Exploring factors that influence how teachers implement the Technology curriculum in Grade 9: A Case of Three Secondary Schools in the Umlazi District

By

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Declaration

I, Zamabongwe Mbongwe, declare that this study entitled, '**Exploring factors that influence how teachers implement the Technology curriculum in Grade 9: A Case of Three Secondary Schools in the Umlazi District'** is my own work and that all sources used and quoted have been indicated and acknowledged by means of complete references.

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Acknowledgements

Abstract

Technology education is a global phenomenon which is often met with varied reactions from teachers largely due to their lived experiences. Various studies, both locally and internationally, indicate that technology education and, by far, technology curriculum implementation is a complex process which is highly unlikely to succeed if it excludes teachers. This study highlights some of the factors that influence how teachers implement the Grade 9 Technology curriculum in secondary schools. The study is therefore framed on the Concerns Based Adoption Model (CBAM) and responds to three critical questions:

1. What are the factors that influence the way teachers implement the Grade 9 Technology curriculum in secondary schools?

2. How do these factors influence the teachers' implementation of the Grade 9 Technology curriculum in secondary schools? And

3. Why do teachers implement the Grade 9 Technology curriculum the way they do in secondary schools?

Using a case study methodology, three secondary schools in the Umlazi district were studied. Three Grade 9 teachers were purposively selected from the three schools based on their professional experience in teaching Technology in Grade 9 at secondary schools. Lesson observations and one-on-one semi-structured interviews were used to generate data which was thematically analysed. Some of the themes that emerged from the analysis of data include: inadequate resources, hands-on practical workshops, continuation of Technology subjects in the FET (Grades 10-12) phase, and collaboration with other teachers. From the findings it was clear that irrespective of the context, curriculum implementation was a complex process which largely depended on competent continuous support to be provided to teachers for teaching and learning to be meaningful for learners. The study suggests that the active involvement of all stakeholders, particularly the Department of Education (at district, provincial and national levels), in ensuring continuous support for teachers to effectively implement any innovation through continuous professional teacher development is necessary.

List of Abbreviations

CAPS   : Curriculum and Assessment Policy Statement

CBAM   : Concern Based Adoption Model

C2005   : Curriculum 2005

DoE   : Department of Education

DUT   : Durban University of Technology

FET   : Further Education and Training

GET   : General Education and Training Band

ICM   : Innovation Configuration Map

IDMEC   : Investigate, Design, Make, Evaluate and Communicate

LoU   : Levels of Use

Mini PAT   : Mini Practical Assessment Task

NCS   : National Curriculum Statement

RNCS   : Revised National Curriculum Statement

SMT   : School Management Team

SoC   : Stages of Concern

UKZN   : University of KwaZulu-Natal

UNISA   : University of South Africa

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CHAPTER 1

Background and Orientation

1.1 Introduction

The official launch of Curriculum 2005 (C2005), as a new national curriculum in 1997, saw the first formal Technology curriculum being implemented in South African schools (Heymans, 2007). Technology was included as a separate subject for the first time in Curriculum 2005 (Potgieter, 2004; Stevens, 2006). However, many years after its inclusion in the curriculum, Naidoo (2013) argues that Technology is not making a significant impact in creating independent, creative problem solvers in the classroom. Many scholars have indicated a number of reasons which seem to pose challenges to the effective implementation of Technology in the classroom. Rauscher (2010) asserts that Technology does not have a subject philosophy compared to subjects such as Mathematics and Science and teachers tend to draw from other disciplines for insight in technological knowledge. Teachers' limited knowledge of the subject matter and assessment practices are identified as being among the reasons for the gap that exists between policy and practice in the technology classrooms (Naidoo, 2013). Mawson (2003) further argues that the unique nature of Technology poses a wide range of problems for teachers. From the views expressed above, it can be concluded that there are many challenges for Technology teachers who are attempting to implement the curriculum in the classroom. Fullan (1992a) refers to curriculum implementation as the actual use of an innovation, the curriculum in this case. Fullan and Stiegelbauer (1991) contend that during implementation teachers attempt to use the curriculum in order to change their practice. It is important to note that teachers are primary implementers of the curriculum (Carless, 1997) therefore their commitment is crucial to the successful implementation (Rennie, 2001). The purpose of this chapter is to provide an orientation to the study. It starts by discussing the background to the study, followed by the description of the focus and purpose of the study. The critical questions that the study seeks to answer are then presented and briefly explained. The significance of the study is discussed thereafter. The chapter concludes by giving an outline of the study.

1.2 Background to the study

One of the many features of C2005 was that Technology should be one of the subjects that provided the vocational aspect of education within the General Education and Training band (GET), which denotes grades 7, 8 and 9 respectively (Potgieter, 2014; Stevens, 2006). In the same vein, Kahn and Volmink (2003) assert that the global economy increasingly demands new skills and abilities from its workers. Therefore, it can be argued that the role of Technology in the South African Education system is consistent with the argument above since the subject is seen to be grounded on the need to produce artisans, engineers and technicians in society and to develop a technologically literate population for the modern world (Department of Basic Education, 2011). In the Curriculum Assessment and Policy Statement (CAPS) document, Technology is defined as:

 "the use of knowledge, skills, values and resources to meet the people's needs and wants by developing practical solutions to problems, taking social and environmental factors into consideration" (Department of Basic Education, 2011 p. 8). This definition sums up why the subject is important and a necessity in the curriculum. Through Technology learners are taught skills and knowledge which they can use to come up with practical solutions to various problems. From this definition it is evident that Technology plays an important role in society.

South Africa can be said to be on track with many other countries in terms of why Technology was introduced in the curriculum. Rasinen (2003) studied six countries with the aim of understanding the focus of their Technology curriculum. The study revealed that in all these countries 'technology literacy is a universal goal' in their Technology education curriculum. Focus in all countries included understanding the importance of Science and Technology in society, stability between technology and the environment, developing technologically literate learners, instilling skills like planning, making, evaluating, innovations, awareness and entrepreneurship in learners (Rasinen, 2003). This focus shows a common background to Technology as a subject in different countries, including South Africa. The study presented above clearly states that the role of Technology in the curriculum is to provide learners with opportunities to design and develop solutions for human needs and to assist learners to involve themselves in fast-changing technologies.

Many changes in the curriculum over the years have had an effect on Technology as a subject. Technology as a subject has had its fair share of challenges which were reported during implementation of previous innovations in the South African education system and in most cases the impact was mostly felt by teachers. Stevens (2006) highlights that during the implementation of C2005, which has been discussed in the introduction, teachers were heavily burdened as they had to master the new terms and jargon in Technology and translate the new curriculum into implementable activities at classroom level. In support, De Jager (2011) points out that the Technology teachers found C2005 to be very complicated with lots of new terminology and content. Engelbrecht, Ankiewicz and Swart (2006) mention the following as challenges encountered by teachers, again during implementation of Technology in C2005: the time frame for implementation was limited and therefore teachers were trained within a short space of time, teachers had to teach the subject without adequate training, and they were unsure of what to teach and how to facilitate it and how to plan lessons in the subject. In the year 2000, the C2005 was reviewed in response to the challenges and this led to the introduction of the Revised National Curriculum Statement- RNCS in 2002. The RNCS was seen as an improvement in Technology because progression through the different phases was clearer and content to be covered was specified (Potgieter, 2004). The RNCS was ultimately adopted as the National Curriculum Statement (NCS) in 2005 (Naidoo, 2013). In an attempt to improve curriculum implementation, ensure smooth implementation and streamline the curriculum (Curriculum News, 2010), the NCS was revised to produce the National Curriculum Statement Grades R-12 (Department of Basic Education, 2011a). The NCS Grades R-12, as a policy for teaching and learning in South Africa, consists of CAPS for all subjects that are approved. The CAPS document provides a guideline and stipulates content that must be taught and learnt on a term by term basis (Motshekga, 2011). Since the year 2013 Technology teachers have been faced with the challenge of understanding and implementing Technology as contained in the CAPS document. This study will attempt to understand the factors that influence how teachers implement this curriculum.

The literature suggests that the success or failure of implementing an innovation is also determined by the attitude of the classroom teacher towards the innovation

(Barnes, 2005; Pudi, 2002). While some scholars claim that beliefs, experience and training can either facilitate or interfere with how the teacher enacts the curriculum (Spillane, Reiser & Reimer, 2002), other researchers point out that teacher professional development is crucial for successful curriculum implementation (Ankiewickz, 2003; Potgieter, 2004; Rennie 2001). The lack of appropriate resources for teaching and learning has also been identified as an impediment towards effective curriculum implementation in Technology (De Jager, 2011; Potgieter, 2004; Ziqubu, 2006). All of this suggests that teachers may be affected by a number of factors during the implementation of a curriculum. It is also evident that the success of curriculum implementation depends on the teachers. This point is emphasised by Marsh (2009) when he argues that curriculum only becomes a reality when teachers implement it with learners in the classroom. Mkandawire (2010) assert that teachers are the most crucial human resource during curriculum implementation because they are the ones responsible for the adoption and implementation of aspirations and ideas of the new innovation. However, failure to implement new curricula successfully has been identified as a persistent problem in education by different scholars (Fullan, 2007; Park & Sung, 2013; Yan, 2012). A similar and, of course related, point is made by Bantwini (2009) when he asserts that well-designed curriculum reforms with impressive goals have failed to achieve their outcomes because too much attention has been focused on the desired educational change and the implementation thereof has been neglected. It is then important to attempt to understand teachers during curriculum implementation. This study seeks to explore factors that influence how teachers implement the Grade 9 Technology curriculum in secondary schools. It will focus on what the factors are, and how and why they influence teachers to implement the Technology curriculum the way they do.

1.3 Focus and purpose of the study

This study focuses on the factors that influence how teachers implement the Technology curriculum, specifically in Grade 9. I am employed as a subject advisor for Technology and as a result the area of Technology curriculum implementation is very close to my heart. As a subject advisor my duties include ensuring and monitoring the smooth implementation of Technology through providing curriculum support to teachers so that they can deliver the curriculum effectively in the classroom. I interact with a number of Grade 9 Technology teachers in secondary

schools and have observed how implementation differed from one school to the next. Research into classrooms has shown that curriculum innovations are rarely implemented as intended (Fullan, 2007; Park & Sung, 2013; Yan, 2012). Teachers either reject the innovation or carry on with their practices like before. Factors that have been suggested to influence implementation of innovations include teachers' attitudes (Wang, 2008), lack of resources (de Jager, 2011; van As & gobbler, 2013), community level factors such as politics, funding and policy (Durlak & Dupre, 2008), lack of teacher training (Pool, Reitsma & Mentz, 2013) and many others. I believe that the identification of these factors could assist in improving the level of implementation in the subject. Finger and Houguet (2009) contend that factors that affect implementation can either be intrinsic or extrinsic in nature. They describe intrinsic factors as those that are more on a personal level such as teacher knowledge and understanding of intended curriculum. Extrinsic factors are environmental factors such as insufficient resources and lack of professional development (Finger & Houguet, 2009). Whether the factors are intrinsic or extrinsic this study aims to know more about how they influence implementation of Technology in the classroom. Policy developers also need to consider a variety of factors which can possibly support or inhibit curriculum implementation in Technology. Therefore, it is the intention of this study to understand the factors that influence the manner in which Grade 9 Technology teachers implement the curriculum, given the fact that Technology teachers in secondary schools come from different disciplines and hence their experiences in the subject are widely varied. The study hopes to unpack the strategies used by the teachers during the teaching and learning (implementation) of Technology, and how their choice of strategies influences the way in which they implement the curriculum.

1.4 Rationale of the study

In Grade 9, Technology teachers are expected to provide a solid foundation so that learners can be able to make choices on Technology subjects they will pursue or study from grade 10-12 which will impact on their career paths in future (Department of Basic Education, 2011). At the Grade 9 level the aim is to develop in the learners the love for the subject, in this case Technology, so that learners can choose or pursue it in the higher grades. Hoepfl (2002) contends that there is a wide gap between what is said in curriculum design and what is actually happening in the

classroom in Technology. Thus, my motivation to do this study is both personal and research orientated. I argue that the Grade 9 Technology teachers are faced with a myriad of challenges which usually has a negative effect on the implementation of the curriculum. I also argue that the lack of support for these teachers by the necessary stakeholders has a huge impact on the way that the teachers implement the curriculum, which I have observed over time to be unaligned with the ideals encapsulated and espoused in the policy. Lack of proper formal training in Technology for some of the in-service teachers, I argue, renders the teachers to lack confidence in their subject content knowledge. As a result, poor implementation is inevitable.

The aim of the Technology curriculum in the Senior Phase (Grades 7-9) tends to be general and the focus is on introducing the basics needed in Civil, Mechanical and Electrical Technology, Engineering Graphics and Design, and other subjects in Grades 10-12 in the Further Education Training (FET) phase (Grades 10-12). Research further suggests that Technology has developed along different lines such as craft, high tech advances such as computers and electronics, engineering and sciences (Lewis 2006; Rauscher, 2011). As a result of Technology being closely related to so many subjects, many teachers usually think of Technology as synonymous or closely linked to Science, Engineering and other subjects (Rennie 2001) As a subject advisor I have observed with concern how the Technology curriculum is poorly implemented because it is highly influenced by other subjects that are closely related to it. In some schools Grade 9 Technology teachers tend to ignore the intended Grade 9 curriculum and seem to focus on the Technology specialisation subject/s offered in the FET phase. I have also noted that after many years since its inception, Technology as a subject has not taken shape in some schools. The situation is further complicated by the fact that some secondary schools do not offer any Technology subject/s in the FET phase and hence Technology becomes a dead-end subject in Grade 9. Stevens (2006) also argues that the lack of a general Technology in FET exacerbates the situation of Technology not developing as a subject. Therefore, this study is really an attempt to understand not only the factors that influence the implementation of the Grade 9 Technology curriculum, but also the manner in which these factors influence the teachers in their implementation of the curriculum.

