in education becomes more strategically important and as vast amounts of public funds will be spent on ICTs in education. Most of the research on districts focuses on management and administrative issues and this shortfall needs to be redressed. It is my hope that this research will help in enhancing the quality of technology integration by supporting and encouraging the DELCs in the very difficult challenges that they have to deal with. I believe that future research should focus on the role of key strategic structures like educational districts and the role they can play in the pedagogical integration of ICTs.

References

Abbit, J. (2011). Measuring Technological Pedagogical Content Knowledge in Preservice Teacher Education - A Review of Current Methods and Instruments. *Journal of Research on Technology in Education, 43*(4), 281 - 300.

Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. In J. Kuhi & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 11-39). Heidelberg: Springer.

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behaviour and Human Decision Processes, 50*, 179 - 211.

Ajzen, I. (2006). Constructing a TpB Questionnaire: Conceptual and Methodological Considerations. 1-14. Retrieved from Icel Ajzen website: http://people.umass.edu/aizen/tpb.html

Ajzen, I. (2012). The Theory of Planned Behaviour. In P. Lange, Kruglanski, A. & Higgins, E. (Ed.), *Handbook of theories of social psychology* (Vol. 1, pp. 438 - 459). London: Sage.

Ajzen, I. (n.d.). Theory of Planned Behavior, 2012, from http://people.umass.edu/aizen/index.html

An, Y. J., & Reigeluth, C. (2011). Creating Technology-Enhanced, Learner-Centered Classrooms: K–12 Teachers' Beliefs, Perceptions, Barriers, and Support Needs *Journal of Digital Learning in Teacher Education, 28*(2), 54-62.

Bai, H., & Ertmer, P. A. (2008). Teacher Educators' Beliefs and Technology Uses as Predictors of Preservice Teachers' Beliefs and Technology Attitudes. *Journal of Technology and Teacher Education, 16*(1), 93-112.

Bandura, A. (1997). *Self-efficacy: the exercise of control*. New York: W.H. Freeman.

Baser, V. G. (2011). *An Investigation Of Relationship Between Pre-Service Elementary Teachers' Pedagogical Beliefs And Their Technology Integration Perception Vesile*. Paper presented at the 2nd International Conference on New Trends in Education and Their Implications, Antalya-Turkey.

Bazeley, P. (2007). *Qualitative Data Analysis with NVivo*. Los Angeles: Sage.

Beck, J., Czerniak, C., & Lumpe, A. (2000). An Exploratory Study of Teachers' Beleifs Regarding the Implementation of Constructivism in Thier Classrooms. *Journal of Science Teacher Education, 11*(4), 323 - 343.

Becker, H. (2000). Findings from the Teaching Learning and Computing Survey Is Larry Cuban Right *Teaching Learning and Computing Survey*, from http://www.crito.uci.edu/tlc/html/findings.html

Becker, H. J., & Anderson, R. E. (1998). Teaching Learning, and Computing: 1998 A National Survey of Schools and Teachers

Describing Their Best Practices, Teaching Philosophies, and Uses of Technology. http://www.crito.uci.edu/tlc/html/tlc_home.html

Booth, W., Colomb, G., & Williams, J. (2008). *The Craft of Research* (3rd ed.). Chicago: The University of Chicago Press.

Burgoyne, N. (2010). *Investigating the Reliabilty and Construct Validity of a Measure of Preservice Teachers' Self-Efficacy for TPACK.* Masters, Brigham Young University.

Burgoyne, N., Graham, C. R., & Sudweeks, R. (2010). *Assessing the Validity and Reliability of an Instrument Measuring TPACK*. Paper presented at the Proceedings of Society for Information Technology Teacher Education International Conference 2010 (2010). www.editlib.org

Burrell, G. (1979). *Sociological Paradigms and Organisational Analysis*. London: Heinemann.

Chai, C. S., & Tsai, C.-C. (2011). Exploring the Factor Structure of the Constructs of Technological, Pedagogical, Content Knowledge (TPACK). *The Asia-Pacific Education Researcher, 20*(3), 595-603.

Chen, C.-H. (2008). Why Do Teachers Not Practice What They Believe Regarding Technology Integration? *Journal of Educational Research, 102*(1), 65-75.
Cohen, L., Manion, L., & Morrison, K. (2007). *Research Methods in Education* ([Kindle], 6th ed.). London and New York: Routledge.
Corbin, J., & Strauss, A. (2008). *Basics of Qualitative Research*. Thousand Oaks, California: SAGE.
Cox, M., Webb, M., Abbott, C., Blakeley, B., Beauchamp, T., & Rhodes, V. (2003). ICT and Pedagogy: A review of the research literature. London: BECTA.
Creswell, J., & Clark, V. (2011). *Designing and Conducting Mixed Methods Research* ([Kindle Edition], 2nd ed.). Los Angeles: Sage.
Creswell, J. W. (2009). *Research Design: Qualitative, Quantitaive and Mixed Method Approaches* ([Kindle Edition], 3rd ed.). Los Angeles: Sage.
Creswell, J. W. (2012). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research* (4th Edition ed.). Boston: Pearson.
DBE. (2011). *Guidelines on the Organisation, Roles And Responsibilities f Education Districts - "Better Districts, Better Quality".* Pretoria.
DoE. (2009). *Report of the Task Team for the Review of the Implementation of the National Curriculum Statement*. Pretoria: Department of Education.
Ertmer, P. A. (2005). Teacher Pedagogical Beliefs: The Final Frontier in Our Quest for Technology Integration? *Educational Technology Research and Development, 53*(4), 25-39.
Ertmer, P. A., Addison, P., Lane, M., Ross, E., & Woods, D. (1999). Examining Teachers' Beliefs about the Role of Technology in the Elementary Classroom. *Journal of Research on Computing in Education, 32*(1), 54-73.
Fang, Z. (1996). A review of research on teacher beliefs and practices. *Educational Research, 38*(1), 47-65.
Field, A. (2009). *Discovering Statistics Using SPSS*. London: SAGE Publications.
Fives, H., & Buehl, M. M. (2005). *Assessing Teachers' Beliefs about Pedagogical Knowledge: Developing an Instrument.* Paper presented at the Annual Meeting of the Southwest Educational Research Association, New Orleans, LA.
Fleisch, B. (2003). *What Works in Education District Development: Lessons from the Field*. Johannesburg: Business Trust.
Fox, D. (1983). Personal theories of teaching. *Studies in Higher Education, 8*(2), 151-163. doi: 10.1080/03075078312331379014
Francis, J. J., Eccles, M. P., Johnston, M., Walker, A., Grimshaw, J., Foy, R., . . . Bonetti, D. (2004a). Appendix C: Discussion Paper - Measurement Issues in the Theory of Planned Behaviour: A supplement to the Manual for constructing questionnaires based on the Theory of Planned Behaviour *A Manual for constructing questionnaires based on the Theory of Planned Behaviour*. Newcastle Upon Tyne, United Kingdom.: Centre for Health Services Research.
Francis, J. J., Eccles, M. P., Johnston, M., Walker, A., Grimshaw, J., Foy, R., . . . Bonetti, D. (2004b). *Constructing Questionnaires Based on the Theory of Planned Behaviour: A Manual for Health Services Researchers*. Newcastle Upon Tyne, United Kingdom.: Centre for Health Services Research.
GDE. (2010). *Gauteng Online Utilisation Strategy - A Presentation to the BMT*. Johannesburg: Gauteng Department of Education.
Glazer, E., Hannafin, M. J., & Song, L. (2005). Promoting Technology Integration Through Collaborative Apprenticeship. *Educational Technology Research and Development, 53*(4), 1042 - 1629.
Graham, C. R., Cox, S., & Velasquez, A. (2009). *Teaching and Measuring TPACK Development in Two Preservice Teacher Preparation Programs.* Paper presented at the Proceedings of Society for Information Technology & Teacher Education International Conference 2009. Retrieved from http://www.editlib.org/p/31297. , Chesapeake, VA.

Gül Baser, V. (2011). *An Investigation of Relationship Between Pre-Service Elementary Teachers' Pedagogical Beliefs and their Technology Integration Perception*. Paper presented at the 2nd International Conference on New Trends in Education and Their Implications, Antalya-Turkey. www.iconte.org

Haney, J. J., & McArthur, J. (2002). Four case studies of prospective science teachers' beliefs concerning constructivist teaching practices. *Science Education, 86*(6), 783-802. doi: 10.1002/sce.10038

Harris, J. (2008). TPCK in in-service education: assisting experienced teachers' "planned improvisations". In AACTE (Ed.), *Handbook of Technological Pedagogical Content Knowledge (TPCK) for Educators* New York: Routledge.

Harris, J., Mishra, P., & Koehler, M. J. (2009). Teachers' Technological Pedagogical Content Knowledge and Learning Activity Types: Curriculum-based Technology Integration Reframed. *Journal of Research on Technology in Education, 41*(4), 393-416.

Hausfather, S. (2001). Where's the Content: The Role of Content in Constructivist. *educational HORIZONS 15*.

Higgins, S., & Moseley, D. (2001). Teachers' thinking about information and communications technology and learning: beliefs and outcomes. *Teacher Development, 5*(2), 191-210. doi: 10.1080/13664530100200138

Hightower, A., Knapp, M., Marsh, J., & McLaughlin, M. (2002). *School Districts and Instructional Renewal.* . New York: Teachers College Press.

Hurworth, R. (2012). Techniques to assist with interviewing. In J. Arthur, M. Waring, R. Coe & L. Hedges (Eds.), *Research Methods and Methodologies in Education* (eBook ed.). London: SAGE.

ITWeb. (2011). Gauteng Online Failing, from http://www.itweb.co.za/

ITWeb. (2011a). Gauteng Online is failing, from http://www.itweb.co.za/

ITWeb. (2012). Gauteng Online project at schools falls short – audit, from http://www.itweb.co.za/

Janney, K. (2010). *A School District as an Institutional Actor in Systemic Reform - A Mixed Methods Case Study*. Doctor of Education, San Diego State University.

Johnson, A., & Onwuegbuzie, A. (2004). Mixed Methods Research - A Research Paradigm Whose Time Has Come. *Educational Researcher, 33*(7), 14 -26.

Jonassen, D., Howland, J., Marra, R., & Crismond, D. (2008). *Meaningful Learning with Technology*. New Jersey: Pearson Merrill/Prentice Hall.

Judson, E. (2006). How Teachers Integrate Technology and Their Beliefs About Learning: Is There a Connection? *Journal of Technology and Teacher Education, 14*(3), 581-597.

Karsenti, T., Harper-Merrett, T., Traore, D., Mbangwana, M., & Toure, K. (2009). *The PanAfrican Resaecr Agenda on the Pedagogical Integration of ICTs*. Paper presented at the The 3rd OECD World Forum on "Statistics Knowledge and Policy: Charting Progress, Building Visions, Improving Life, Busan, Korea.

Koehler, M. J. (n.d.). TPACK, 2012, from http://tpack.org/

Kopcha, T. J. (2008). A systems-based approach to technology integration using mentoring and communities of practice. *Educational Technology Research and Development, 58*(2), 175-190. doi: 10.1007/s11423-008-9095-4

Landry, G. A. (2010). *Creating and Validating an Instrument to Measure Middle School Mathematics Teachers' Technological Pedagogical Content Knowledge (TPACK)*. PHd, University of Tennessee - Knoxville. Retrieved from http://trace.tennessee.edu/utk_graddiss/720

Laurillard, D. (2002). *Rethinking University Teaching: A Framework for the effective use of learning technologies*. London: Routledge / Falmer.

Lee, J., Cerreto, F. A., & Lee, J. (2010). Theory of Planned Behavior and Teachers' Decisions Regarding Use of Educational Technology. *Educational Technology & Society, 13*(1), 152–164.

Leech, N. L., & Onwuegbuzie, A. J. (2007). An array of qualitative data analysis tools: A call for data analysis triangulation. *School Psychology Quarterly, 22*(4), 557-584. doi: 10.1037/1045-3830.22.4.557
Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology, 22*(140).
Maxwell, J. A., & Mittapalli, K. (2010). Realism as a stance for mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), *SAGE handbook of mixed methods in social & behavioral research* (2nd ed.). Thousand Oaks, CA: Sage.
Mayer, R. E. (2004). Should there be a three-strikes rule against pure discovery learning? The case for guided methods of instruction. [Review]. *Am Psychol, 59*(1), 14-19. doi: 10.1037/0003-066X.59.1.14
Mayer, R. E. (2009). *Multimedia Learning* (Kindle ed.). New York: Cambridge University Press.
McCombs, B. L., & Whisler, J. S. (1997). *The Learner-Centered Classroom and School: Strategies for Increasing Student Motivation and Achievement*. San Francisco: Jossey-Bass Publishers.
McMillan, J. H. (2012). *Educational Research: Fundamentals for the Consumer*. Boston: Pearson.
McMillan, J. H., & Schumacher, S. (2010). *Research In Education, Evidence-Based Inquiry*. New Jersey: Pearson.
Mishra, P. (n.d.). Punya Mishra's Web, 2012, from http://punya.educ.msu.edu/research/tpck/
Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge *Teachers College Record, 108*(6), 1017 - 1054.
Muijs, D. (2011). *Doing Quantitative Research in Education with SPSS* ([Adobe Digital Editions], 2nd ed.). Los Angeles: Sage.
Munby, H. (1982). The Place of Teachers' Beliefs in Research on Teacher Thinking and Decision Making, and an Alternative Methodology. *Instructional Science 11 (1982) 201-225, 11*, 201-225.
Munby, H. (1984). A Qualitative Approach to the Study of a Teacher's Beliefs. *Journal of Research in Science Teaching, 21*(1), 27 – 38.
Okojie, M. C., Olinzock, A. A., & Okojie-Boulder, T. C. (2006). The Pedagogy of Technology Integration. *The Journal of Technology Studies, 32*(2), 66-71.
Onwuegbuzie, A., & Johnson, R. (2006). The Validity Issue in Mixed Research. *Research in Schools, 13*(1), 48 - 63.
Onwuegbuzie, A. J., & Combs, J. P. (2011). Data Analysis in Mixed Research: A Primer. *International Journal of Education, 3*(1). doi: 10.5296/ije.v3i1.618
Pajares, M. F. (1992). Teachers' Beliefs and Educational Research: Cleaning up a Messy Construct. *Review of Educational Research, 62*(3), 307-.
Palak, D. (2004). *Teachers' Beliefs in Relation to Their Instructional Technology Practices.* Doctor of Education in Technology Education, West Virginia, Morgantown, West Virginia.
Palak, D., & Walls, R. T. (2009). Teachers' Beliefs and Technology Practices: A Mixed-methods Approach. *Journal of Research on Technology in Education, 41*(4), 417–441.
PanAfrican Research Agenda on the Pedagogical Integration of ICTs. (n.d.), from http://www.observatoiretic.org/default/use
Paulhus, D. L., & Vazire, S. (2010). The Self-Report Method. In R. W. Robins, R. C. Fraley & R. F. Krueger (Eds.), *Handbook of Research Methods in Personality Psychology* (pp. 224 - 239). New York: Guilford.
Pierce, R., & Ball, L. (2009). Perceptions that may affect teachers' intention to use technology in secondary mathematics classes. *Educational Studies in Mathematics, 71*(3), 299-317. doi: 10.1007/s10649-008-9177-6
Polanyi, M. (1983). *The Tacit Dimension*. Gloucester, Mass: Peter Smith.
Program, U. C. A. S. M. (n.d), from http://cmcismentorprogram.wordpress.com/
Ravitz, J. L., Becker, H. J., & Wong, Y. (2000). Constructivist-Compatible Beliefs and Practices among U.S. Teachers *Teaching, Learning, and Computing: 1998 National Survey* (pp. 1-68):

Center for Research on Information Technology and Organizations, University of California, Irvine and University of Minnesota.
Renzi, S. (2008). *Differences in University Teaching after Learning Management System Adoption - An Explanatory Model Based on Ajzen's Theory of Planned Behavior.* PHd, The University of Western Australia, Perth.
Renzi, S., & Klobas, J. (2008). Using the Theory of Planned Behavior with Qualitative Research (Version Working Paper Number 12): Centre for Research on Social Dynamics (DONDENA), Università Commerciale Luigi Bocconi in its series Working Papers with number 012. Retrieved from www.dondena.unibocconi.it/wp12
Richardson, V. (2003). Constructivist Pedagogy. *Teachers College Record, 105*(9), 1623-1640.
Ronau, R. N., & Rakes, C. R. (2012). Making the Grade - Reporting Educational Technology and Teacher Knowledge Research In R. N. Ronau, C. R. Rakes & M. L. Niess (Eds.), *Educational Technology, Teacher Knowledge, and Classroom Impact - A Research Handbook on Frameworks and Approaches*. Hershey PA: Information Science Reference.
Rowan, B., Schilling, S. G., Ball, D. L., Miller, R., Atkins-Burnett, S., Camburn, E., . . . Phelps, G. (2001). *Measuring Teachers' Pedagogical Content Knowledge (PCK) in Surveys: An Exploratory Study*.
SA_IT_NEWS. (2012). 700 000 learners using Gauteng Online, Retrieved from http://saitnews.co.za/internet/learners-gautengonline/
Sahin, I. (2011). Development of Survey of Technological Pedagogical and Content Knowledge (TPACK). *The Turkish Online Journal of Educational Technology, 10*(1), 97-105.
SAIDE. (2010). e-Maturity and e-Readiness Assessment Report *Prepared for the Gauteng Department of Education (GDE)* (pp. i-123): GDE.
Salleh, S. M., & Albion, P. R. (2004). *Using the Theory of Planned Behaviour to predict Bruneian teachers' intentions to use ICT in teaching*. Paper presented at the Proceedings of Society for Information Technology & Teacher Education International Conference 2004 Chesapeake, VA. Retrieved from http://www.editlib.org/p/13671
Sandelowski, M. (2001). Real Qualitative Researchers Do Not Count - The Use of Numbers in Qualitative Research. *Research in Nursing and Health,* 24, 230 -240.
Sandelowski, M., Voils, C. I., & Knafl, G. (2009). On Quantitizing. *J Mix Methods Res, 3*(3), 208-222. doi: 10.1177/1558689809334210
Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J., & Shin, T. S. (2009). Technological Pedagogical Content Knowledge (TPACK): The Development and Validation of an Assessment Instrument for Preservice Teachers. *Journal of Research on Technology in Education, 42* (2), 123–149.
Silverman, D. (2006). *Interpreting Qualitative Data: Methods for Analyszing Talk, Text and Interaction* ([Kindle], Third ed.). London, Thousand Oaks, New Dehli: SAGE Publications.
Spillane, J. P. (2002). Local Theories of Teacher Change: The Pedagogy of District Policies and Programe. *Teachers College Record, 104*(3), 377-420.
Stein, M., & D'Amico, L. (2002). The District as a Professional Learning Laboratory. In A. Hightower, M. Knapp, J. Marsh & M. McLaughlin (Eds.), *School Districts and Instructional Renewal.* New York: Teachers College Press.
Sugar, W., Crawley, F., & Fine, B. (2004a). Examining teachers' decisions to adopt new technology. *Educational Technology and Society, 7*(4), 201 - 213.
Sugar, W., Crawley, F., & Fine, B. (2004b). Examining teachers' decisions to adopt new technology. *Educational Technology and Society, 7*(4), 201-213.
Teddlie, C., & Tashakkori, A. (2003). Major issues and controversies in the use of mixed methods in the social and behavioural sciences. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioural research.* Thousand Oaks, CA: Sage.

Teddlie, C., & Tashakkori, A. (2009). Foundations of Mixed Methods Research: Integrating Quantitative and Qualitative Approaches in the Social and Behavioural Sciences (eBook ed.). Thousadnd Oaks: SAGE.

Villegas-Reimers, E. (2003). *Teacher professional development: an international review of the literature*. Paris: UNESCO: International Institute for Educational Planning.

Voogt, J., Fisser, P., Pareja Roblin, N., Tondeur, J., & van Braak, J. (2012). Technological pedagogical content knowledge - a review of the literature. *Journal of Computer Assisted Learning*, no-no. doi: 10.1111/j.1365-2729.2012.00487.x

Watson, D. (2001). Pedagogy before Technology - Re-thinking the Relationship between ICT and Teaching. *Education and Information Technologies, 6*(4), 251 - 266.