1.5 Critical research questions

In order to gather the necessary data, the participants will be asked these three critical questions:

1. What are the factors that influence the way that teachers implement the Grade 9 Technology curriculum in secondary schools?

This question's aim is to understand the various factors that influence the teachers in their implementation of the curriculum. The question is broad precisely because I want to observe and fully understand as much as possible from the teachers which factors make them implement the curriculum better and/or those that hinder the process of implementation. The second question is connected to the first one:

2. How do these factors influence the teachers' implementation of the Grade 9 Technology curriculum in secondary schools?

By this question, I wish to observe and understand how the factors mentioned in critical question 1 influence the teacher's implementation of the curriculum in the Technology classroom. The third question is:

3. Why do teachers implement the Grade 9 Technology curriculum the way they do in secondary schools?

This question attempts to find out the underlying reasons or justifications that make the teachers implement the Technology curriculum the way they do. It is important to understand if these reasons facilitate or hinder the effective implementation of Technology in the classroom.

1.6 Significance of the study

It is a widely noted phenomenon in the literature that curriculum innovations are sometimes not implemented as intended (Fullan, 2007; Smith & Southerland, 2007). It is then crucial to understand what influences the way teachers respond to curriculum innovations and how that may ultimately influence how they implement Technology in the classroom. This study may be able to shed some light on what truly happens during teaching and learning in the Technology classroom.

The Grade 9 Technology curriculum is regarded as a gateway to Technology subjects in the FET phase (Department of Basic Education, 2011). The literature

researched revealed few South African studies with an emphasis on Grade 9 yet teachers at this level have been tasked with a huge responsibility of ensuring that learners gain skills and knowledge which will assist them to pursue Technology careers and produce a technologically literate population. Therefore, this study is responding to this paucity of literature which it wishes to address through the critical questions that have already been stated. It hopes to contribute to the growing body of knowledge in the Technology field.

The role of the teacher is pivotal in curriculum implementation and its success depends on them, hence the emphasis of this study is for teachers to be supported in whatever way possible by all stakeholders if the implementation is to be successful. This study indicates potential ways in which teachers can be supported such as the creation of opportunities for teachers to work collaboratively with colleagues not only from the same school but from other schools as well; and capacitation of teachers and their Heads of Department (HODs). This capacitation may be a possibility if teachers or the schools have sufficient and updated teaching and learning resources.

1.7 Outline of the study

Chapter 1: Orientation and Background to the study

This chapter introduces and gives an orientation to the study by doing the following: discussing the general background to the study, providing the focus and aim of the study, and describing the significance of the study and mentioning the critical research questions of the study. Lastly, the outline of the study is provided.

Chapter 2: Review of related literature and Theoretical Framework

Literature is reviewed and presented in this section in order to give a deeper understanding of the following issues: definition of curriculum, curriculum implementation and its nature, different factors that shape teachers' thinking during implementation, curriculum implementation in Technology and its relationship with other subjects, and methodology and approach to teaching Technology. It concludes with a presentation of the theory that is used to frame the study.

Chapter 3: Research Design and Methodology

In this chapter the research design and methodology employed in this study are presented. Location of the study is provided followed by a presentation of the data generation methods and data analysis process used in this study. Lastly, issues of ethical considerations are discussed.

Chapter 4: Data Presentation and Analysis

Findings of the study are presented and analysed in this chapter in the light of relevant literature

Chapter 5: Recommendations and conclusion

This section concludes the study by providing a description of the findings, stating the implications of the study, describing the limitations and providing recommendations to inform future research.

1.8 Conclusion

This chapter provided briefly the introduction and the background of the study. Secondly, the focus and purpose of the study were described. The discussion of the critical questions which drive this project and significance of the study were provided. As indicated, this study attempted to answer three critical questions: 1) What are the factors that influence the way that teachers implement the Grade 9 Technology curriculum in secondary schools? 2) How do these factors influence the teachers' implementation of the Grade 9 Technology curriculum in secondary schools? 3) Why do teachers implement the Grade 9 Technology curriculum the way they do in secondary schools? Finally, the outline of the study is discussed. The next chapter presents the literature reviewed and the theoretical frame for this study.

CHAPTER TWO

Review of related literature and theoretical framework

2.1 Introduction

In order to address the critical questions of my research, this chapter presents the literature reviewed in an attempt to explore the factors that influence the manner in which teachers implement the Grade 9 Technology curriculum. This literature review is divided into three sections. In the first section, an overview of what curriculum and curriculum implementation mean in general is provided. The second section explores existing literature on the factors that shape teachers' thinking about the implementation. In the third section, the teaching methodologies and approaches to teaching Technology will be explored. Finally, the theoretical underpinnings for this study will be explored.

2.2 What is curriculum?

The term curriculum is defined in various ways by numerous scholars and it is perceived and interpreted differently. Vanderlinde, Van Braack, Ruben Hermans (2009), for example, define curriculum as the content, activities, purpose and organisation of an educational programme. In simplest terms curriculum can be defined as a plan for achieving goals (Ornstein & Hunkins, 2009).

Marsh and Willis (2007) delve deeply and point out that in order to understand curriculum it is important to view it as an on-going process and to consider it as a product of what is intended which is the planned curriculum, what actually happened, which is the enacted curriculum, and the influence of how what happens influences those that are involved, which is the experienced curriculum. Marsh and Willis (2007) view curriculum as all the classroom experiences that are planned and enacted. They put more emphasis on the fact that curriculum is what is successfully conveyed by the teacher and note that there is a difference in what the school has planned and what the teacher implements in the classroom. Marsh (2009) points out that the interpretation of curriculum has now broadened to include subjects. He states that nowadays school documents and many academic textbooks refer to any or all subjects offered or prescribed as 'the curriculum of the school'. The point made by Marsh is confirmed by Ornstein and Hunkins (2009) when they contend that

curriculum can also be defined in terms of subject matter like maths, science, history and so on, or content. This position on curriculum focuses on objectives, goals, learning activities, content, methods, curriculum material and evaluation procedures for that subject (Carl, 2009). Pinar (2012) contributes significantly to what curriculum is with his study of currere. He employs the concept of currere the Latin infinitive of curriculum which mean 'the running of the course' in the present historical situation. This autobiographical concept provides a strategy for self-study and self-exploration (Pinar, 2014). He explains that when teachers enter the classroom the learners can be constructed by connecting academic knowledge to the students' and the teachers' subjectivities to society and to the historical movement.

Pinar (2012) points out that as a way of looking at curriculum teachers need to understand their situations, slow down, remember or even re-enter the past and imagine the future. The concept of currere suggests that curriculum also embraces history, politics, race, gender, autobiography and other factors. Grumet (2012) takes the view of autobiography a step further when she states that currere provides a method for telling each other's stories of educational experience from a subjective and narrative perspective based on the teachers' and students' experiences articulation. She is of the view that curriculum is the collective story that is told to children about the past, present and future. Grumet (2014) argues that curriculum is an event that takes place in time. While it is clear that defining curriculum is complex and writers have different opinions, Kelly (2004) simply defines curriculum as what is taught and what is learnt in schools. Kelly (2009) cautions that it is not wise to adopt a definition of curriculum which confines us to what is planned only because what is received by learners is also equally important. It is evident from literature that there is no generally agreed upon definition for curriculum. For this study, curriculum is understood as the skills and knowledge that learners are expected to learn. It includes all the planned and unplanned experiences that are attained by learners inside or outside the classroom. I view curriculum as how academic content is taught, classroom layout, the teaching methods that the teacher utilises, the use of Learning and Teaching Support Materials (LTSM) like textbooks, tools and equipment that are used for teaching and learning, the instructional methods used by the teacher, what learners eventually learn and the methods used to asses learner performance for example tests and projects. Curriculum is very

broad and encompasses all the above-mentioned factors, in my opinion. While there are different opinions on what curriculum is, the most intense debate about curriculum seems to be about its implementation.

2.3 Curriculum implementation

2.3.1 What is curriculum implementation?

The term "curriculum implementation refers to the actual use of a curriculum or syllabus or what it consists of in practice" (Marsh, 2009, p 92). Fullan (1992) defines curriculum implementation as what happens in practice in the classroom. It is concerned with the nature and extent of actual change and the factors that influence the changes that are achieved (Fullan, 1992a). He further emphasises two reasons why it is important to focus on implementation, firstly, without implementation data particular changes cannot be linked to learning outcomes, for example, is failure due to implementing poor ideas? The second reason for examining implementation is to understand the reasons behind the failure or success of educational innovations.

2.3.2 The nature of curriculum implementation

Marsh (2009) points out that curriculum is a plan which only becomes a reality when teachers implement it with learners in the classroom. However, the use of a new curriculum is always a challenge for the teachers. The implementation of a curriculum may take considerable time because the teacher needs to be competent and confident in using it first (Marsh, 2009). Hall and Hord (1987) are also of the view that only when the innovation users are confident and competent in the use of the new curriculum can they afford to be concerned about how it influences their learners. Ornstein and Hunkins (2009) assert that as teachers become comfortable with the curriculum they modify it to meet their learners' needs and so that it fits their own educational philosophy. This is the reason why Hall and Hord (1987) emphasise that the teachers' concerns regarding curriculum use should be given more attention.

Fullan (1992) claims that curriculum implementation is a tricky business because it concerns changing people's lives and their working environment with practices that have not been proven "in the name of outcomes we are not sure we can actually achieve" p.7. Ornstein and Hunkins (2012) are of the view that successful

implementation depends on careful planning which focuses on people, programmes and processes. To implement a curriculum teachers need to get people to change their views and habits. "Simply put curriculum activity is change activity", according to Ornstein & Hunkins (2012) p.253, because it brings into reality the anticipated changes. Most schools have failed to implement their programmes because they ignored the people factor and spent most time and money on modifying the programme (Ornstein & Hunkins, 2012). Scholars over the years have studied and investigated curriculum implementation and what makes it a success or failure. Fullan (1992) produced what he called interactive factors affecting curriculum implementation:

Characteristics of change

- Need
- Clarity
- Complexity
- Quality/practicality

Local characteristics
- School districts
- Community
- Principal
- Teacher

IMPLEMENTATION

External factors

- Government and other agencies
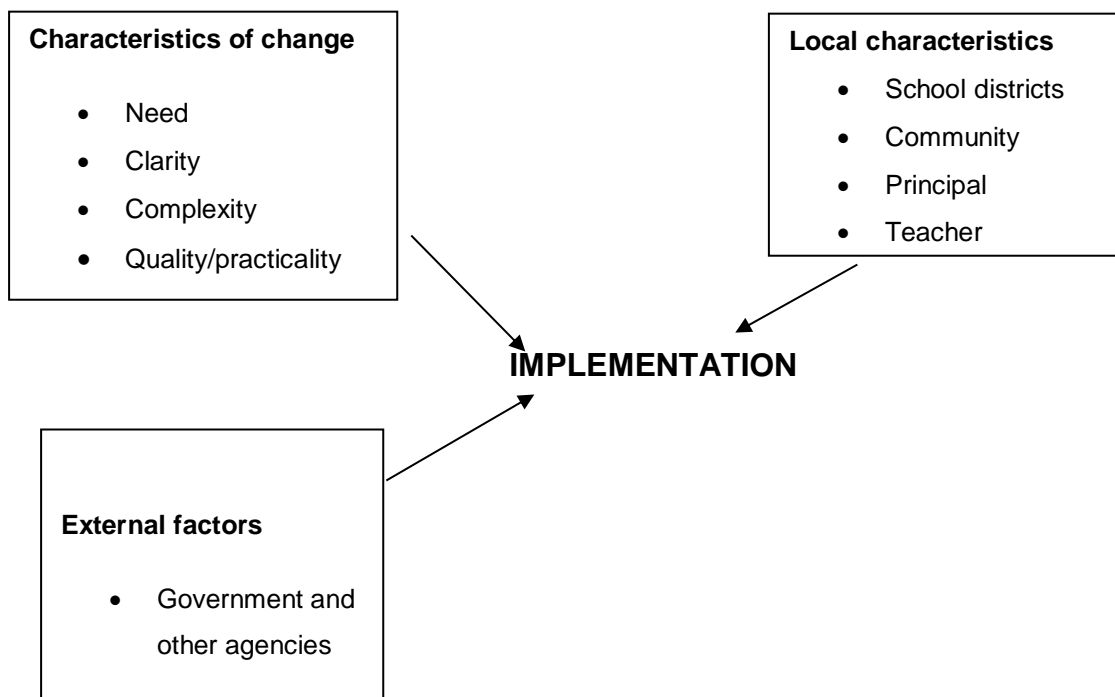
Figure 1: Interacting factors affecting curriculum implementation *[Sourced from Fullan (1992b)]*

These interacting factors have been widely used and cited in literature. Fullan (1992b) points out that curriculum implementation is more effective if teachers feel that there is a need for change, there is clarity about the goals and needs, the extent of change required from teachers is understood and when the innovation is practical and not too complex. Fullan (1992b) views every stakeholder during implementation as important such as the principal, teacher, communities and other, government and

other agencies. The attitude of inspectors and administrators from local districts towards the implementation process is essential if change is meant to be effective argues Fullan (1994). Fullan (1992b) maintains that even though communities are not directly involved in the implementation but they can be included in the implementation strategy though an adequate information system and offers to participate in implementation. The role of teachers during implementation is crucial, their commitment and competencies make up another crucial group of factors for implementation (Fullan, 1992b). However, this involves in my view, teachers fully accepting the innovation but in reality this may be a challenge because teachers may be sceptical of change at first. Fullan (1992b) assert that principals and school management teams are the single most influential group of persons to make change process fail or successful. In this study I intend to explore the factors that influence the Grade 9 curriculum implementation in a South African context. As much as curriculum implementation happens at a classroom level, I also strongly believe it is vital to rethink and consider other factors that happen within the school and the role of other stakeholders and how they influence the curriculum implementation.