Williams, K. (2007). *Beliefs about Technology Integration Support Factors Held by School Leadership and School Faculty: A Mixed Methods Study.* Doctor of Philosophy, Georgia State University. Retrieved from http://digitalarchive.gsu.edu/msit_diss/14

Appendix A: Correlations

Correlations

		CON_TOT	TPACK_TOT	TPK_TOT	PCK_TOT	PK_TOT	LC_TOT	BI_TOT
CON_TOT	Pearson Correlation	1	.042	.037	.142	-.191	.282	.163
	Sig. (2-tailed)		.867	.884	.575	.447	.257	.519
	N	18	18	18	18	18	18	18
TPACK_TOT	Pearson Correlation	.042	1	.898**	.434	.807**	.371	.272
	Sig. (2-tailed)	.867		.000	.072	.000	.130	.274
	N	18	18	18	18	18	18	18
TPK_TOT	Pearson Correlation	.037	.898**	1	.285	.697**	.329	.298
	Sig. (2-tailed)	.884	.000		.252	.001	.183	.230
	N	18	18	18	18	18	18	18
PCK_TOT	Pearson Correlation	.142	.434	.285	1	.109	.494*	.252
	Sig. (2-tailed)	.575	.072	.252		.668	.037	.312
	N	18	18	18	18	18	18	18
PK_TOT	Pearson Correlation	-.191	.807**	.697**	.109	1	.145	.020
	Sig. (2-tailed)	.447	.000	.001	.668		.566	.936
	N	18	18	18	18	18	18	18
LC_TOT	Pearson Correlation	.282	.371	.329	.494*	.145	1	-.078
	Sig. (2-tailed)	.257	.130	.183	.037	.566		.759
	N	18	18	18	18	18	18	18
BI_TOT	Pearson Correlation	.163	.272	.298	.252	.020	-.078	1
	Sig. (2-tailed)	.519	.274	.230	.312	.936	.759	
	N	18	18	18	18	18	18	18

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

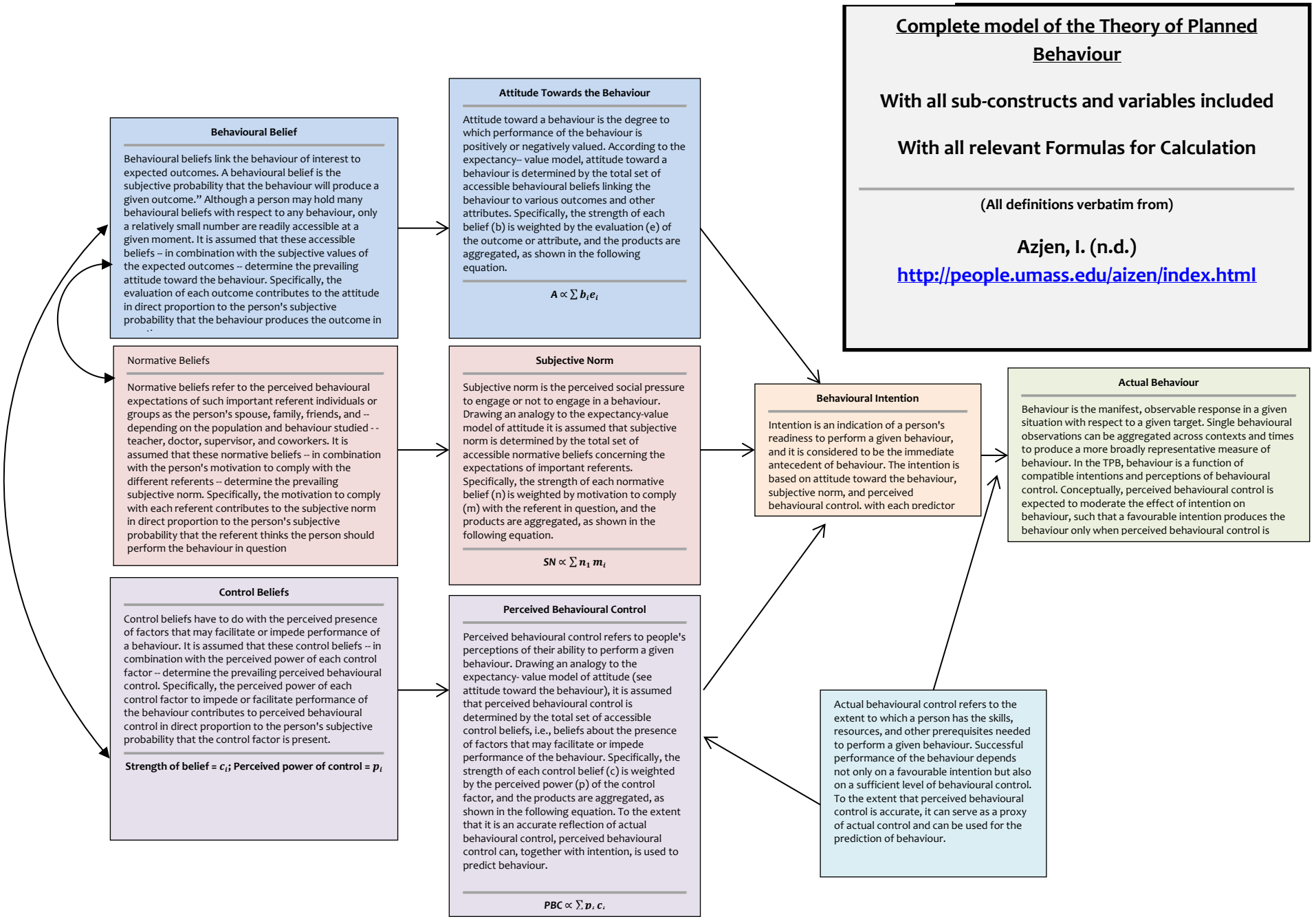
			CON_TOT	TPACK_TOT	TPK_TOT	PCK_TOT	PK_TOT	LC_TOT	BI_TOT
Kendall's tau_b	CON_TOT	Correlation Coefficient	1.000	.020	-.055	.064	-.218	.165	.131
		Sig. (2-tailed)	.	.909	.759	.725	.238	.357	.466
		N	18	18	18	18	18	18	18
	TPACK_TOT	Correlation Coefficient	.020	1.000	.805**	.483**	.635**	.150	.273
		Sig. (2-tailed)	.909	.	.000	.008	.001	.399	.125
		N	18	18	18	18	18	18	18
	TPK_TOT	Correlation Coefficient	-.055	.805**	1.000	.369*	.585**	.142	.227
		Sig. (2-tailed)	.759	.000	.	.049	.002	.439	.216
		N	18	18	18	18	18	18	18
	PCK_TOT	Correlation Coefficient	.064	.483**	.369*	1.000	.310	.330	.132
		Sig. (2-tailed)	.725	.008	.049	.	.108	.077	.479
		N	18	18	18	18	18	18	18
	PK_TOT	Correlation Coefficient	-.218	.635**	.585**	.310	1.000	.030	-.007
		Sig. (2-tailed)	.238	.001	.002	.108	.	.874	.968

		N	18	18	18	18	18	18	18
	LC_TOT	Correlation Coefficient	.165	.150	.142	.330	.030	1.000	-.035
		Sig. (2-tailed)	.357	.399	.439	.077	.874	.	.847
		N	18	18	18	18	18	18	18
	BI_TOT	Correlation Coefficient	.131	.273	.227	.132	-.007	-.035	1.000
		Sig. (2-tailed)	.466	.125	.216	.479	.968	.847	.
		N	18	18	18	18	18	18	18
Spearman's rho	CON_TOT	Correlation Coefficient	1.000	.027	-.039	.058	-.317	.245	.142
		Sig. (2-tailed)	.	.916	.878	.820	.200	.328	.574
		N	18	18	18	18	18	18	18
	TPACK_TOT	Correlation Coefficient	.027	1.000	.896**	.613**	.752**	.239	.355
		Sig. (2-tailed)	.916	.	.000	.007	.000	.340	.149
		N	18	18	18	18	18	18	18
	TPK_TOT	Correlation Coefficient	-.039	.896**	1.000	.427	.716**	.229	.260
		Sig. (2-tailed)	.878	.000	.	.077	.001	.360	.298
		N	18	18	18	18	18	18	18
	PCK_TOT	Correlation Coefficient	.058	.613**	.427	1.000	.326	.423	.157
		Sig. (2-tailed)	.820	.007	.077	.	.186	.080	.535
		N	18	18	18	18	18	18	18
	PK_TOT	Correlation Coefficient	-.317	.752**	.716**	.326	1.000	.028	-.050
		Sig. (2-tailed)	.200	.000	.001	.186	.	.911	.844
		N	18	18	18	18	18	18	18
	LC_TOT	Correlation Coefficient	.245	.239	.229	.423	.028	1.000	-.057
		Sig. (2-tailed)	.328	.340	.360	.080	.911	.	.822
		N	18	18	18	18	18	18	18
	BI_TOT	Correlation Coefficient	.142	.355	.260	.157	-.050	-.057	1.000
		Sig. (2-tailed)	.574	.149	.298	.535	.844	.822	.
		N	18	18	18	18	18	18	18

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix B: A Comprehensive Overview of the Theory of Planned Behaviour

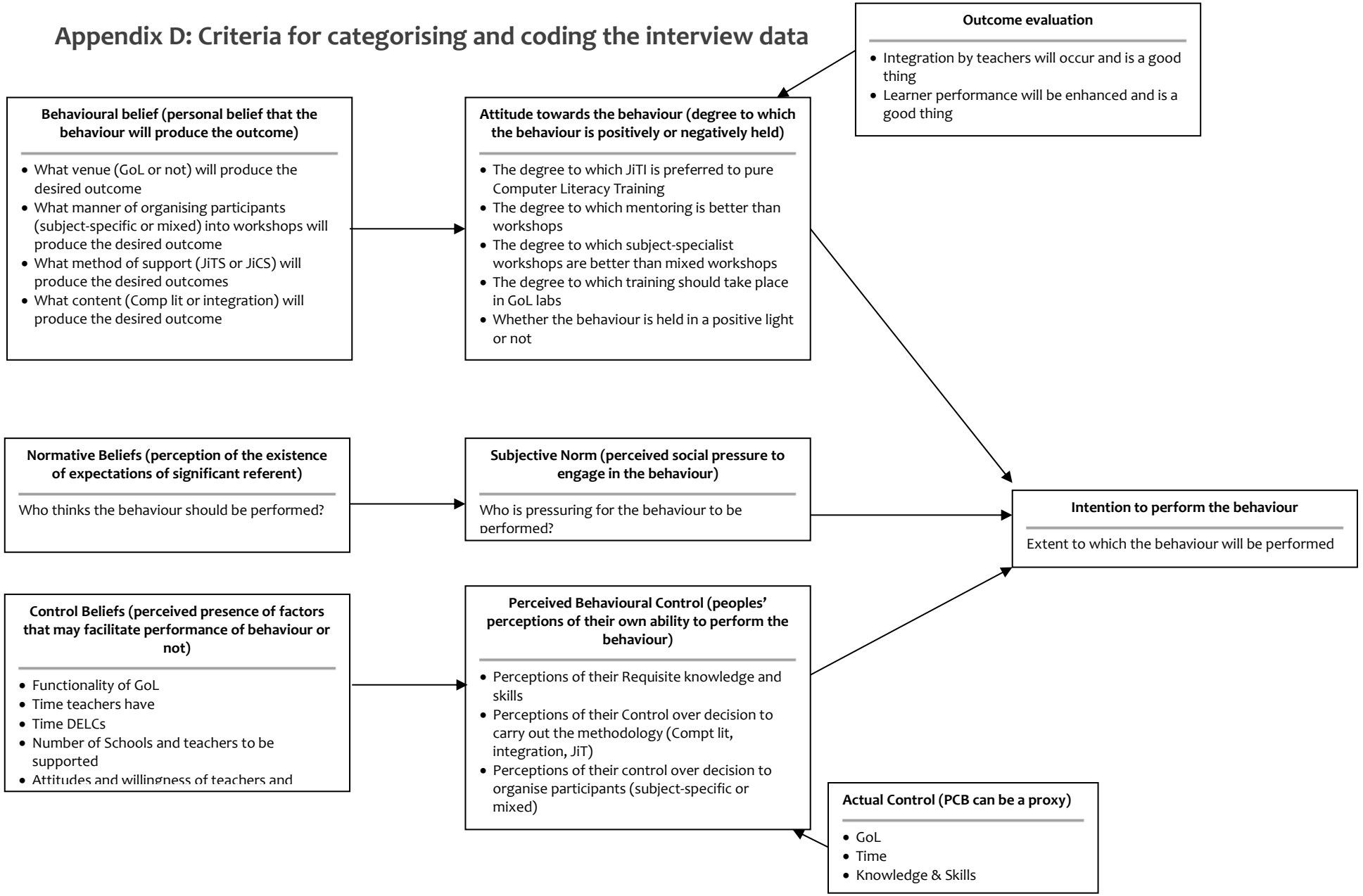


Appendix C: Coding Sampling Frame

Interviews

Name	Sources	References	Created On
Beliefs	21	416	27/01/13 16:20
Beliefs-Practice	1	3	07/02/13 18:22
Consistency	0	0	07/02/13 18:23
Inconsistency	1	2	07/02/13 18:23
Gauteng Online (GoL)	18	175	30/01/13 00:14
Functionality	6	9	10/02/13 15:51
Learning	13	43	10/02/13 16:03
Subject Content	11	26	10/02/13 15:47
eLessons	1	1	10/02/13 16:08
Teaching	7	13	10/02/13 16:04
Teaching based on planned lessons	6	7	10/02/13 15:49
Technology Focus	5	6	27/01/13 16:16
Technicist	2	3	07/02/13 18:30
Timetable	4	5	09/02/13 14:09
Types of Activities	7	12	10/02/13 15:53
Computer Literacy	3	5	10/02/13 15:52
Utilisation	7	12	10/02/13 15:47
Used for different purposes	3	4	10/02/13 15:48
Integration	16	69	15/02/12 12:46

Appendix D: Criteria for categorising and coding the interview data



Appendix E: Letter of Information to the DELCs and Consent form

Tom Waspe
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To:
e-Learning Specialist

Re: Request to Participate in a Research Interview Process for MEd purposes

I am doing research for my MEd Research Project. The topic of my project is: "A study of the extent to which the beliefs of the district e-learning coordinators in the GDE about the pedagogical integration of ICTs in GoL schools are consistent with contemporary theories in the field – A Grounded Theory Approach." I would appreciate it very much if would agree to be interviewed for this research. The interview will last about two hours and I would like to record the interview. This would be a semi-structured interview in which you (the interviewee) and I (the interviewer) will engage in a discussion around the questions and issues in the Schedule attached. There is no right or wrong answers as this interview is about your beliefs in these areas.

I am hoping to interview at least 11 districts based e-learning specialists and one head office specialist. Once the interviews are complete I will be compiling a grid which will contain a set of statements which will be derived from the interviews. I would then like to give you this grid for you to rate the statements on the grid. This rating exercise should take no longer than half an hour.

You may find your involvement in the interview process beneficial as it will raise a range of issues about your role as well as about the educational value of Gauteng Online. I will also give you a copy of the report which may also help you in your further efforts in these areas.

Your participation in this process is entirely voluntary and if you decide not to participate I will fully respect your decision. If in the course of the interview or the completion of the grid you decide to terminate your involvement in the process, once again your decision will be fully respected.

I would like to record and transcribe the interview. If you wish a copy of the transcript will be given to you. Your interview and the data taken from the interview will be kept completely confidential. Your name will not be mentioned in the report, but a codename will be used instead.

My contact details are provided above. The contact details of my supervisor are: Prof Ian Moll, 0117173194, 0711654123, ian.moll@wits.ac.za if you need to contact him for any reason.

Yours sincerely

Tom Waspe

I _____ agree to participate in the research process on the above terms

Signature: Date:

Interview "schedule"

Questions, topics, issues to be discussed with the District e-learning Coordinators

The interviews will take on a social constructivist format. In other words the interview will be conducted in an informal manner where the interviewer and the interviewee tackle the questions and answers together thereby co-constructing ideas and thoughts about the pedagogical integration of Gauteng Online. The idea is to arrive at a Grounded Theory through "active coding" during the interview process.

About the Pedagogical Integration of ICTs

1. Do you believe that ICTs should be integrated into teaching and learning? How? What bearing does this have on GoL?
2. Do you believe that ICTs should be integrated into the curriculum? How? What bearing does this have on GoL?
3. How does learning take place in a school? How should it take place? How should teaching take place to ensure this kind of learning?
4. Should learners and teachers develop basic computer literacy skills before the pedagogical integration of GoL is attempted or should the development of these skills take place on a "just-in-time" basis?
5. What is the best method of teaching computer skills in learners?
6. What is the best method of teaching computer skills in teachers?
7. What is the best method of teaching subject content in GoL laboratories?
8. How should computer literacy skills be developed in DELCs?
9. What is the best method of teaching higher order thinking skills in learners in GoL laboratories?
10. What is the best method of teaching higher order thinking skills in teachers using ICTs?
11. How should computer literacy skills be developed in DELCs?
12. What is the best method of teaching higher order thinking skills in DELCs using ICTs?

About GoL

13. What are your beliefs about the role that GoL plays or can play in education? Why?
14. What are the GDE's policies on the pedagogical integration of GoL? Are teachers aware of these? How do you implement them?
15. Do you know about the current utilisation strategy for GoL? Will it be effective in improving the pedagogical integration of GoL? What is your particular role in implementing this strategy?
16. What do you understand by the quality integration of GoL? How could this quality be achieved?

About GoL laboratories

17. What possibilities and pedagogical opportunities do GoL laboratories create? Give examples of the type of activities that are feasible in GoL labs?
18. Are GoL laboratories conducive to computer literacy training? Why?
19. Are GoL laboratories conducive to project-based learning? Why?
20. Are GoL laboratories conducive to subject content teaching and learning? Why?
21. How should learning take place in a GoL laboratory? How should teaching take place to ensure this kind of learning?

About the role of e-learning coordinator

22. What are your beliefs about the role of the e-learning coordinator?
23. What role should the e-learning coordinator play in ensuring GoL is pedagogically integrated?
24. What is the role of the e-learning coordinator?
25. What knowledge you need to have in order to carry out your work?
26. What kind of training or development have you had on the pedagogical integration of ICTs / GoL?
27. What kind of support do you give teachers for the pedagogical integration of GoL? How & how often? How do you engage teachers and school principals about the pedagogical integration of GoL?
28. How do you press for the uptake of GoL?
29. What kind of behaviour do you expect from teachers when you provide or after you provide support? How do you ensure the support rubs in?
30. Is your role essential for the successful pedagogical integration of GoL or is it a contributing factor? How, why, discuss?
31. What materials or resources do you have at your disposal to improve the pedagogical integration of GoL? How do you use them?
32. How do you gauge what level of support to give schools or teachers?

About teachers

33. What knowledge do teachers need to have in order to integrate GoL pedagogically?
34. What do teachers need to believe in order to integrate GoL pedagogically?
35. What skills do teachers need to have in order to integrate GoL pedagogically?
36. Do teachers support GoL? Why? Why not?
37. **About the levels and processes of integration of GoL**
38. Based on your knowledge and experience what processes does a school need to go through in order to integrate ICTs
39. Based on your knowledge and experience what processes does a teacher need to go through in order to integrate GoL into their teaching?
40. Please outline a process of how GoL gets integrated pedagogically?

About the essential factors for pedagogical integration

41. What factors promote the pedagogical integration of GoL? Mention classroom based, school based, district based, provincial based, nationally based, internationally based factors
42. What are the barriers which prevent the pedagogical integration of GoL?

About the impact of ICTs and GoL

43. Do you believe ICTs have a positive impact on learner performance and outcomes? On learners exam marks? Why? Why not? Do you have any evidence?
44. Do you believe GoL has a positive impact on learner performance and outcomes? On their marks? Is this important for you? Why? Why not? Do you have any evidence? Is it important to get this evidence? How will you get it?
45. What do you think teachers' beliefs are on this issue of the impact of GoL on learner performance?

About the new curriculum reforms

46. Have you read the Curriculum Review Committee report and the recently published curriculum documents? What implications do you think this has for e-learning and the pedagogical integration of ICTs generally and for GoL specifically?
47. Do you think the new curriculum will change your role in any way? How?
48. Do you think teachers know about the new policy? Do you think the new curriculum changes the role of the teacher? In normal classes? In GoL laboratories?

About the DELC being interviewed

49. How have your beliefs about the pedagogical integration of ICTs as well as GoL developed and changed over time? When did they change? What made them change?
50. What is your phase or learning area specialisation? How do you think GoL should be used for teaching and learning in that area? What other opportunities does your phase or LA offer for the pedagogical integration of ICTs broadly speaking?
51. What is your attitude towards your own pedagogical beliefs? Are your beliefs true? Do you feel you should change your belief system or patterns?