Fullan (1992b) contends that if one or more factors in the structure above are working against implementation the process will be less effective. This simply means that more change will be accomplished in practice if more of these factors support implementation. He further clarifies that these factors interact in order to determine the success or failure of implementation.

Carl (2009) mentions the following as factors that determine the success of curriculum implementation: continuous contact with the teachers and providing help and advice, clear communication to supply answers to queries and illustrate different roles, provision of support service by the education department and/or school, for example, supplying material and encouraging teachers. Ornstein and Hunkins (2012) view is very closely aligned to the one above. They also list a few factors that must be taken into consideration for successful implementation as communication among peers needs to be ensured and encouraged, and people should be brought together to discuss new curricula because feedback from teachers is essential to the curriculum process. Secondly, in order to facilitate implementation curriculum developers must provide support such as in-service training or staff development for teachers who do not have an understanding of the curriculum. The important points

that I see emanating from these two views are that communication and support such as staff development is crucial for successful curriculum implementation. It is clear that teachers must be given the relevant knowledge and skills before an attempt to implement a curriculum is made.

Ornstein and Hunkins (2012) argue that curriculum implementation requires teachers to adjust ways of behaving, personal habits, the existing curriculum and schedules and learning spaces. They also emphasise that the quality of initial planning for implementation by curriculum developers will determine the readiness with which teachers and others accept a new curriculum. Ornstein and Hunkins (2012) caution that new curricula can fail because of inadequate financial support such as money for new materials and equipment. Similarly, Ali (2006) suggests that technical and financial resources along with quality human resources are key and contribute to a proper curriculum implementation.

Because of the uniqueness of each school implementation of a new curriculum should be tailored to the school (Ornstein & Hunkins, 2012). The above argument suggests that teachers or schools are expected to develop and modify the curriculum to suit their learners and school environment. According to my experience, this approach is always misunderstood by teachers. A classic example in Technology is during the implementation of NCS when teachers were given freedom to replace projects if they thought it did not suit their school with one that would suit their context. This resulted in some teachers replacing the projects with ones which did not test the knowledge or skills that were taught. This was a challenge for learners and teachers in different schools were all acting independently of one another. While this is a good idea, the challenge is that most schools or teachers do not possess the skills and knowledge to develop a customised curriculum.

2.4 Different factors that shape teachers' thinking during implementation.

A number of studies suggest that teachers are not just implementers of what is handed down to them; they modify, alter, interpret and implement according to their beliefs and the context (Barnes 2005; Fullan, 2007; Orafi, 2008; Park & Sung, 2013; Spillane, Reiser & Reimer, 2002). Spillane et al. 2002 argue that the individual's prior

knowledge, values, beliefs and experiences play an important role in what they make of new information. Barnes (2005) points out that the attitude of the classroom teacher determines the success or failure of the innovative curriculum. Therefore it may be argued that teachers may present different characteristics, perspectives and viewpoints because of their subject matter, background, prior knowledge, experiences and other factors mentioned in the studies above. Park and Sung (2013) caution that if teachers perceive a curriculum innovation as being out of their control because they do not feel well-equipped they may not implement it even if they have a positive attitude. The literature above clearly suggests that people's attitudes may determine how successful a task will be and it is important to find out if this may be the case with the curriculum implementation in Technology.

2.4.1 Teachers' beliefs

The beliefs that teachers hold may influence their judgments and perceptions and, in turn, their behaviour in the classroom (Richardson, 2003). Richardson (2003) argues that the pre-existing beliefs of teachers strongly affect what and how they learn and eventually how they approach teaching in the classroom. These beliefs may also be very difficult to change. Orafi's (2008) view is closely aligned with Richardson's when he states that teachers' beliefs and other contextual factors may lead to a limited uptake of curriculum by teachers. The underlying assumption here is that the teachers' beliefs play a critical role and may determine how they teach in the classroom. Teachers' beliefs can either facilitate or inhibit curriculum implementation. It is important to understand that teachers as implementers will have a point of view about the curriculum that is being implemented. Depending on how they look at it they may then eventually take a position whether to implement or not. In light of the argument above it is important to conduct a study that explores what influences teachers during curriculum implementation. This study intends to go beyond what is taught in the classroom by looking at the impact of the teacher's beliefs on the implementation of the Technology curriculum in the classroom.

Spillane et al. (2002) argue that it would be unfair for anyone to expect teachers to faithfully implement a curriculum as intended by developers because they also formulate their perceptions and meanings when changes are introduced to them. In

agreement, Park and Sung (2013) are of the view that teachers formulate their own perceptions and meanings when implementing a curriculum.

2.4.2 Teachers' experiences

Fullan (2007) brings in the issue of subjectivity. He points out that change is a subjective process whereby an individual constructs his or her own personal meaning about the change they are experiencing. Pinar (2011) asserts that it is important for teachers to reconstruct their own understanding of what it means to study and teach, and become educated in the present moment. He further notes that different people have different genetic make-up, upbringing and families. All this is specific to an individual. In his concept of currere, Pinar (2011) argues that it is only in the lived experience of the curriculum, the running of the course, that the curriculum can be experienced, enacted and reconstructed by teachers. He points out that if individuals work on their history and lived experiences they can achieve an understanding which can assist them to construct their own subjective and social lives. Pinar (2011) suggests that school reforms should construct a curriculum that connects academic knowledge, teacher and learner subjectivity, society and historical background. This method recognises the importance of teacher subjectivity in a curriculum. An important aspect that I see emanating from Fullan (2007) and Pinar (2011) above is that teachers' judgement is shaped by a number of things like feelings, opinions, experiences, history and other. The individualistic nature and subjectivity of the teacher should be taken into consideration and only then can we understand what informs or influences their decision making during curriculum implementation.

2.4.3 Teacher knowledge and/or understanding

Spillane et al. (2002) emphasises that policies are not static ideas that can be modified, accepted or rejected but implementers must first notice the policy, frame it, and then construct its meaning. Another factor that is related to the implementation of innovations such as Technology curriculum is what Spillane et.al (2002) call 'sense making'. They draw our attention to the fact that there are cognitive factors that also play a role in implementation, "the implementing agents depend significantly on their 'sense making' of policy which is 'not' a simple decoding of the policy message; in general the process of comprehension is an active process of

interpretation that draws on the individual's rich knowledge base of understanding, beliefs and attitudes" p.391.

Bufalino (2013) asserts that what is ultimately learned and taught in the classroom is determined by the teachers' individual professional knowledge, values, ideas, work and identity and again each student's prior knowledge, values and background. She argues that all the above-mentioned form what she calls a sense of 'teaching identity' which then determines how their role as teachers is enacted.

2.4.4 The hidden curriculum

There are also other factors that are involved into what and how the teacher teaches the subject in the classroom and ultimately contributes to what the learners learn. The hidden curriculum also needs to be taken into consideration. Booysen and Du Plessis (2008) describe the hidden curriculum as learning which is hidden from the teachers as well as from learners. It is a form of implicit learning which the teachers did not intend and may not even be aware of. Bufalino (2013) argues that a teacher's upbringing, values and culture are all part of the hidden curriculum. "Students learn these values through the constant modelling of the teacher without being consciously or specifically planned or taught" p.13. Some scholars have also studied the hidden curriculum and have come up with various definitions. Hawden (2013) argues that hidden curriculum is all the things that are taught through the teacher's actions, inactions and attitudes. Margolis (2001) defines the hidden curriculum as the socialisation elements that occur in school but are not part of the formal curriculum such as values, norms, beliefs embedded in the classroom life and school which are imparted to learners through daily routines, social relationships and curricular content. These definitions raise the issue that in schools learners may learn knowledge and skills which are not part of the prescribed curriculum. It is then crucial to understand whether the hidden curriculum reinforces or contradicts the prescribed curriculum. It may therefore be argued that the hidden curriculum can inhibit or foster curriculum implementation. That is why Ornstein and Hunkins (2009) caution that we need to realise the power of the hidden curriculum and acknowledge that while some parts of the curriculum are not written they will certainly be learned by learners in the classroom. I argue that the hidden curriculum can thus shape and influence what is taught in the Technology classroom and ultimately curriculum implementation in the

subject. Even though some values and attitudes that are learnt through the hidden curriculum are not intended, the teachers in the Technology subject need to be aware and acknowledge their role during teaching and learning. When the planned curriculum is implemented, learners also experience an 'unwritten curriculum' which is informal and has not been consciously planned (Kentli, 2009).

Some scholars have also contributed to the discussion on the role of Technology teachers in schools. Jones and Moreland (2003) argue that it is pivotal to construct a knowledge base for technology teachers in order to ensure effective teaching and learning. Moreland and Jones (2000) explain that the selection of tasks for learners in technology must ensure that learners are involved with experiences in different Technology areas. This approach has, however, led to the neglect of progression in learners' technical knowledge and understanding because these tasks appear to be isolated occurrences rather than cumulative and purposeful experiences. Moreland and Jones (2000) are of the view that this is because teachers tend to miss the 'bigger picture' as they eagerly try to cover as much Technology content of the curriculum as possible, coupled with their desire to design and make products. To a certain extent, I can agree with Moreland and Jones' claim because I have also noted (in my capacity as subject [Technology] advisor) that sometimes teachers feel the pressure to cover the prescribed content, they then rush though it and tend to focus on the end product, which is production of the product. There is a range of processes that the learner must go through before making the product. This is when the importance of teacher knowledge comes in. Naidoo (2013) notes that making a product is an important part of Technology and cannot be avoided, however, it becomes a problem when making the product becomes the main focus. Among many other things that Naidoo (2013) discovered in her study, was that the awarding of marks by Technology teachers was based on the completion of an end product. (Jones & Moreland, 2003) similarly argues that the decision making and the actual process of thinking are more important than the products that the learners make.

There has been an extensive account in the literature about well-designed curriculum policies that have not been effectively implemented and thus failed to achieve their outcomes (Fullan, 2007; Park & Sung, 2013; Yan, 2012). Park and Sung (2013) point out that many countries have made efforts to implement curriculum reforms which are well designed but the implementation has resulted in

less than desirable outcomes and these changes were not effected in the classroom. Hoepfl (2002) suggests that there is a wide gap between what is said in curriculum design and what is done in the classroom. He further argues that although in theory there is a promotion of a broad based curriculum that takes a larger view of Technology and its interactions with society, in practice a narrow curriculum that focuses on manipulation of tools and materials is presented. It is therefore important to engage in a study that seeks to understand the factors that influence how teachers implement the Technology curriculum in order to understand what really goes on in the classroom

2.5 Curriculum implementation in Technology

Technology has been in the South African curriculum for a number of years now. On-going implementation challenges in the South African education system resulted in the review of the policies that existed and this resulted in the introduction of the Curriculum and Assessment Policy Statements (CAPS) for all subjects, including Technology. In 2013 teachers started implementing the Technology CAPS which is based on a previous curriculum, the National Curriculum Statement (NCS). However, the curriculum has now been re-packaged and updated. Curriculum implementation is a complex process and teachers have an important role to play during implementation. According to Altrichter (2005, p.2), implementation "in a broad sense conceptualises the process through which a proposed concept, model, topic, theory etc. is taken up by some practice".

In an international study conducted by Barnes (2005) which focused on identifying factors that influenced the teachers of Queensland to implement a new Technology curriculum, the importance of subjective experience by individuals was emphasised. In this study five important factors emerged, including flagging student interest, which means that the students' needs tailored the curriculum and the students' enthusiasm towards the Technology curriculum encouraged teachers to rethink their attitudes to existing curricula; the external curriculum which provided the direction for curriculum changes; and that a supportive environment was crucial and the contributors were the principal, head of department, parents, time, materials, giving teachers freedom to change, and personal reflection. All these changed the teachers' belief in Technology education. This then suggests that schools, especially

the management, need to provide teachers with a conducive environment, and they need to encourage and support them emotionally and financially in order to facilitate curriculum implementation. While Barnes's (2005) study has highlighted a number of factors that may influence curriculum implementation, a study from a South African context is still required.

Another study conducted in Korea by Park and Sung (2013) examined how elementary teachers perceived a curriculum reform and what support these teachers needed in order to implement the reformed curriculum. The findings indicate that teachers generally harbour negative feelings about curriculum change and that these feelings may adversely impact teachers' commitment to implementing change. Park and Sung (2013) further highlight several issues that are known to inhibit implementation of a curriculum. Issues such as: insufficient professional development programmes support for teachers, not having opportunities to work through the implementation problems with peers, and contextual and cultural constraints.

Bondy (2007) conducted a study which set out to discover how Technology has been implemented across a small selection of schools in Wellington, New Zealand. The factors that emerged from her study highlighted that teachers seemed to consider the learners' backgrounds, learning needs, abilities and aspirations when implementing the Technology curriculum. It also emerged that the teachers' own experiences and qualifications, and contextual factors associated with the school appeared to be linked to how the teachers interpreted and implemented the curriculum. In addition teachers identified the need for on-going professional development and resourcing in the form of materials and staffing.