Tom Waspe
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Consent to allow interview to be recorded

The following applies to research being conducted by T L V Waspe for MEd purposes. I hereby give my consent to have my interview audio recorded on the following conditions:

- Participation in the interview is voluntary and I may withdraw from the interview process at any stage
- My name will be kept confidential and will not be used in the research report
- The recording and the transcript of the interview will be kept confidential and may not be used for any other purpose than that stated above and a copy of the transcript of the interview will be made available to me if I request it.
- The recording and the transcripts will be retained by the researcher for a period of 5 years after completion of the project.

Name: _____

Signature: _____

Date: _____

Appendix F: Survey Questionnaire

District eLearning Coordinators' Beliefs (II)

_____

This survey has 20 pages with 172 questions. This may sound a lot, but you will only have to spend a few seconds on each question and click on the appropriate response. There is no typing or the answering of open-ended questions. All questions or comments are close-ended. At the bottom of each page click "Next". It should take you about 1 hour to complete all the questions. You can save and continue with the survey at a later stage after the first two pages only by clicking on "Save and continue survey later" at the top of the page. The first two pages deal with PERSONAL DETAILS

The purpose of this questionnaire is to try and get an understanding of your beliefs about the integration of Gauteng Online into teaching and learning. It is an anonymous survey and so you need not worry about other people having access to the information. However, to be eligible for the iPad prize you will have to provide your name so that the prize is awarded to the correct person. Furthermore, although the overall findings of the survey may be made available to others, only the researcher will have access to the completed questionnaires and so the confidentiality of your information is assured. So you are encouraged to reflect deeply and frankly on the questions and answer as honestly as you can. Try and work out what your beliefs are in relation to the questions. All you need to do is click to answer the questions. The first two pages deal with PERSONAL DETAILS

1) Your name:

_____

2) I am*
( ) Male
( ) Female

3) I am*
( ) Black (African)
( ) Indian
( ) Coloured
( ) White

4) My age is*
( ) 25 – 30
( ) 31 – 35
( ) 36 – 40
( ) 41 – 45
( ) 46 – 50
( ) 51 – 55
( ) 56 – 60
( ) 61 - 65

5) My post level in the GDE is*
( ) SES
( ) DCES
( ) CES

6) I have the following qualifications(s).*
Choose only those that apply
[ ] Three year teachers' diploma
[ ] Four year teachers' diploma
[ ] Four year teachers' degree
[ ] Bachelor degree + Post Grad Certificate
[ ] Honours
[ ] Masters
[ ] Doctorate
[ ] Other (please specify)

_____

PERSONAL DETAILS (Continued). You can save and continue with the survey at a later stage after the first two pages only by clicking on "Save and continue survey later" at the top of the page.

7) Number of years in this post*
( ) 1 – 3
( ) 4 – 6
( ) 7 - 9

8) I am posted in the following district:*
( ) Ekurhuleni North
( ) Ekurhuleni South
( ) Gauteng East
( ) Gauteng North
( ) Gauteng West
( ) Jhb Central
( ) Jhb East
( ) Jhb North
( ) Jhb South
( ) Jhb West
( ) Sedibeng East
( ) Sedibeng West
( ) Tshwane North
( ) Tshwane South
( ) Tshwane West
( ) Head Office

9) When I was a teacher my phase and learning area / subject specialisation was*
Choose only those that apply
[ ] Foundation Phase

[ ] GET Languages
[ ] GET Creative Arts
[ ] GET Economic and Management Sciences
[ ] GET Life Orientation
[ ] GET Mathematics
[ ] GET Natural Sciences
[ ] GET Social Sciences
[ ] GET Technology
[ ] FET Languages
[ ] FET Accounting
[ ] FET Agricultural Management Practices
[ ] FET Agricultural Science
[ ] FET Agricultural Technology
[ ] FET Business Studies
[ ] FET Civil Technology
[ ] FET Computer Applications Technology
[ ] FET Consumer Studies
[ ] FET Dance Studies
[ ] FET Design Studies
[ ] FET Dramatic Arts
[ ] FET Economics
[ ] FET Electrical Technology
[ ] FET Engineering Graphics and Design
[ ] FET Geography
[ ] FET History
[ ] FET Hospitality Studies
[ ] FET Information Technology
[ ] FET Life Orientation
[ ] FET Life Sciences
[ ] FET Mathematical Literacy
[ ] FET Mathematics
[ ] FET Mechanical Technology
[ ] FET Music
[ ] FET Physical Sciences
[ ] FET Religion Studies
[ ] FET Tourism
[ ] FET Visual Arts

10) My years of experience as a teacher*
( ) 1 – 5
( ) 6 – 10
( ) 11 – 15
( ) 16 – 20
( ) 21 – 25
( ) 26 – 30
( ) 30 – 35

11) My years of experience as a school manager*
( ) Not applicable
( ) 1 – 5
( ) 6 – 10
( ) 11 – 15
( ) 16 – 20

12) Please choose the statements that characterise your use of ICTs when you were a teacher / school manager*
[ ] Not at all
[ ] Personal (non-professional) use
[ ] Administration (Word or Excel or other)
[ ] Typing and formatting lesson plans and or class worksheets (Word or Excel or other)
[ ] Lesson delivery using a data projector (Word or Excel or PowerPoint or other) (Teacher use only)
[ ] Online research for lesson information
[ ] Teaching classes with ICTs fully integrated in teaching and learning (Teacher and Learner use)
[ ] Use of subject content specific software in teaching and learning
[ ] Use of ICT integrative pedagogies (Cyberhunts, WebQuests, Project-based Learning, ThinkQuests, etc)
[ ] Classroom based use of ICTs
[ ] Laboratory based use of ICTs

_____
Your beliefs about teaching.....
Read these scenarios and then answer the questions that follow.
Ms. Dlamini was leading her class in an animated way, asking questions that the learners could answer quickly; based on the reading they had done the day before. After this review, Ms. Dlamini taught the class new material, again using simple questions to keep learners attentive and listening to what she said. Mr. Maseko's class was also having a discussion, but many of the questions came from the learners themselves. Though Mr. Maseko could clarify learners' questions and suggest where the learners could find relevant information, he couldn't really answer most of the questions himself.
_____
13) Which type of class discussion would you be more comfortable having in a class if you were still teaching?*
( ) Definitely Ms. Dlamini
( ) Tend towards Ms. Dlamini
( ) Can't decide
( ) Tend towards Mr. Maseko

( ) Definitely Mr Maseko

14) Which type of discussion do you think most learners prefer to have?*
( ) Definitely Ms. Dlamini
( ) Tend towards Ms. Dlamini
( ) Can't decide
( ) Tend towards Mr. Maseko
( ) Definitely Mr Maseko

15) From which type of class discussion do you think learners gain more knowledge?*
( ) Definitely Ms. Dlamini
( ) Tend towards Ms. Dlamini
( ) Can't decide
( ) Tend towards Mr. Maseko
( ) Definitely Mr Maseko

16) From which type of class discussion do you think learners gain more useful skills?*
( ) Definitely Ms. Dlamini
( ) Tend towards Ms. Dlamini
( ) Can't decide
( ) Tend towards Mr. Maseko
( ) Definitely Mr Maseko

_____
Your beliefs about teaching and learning.....(You can save and continue with the survey at a later stage after the first two pages only by clicking on "Save and continue survey later" at the top of the page.)
Indicate how much you disagree or agree with each of the following statements about teaching and learning.
17) Teachers know a lot more than learners; they shouldn't let learners muddle around when they can just explain the answers directly*
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree

18) A quiet classroom is generally needed for effective learning*
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree

19) Learners are not ready for "meaningful" learning until they have acquired basic reading and math skills*
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree

20) It is better when the teacher - not the learners - decides what activities are to be done*
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree

21) Learner projects often result in learners learning all sorts of wrong "knowledge"*
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree

_____
Your beliefs about teaching and learning.....(You can save and continue with the survey at a later stage after the first two pages only by clicking on "Save and continue survey later" at the top of the page.)
22) Homework is a good setting for having learners answer questions posed in their textbooks*
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree

23) Learners will take more initiative to learn when they feel free to move around the room during class*
( ) Strongly Agree
( ) Moderately Agree

( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree

24) Learners should help establish criteria on which their work will be assessed*
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree

25) Instruction should be built around problems with clear, correct answers, and around ideas that most learners can grasp quickly*
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree

26) How much learners learn depends on how much background knowledge they have - that is why teaching facts is so necessary*
( ) Strongly Agree
( ) Moderately Agree
( ) Slightly Agree
( ) Slightly Disagree
( ) Moderately Disagree
( ) Strongly Disagree

_____
Different educators have described very different teaching philosophies to researchers. For each of the following pairs of statements, check the button that best shows how closely your own beliefs are to each of the statements in a given pair. The closer your beliefs to a particular statement, the closer the button you check.....(You can save and continue with the survey at a later stage after the first two pages only by clicking on "Save and continue survey later" at the top of the page.)
27) Different educators have described very different teaching philosophies to researchers. For each of the following pairs of statements, check the button that best shows how closely your own beliefs are to each of the statements in a given pair. The closer your beliefs to a particular statement, the closer the button you check.*
A teacher's role is mainly as a facilitator. They should try to provide opportunities and resources for learners to discover or construct concepts for themselves."
( ) .
( ) .
( ) .
( ) .
( ) .
"That's all nice, but learners really won't learn the subject unless you go over the material in a structured way. It's a teacher's job to explain, to show learners how to do the work, and to assign specific practice."

28) As above*
"The most important part of instruction is the content of the curriculum. That content is the government's judgment about what children need to be able to know and do."
( ) .
( ) .
( ) .
( ) .
( ) .
"The most important part of instruction is that it encourage "sense-making" or thinking among learners. Content is secondary."

29) As above*
"It is useful for learners to become familiar with many different ideas and skills even if their understanding, for now, is limited. Later, in college, perhaps, they will learn these things in more detail.
( ) .
( ) .
( ) .
( ) .
( ) .
"It is better for learners to master a few complex ideas and skills well, and to learn what deep understanding is all about, even if the breadth of their knowledge is limited until they are older.