Both these studies by Park and Sung (2013) and Bondy (2007) reveal a number of factors that may inhibit or assist curriculum implementation in Technology. They both identify the need for robust, on-going teacher professional development for successful curriculum implementation. Teachers must be given knowledge and skills before they can implement a curriculum. Jones, Buntting and de Vries (2011) point out that in all countries teacher education and professional development are the keystones in the implementation of a curriculum. Altrichter (2005) concurs by stating that pre-implementation training is helpful for orientating teachers towards new aims

and practices but emphasises that support is most crucial when participants actually try to implement new approaches i.e. during implementation.

Van der Akker et al. (2009) emphasises teacher involvement for successful implementation to be achieved. They assert that adopting a communicative approach using the deliberative model can assist. According to this model, relationships must be built with the stakeholders and input from all parties involved is vital. In the context of this study teachers should be involved when changes are made to the curriculum so that they can make meaningful contributions; they are the implementers of the curriculum after all. This suggests that if teachers are not involved and informed about a curriculum innovation their commitment to the implementation may be adversely affected.

In her international study, Davis (2011) identifies two types of factors which are said to impact on curriculum implementation, particularly Technology implementation. She distinguishes between factors that facilitate and those that inhibit or are barriers to curriculum implementation. Davis (2011) claims that colleague support, input by curriculum officers, adequate training and teacher development contribute positively to curriculum implementation, while lack of resources, poor infrastructure, lack of subject knowledge, teacher attitudes and inadequate support by administrators/managers at school prove to be barriers to curriculum development. The study above is similar to this study in that it also looks at factors that impact on curriculum implementation in Technology in New Zealand. This study explores factors that influence implementation of Grade 9 Technology in a South African context. Davis (2011), like other scholars, reveals lack of support by managers at school as a barrier to curriculum implementation. Likewise, Ornstein and Hunkins (2012) assert that the principal's leadership is central to successful curriculum implementation. If the principal creates an atmosphere which allows for good working relationships among teachers it is likely that programme changes will be successfully implemented (Ornstein and Hunkins, 2012). Davis (2011) identifies lack of infrastructure and resources as a barrier to implementation. Indeed, the lack of resources will have a negative influence on how teachers present their lessons in the classroom because of the practical nature of Technology.

Finger and Houguet (2007) carried out a study to gain insights on the intrinsic and extrinsic challenges experienced by primary school teachers during implementation of Technology. The study revealed a number of intrinsic and extrinsic challenges associated with implementing Technology in Queensland. The intrinsic challenges revealed were challenges with professional knowledge and understanding, professional adequacy, teaching approaches, professional attitudes and values. The extrinsic challenges revealed were lack of resources, time management, a lack of history and tradition of Technology, varying methods of learner assessment and the practicality of implementation. Indeed, limited knowledge of the Technology subject and assessment practices have been cited by Technology scholars as reasons for the gap that exists between policy and practice (Hoepfl, 2002; Jones, Buntting & de Vries, 2013; Naidoo, 2013). In light of the above argument it is crucial for teachers to have sufficient subject knowledge in order to be able to effectively implement the curriculum. This argument is highlighting the importance of teacher knowledge in Technology.

Local literature revealed that very few teachers feel that the implementation of Technology was successful and that schools were ready for implementation. This was according to the study conducted by Heymans and Pienaar (2004) in the Free State province. This study further indicated that the level or standard of Technology in different schools was not the same, there was a need for specialised trained teachers, there must be appropriate equipment to teach Technology and that a high percentage of teachers felt that Technology did not have a place in the FET sector.

Stevens (2006) also notes that one of the factors that hampers the development of Technology in schools is the lack of Technology subjects both in the FET 10-12 band and at tertiary level. What exists at present is a general Technology subject in Grades 7-9 and specialised Technology subjects in the GET (Grade 7-9) phase. Stevens (2006) is of the opinion that the general Technology subject should be taken up from GET to FET level and right up the tertiary level. Teachers in the GET band introduce learners to the basics needed in specialised Technology subjects like Civil, Mechanical, Electrical technology and Engineering and Graphic Design. The teachers' role is to provide a solid foundation for these FET subjects as well as the field of work (Department of Basic Education, 2011a). It is, however, of concern that

not all high schools offer Technology subjects in the FET phase and for these schools there is no continuation of the subject and it becomes a dead end subject in Grade 9. This study will try to address this gap and understand if the argument above is influential in how teachers implement the Technology curriculum. Stevens (2006) argues that the inclusion of 'general' Technology in the FET phase is essential and he maintains that this will have a motivating 'pull' on the teaching and learning of Technology. Reid (2000) also raises a similar concern when he argues that the lack of understanding of careers and progression to pathways to tertiary education is a barrier to implementation of the Technology curriculum. Jones (1997) also raises a similar assertion; he states that there is no single well-established academic discipline for Technology in higher education but what exists are a multiple technologies.

In another study conducted locally by Adams (2002), in which he investigated the implementation of Technology in the South African curriculum, the findings suggested that teachers did not have a conceptual understanding of Technology and the lack of government support was identified as the biggest problem facing the successful implementation of Technology. Adam (2002) clearly illustrates the need for a shift in the Technology teaching methods, need for parent involvement, and involvement with NGOs, government and higher learning institutions. In my view this means that the involvement of all relevant stakeholders is crucial during curriculum implementation. Teachers play a central role during implementation but they cannot do it alone. The Department of education and parents must also play their role of support. A team effort is required for successful implementation.

Ntshaba (2012) conducted a study to investigate teaching and learning practices in Grade 9 Technology classrooms in the King Williams Town district. The study found that the teaching and learning practices were not aligned to the curriculum expectations because of lack of confidence with regard to content by teachers and their limited understanding of the curriculum. Jones and Moreland (2004) contend that for teachers to be successful in teaching Technology they should possess technological competences which are the subject knowledge, pedagogical subject skill and subject skill. The above implies that if teachers teach with limited subject knowledge they will be tempted to only focus on subject area which are familiar to them argues Pool, Reitsma and Mentz (2013) The lack of content knowledge of

Technology teachers has emerged in most of the arguments above. This has implications for the Department of Education; teachers need to be trained on Technology content. Curriculum specialists must ensure that programmes or the curriculum is implemented in schools by providing and sharing their specialised content knowledge with teachers. This study attempts to provide district officials with information that will improve their ability to assist teachers implement Technology curriculum successfully. The main question that could be asked is: do these specialists possess the expertise in content that is required to assist the teachers?

Ziqubu (2006) conducted a study to understand constraints experienced by Grade 7 teachers to the effective teaching and learning of Technology. The findings were that schools do not have the required resources for the learning and teaching of Technology, and teachers lacked the skills and competences needed to teach Technology and had not received sufficient training. The study also revealed the teachers' understanding of what should be emphasised in technology differed from one teacher to the next. The role of resources in Technology has been well documented with researchers asserting that in order for the implementation of Technology to be a success it will largely depend on the availability of resources and facilities (De Jager, 2011; Potgieter, 2004, van As & Gobler, 2013). Jones et.al (2013) point out that the level of resourcing during curriculum implementation greatly influences how rapidly policy changes can be effected in the classroom. A related view is raised when Gaotlhobogwe (2012) asserts that the lack of resources has an influence on learners' attitudes about the subject itself because in his study one of the findings was a decline in learners' enrolment in Design and Technology due to the lack of resources. While there has been much research on the lack of resources in Technology much more research is needed to understand how the unavailability of resources directly impacts on how the teachers implement the curriculum.

Naidoo (2013) conducted a study which focused on assessment practices in Technology. The findings also spoke to how the teachers implemented the curriculum in the subject. It emerged that teachers put greater emphasis on completed products done by learners instead of the designing and the learning process of the learner. Lack of pedagogical knowledge in the field of Technology and limited knowledge on assessment strategies contributed to the teachers' assessment practices. Assessment plays an important role in determining the success of the

teaching and learning process (Carl, 2009). From the above it is clear that assessment is an integral part of curriculum implementation and correct methods must be used in order to ensure learners can demonstrate what they have been taught.

A study was conducted by Ramatlapana and Makonye (2012) to explore FET teachers' adherence to CAPS implementation. Data was collected from 52 FET teachers, teaching different subjects in 12 schools. The study discovered that the prescriptive nature of CAPS compromised teacher autonomy in effecting quality education. Teachers felt compelled to comply despite their beliefs and attitudes on the curriculum. Seventy percent of the teachers stated that they could not just implement CAPS without regarding their learners' state and interests. According to the study, teachers were generally willing to adhere to CAPS, however, they did not always do so. While CAPS may be prescriptive in nature, it is my opinion that it also provides a clear guideline on what exactly should be taught by teachers in the classroom. It is true that there are challenges in terms of implementation of CAPS and teachers may feel that they do not have the freedom and control in their classrooms but other factors also need to be looked at and considered. It is thus important to research and find out other reasons why teachers do not sometimes adhere to the curriculum that must be implemented.

Ankiewicz, Adam, De Swardt & Gross (2001) point out that Technology in the schooling system is viewed as an innovation towards the development of a more thinking framework. This requires a different role for Technology teachers; they are expected to be facilitators of the learning process and shift from the traditional notion of being authoritative and imparting knowledge to learners. They further argue that this poses serious challenges to teachers who have been informed by a curriculum framework characterised by authoritarian and rote approaches to learning and teaching. The literature above highlights the plight of most teachers in the education system that were trained in a different era and now have to adapt to the requirements of 'new' subjects like Technology. Even though it is not mentioned in the CAPs document it is clear that Technology teachers must be highly skilled and use a variety of strategies to impart knowledge to the learners. However, in most instances this is not the case. It is essential then to explore such claims further and see if they have any influence on curriculum implementation in Technology.

2.6 Technology and its relationship with other subjects

The aim of the Technology curriculum in Grade 9 in the General Education Training (GET) phase is general and it is to introduce the basics needed in Civil, Mechanical and Electrical Technology and Engineering Graphics and Design and other subjects in Grades 10-12 in the FET phase. The expectation is that Technology will provide learners with experience so that they can make career oriented subject choices at the end of Grade 9 (Department of Basic Education, 2011a). The diagram below shows the Technology subject and its link with some subjects in the FET phase as stipulated in CAPS.

HET: TERTIARY QUALIFICATIONS

TECHNICIAN, ARTISAN, ENGINEER, QUANTITY SURVEYOR

MECHANICAL TECHNOLOGY

CIVIL TECHNOLOGY

ELECTRICAL TECHNOLOGY

ENGINEERING GRAPHICS AND DESIGN

PHYSICAL SCIENCES

DESIGN

FET: STUDY FIELDS LINKED TO TECHNOLOGY GRADES 10-12

GET: TECHNOLOGY: GRADES 7-9
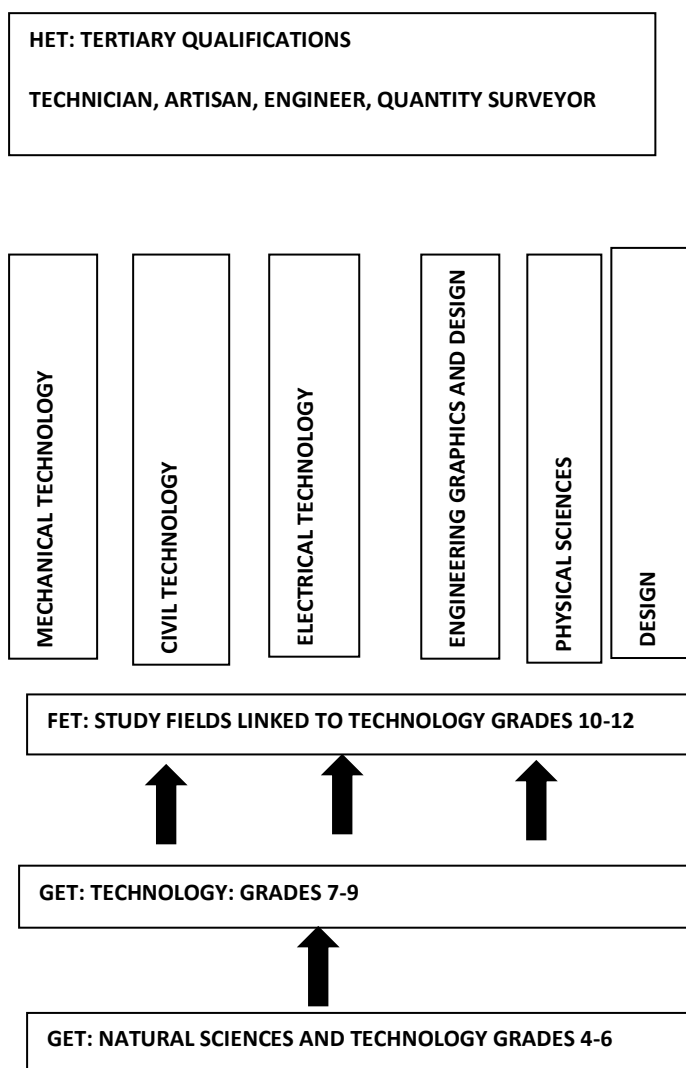
GET: NATURAL SCIENCES AND TECHNOLOGY GRADES 4-6

Figure 2: Subject choices at the end of Grade 9 (Sourced from Department of Basic Education, 2011)

Research also suggests that Technology has developed along different lines such as craft, high tech advances such as computers and electronics, engineering and sciences (Rauscher, 2011)

Jones et al. (2013) analysed the historical development of Technology in ten countries and identified seven representations of the subject as the industrial arts/vocational training, Engineering and Mathematics, Technology, Technology informed by design, Technology integrated within science, Technology as Applied Science, skills and gendered craft subjects, and Technological literacy. As a result of Technology being closely related to so many subjects many teachers are known to comfortably think of Technology along the lines of Science, Engineering and other subjects (Van As & Gobler, 2013; Rennie 2001). One of the challenges faced by most practising teachers is that they have not been formally trained to teach Technology. They were generally sourced from subjects like woodwork, metalwork, science and home economics and therefore when teaching they tend to draw and rely on their background knowledge of traditional subjects. (Potgieter, 2004; Rauscher, 2011). The discontinuation of industrial arts subjects resulted in qualified and competent teachers in subjects, such as Home Economics, Woodwork, Metalwork and Industrial Arts being assigned the responsibility of implementing and teaching technology (Van As & Gobler, 2013). If a Technology teacher has a strong Engineering Graphic and Design-EGD background, for example, he/she could put more emphasis and time on the drawing aspect of Technology. The effective implementation of Technology requires teachers to be thoroughly trained on content. Msibi and Mchunu (2013) argue that teachers have to be experts in the subjects that they teach and in order for this to take place support has to be provided to teachers.

Jones, Harlow and Cowie and (2004) gained data on New Zealand teachers' experiences of implementing the Technology curriculum from a national study called the National School Sampling Study. They discuss the results and findings of this study. The study revealed that Technology was being implemented differently depending on the type of school. Over 60% of teachers were integrating Technology with other subjects. Primary schools tended to integrate Technology with Languages and Science and high schools viewed Technology as a fragmented subject. It was taught in modules or blocks and was mostly integrated into Home Economics and Workshop Technology. The study also revealed that change has not been easy in

the secondary schools as compared to primary schools because of existing schools structures, and strong subject subculture of subjects like graphics, home economics and workshop technology. All these had an impact on curriculum implementation in the Technology subject and this supports the argument presented by Potgieter (2004) and Rauscher (2011) above on influences of other subjects on Technology.

Literature in Technology has highlighted the influence of subject subcultures on teaching and learning in the subject Moreland, Jones and Northover (2001). They argue that teachers have a subjective view of the practice of teaching within their subject areas and this they refer to as subject sub cultures. They claim that the teachers' concept of Technology and their concept of learning and teaching may impact on the subject in various ways such as the way they structure their lessons and develop classroom strategies.

Research in New Zealand (Moreland, Jones & Northover, 2001; Jones 2002) suggests that subject subcultures are a strong influence on teachers' perceptions of technology and subsequently on their classroom practice. In a study conducted by Jones (2002) the findings were that technical teachers in secondary schools had a broader view of the subject Technology and this was influenced by their experience of the subject at national level. He continues and points out that the subjects that are taught at secondary level influence what the teachers think Technology is about and what their students should be taught. He concluded from his study that it was apparent that many secondary school teachers did not possess a broad view of Technology, their knowledge was restricted within the subject they already taught and within which they were trained. This study reveals that the subject subculture has a direct influence on the way teachers structure their lessons and teach Technology concepts and processes in the classroom. I believe that subject subculture is a factor that could greatly influence curriculum implementation in Technology. It is then important to take into account the teachers' view of the subject and to take into consideration how these views will influence the implementation of the new curriculum.

Some scholars have studied the role played by the division of subjects in schools. Siskin (2001) contend that schools are social 'worlds' and there are deep divisions of

subject departments in schools. He identifies subjects that are basic subjects in schools such as Maths, English, Science and Social studies. He then argues that faculties like special needs education often sit uneasily in the subject hierarchies in schools or may not have a department at all. While some departments such as home economics face extinction in the face of changing enrollments or budget cuts. It is a reality that in schools traditional subjects like Mathematics and Science seem to be well regarded while the newer and practical subjects like Arts, Drama and Technology are sometimes marginalised. A classic example is that Technology subjects in the Grade 12 band are not even weighted; they do not qualify learners to gain entry to universities. It is important to understand whether issues like this have any influence on how teachers implement the curriculum in Grade 9 in South African schools.

2.7 Teaching methodology and approach to teaching technology

2.7.1 The Design Process

The Design process forms the backbone of the subject and should be used to structure teaching of Technology. The Design Process consists of the following skills: Investigate, Design, Make, Evaluate and Communicate - IDMEC.

Investigating: requires learners to gain more information and insight regarding a particular problem, evaluating existing products and performing practical tests to get a better understanding of materials and products or determining the products' fit for purpose. This is done so that learners can make informed choices.

Designing: Once clarity has been gained regarding the problem and the specifications are considered ideas are then generated. Most often these are in the form of drawings. The initial idea is not necessarily the best. This part of the design process requires learners to have an understanding of graphics, the use of two and three dimensional drawings, planning and modelling. The drawing should be in detail and include notes, instructions and dimensions.

Making: this when learners use various materials and tools to develop the solution to the problem. This process involves numerous skills like measuring, building, mixing

and modifying. When making learners should be encouraged to reflect on their progress and to modify their solutions based on problems they encountered.

Evaluation: learner evaluates the course of action that he or she has taken in coming up with the solution. Learner uses evaluation skills to choose ideas. Key aspects of design are used at this stage to evaluate both existing designs and designed products against predetermined criteria. Learner has an option to modify the product or not using suggestions from peers.

Communication: Communication should be seen as integral to the overall process. Learners should be recording and presenting progress in written and graphical forms at this stage *(Department of Basic Education 2011).*

A number of studies also suggest that the approach to teaching Technology Education is based on a model of a design process (De Jager, 2011b; Mawson, 2003; Williams, 2000). A common approach to teaching the Design process in Technology is mapping out a series of steps that must be followed by learners as they make their products (Williams, 2000). CAPS stipulates that learners in Technology must work collaboratively with others doing practical projects using a variety of technological skills (investigating, designing, making, evaluating and communicating). The importance of the design process in the teaching of Technology is further emphasised in CAPS by the specification that content weighting for tests and examination should be 50% for the design process, 30% for knowledge and 20% for values and attitudes. This weighting for assessment should guide the approach to teaching in Technology. This means that most of the knowledge acquired by learners should happen during the development of the design process. An example is when learners investigate some knowledge and evaluate its impact on the environment. (Department of Basic Education, 2011).

However, the over-emphasis on the design process in some cases by teachers as a linear format during teaching and learning is an area of concern. Williams (2000) points out that referring to the skills of the design process as steps or stages in curriculum documents has a sequential connotation and this is not appropriate. The view of the design process as being linear was further compounded by the fact that in the past South African designers of the Technology curriculum have emphasised a linear and structured way of working technologically.

In support of the argument above, Lewis (2006) emphasises that the steps of the design process are iterative and can be performed in different sequences depending on the details of the design problem. It must be noted that CAPS, however, emphasises that the design process is non-linear but how it is being taught in the classroom could be different.

Some researchers have also identified a non-linear nature of working technologically (Fleer, 2000; Hill and Anning, 2001; Lewis, 2006; Mawson, 2003; Williams, 2000). Lewis (2006) argues that teachers sometimes present a formula which is comprised of stages when teaching the design process and this contradicts the natural way that children follow when designing. Similarly Williams (2000) mentions a systems approach (input-process-output) that can be used and followed to come up with a product. The arguments presented above clearly state that the design process is not a linear process; there is a range of processes which learners are engaged in when doing Technology.

"Learners are forced to think in a way that has been predetermined by the teacher" (Williams, 2000, p.13). The CAPS document, among other things, envisage learners who are innovative and develop their creative and critical thinking skills and this should be instilled in learners at all times. Learners cannot achieve this if they are expected to follow a certain method. Learners must be free and have their own strategies to come up with a solution. Learners are not able to follow a predetermined process in their work as "they invent a process as they proceed towards task completion" (Williams, 2000, p.13). The teachers' understanding of the design process, which is the backbone of the subject and how they modify and alter it to suit their learners, may influence the implementation of the Technology curriculum. Naidoo (2013) contends that for teachers to teach Technology it is imperative that they understand how the design process works.

Moreland and Jones (2000) point out that selection of tasks for learners in technology must ensure that learners are involved with experiences in different Technology areas or aspects. This approach has, however, led to the neglect of progression in learners' technical knowledge and understanding because these tasks appear to be isolated occurrences than cumulative and purposeful experiences. Moreland and Jones (2000) are of the view that this is because

teachers tend to miss the 'bigger picture' as they eagerly try to cover as much Technology content of the curriculum as possible, coupled with their desire to design and make products.

2.7.2 Approach to teaching Technology

When approaching the subject in the classroom teachers must first engage learners in enabling tasks. These tasks are meant to build capacity in learners so that they can complete the formal assessment tasks referred to as Mini-Practical Assessment Task (Mini-Pat) later on in the term. According to CAPS Technology (2012), in order to develop coherent units of work around a problem-solving task the following approaches have been adopted as classroom practice in Technology: enabling tasks and Mini-PAT.

Enabling tasks: Activities used to teach and then practice specific skills in preparation for a more advanced task, sometimes also called resource tasks. These tasks are assessed informally. These are done to build capacity to complete the formal assessment tasks later in the term.

Mini-PAT: A short Practical Assessment Task which makes up the main formal assessment of a learner's skills and knowledge application during each term. It may be an assignment covering aspects of the design process, or it may be a full capability task covering all aspects of the design process (IDMEC). It is designed to provide learners with an opportunity to show their levels of ability. (Department of Basic Education, 2011).

The key issues to teach in Technology are:
- Problem solving using the design process;
- Practical skills; and
- Knowledge and application of knowledge

There are four content areas to be taught in Technology, namely: Structures, Processing, Mechanical Systems and Control and Electrical Systems and Control. The recommended approach to teach this content is to introduce the knowledge and follow with practical work in which the knowledge is applied. The ability to design is a key element to teach in Technology. (Department of Basic Education, 2011a)

While the studies that have been discussed in this chapter provide information on curriculum implementation internationally and locally in Technology, the work has focused mostly on primary schools or at the entire education system. A gap exists in relation to understanding the factors that influence curriculum implementation, specifically in Grade 9 which is the exit level at the GET band in South African schools. In cases where work has been done locally the focus has been on the Revised National Curriculum Statement R-12 and the National Curriculum Statement Grades 10-12. Not much has been done on the implementation of the amended, improved and recently implemented CAPS in the Technology subject. It is this gap that this study seeks to fill. This study will provide an in-depth exploration of factors that influence teachers to implement the Technology curriculum the way they do in secondary schools.

2.8 Theoretical framework

The study is framed on the Concerns Based Adoption Model (CBAM) by Hall and Hord (1987). Hall, Wallace and Dossett proposed the CBAM in 1973. The CBAM is a conceptual framework that outlines the development process that individual teachers undergo as they implement a new curriculum (Hall & Hord, 2001). Hall and Hord (2011) argue that there is a range of feelings, doubts, opinions for those engaged with implementing new approaches so it is important to understand the personal side of change because failing to address these concerns may lead to resistance or even rejection of a new way. The CBAM holds that people considering and experiencing change advance in the kinds of questions they ask and in their use of whatever the change is (Hall & Hord, 2001). The following factors are the important assumptions and assertions that underlie the CBAM as listed by Hall and Hord (1987):

I.   It is important to understand the participant's view during the change process;
II.   Change is not an event but a process;
III.   It is possible to expect much that will occur during change;
IV.   Innovations may come in different sizes and shapes;
V.   Innovation and implementation are almost the same during the change process;
VI.   Someone has to change first in order to change someone else; and

VII.   Anyone can be a change facilitator.

The CBAM has three diagnostic dimensions, namely the Innovation Configuration Map (ICM), Stages of Concern (SoC) and Levels of Use (LoU). For the purpose of this study I will focus on only one dimension which is called the 'Stages of Concern'. The SoC dimensions of the CBAM focuses on the concerns of the individuals involved in an innovation. Hall and Hord (1987) argue that an individual is likely to have some degree of concern at all stages at any given time during an implementation of an innovation. Concerns are also defined by Jones (2013) as "a phenomenon that occurs within all of people when faced with new experience, demands to improve and changes in environment" p.9. Hall and Hord (1987) suggest that there are six stages of concern that the individuals involved in implementation of any innovation may undergo, namely: stage 1 – Informational, stage 2 – Personal, stage 3 – Managerial, stage 4 – Consequential, stage 5 – Collaborative, and stage 6 – Refocusing.

When a change effort is in its early stages the teachers are likely to have self-concerns (stages 1 and 2). Concerns may be intense during these stages as teachers may want to know more about the innovation and how similar or different it is to what they are already doing in their day-to-day teaching and learning activities. Furthermore, teachers may be concerned about their abilities to fulfil the task, that is, managing the implementation of the new innovation stage 3 (Hall & Hord, 1987). Roach, Kratochwill & Will (2009) have a similar claim, that issues related to organisation, efficiency, scheduling and time demands are the utmost concerns at the management stage of the CBAM. Hall and Hord (1987) point out that when the teachers' concerns are about the effects of an innovation on learners and want to improve the effectiveness of the programme they would have reached the impact level which is represented by stages 4, 5 and 6. Stage 4 indicates the teachers' concerns about the impact of the programme on the learners. While teachers In stage 5 are known to be concerned about working well with other teachers or stakeholders to improve the outcomes of the innovation, in stage 6 teachers become concerned about finding better ways to reach and teach the learners. The stages of concern are important because firstly they point out the importance of attending to where people are and addressing their questions. Secondly the stages of concern suggest that attention should be paid to implementation for a number of years

because it takes about three years for early concerns to be addressed (Hall & Hord, 2011)

In relation to this study, focusing on the Stages of Concern dimension of the CBAM is appropriate because this will assist me to understand: (i) the concerns that the teachers (implementers of a curriculum) have as they implement the Technology curriculum. (ii) the factors that affect the teachers as they implement the Technology curriculum and how these factors impede or facilitate implementation in the classroom.