30) As above*
"It is critical for learners to become interested in doing academic work - interest and effort are more important than the particular subject-matter they are working on."
( ) .
( ) .
( ) .
( ) .
( ) .
"While learner motivation is certainly useful, it should not drive what learners study. It is more important that learners learn the history, science, math and language skills in their textbooks."

31) As above*

"It is a good idea to have all sorts of activities going on in the classroom. Some learners might produce a scene from a play they read. Others might create a miniature version of the set. It's hard to get the logistics right, but the successes are so much more important than the failures."
( ) .
( ) .
( ) .
( ) .
( ) .
"It's more practical to give the whole class the same assignment, one that has clear directions, and one that can be done in short intervals that match learners' attention spans and the daily class schedule."

_____
Teachers know that different approaches sometimes work for different types of learners and that a mix of approaches is often the best. Between the two basic approaches shown, what mix of lesson time do you think is best for each of these types of learners?
Teachers know that different approaches sometimes work for different types of learners and that a mix of approaches is often the best. Between the two basic approaches shown, what mix of lesson time do you think is best for each of these types of learners?

Giving learners background factual knowledge and directly teaching concepts Using active learning approaches like learner discussions, projects, and presentations

32) For learners in Grade 5 learning South African history in Social Science?
Giving learners background factual knowledge and directly teaching concepts Using active learning approaches like learner discussions, projects, and presentations
*
( ) 90%
( ) 80%
( ) 70%
( ) 50-60%
( ) 70%
( ) 80%
( ) 90%

33) For learners in Grade 11 studying science
Giving learners background factual knowledge and directly teaching concepts Using active learning approaches like learner discussions, projects, and presentations

*
( ) 90%
( ) 80%
( ) 70%
( ) 50-60%
( ) 70%
( ) 80%
( ) 90%

34) For learners in Grade 8 who are not doing much work but enough to "get by"
Giving learners background factual knowledge and directly teaching concepts Using active learning approaches like learner discussions, projects, and presentations
*
( ) 90%
( ) 80%
( ) 70%
( ) 50-60%
( ) 70%
( ) 80%
( ) 90%

35) For an enthusiastic learner in any grade level you can teach
Giving learners background factual knowledge and directly teaching concepts Using active learning approaches like learner discussions, projects, and presentations
*
( ) 90%
( ) 80%
( ) 70%
( ) 50-60%
( ) 70%
( ) 80%
( ) 90%

36) For a slow learning and unmotivated learner in any grade level you can teach
Giving learners background factual knowledge and directly teaching concepts Using active learning approaches like learner discussions, projects, and presentations
*
( ) 90%
( ) 80%
( ) 70%
( ) 50-60%
( ) 70%
( ) 80%
( ) 90%

_____

What do you know about pedagogy, content and technology? Choose the answer that applies to you for each of these statements below.
37) I can use teaching strategies that combine content, technologies and pedagogy.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

38) I can select technologies to use in a classroom that enhances the content of teaching, how teaching should take place and what learners learn.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

39) I can provide leadership in helping others to coordinate the use of content, technologies and teaching approaches at schools in my district.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

40) I can teach lessons that appropriately combine my second teaching subject, technologies and teaching approaches.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

41) I can teach lessons that appropriately combine my first teaching subject, technologies and teaching approaches.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

42) I can use ICTs for personal (non-professional) use.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

43) I can use ICTs for administrative purposes (Word or Excel or other).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

44) I can design, type and format lesson plans and or class worksheets (Word or Excel or other).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

45) I can deliver a lesson using a data projector (Word or Excel or PowerPoint or other).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

46) I can do online research for lesson information.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

47) I can use subject content specific software (e.g. maths software) in teaching and learning.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

48) I can use ICT integrative pedagogies (Cyberhunts, WebQuests, Project-based Learning, ThinkQuests, etc.)*
( ) Strongly Agree
( ) Agree

( ) Undecided
( ) Disagree
( ) Strongly Disagree

49) I am able to conduct a lesson in a GoL Laboratory using the ICTs.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

_____
What do you know about pedagogy, content and technology? (Continued)....
50) I am able to use of the Internet / Web for teaching and learning during a lesson (not teacher research).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

51) I am able to create web pages.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

52) I have sufficient knowledge about my second teaching subject.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

53) I can think about the content of my second teaching subject like a subject matter expert.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

54) I am able to develop deeper understanding about the content of my second teaching subject.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

55) Without using technology, I can help learners understand the content knowledge of my second teaching subject in various ways.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

56) Without using technology, I know how to select effective teaching approaches to guide learners' thinking and learning in my second teaching subject.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

57) Without using technology, I can help learners understand the content knowledge of my first teaching subject in various ways.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

58) Without using technology, I know how to select effective teaching approaches to guide learners' thinking and learning in my first teaching subject.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

59) I am able to help learners reflect on their learning strategies.*
( ) Strongly Agree
( ) Agree
( ) Undecided

( ) Disagree
( ) Strongly Disagree

60) I am able to help learners monitor their own learning.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

61) I am able to guide learners discuss effectively during group work.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

62) I am able to guide learners adopt appropriate learning strategies.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

63) I am able to plan group activities for learners.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

_____
What do you know about pedagogy, content and technology? (Continued)....
64) I am able to stretch learners' thinking by creating challenging tasks for them.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

65) I have sufficient knowledge about my first teaching subject.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

66) I can think about the content of my first teaching subject like a subject matter expert.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

67) I am able to develop deeper understanding about the content of my first teaching subject.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

68) I know about the technologies that I have to use for the research of content of my first teaching subject.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

69) I know about the technologies that I have to use for the research of content of my second teaching subject.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

70) I can use appropriate technologies (e.g. multimedia resources, simulation) to represent the content of my first teaching subject.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

71) I can use appropriate technologies (e.g. multimedia resources, simulation) to represent the content of my second teaching subject.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

72) I am able to facilitate learners' use of technology to plan and monitor their own learning.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

73) I am able to facilitate learners' use of technology to construct different forms of knowledge representation.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

74) I am able to facilitate learners' collaboration with each other using technology.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

_____
What do you believe about teaching and learning? For the following statements indicate how much you agree or disagree.
75) Learners have more respect for teachers they see and can relate to as real people, not just as teachers*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

76) There are some learners whose personal lives are so dysfunctional that they simply do not have the capability to learn.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

77) Teachers can't allow themselves to make mistakes with learners.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

78) Learners achieve more in classes in which teachers encourage them to express their personal beliefs and feelings.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

79) Too many learners expect to be pampered in school.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

80) If learners are not doing well, they need to go back to the basics and do more drill and skill development.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

81) In order to maximise learning, teachers need to help learners feel comfortable in discussing their feelings and beliefs.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

82) It's impossible to work with learners who refuse to learn.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

83) No matter how bad a teacher feels, he or she has a responsibility not to let learners know about those feelings.*
( ) Strongly Disagree

( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

84) Addressing students' social, emotional and physical needs is just as important to learning as meeting their intellectual needs.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

85) Even with feedback, some learners just can't figure out their mistakes.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

86) A teacher's most important job is to help learners meet well-established standards and outcomes of what it takes to succeed.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

_____
What do you believe? (Continued).....
87) Taking the time to create caring relationships with learners is the most important element for learner achievement.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

88) When I taught I could not help feeling upset and inadequate when dealing with difficult learners.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

89) If a teacher does not prompt and provide direction for learners' questions, they won't get the right answer.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

90) Helping learners understand how their beliefs about themselves influence learning is as important as working on their academic skills.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

91) It's just too late to help some learners.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

92) A teacher knowing his / her subject matter really well is the most important contribution he / she can make to learner learning.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

93) When I taught I could easily help learners who were uninterested in learning get in touch with their natural motivation to learn.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

94) No matter how hard teachers try, there are some learners who are unreachable.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

95) Knowledge of the subject area is the most important part of being an effective teacher.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

96) Learners will be more motivated to learn if teachers get to know them at a personal level.*
( ) Strongly Disagree
( ) Somewhat disagree

( ) Somewhat agree
( ) Strongly agree

97) Innate ability is fairly fixed and some children just can't learn as well as others.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

98) One of the most important things a teacher can teach learners is how to follow rules and to do what is expected of them in the classroom.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

_____
What do you believe? (Continued).....
99) When teachers are relaxed and comfortable with themselves, they have access to a natural wisdom for dealing with even the most difficult classroom situations.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

100) Teachers shouldn't be expected to work with learners who consistently cause problems in class.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

101) Good teachers always know more than their learners.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

102) Teachers should be willing to share who they really are as a person with learners and this facilitates learning more than being an authority figure.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

103) Teachers know best what learners need to know and what's important; learners should take a teacher's word that something will be relevant to them.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

104) Teachers' acceptance of themselves as a person is more central to classroom effectiveness than the comprehension of teaching skills.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

105) For effective learning to occur, teachers need to be in control of the direction of learning.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

106) Accepting learners where they are – no matter what their behaviour and academic performance – makes them more receptive to learning.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

107) A teacher is responsible for what learners learn and how they learn.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

108) Seeing things from the learners' point of view is the key to their good performance in school.*
( ) Strongly Disagree
( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

109) I believe that just listening to learners in a caring way helps them solve their own problems.*
( ) Strongly Disagree

( ) Somewhat disagree
( ) Somewhat agree
( ) Strongly agree

_____
This set of activities described in this paragraph is referred to as "Model 2012" in all the questions and statements that follow: "This coming year I intend to run teacher development training on how to integrate GoL labs into teaching and learning which will be held in the GoL labs in the school. I will run training for either teachers per Grade or per learning area speciality. After each workshop I will be available for "just-in-time" mentoring for all teachers."
110) "This coming year I intend to run teacher development training on how to integrate GoL labs into teaching and learning which will be held in the GoL labs in the school. I will run training for either teachers per Grade or per learning area speciality. After each workshop I will be available for "just-in-time" mentoring for all teachers." (This is "Model 2012").*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

111) I intend running teacher professional workshops this year.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

112) The workshops I run this year will focus mainly on the pedagogical integration of GoL labs.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

113) Each workshop I run this year will have participants form the same Grade levels.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

114) Each workshop I run this year will have participants from the same specialist subjects or learning areas.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

115) After the workshops I run this year I will be available for "just-in-time" mentoring for all teachers.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

116) The best way of getting teachers (who have never used ICTs before) to begin integration in GoL labs is to provide....*
Computer literacy training
( ) a
( ) b
( ) c
( ) d
( ) e
GoL integration training from the start