The stages imply that implementation of an innovation may take different forms because teachers bring their background experience and teaching philosophies into their classrooms which results in them adapting their instruction to meet their learners' needs (Hall & Hord, 2006). Hall and Hord (1987) note that not everyone will move through the stages at the same time nor have the same intensity of concern at various stages. Change or the implementation of an innovation relies on individual teachers and the focus is on enabling the teachers to adopt the curriculum and make it their own (Onstein & Hunkins, 2009). For the purpose of this study the CBAM as a framework is appropriate in understanding the factors that may or may not influence how teachers implement the Grade 9 Technology curriculum. The literature that has been reviewed thus far indicates that teachers are the main actors in curriculum implementation therefore knowing about their experiences and/or concerns in relation to a particular innovation is important for this study (Evans, 1993).

The strength of the CBAM framework is its focus on understanding the concerns, attitudes and skills of teachers so that support such as resources and teacher development can be directly linked to what teachers really need. The other strength of this framework is its emphasis on the preparation of those involved in the change or innovation itself (Carl, 2009). CBAM can be useful for planning and mentoring staff development initiatives such as staffing, training, providing resources and others. CBAM is also concerned about managing the logistics around putting the change into practice (Hall & Hord, 1987). Hall and Hord (2011) argue that the introduction of new practices does not guarantee that they will be incorporated into on-going classroom practices. Hall and Hord (2011) further emphasise that the CBAM outlines the developmental process the teachers go through as they

implement the curriculum. This model focuses on assisting teachers to adopt the curriculum and to make it their own. Using the CBAM will give me a lens through which I can look at all possible factors that may be influential on how the teachers implement the Technology curriculum and maybe provide answers on how these factors influence implementation.

Some researchers such as Ismail (2014) have used the CBAM to look at factors affecting the implementation of Information Literacy. Overbaugh and Lu (2008) used CBAM to study teachers' attitudes towards integrating ICT in the teaching and learning. Bitanfiedlander, Dreyfus and Milgrom (2014) used the CBAM to look at the teachers' attitudes towards a new subject. I have chosen the CBAM because it is highlighted by the researchers mentioned above as a useful framework for understanding teacher's attitudes, questions and concerns during the implementation of a programme. The CBAM is appropriate for my study because I will be able to understand any factors that may impede or support how the teachers implement the curriculum in technology. The CBAM model focuses on the needs of an individual, in this study: the Technology teacher who is implementing the curriculum. It is important to assess implementation at regular intervals (Hall & Hord, 2011). Using this framework for this study will ensure that I can measure how far each teacher is progressing with implementation of the Technology curriculum.

2.9 Conclusion

This chapter has provided an overview of curriculum implementation, what makes it successful at times and what makes it fail both internationally and locally. Secondly, the different factors that influence or shape teachers' thinking around the implementation process were reviewed. Teaching methodologies and, in particular, approaches to teaching Technology were also discussed. The following chapter will present the methodology and research design for this study.

CHAPTER THREE

Research design and methodology

3.1 Introduction

The previous chapter presented both international and local literature review exploring the factors that influence how the teachers implement the Technology curriculum in Grade 9 and to understand how these factors influence them. I therefore begin this chapter by discussing the research design features, namely the interpretive paradigm (within which the study was located), the qualitative approach, the methodology and the instruments used to gather data. Furthermore, the data analysis plan is presented as well as the ethical issues guiding this study. Lastly, the limitations of the study are also discussed.

3.2 Research Design

Macmillan and Schumacher (2014) point out that the purpose of the research design is specifying a plan for generating evidence that will be used to answer the research questions. The purpose of this section is to inform the reader about the chosen paradigm for this study. Justifications for the choices made are also explained. Furthermore, the qualitative approach is presented as an approach that underpins the study.

3.2.1 Interpretive Paradigm

A paradigm is defined as a "loose collection of logical related assumptions, concepts or propositions that orient thinking and research" (Johnson & Onwuegbuzie, 2005, p. 277). Given the purpose of this study, which is to explore the factors that influence how Technology teachers implement the curriculum in Grade 9, I found the interpretivist research paradigm to be most suitable because the data is more detailed and this gave me an in-depth understanding into what really takes place during teaching and learning in the Technology classroom. Interpretive studies generally attempt to understand phenomena through the meanings that people assign to them (Maree, 2007). According to Cohen, Manion and Morrison (2011), the central endeavour in the interpretive paradigm is to understand the subjective world of human experience. They further explain that in order to retain the phenomenon

that a researcher is investigating "efforts are made to get inside the person and to understand from within'' (Cohen, Manion & Morrison, 2011, p. 17). Each individual is unique and therefore each teacher's implementation of the curriculum may be influenced by different factors and therefore using this paradigm allowed me to realise how different one teacher is to the next in terms of implementing the very same Grade 9 curriculum. The choice of the interpretivist paradigm is based on the belief that events and teachers are unique which results in multiple realities and interpretations of events (Neuman, 2000).

This study employed the interpretivist paradigm in order to get an in-depth understanding of the factors that influence implementation of the curriculum in the classroom. I am also aware of the critique that is levelled against the interpretivist research paradigm which is directed at the fact that it is subjective and is not able to generalise its findings beyond the situation being studied (Maree, 2007). My intention, however, was not to generalise but to have a deeper understanding of the factors that influence Technology curriculum implementation by the selected group of teachers as well as the reasons why they implement this curriculum in the way they do.

3.2.2 Qualitative Approach

Through this study, I intended to understand the factors that influence curriculum implementation in Technology, specifically in Grade 9. The appropriate research approach I employed for the study was the qualitative approach. Maree (2007) asserts that the qualitative research approach focuses on understanding the meanings provided by participants through describing phenomena within their naturally occurring context. Macmillan and Schumacher (2014) support this view when they state that in qualitative research data is gathered on naturally occurring phenomena and that researchers search and explore with different methods until a deep understanding is achieved. I engaged with teachers in order to understand their views and experiences on curriculum implementation because qualitative studies seek to understand the world from the perspectives of those living in it (Hatch, 2002). Patton (2005) concurs when he asserts that qualitative researchers engage in naturalistic enquiry and study real world settings to produce narrative descriptions and construct case studies. In this study, I observed teachers

conducting and presenting Technology lessons in their naturally occurring context, which is the classroom within the school, in order to construct meanings from their lived experiences. I also made use of interviews as there are several ways of gathering, interpreting and acknowledging multiple realities (Creswell, 2005). The experiences, opinions and reasons varied from one teacher to the next. Utilising the qualitative approach allowed me to get a deeper meaning of what influences teachers to implement the curriculum and this resulted in the production of rich thick data. One of the strengths of the qualitative research approach is that "data is based on the participant's own categories of meaning" and they can describe phenomena in rich detail (Johnson & Onwuegbuzie, 2007, p.54). Johnson and Onwuegbuzie (2007) also identify weaknesses of the approach as being that the findings may be unique to the relatively few participants included in the research study which means that the knowledge that is produced cannot be generalised to other people or settings and that it takes longer to generate data compared to quantitative research. The above-mentioned weaknesses did not limit this study in any way because the aim was not to generalise but to gather rich data about this phenomenon. The three participants were able to provide data which enabled me to get a better understanding of curriculum implementation in Technology.

3.3 Location

The study was conducted in three schools in the Umlazi District. Umlazi district is a huge district that consists 570 schools, of which 144 are secondary schools. The schools selected for the study are secondary schools offering Technology in Grade 9. Grade 9 is the exit grade in the senior phase at secondary schools. I conducted this study at Umlazi District because I am employed there and am familiar with the schools. Schools in this district can be divided into better-resourced schools, which are mostly found in urban areas, and disadvantaged schools or under-resourced schools which are predominantly in rural areas and townships. The majority of schools fall within the disadvantaged or under-resourced category and most of these schools have challenges because of poor socio-economic conditions that are prevalent within their communities. Most of these schools are affected by the lack of basic services such as water and electricity, lack of educational facilities, unemployment, poverty and other issues. In the Umlazi District most of the schools in the disadvantaged category are poor performing in terms of learner performance.

Schools that achieve below 60% in terms of overall Grade 12 results are placed in the disadvantaged schools in the Umlazi district. On the other hand the schools located in the urban areas generally perform well and are well-resourced. Most of these schools achieve above 60% in terms of overall performance in Grade 12. I was also interested in finding out if these factors influenced the teaching and learning in Technology. Each of the three schools that were selected represented a particular category/context, namely urban, township and rural.

3.4 Description of schools

Silindile High School is a secondary school located in the township. There are about five hundred learners at the school. The school does not offer a Technology subject in the FET phase. It falls within the under-resourced or disadvantaged category of schools because it is located in a township that is faced with a variety of socio-economic issues like unemployment and overpopulation. The school buildings have visible signs of vandalism as you enter. The school achieved way below than 60% overall achievement in the Grade 12 results in 2015.

Ruby Secondary is located in an urban area. The school has an enrolment of over a thousand learners. The school used to offer Technology subjects in the FET phase (Grades10-12) but has since dropped these subjects from the school curriculum. The school is categorised under the better-resourced or advantaged schools within the Umlazi District for the mere fact that it is located in an urban area. The school is easily accessible and the state of infrastructure is good. The school has basic resources to support teaching and learning such as a Technology workshop, Science laboratory and a library.

Mayenziwe High School is a secondary school located in a rural area. It falls within the category of under-resourced or disadvantaged schools because of the lack of access to basic services like water and electricity, and a lack of educational facilities in the area. The school is affected by a high rate of unemployment and overpopulation in the community. The school does not offer any Technology subjects in the FET phase (Grades 10-12).

For this study I selected schools from these three categories because I wanted to ensure that I obtained diverse views and perspectives on curriculum implementation.

As the study will reveal the three participating schools were able to provide sufficient and rich data on the issues that responded to the critical questions.

3.5 Research Methodology

The purpose of this section is to inform the reader about the chosen methodology for this study. This section provides an outline of the way that this research was undertaken. A case study was the preferred methodology for this research.

3.5.1 Case study

Researchers in different disciplines have used the case study research methodology to answer the why and how questions (Maree, 2007). In this study I wanted to understand why Technology teachers implement the curriculum the way they do and how different factors influence how they teach the Technology curriculum. It was therefore logical to opt for a case study. Yin (2014) explains that case studies are able to investigate a phenomenon (the 'case') in its real world context. A case study is able to look at a case over time in depth using multiple sources of data (Macmillan & Schumacher, 2014). Maree (2007) supports this by emphasising that case studies offer a multi-perspective analysis because the researcher considers not just one voice and perspective in situations but also the views of other relevant people and the interaction between them. A case could be an individual, a group of people or an event and the emphasis is not on methodology but rather on subjects or objects that is why "there is frequently a resonance between case studies and interpretive methodologies'' (Cohen et al. 2011, p. 289).

In this study, the case is the three Grade 9 Technology teachers from three secondary schools in the Umlazi District. Yin (2011) points out that a case study research always starts from the desire to get an up-close and in-depth understanding of a single or a number of 'cases'. Through observing lessons, I experienced 'what it is like' to be in a particular situation (Cohen et al., 2011). One of the strengths of a case study is that it strongly encourages the use of multiple methods of generating data (Robson, 2007). I generated data through the use of multiple sources, which were lesson observations and one-on-one semi-structured interviews. Cohen et al., (2011) point out some disadvantages of case studies; they argue that they are not easily open to cross checking, hence they may be selective, personal and subjective.

Even though case studies are not open to cross checking as a researcher I abided by trustworthiness in ensuring that explanations were supported by evidence.

3.6 Data generation instruments

For this study, two methods of data production, namely: lesson observations and semi-structured interviews were used as an attempt to obtain rich data.

3.6.1 Lesson Observations

"Observation is a way for the researcher to see and hear what is occurring naturally in the research site'' (Macmillan & Schumacher, 2014, p.350). Creswell (2012) maintains that observation is the process of gathering open-ended information by observing people and places at a research site. Cohen et al., (2011) contends that an observation will offer the researcher an opportunity to gather 'live' data from naturally occurring social situations. Through seeing and hearing what was occurring during the actual lesson I was able to observe and get first-hand information on any possible factors that affected and influenced teachers during teaching and learning. I observed Technology lessons and got the feel of what really goes on in the classroom in order to understand any factors that may influence how teachers implement the Technology curriculum. Observations were an appropriate data generation method for this study because I was able to observe the teachers within the context of their natural setting. It was important for me as the researcher to know what I wanted to observe and in this study I was able to observe events as they happened in the classroom, how the teacher interacted with learners, and how content was taught. I could closely scrutinise the teaching strategies they used and look at how they utilised the resources to enhance teaching and learning. I made use of an observation schedule (see Appendix E) in order to focus on specific aspects of the lesson.

One lesson was observed for each teacher. I took notes during the lesson, which were later used to craft follow-up questions for the one-on-one interviews. Cohen et al., (2011) emphasise that to undertake observation requires the informed consent of the person that is being observed. Consent to conduct lesson observations was

sought from participants though asking them to sign participant consent letters which clearly stated lesson observations as one of the data generation methods to be used in this study. The strength of using observations is that "it provides a record of what people actually do than what they say they do'' (Robson, 2007, p. 84). However, the challenge with using observations is that the single observer cannot be supported by anyone on his/her perceptions of what transpired so, as a result, trustworthiness is questionable (M. Struwig, F Struwig & Stead, 2001). Another challenge is that only a small number of observable behaviour can be captured in observation notes and schedules (Robson, 2007).

3.6.2 Semi structured one-on-one interviews

The study used one-on-one semi-structured interviews. Cohen et al. (2011) asserts that interviews allow participants to express their own point of view on how they regard situations and share their interpretations of the world. Creswell (2012) defines one-on-one interviews as data generation whereby the researcher asks questions and records answers from a participant at a time. This was the preferred method of generating data in this study because it is a flexible tool and I was able to get different views from the participants on factors that influence curriculum implementation in Technology. I first started by preparing for the interview. Letters informing the participants of the aim of the interview were issued. Maree (2007) states that the researcher must always make it clear to the participant what the aim is. Walliman (2001) contends that "semi-structured interviews involve achieving defined answers to defined questions" p.238. This view motivated me to develop an interview schedule (see Appendix F) with all the questions that I needed to ask the participants around curriculum issues in Technology. The one-on-one interviews were then carried out at agreed upon venues. I conducted the interviews individually with each participant for the duration of approximately 45 minutes or more. I ensured that the participants were relaxed during the interviews and they were allowed sufficient time to respond to the questions which can be said to have assisted me in getting detailed responses. I was able to ask probing questions and the participants were able to give me deeper responses and this assisted me to gain a deeper insight about the participants and understand the factors that influence how they implement the Grade 9 curriculum.

The interviews were recorded as Robson (2007) states that taping an interview is strongly recommended so that accurate data is captured for analysis at a later stage. He then cautions that before the interview commences permission must be sought from the participant to record the interview. Permission to record the interview was sought beforehand and participants signed a consent letter which explained clearly that audio recording would be used during interviews and observations. I was also taking notes during the interviews to supplement the recordings. Transcripts were produced from the recordings. Robson (2007) points out the disadvantages of semi-structured interviews: they are subject to bias as interviewees may tell you as the researcher what they think you want to hear. Creswell (2012) argues that interview data may be deceptive and provide perspectives expected by the researcher. As a researcher I was able to overcome this by continuously emphasising the aim of the research and asked for the participants' honest views and opinions on issues being asked. And again, the use of different methods of data generation (interviews and observations) in this study counteracted the issue of obtaining deceptive interview data.

3.7 Selection of Participants

Sampling refers to a method used to select a portion of a population for a study (Maree, 2007). Cohen et al., (2011) define sampling as a way of generating data from a smaller group of the total population so that knowledge gained is representative of the total population. The main focus for qualitative researchers is on the depth and richness of the data and generally samples would be selected purposefully rather than randomly. Since this is a qualitative study, I used purposive sampling to select my participants. Cohen et al. (2011, p.156) describes purposive sampling as "when a researcher hand-picks the cases to be included in the sample''. Three secondary schools were purposefully selected from the Umlazi district. Two of the schools were hand-picked because they did not offer a Technology subject in the FET and the one school was selected because it offered a Technology subject in the FET phase. These schools were further stratified according to urban, township and rural schools. This is called stratified purposeful sampling, according to Maree (2007). She defines it as selecting participants according to a certain criteria relevant to particular research questions. I then selected one teacher from each of the urban, township and rural schools to participate in the study. Only Grade 9 teachers who

are currently teaching Technology were selected as participants for this study. The strength of purposive sampling is that it ensures that the required information will be received and assures a high participation rate because 'knowledgeable' people about the particular issues are selected (Macmillan & Schumacher, 2014). The teachers that participated were knowledgeable about the Grade 9 curriculum and had implemented the previous curriculum and were able to give maximum participation during interviews. Technology teachers come from different subject backgrounds or disciplines in most cases. The teachers would have received different training both at tertiary and school levels. Through purposive sampling I was able to ensure that some of the participants had a Technology subject background and others not. This ensured that I receive diverse perceptions and experiences. There are, however, challenges that come with employing purposive sampling method like the difficulty to generalise to other subjects and there is a great likelihood of error due to participants' bias (Macmillan & Schumacher, 2014). However, the selected participants were able to assist me to answer the research questions.

3.7.1 Participants' Narratives

Miss Sinabo

She is a teacher with ten years teaching experience. She obtained an Advanced Certificate in Education (ACE) specialising in Technology about five years ago. She has taught Technology ever since she was employed 10 years ago but has taught it for three years in Grade 9. She says she enjoys teaching Technology. She also teaches Consumer studies in Grades 10-12. A vast majority of Technology teachers in South African schools were sourced from subjects like Home Economics (now called Consumer Studies). The one-on- one interview with Miss Sinabo was conducted on a Monday after school hours between quarter past three and four in the afternoon. She was very welcoming and took the interview seriously. She displayed a lot of enthusiasm from the beginning to the end of the interview. Even when the discussion was on the challenges she faces as a Technology teacher she maintained a positive attitude throughout.

Mr Rutendo

He has more than 30 years' teaching experience. He has been teaching Technology from the time it was introduced into the South African curriculum. He received formal training in Civil Technology, Mechanical Technology and Electronics while doing his Further Diploma in Education. He says he is passionate about the subject of Technology. The semi-structured interview with Mr Rutendo was conducted on a Wednesday afternoon between 4pm and 5pm. He seemed very comfortable before and during the interview. He held very strong opinions about some issues being discussed and expressed his frustrations and opinions freely.

Mr Maswazi

He has more than 25 years teaching experience. He has been teaching Technology in Grade 9 for about three years now. He has never been formally trained in Technology. He has worked for a Non-Governmental Organisation (NGO) as a Science and Technology facilitator previously. He possesses a teaching Diploma and an Advanced Certificate in Science. The interview with Mr Maswazi took place on a Saturday morning from around 9am until around 11h30 am. He was very calm during the interview and took his time to apply his mind and respond to the questions. He maintained this composure until the end of the interview and as a result the duration of the interview was longer compared to the other participants.

3.8 Data Analysis Process

Qualitative data analysis is a process of coding, reviewing, synthesising and interpreting data to describe and explain the phenomena (Fossey, Harvey, Mcdermott & Davidson, 2002). In this study I used thematic analysis to analyse data. Fossey et al., (2002) assert that thematic analysis involves a process of classifying, comparing, grouping and refining groupings of text segments and then classifying categories or themes within data. The interview transcripts were typed verbatim because M. Struwig, F Struwig and Stead (2001, p.169) argue that "if raw data are summarised they no longer become original data". I wanted to ensure that I do not lose meaning of the views and perspectives obtained from participants during interviews and observations. I ensured that before analysing data all notes, reports from the lesson observations, and interview transcripts were available. I had to read

thoroughly and carefully all the transcripts and try to understand what the participants meant. Some views from the participants were clearly expressed, however, some views were not clearly put across and I had to read the data repeatedly to understand what the participant implied. At times participants would give me hints and I have to make sense of that information in order to identify themes from the data. Guest, MacQueen and Namey (2011) assert that in thematic analysis one has to move beyond counting explicit phrases and words and identify and describe both explicit and implicit ideas from the data. This is when one identifies themes from the data generated. I then proceeded to code the data and grouped it into categories. The identified recurring themes from the data were used to understand the factors that influence curriculum implementation in Technology. These themes were then interpreted in order to explain phenomena in the study.

3.9 Ethical considerations

Ethics are concerned about beliefs and what is wrong or right from a moral perspective (Macmillan & Schumacher, 2014, p.117). M. Struwig, F. Struwig and Stead (2001) contend that ethics provide moral guidelines for researchers on how to conduct research in a morally acceptable way. Consent to conduct the research and access personnel in schools was sought from the Department of Education by means of an application letter and permission was granted (see Appendix A). I also applied for ethical clearance from the University's Ethics office and permission was also granted (see Appendix B). In this study I ensured that the participants agreed to take part in the research by communicating with them verbally and then making them sign a participant consent letter (see Appendix D). Permission was sought from the principals of the schools sampled for the study (see Appendix C). The purpose of the study, methods of data generation, and the role of the participants were fully disclosed to the participants and their schools and this I believe achieved informed consent (Macmillan & Schumacher, 2014). Participants were informed about their right to withdraw from the study at any point should they wish to do so. The participants were then contacted telephonically to arrange a suitable date, time and venue for the interview. Confidentiality of the participants was ensured in the study. All confidential materials such as audio recordings, transcripts, notes and any other data is kept safe. Participants were not discussed with anybody and their identities

were protected through the use of pseudonyms for schools and participants. In this way, anonymity was ensured.

3.10 Issues of Trustworthiness

In quantitative research validity and reliability are important but in qualitative research researchers want to ensure credibility and trustworthiness of the research (Maree, 2007). Lincoln and Guba (1985) substituted reliability and validity with the concept of trustworthiness, which encompasses credibility, transferability, and confirmability. The following are suggested to ensure trustworthiness of a study audit trails, member checks, and confirming results with participants, peer debriefing, negative case analysis (Morse, Barret, Olson & Spiers, 2008).

3.10.1 Credibility

Shenton (2004) states that credibility deals with the question of 'how congruent the findings are with reality' p. 64. Rolfe (2006) asserts that credibility responds to the concept of internal validity in the positivist concept. One way of ensuring credibility, according to Shenton (2004), is to use research methods that are well-established in qualitative research. This study used both interviews and observations to address credibility because the use of different methods together compensates for their individual limitations and exploits the benefits of each (Shenton, 2004). I encouraged my participants to be honest from the onset of the study to ensure credibility. A colleague who is experienced in the field of research was requested to re-analyse some of the data in my study so that I could get another perspective. This is called 'peer checking', according to Rolfe (2006). I asked the participants to verify if the data collected reflected their feelings and views by allowing them to look at and review the interview transcripts and this is what Rolfe (2006) calls 'member checks'.

3.10.2 Transferability

Transferability is concerned with the extent to which the findings of one study can be applied to other situations (Shenton 2004). Rolfe (2006) states that transferability is a form of external validity in qualitative research. To address this a detailed description of the phenomenon was provided in the study so that anyone who read it would have a proper understanding. I have mentioned the number of participants that were

involved in the study. Information on data generation methods which were employed in the study, that is, observations and semi-structured interviews was provided and thoroughly discussed. Other crucial information about the study, such as the period of time over which data was generated, was provided so that the reader would have a better understanding of the study. Providing this additional information will enable the readers of this study to make a transfer or relate the findings to their own situations (Shenton, 2004).

3.10.3 Confirmability

Shenton (2004) describes confirmability as the qualitative researcher's comparable concern to objectivity. It is largely an issue of presentation (Rolfe, 2006). Confirmability is concerned with whether the findings reflect the experiences and ideas of the participants rather than the preferences of the researcher (Shenton, 2004). To ensure confirmability I used 'audit trail' (Shenton, 2004). I presented a clear description of how data was gathered and processed leading to the formation of recommendations. I have ensured that I explain all the research steps undertaken from the start of my research to reporting of findings. I maintained a log of all research activities, documented data generation and analysis procedures throughout the study (Cresswell & Millar, 2000). I also depended on the audit of my research by a peer to address confirmability (Patton, 2005). The peer also examined my transcripts, data analysis and checked any traces of researcher bias and influence.

3.11 Limitations

Every researcher is expected to declare any limitations that may render the study's credibility to be questionable. The main limitation of this study is that I am a subject advisor in the Umlazi District (where the research sites are located). This reason may have led to me not getting authentic data because of power relations (participants receiving and treating me as a Department of Education official). This perception would have resulted in participants providing me with information that they thought I wanted to hear. In an attempt to overcome this limitation I provided a full explanation and assured participants that the research was a personal endeavour and that it was not in any way an evaluative exercise of their work. The fact that the participants seemed to be at ease during the observations and were able to communicate openly with me during their individual interviews could be an

indication that they did not feel any pressure to 'please' me as a subject advisor. Johnson and Onwuegbuzie (2007) also identify weaknesses of the qualitative approach as being that the knowledge that is produced cannot be generalised to other people or settings. Although this was a small-scale study, which others may deem to be difficult to generalise, I believe that this work presents contextual realities that teachers encounter with curriculum implementation, particularly with the Grade 9 Technology curriculum. The study was able to raise some important curriculum issues around Technology and can be transferred and maybe explored in other contexts.

3.12 Conclusion

This chapter has addressed the research design and methodology employed in this study. I have described the procedures that were followed in conducting the study which include the paradigm and approach, data generation techniques and analysis, and selection of participants. I have provided justification for the choice of participants. Ethical clearance issues, challenges and limitations of the study were outlined. In the next chapter I will present the findings that were obtained from the data generated in this study.

CHAPTER 4

Data presentation and analysis

4.1 Introduction

The case study explored the factors that influence how the teachers implement the Technology curriculum in Grade 9 at three secondary schools in the Umlazi District, as well as reasons why the teachers implement the curriculum in the way that they do. Permission to conduct this study was granted by the three principals of the Silindile, Ruby and Mayenziwe schools. As indicated in the previous chapter the contexts of these three schools were greatly varied in terms of geographical location and the socio-economic factors prevalent in communities surrounding them. In this chapter I present the data generated as well as the findings that were discovered from the study. The data was analysed in this study in order to answer the following critical questions:

1.   What are the factors that influence the way that teachers implement the Grade 9 Technology curriculum in secondary schools?
2.   How do these factors influence the teachers' implementation of the Grade 9 Technology curriculum in secondary schools?
3.   Why do teachers implement the Grade 9 Technology curriculum the way they do in secondary schools?