117) The most effective form of teacher development is through....*
Workshops
( ) a
( ) b
( ) c
( ) d
( ) e
one-on-one mentoring

118) I think that training in GoL integration is best done with teachers organised into.....*
specialist subject / learning area groupings
( ) a
( ) b
( ) c
( ) d
( ) e
mixed subject / learning are groupings

119) I think that training in GoL integration is best done with teachers organised into....*
Grade level groupings

( ) a
( ) b
( ) c
( ) d
( ) e
Mixed grade groupings

120) The most effective type of support is....*
"just-in-time" mentoring
( ) a
( ) b
( ) c
( ) d
( ) e
"just-in-case" support

_____
This set of activities described in this paragraph is referred to as "Model 2012" in all the questions and statements that follow: "This coming year I intend to run teacher development training on how to integrate GoL labs into teaching and learning which will be held in the GoL labs in the school. I will run training for either teachers per Grade or per learning area speciality. After each workshop I will be available for "just-in-time" mentoring for all teachers." .... (Continued).....
121) Training in GoL integration should take place in the GoL labs....*
Agree
( ) a
( ) b
( ) c
( ) d
( ) e
Disagree

122) Workshops are the most effective method of professional development.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

123) Workshops on the integration of GoL labs into teaching and learning are worthwhile.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

124) The best venues for workshops on the integration of GoL labs into teaching and learning are in the GoL labs themselves.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

125) Workshops with participants from the same Grade / Phase level are the most effective.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

126) Workshops with participants from the same subject / learning area are the most effective.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

127) Workshops with mixed participants (across schools, across grades, across subjects / learning areas) are the most effective.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

128) "Just-in-case" support is the most effective.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

129) "Just-in-time" mentoring is the most effective form of support.*
( ) Strongly Agree

( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

130) Colleagues in other districts are likely to also provide "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

131) My district director is most likely to instruct me to provide "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

132) My supervisor is most likely to instruct me to provide "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

_____
This set of activities described in this paragraph is referred to as "Model 2012" in all the questions and statements that follow: "This coming year I intend to run teacher development training on how to integrate GoL labs into teaching and learning which will be held in the GoL labs in the school. I will run training for either teachers per Grade or per learning area speciality. After each workshop I will be available for "just-in-time" mentoring for all teachers."
.... (Continued).....
133) If I conducted a needs survey amongst teachers in my schools they are most likely to request "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

134) The subject specialist curriculum advisers would expect me to provide "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

135) I personally have the requisite knowledge and skills to provide*
Computer literacy training
( ) I am more than capable
( ) I am basically capable
( ) I am mediocre
( ) I am basically incapable
( ) I am more than incapable

136) I personally have the requisite knowledge and skills to provide*
GoL Integration training
( ) I am more than capable
( ) I am basically capable
( ) I am mediocre
( ) I am basically incapable
( ) I am more than incapable

137) I personally have the requisite knowledge and skills to provide*
"just-in-time" mentoring
( ) I am more than capable
( ) I am basically capable
( ) I am mediocre
( ) I am basically incapable
( ) I am more than incapable

138) I personally have the requisite knowledge and skills to provide*
"just-in-case" support
( ) I am more than capable
( ) I am basically capable
( ) I am mediocre
( ) I am basically incapable
( ) I am more than incapable

139) It is mostly up to me to decide whether I provide GoL Integration training*
( ) I have complete decision making authority
( ) I am part of the decision making process
( ) I make recommendations only

( ) I have minimal influence on the decisions
( ) I have no influence on the decision making

140) It is mostly up to me to decide whether I provide "just-in-time" mentoring*
( ) I have complete decision making authority
( ) I am part of the decision making process
( ) I make recommendations only
( ) I have minimal influence on the decisions
( ) I have no influence on the decision making

141) It is mostly up to me to decide whether I provide "just-in-case" support*
( ) I have complete decision making authority
( ) I am part of the decision making process
( ) I make recommendations only
( ) I have minimal influence on the decisions
( ) I have no influence on the decision making

142) It is mostly up to me to decide where training is provided*
( ) I have complete decision making authority
( ) I am part of the decision making process
( ) I make recommendations only
( ) I have minimal influence on the decisions
( ) I have no influence on the decision making

143) It is mostly up to me to decide who the target participants of training would be*
( ) I have complete decision making authority
( ) I am part of the decision making process
( ) I make recommendations only
( ) I have minimal influence on the decisions
( ) I have no influence on the decision making

144) The current level of GoL lab functionality prevents me from providing training in GoL labs*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

_____
This set of activities described in this paragraph is referred to as "Model 2012" in all the questions and statements that follow: "This coming year I intend to run teacher development training on how to integrate GoL labs into teaching and learning which will be held in the GoL labs in the school. I will run training for either teachers per Grade or per learning area speciality. After each workshop I will be available for "just-in-time" mentoring for all teachers." .... (Continued).....
145) The amount of time available to teachers will prevent me from providing "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

146) The amount of time available to me will prevent me from providing "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

147) The number of teachers that require support will prevent me from providing "just-in-time" mentoring.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

148) "Model 2012" which states: "This coming year I intend to run teacher development training on how to integrate GoL labs into teaching and learning which will be held in the GoL labs in the school. I will run training for either teachers per Grade or per learning area speciality. After each workshop I will be available for "just-in-time" mentoring for all teachers." is likely to get teachers to start integrating GoL into teaching and learning almost immediately*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

149) Integrating GoL into teaching and learning will result in learners' achievements, performance and marks as well as computer literacy improving.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

150) Integrating GoL into teaching and learning will help learners become more active in their learning.*

( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

151) Integrating GoL into teaching and learning will provide learners with a variety of types of learning experiences.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

152) The district director thinks that I should carry out "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

153) My colleagues think that I should carry out "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

154) My supervisor thinks that I should carry out "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

155) The head office e-Learning Directorate would expect me to carry out "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

156) When it comes to carrying out "Model 2012" - (see above for Model 2012), how much do you want to do what your peers and colleagues think you should do?*
very much
( ) .
( ) .
( ) .
( ) .
( ) .
not at all

_____
This set of activities described in this paragraph is referred to as "Model 2012" in all the questions and statements that follow: "This coming year I intend to run teacher development training on how to integrate GoL labs into teaching and learning which will be held in the GoL labs in the school. I will run training for either teachers per Grade or per learning area speciality. After each workshop I will be available for "just-in-time" mentoring for all teachers." .... (Continued).....
157) When it comes to carrying out "Model 2012" - (see above for Model 2012), how much do you want to do what your supervisor thinks you should do?*
Very much
( ) a
( ) b
( ) c
( ) d
( ) e
not at all

158) When it comes to carrying out "Model 2012" - (see above for Model 2012)., how much do you want to do what the curriculum specialists think you should do?*
Very much
( ) a
( ) b
( ) c
( ) d
( ) e
not at all

159) When it comes to carrying out "Model 2012" - (see above for Model 2012), how much do you want to do what teachers think you should do?*
Very much
( ) a
( ) b
( ) c
( ) d

( ) e
not at all

160) I expect that the amount of time at the disposal of teachers for professional development would limit my ability to perform "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

161) I expect that the functionality of GoL labs will restrict the extent to which I can perform "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

162) I expect the attitudes and willingness of teachers will limit my ability to perform "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

163) I expect the level of the technological and pedagogical capabilities of the teachers will restrict the extent to which I can perform "Model 2012" - (see above for Model 2012).*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

For each of the following statements, check the button that best shows how closely your own beliefs are to each of the terms in a given pair. The closer your beliefs to a particular statement, the closer the button you check. All of this applies to the ease with which you could perform "Model 2012" (see Model 2012 above).

---

164) The amount of time at the disposal of teachers will make it*
much more difficult
( ) a
( ) b
( ) c
( ) d
( ) e
much easier

for me to perform "Model 2012" - (see above for Model 2012).

165) The functionality of GoL labs will make it .....*
much more difficult
( ) a
( ) b
( ) .
( ) d
( ) e
much easier

for me to perform "Model 2012" - (see above for Model 2012).

166) The attitudes and willingness of teachers .....*
much more difficult
( ) a
( ) b
( ) c
( ) d
( ) e
much easier

for me to perform "Model 2012" - (see above for Model 2012).

167) The technological and pedagogical capabilities of the teachers will make it.....*
much more difficult
( ) a
( ) b
( ) c
( ) d
( ) e
much easier

_____
Workshop methods....
168) When I run workshops for teachers this year I will give short lectures or talks or presentations.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

169) When I run workshops for teachers this year I will demonstrate and model skills and/or teaching methods and/or technology integration and/or subject content and/or e-lessons.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

170) When I run workshops for teachers this year I will get teachers to design lessons and they will then demonstrate these to their colleagues at the workshop.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

_____
Your beliefs about your role....
171) When I run workshops for teachers this year I will get teachers to repetitively practice their basic computer skills at the workshop.*
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly disagree

172) What do you believe are the priority functions of the District eLearning Coordinator in the district? Put the following into order of priority.*
Drag items from the left-hand list into the right-hand space to order them.
You can re-order the list on the right at any stage by clicking on the double-headed arrow and dragging the item up and down.
_____Pedagogical support
_____Technical support
_____Subject Content support
_____Institutional support
_____Applying pressure on schools
_____Professional development of SMTs and teachers
_____Implementing national, provincial and district policy
_____Monitoring and evaluating
_____Providing resources
_____Getting schools to account
_____Communicating the integration message
_____Integration support

173) Prioritise the competencies required by a District eLearning Coordinator from the most important to the least important...
Drag items from the left-hand list into the right-hand space to order them.
You can re-order the list on the right at any stage by clicking on the double-headed arrow and dragging the item up and down.
_____Subject content knowledge
_____Ability to design a technology based lesson plan
_____Computer literacy
_____Ability to develop web based resources
_____Ability to trouble shoot technical problems
_____People relationship skills
_____Report writing skills
_____Developing evaluation instruments
_____Policy analysis skills
_____Project management and implementation
_____Teaching capabilities
_____Facilitation skills
_____Pedagogical Knowledge
_____Technological Knowledge

_____
Thank You!

Appendix G: Interview Schedule

Questions, topics, issues to be discussed with the District e-learning Coordinators

About the Pedagogical Integration of ICTs

1. Do you believe that ICTs should be integrated into teaching and learning?
2. Do you believe that ICTs should be integrated into the curriculum?

Complete these sentences (Don't explain or justify the sentence to me, just say the complete sentence aloud):

3. I know GoL integration is taking place when……
4. I know learning with technology in GoL labs is taking place when……
5. I know learning with technology in GoL labs is not taking place when……
6. I know good teaching is taking place in a GoL lab when……
7. I know poor teaching is taking place in a GoL lab when……
8. The most important thing I can get across to my teachers is……
9. The part of being an e-learning co-ordinator I enjoy the most is……
10. The part of being an e-learning co-ordinator I enjoy the least is……
11. My most important goal for my teachers is……
12. My most important goal for my GoL labs is……
13. My most important goal for my schools is……
14. My most important goal for myself is……
15. The most important thing as an e-learning co-ordinator is……
16. The least important thing as an e-learning co-ordinator is……
17. Something I need to do better is……
18. A good e-learning co-ordinator is one who……
19. I am most comfortable when my teachers are……
20. I am most comfortable when my schools are……
21. I am least comfortable when my schools are……
22. I am least comfortable when my teachers are……
23. I am most comfortable in my job when I……
24. I am least comfortable in my job when I……

25. How does a learner learn?
26. How should learning take place in a GoL laboratory?
27. How should teaching take place to ensure this kind of learning?
28. Should learners and teachers develop basic computer literacy skills before the pedagogical integration of GoL is attempted or should the development of these skills take place on a "just-in-time" basis?
29. What is the best method of developing computer skills in learners?
30. What is the best method of developing computer skills in teachers?
31. How should computer literacy skills be developed in DeLCs?
32. What is the best way of using GoL laboratories to teach subject content?
33. What is the best method of teaching higher order thinking skills in learners using the GoL laboratories?
34. What is the best method of teaching higher order thinking skills in teachers using ICTs (GoL)?
35. What pedagogical benefits do ICTs provide teachers?
36. What learning benefits do ICTs provide learners?

About GoL laboratories

37. What possibilities and pedagogical opportunities do GoL laboratories create?
38. Give examples of the type of activities that are feasible in GoL labs? Optional
39. Are GoL laboratories conducive to computer literacy training? Why?
40. Are GoL laboratories conducive to project-based learning? Why?
41. Are GoL laboratories conducive to subject content teaching and learning? Why?

Metaphors

This section is about the metaphors e-learning coordinators have about their beliefs, their work, their teachers and schools. For example some teachers say they are like gardeners, police officers, etc. It is important that after the word *like* is a metaphor and is not literal and it is also important that the part after the word *because* explains the metaphor and is completed.

Here is an example:

Students are *like* sponges *because* they absorb information and wring it out for the exams.

42. Teaching is like…..because……..
43. Learning is like…..because……..
44. A school is like…..because……..
45. Teaching with technology is like…..because……..
46. Learning with technology is like…..because……..
47. Being an e-learning coordinator is like…..because……...
48. Professional development is like…..because……..
49. A Gauteng Online lab is like…..because……..
50. Technology is like…..because……..

About the role of e-learning coordinator

51. What are your beliefs about the role of the e-learning coordinator?
52. What role should the e-learning coordinator play in ensuring GoL is pedagogically integrated?
53. Describe how you spend most of your time on the job.
54. Describe a typical day. Describe a typical week.?
55. What knowledge do you need to have in order to carry out your work?
56. What kind of training or development have you had on the pedagogical integration of ICTs / GoL?
57. What kind of support do you give teachers for the pedagogical integration of GoL? How & how often? How do you engage teachers and school principals about the pedagogical integration of GoL?
58. How do you press for the uptake of GoL?
59. How do you gauge what level of support to give schools or teachers?
60. Do you use the data from the SAIDIE report to measure levels and to plan your support?
61. What tools or instruments or resources do you use?
62. Do you get other district based support staff (curriculum specialists, IDSOs) involved in the technology (GoL) integration process?
63. What is the role of these officials in the GoL integration process?

About teachers and principles

64. What knowledge do teachers need to have in order to integrate GoL pedagogically?
65. What knowledge do e-learning coordinators need to have to do their job?
66. What do teachers need to believe in order to integrate GoL pedagogically?
67. What skills do teachers need to have in order to integrate GoL pedagogically?

About the levels and processes of integration of GoL

68. Based on your knowledge and experience what processes or stages does a school need to go through in order to integrate GoL (ICTs)
69. Based on your knowledge and experience what processes or stages does a teacher need to go through in order to integrate GoL into their teaching?

About the impact of ICTs and GoL

70. Do you believe GoL has a positive impact on learner performance and outcomes? On their marks?
71. What do you think teachers' beliefs are on this issue of the impact of GoL on learner performance?

About the DeLC being interviewed

72. How have your beliefs about the pedagogical integration of ICTs as well as GoL developed and changed over time? When did they change? What made them change?
73. What training have you had for the pedagogical integration of ICTs?
74. What is your phase or learning area specialisation?
75. How do you think GoL should be used for teaching and learning in that area?
76. What other opportunities does your phase or LA offer for the pedagogical integration of ICTs broadly speaking?

About the new curriculum reforms

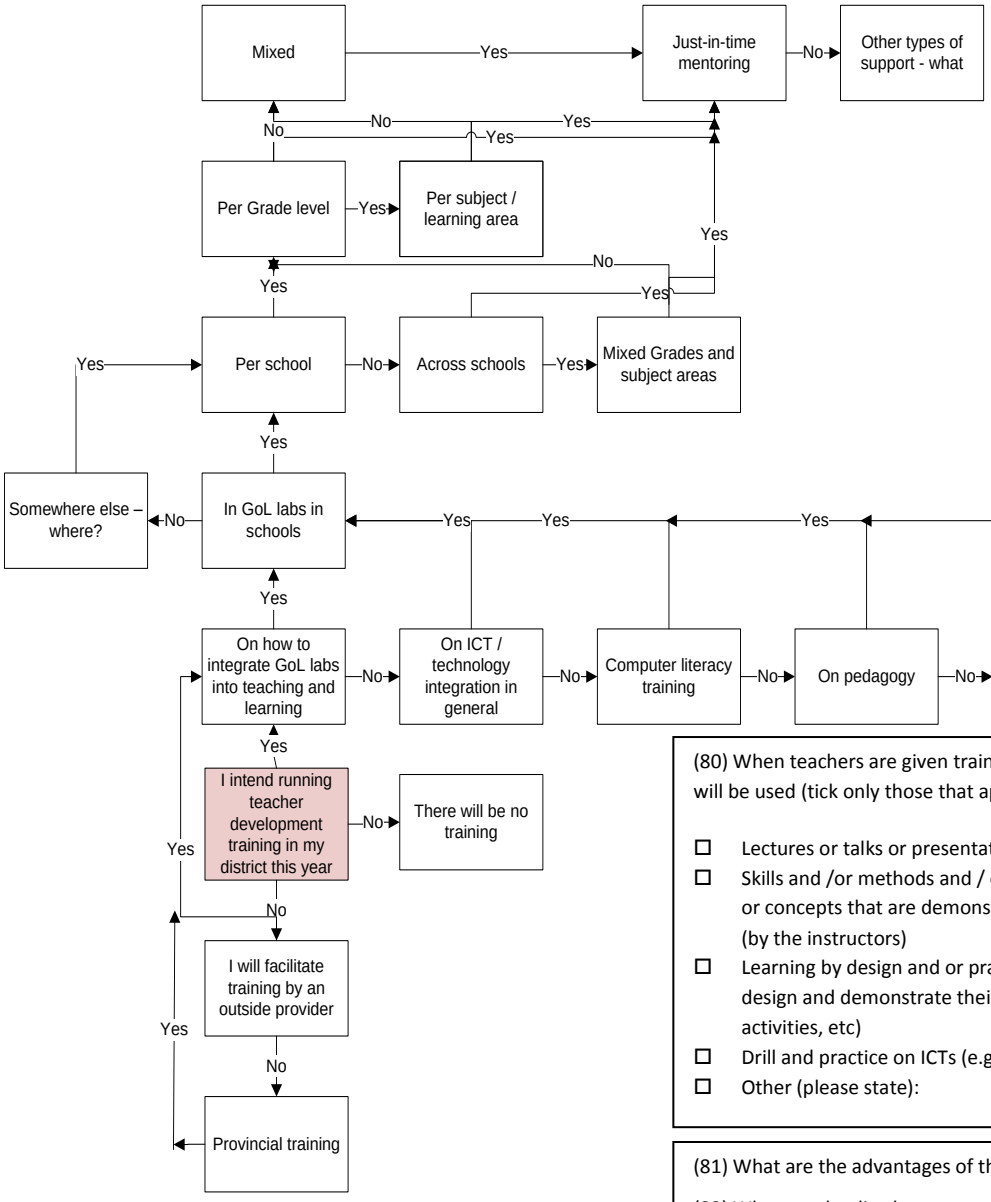
77. Have you read the Curriculum and Assessment Policy Statements (CAPS)?

78. What implications do you think the CAPS has for e-learning and the pedagogical integration of ICTs generally and for GoL specifically?
79. Do you think the new curriculum will change your role in any way? How?

District e-Learning Coordinator Action Decision Tree

Instruction: For the following behaviour starting at the shaded box, tick off either Yes or No and then the appropriate box that follows.

(A) This coming year I intend to run teacher development training on how to integrate GoL labs into teaching and learning which will be held in the GoL labs in the school. I will run training for either teachers per Grade or per learning area speciality. After each workshop I will be available for "just-in-time" mentoring for all teachers.



(80) When teachers are given training which of the following methods will be used (tick only those that apply):

- ☐ Lectures or talks or presentations
- ☐ Skills and /or methods and / or techniques and / or content and / or concepts that are demonstrated and / or modelled using ICT (by the instructors)
- ☐ Learning by design and or practice using ICTs (e.g. teachers design and demonstrate their designs – e.g. of lesson plans; activities, etc)
- ☐ Drill and practice on ICTs (e.g in computer literacy)
- ☐ Other (please state):

(81) What are the advantages of the activity (A)?

(82) What are the disadvantages of the activity (A)?

(83) Which roleplayers in your professional ambit would approve of (A)?

(84) Which roleplayers in your professional ambit would disapprove of (A)?

(85) What factors or circumstances would enable you to carry out (A) in the coming year?

(86) What factors or circumstances would make it difficult or impossible for you to carry out (A) in the coming year?

(87) Are there any other issues that come to mind when you think about the difficulty of to carry out (A) in the coming year?