I have used thematic analysis to analyse data and this involves a process of classifying, comparing, grouping and refining groupings of text segments and then classifying categories or themes within data (Fossey, Harvey, Mcdermott & Davidson, 2002). The data analysed was generated from lesson observations (see attached appendix E) and interview transcripts (see attached appendix F). I used verbatim quotations from the interviews so that readers could examine the data collected on their own and gain a deeper understanding of the findings while also checking for its credibility. Corden & Sainsbury (2006) assert that verbatim quotations are used in order to provide evidence and explanation, deepen understanding, and enhance readability and to give participants a voice. Data was read repeatedly until I was able to discover and recognise certain patterns from it. I then used codes to label different sections of data according to the identified

patterns. Themes associated to the research questions of my study were then developed. The themes identified from this study are as follows: unavailability of resources and tools, teacher experience, Technology as a vocational subject, subject backgrounds, link with the subjects, subject content knowledge, teacher training and development, teacher collaboration and communication, monitoring and support, teaching and learning in Technology, design process, teaching and learning time, teachers' attitudes towards Technology, and changes and status of Technology in the curriculum. The identified recurring themes from the data were used to understand the factors that influence curriculum implementation in Technology. In this study ethical issues of anonymity and confidentiality have been adhered to through the use of pseudonyms for both the participants and the schools in which they work. The participants were referred to as Miss Sinabo, Mr Rutendo and Mr Maswazi and the schools were called Silindile High, Ruby Secondary and Mayenziwe Secondary School.

4.2 Thematic analysis of data

The following section discusses the themes that resulted from the analysed data by presenting what was observed during the lesson observations as well as the participants' responses to the interview questions.

4.2.1 Theme 1: Un/availability of resources and tools

In Technology learners are expected to work collaboratively with others and do practical tasks/projects using different technological skills. In order for teachers to be able to assist learners to achieve this collaborative work, they need to have a wide range of materials, equipment and tools. Technology is largely practical in nature and the Curriculum Policy Statement (CAPS) Technology document states that it is the responsibility of the school to provide learners with minimum tools and equipment to meet the subject demands and to develop the teachers' appropriate knowledge and skills (Department of Basic Education, 2011). Jones et al. (2013) point out that the level of resourcing during curriculum implementation greatly influences how rapidly policy changes can be effected in the classroom.

To the question, "Do you have sufficient resources and tools to teach the Technology content contained in the CAPS document"? Miss Sinabo responded:

"Eh! No, we do not have resources and tools, we really are struggling. The only things that we use are old things. The only things that we use are recycled materials like cardboard and newspaper but then they easily get torn if you don't put them properly. We don't have enough, we use scissors to cut. The only thing we use to assemble things is sellotape and sometimes it can come out and the whole project will be ruined. That is the major thing about resources, we don't have enough."

Mr Maswazi seemed to echo a closely related response to that of Miss Sinabo when he said:

"The only resource I have here are textbooks for learners. The thing is when it comes to the practical part the resources are very scarce. That's the only challenge I am having but I am hoping that since I am building up a kit I will be ok. Another thing is the lack of a designated place for Technology, it is a challenge."

Mr Rutendo, however, presented a positive response when stating that:

"In this particular school I would say yes, but I would like more textbooks because what actually happens is that when you do a particular section you want the kids to have something in front of them."

When further asked if the books were sufficient, Mr Maswazi responded:

"No, there are three (meaning three learners share one book) in one book but we are topping it up."

When probed further if learners have textbooks Mr Rutendo responded:

Oh Mam, what actually happens is that the school does not buy textbooks for the kids; they buy a textbook for you as a teacher. The textbooks that I am using, they bought them a long, long time ago, 20 years ago. I have got about 35 copies of those, but they have relevant sections that you can go through.

The data revealed that there was a common concern from the participants about the unavailability of resources and tools to support teaching and learning in all three schools. The data generated suggests that Ruby Secondary school is better resourced than Silindile and Mayenziwe High. Both Mr Rutendo and Mr Maswazi claimed to have a shortage of textbooks which resulted in the use of textbooks that are out-dated. Technology has evolved with the introduction of CAPS with some content updated, some content completely taken out and some topics re-arranged within the Senior Phase (Grades 7-9). Using out-dated textbooks may result in teachers imparting incorrect, irrelevant and out-dated content to learners which will end up compromising the implementing of the curriculum. Although Mr Rutendo claimed that there were relevant sections in the old textbooks, according to CAPS the curriculum for Grade 9 is non-specific and textbook authors have been given free rein to be innovative and develop ideas that suit the content which is provided in the policy (Department of Basic Education, 2011a). It is therefore very crucial for teachers to utilise textbooks that are CAPS compliant so that the curriculum is implemented as per policy in the classroom. What emanated from the interviews was that the issue was not just about the unavailability of resources in these schools but poor control of the resources and tools seemed to be a challenge as well. This was confirmed by Mr Maswazi when he said:

> "*Next year I hope another 50 books will come and in the third year another 50 will come but by the time they get here some of the first set of books will be destroyed because we don't keep the books for them.*"

The teachers' concern about inadequate resources represents the management stage in the CBAM whereby teachers are concerned about managing the logistics around putting the change into practice (Hall & Hord, 1987). The participants in this study understand the innovation and have adopted it but are concerned about the lack of resources to achieve or implement the innovation. Participants mentioned the lack of a designated area to teach Technology, lack of textbooks, scarcity of materials to teach practical work and have a concern on how they will master the innovation without these resources. Hall and Hord (2001) assert that at the management stage the teacher's focus is on dealing with the innovation and mastering the task which is the implementation of Technology in this case. It is clear

that the focus of the participants at this stage is the best use of information and resources to implement Technology in the classroom.

When asked to explain the role they thought was played by resources and tools in the effective implementation of Technology; Miss Sinabo's response was:

> "*Ya, ya, they are very important because now it is important for learners to use different resources like glue guns. It is important for learners to be able to recognise different tools.*"

Mr Rutendo was of the same view:

> "*It's a big role, in terms of time allocation, in terms of getting it effectively done and in terms of making sure that both the teachers and learners are doing their work, it plays a huge role.*"

Mr Maswazi supported the views of the other participants by stating that:

> "*A very important role. With Technology you have got be practical because you need to practise, practise you know for your skill, you don't just theorise Technology.*"

The data generated suggests that all participants share the same view that resources have an important role to play in the implementation of Technology. The role of resources in Technology has been well-documented by researchers asserting that in order for the implementation of Technology to be a success, it will largely depend on the availability of resources and facilities (De Jager, 2010; Potgieter, 2003). Jones & Moreland (2004) assert that the use of resources is one of the critical aspects that enhance the teacher content knowledge which is crucial for effective teaching and learning in Technology.

It is evident from the data generated that the lack of resources impacted negatively on the teaching time when the participants made the following remarks:

Mr Rutendo remarked that:

> "*Negatively, as I said, once again we have got two periods of Technology per week, not enough. In two periods, by the time you finish handing out worksheets and stuff like that a quarter of the period is gone already. You*

are going to start putting things together; it's not a lot of time. There are Mini Pats and stuff like that. If we had a workbook, work would start immediately."

Mr Maswazi added:

"*The lack of resources is a delay because you don't do something once, review and reflect on it. You have to take it slowly, maybe what you have organised is not enough for the whole class."*

While on the other hand Miss Sinabo stated:

"*I always make it a point that the product will come out even though they have a challenge with resources at school. I try by all means to improvise because what is important is for the learners to understand how to do the projects."*

Data generated suggests that as participants try to improvise and organise resources for their learners, valuable time for teaching and learning is lost. Participants expressed concerns such as: "*the lack of resources is a delay*", "*we have got two periods of Technology per week, it is not enough*". Hall and Hord (1987) state that when teachers are concerned about the time that is consumed by the user in relation to the innovation then they are at the management stage of the CBAM. This view is confirmed by Roach, Kratochwill & Will (2009) when they state that issues related to organisation, efficiency, scheduling and time demands are the utmost concerns at the management stage of the CBAM.

The lack of resources also had a direct impact on how the participants implemented the curriculum in the classroom, according to data that was generated from the lesson observations. Miss Sinabo brought in a few components for the electric circuit but these could not be assembled because some components were not available. She made an attempt to show learners the different components from the front but most were too small and could not be seen from the back. While Mr Rutendo had resources to assemble the circuit during the lesson, he could only demonstrate to the learners, who were not fully involved in the practical work because there was a shortage of electrical components. The resources were only sufficient for the teacher to do a demonstration and for the learners to observe.

In both the Ruby and Silindile schools the unavailability of resources impacted directly on learners' learning. The learners could only watch as the teacher was manipulating the different electrical components. Learners were not active participants during practical demonstration; they became mere onlookers and would nod their heads from time to time. CAPS puts an emphasis on learners working collaboratively with others and doing practical projects in Technology (Department of Basic Education, 2011a) but this aspect of the curriculum was not fully enacted in both schools. Mr Maswazi's lesson did not require any materials as he was addressing the theory part of the subject. Gaotlhobogwe (2013) asserts that the lack of resources has an influence on learners' attitudes about the subject itself because in his study one of the findings was a decline in learners' enrolment in Design and Technology due to the lack of resources. The lack of resources during lesson observations did not allow learners the opportunity to learn practical skills. The unavailability of resources not only affects teachers negatively as already displayed by the data presented above but learners as well. The data generated from the interviews and lesson observations reveal that the lack of resources is a common challenge in all three schools, particularly in the township and rural schools. Ziqubu (2006) also discovered in his study that the lack of resources was one of the constraints experienced by teachers to the effective teaching and learning of Technology.

4.2.2 Theme 2: Teacher Experience

While interviewing the teachers it became clear that teachers' experiences are a contributing factor towards curriculum implementation in Technology. The teachers had their understanding of Technology based on their opinions, feelings and experiences. While addressing different questions during the interview the issue of the teacher experience came up. When asked to name the concepts or aspects that the he enjoyed teaching the most in Technology, Mr Rutendo commented that he enjoys the mechanical aspect of Technology and when asked why he said:

> "*It's my favourite, I used to be a workshop teacher for many years. You know, I enjoy it, I enjoy gears, I enjoy levers, and I love putting things together. I love experiments, I love building things.*"

Mr Maswazi also indicated that:

> "*You know, what I like with Technology is that it's practical all the way. Even the examples you are using, you can draw from your experience. It's easy for me since I am a handy man.*"

This was in response to the question: What are the most challenging aspects or concepts to teach in Technology?

At the beginning of the interview when Mr Maswazi was asked if he was a specialist Technology teacher? He responded:

> "*No, if you refer to it as specialised training. No, I don't have it but it's from my experience of being participating in Science and Technology.*"

Miss Sinabo also implied that her experience in teaching other subjects was helpful, when she remarked that:

> "*Yes, it does assist with the teaching of Technology: my knowledge of Consumer Studies. We usually do not have a problem with my learners for an example we make juice with my Grades 9s. We collect money like one rand and we buy different fruits and we are able to process.*"

She was responding to the question of whether she taught any FET subject at the school.

In a study conducted by Bondy (2007) it emerged that the teachers' own experiences and qualifications, and contextual factors associated with the school appeared to be linked to how the teachers interpreted and implemented the curriculum. The influence of teacher experience was apparent in this study as well when all three participants expressed their confidence in teaching Technology and love for the subject based on their experience; one as a handy man, another as a workshop teacher and the third as a Consumer Studies teacher. Mr Maswazi believes that he draws his knowledge of teaching Technology from being able to do various repair jobs around the house as a handy man. Mr Maswazi has never been trained in Technology but, according to him, his teaching experience is the most important factor that contributes towards the effective teaching of Technology in the classroom. Miss Sinabo believes her experience as a Consumer Studies teacher assists as

some topics are similar to those found in Grade 9 and this makes her teaching easier. They gave credit to the skills and knowledge they possessed and believe these assisted them to effectively implement the curriculum. Spillane, Reiser & Reimer (2002) argue that the individual's prior knowledge, values, beliefs and experiences play an important role in what they make of new information. This is evident in the data presented above.

4.2.3 Theme 3: Technology as a vocational subject

The study further revealed that all three participants viewed Technology as a vocational subject; they all placed emphasis on preparing learners for a certain trade or craft or job. It is clear that the participants wanted to give their learners hands-on skills in a specific trade. Park and Sung (2013) are of the view that teachers formulate their own perceptions and meanings when implementing a curriculum. Teachers will always have their own point of view about the curriculum that is being implemented, and these views are expressed in the data generated in this study. During her interview Miss Sinabo mentioned that:

> "*Learners don't just learn about hydraulics, they get a demonstration of how it works. They will not have a problem if they are hired by Toyota because of Technology.*"

She made this comment when she was discussing the link that Technology has with the subjects in Grades 10-12.

Mr Rutendo was expressing his concern on learners' difficulties in learning and understanding Technology:

> "*Generally speaking, most kids understand the theory part but some kids are more applied to the practical part, they understand it better. That's where we went wrong, that's why we have so many kids that are leaving school, we took away metalwork, woodwork and threw in Civil Technology and we threw in Mechanical Technology which is mostly Maths theory and Applied Maths. What happens to the practically minded child? The child who does not want to be an Engineer but wants to be a welder? The child that does not want to be a civil engineer but wants to work in construction industry? We destroyed that. Do you understand?*"

Richardson (2003) argues that the teacher's pre-existing beliefs about the innovation strongly affect what and how they learn and eventually how they approach teaching in the classroom. Mr Rutendo strongly believes in vocational training to an extent that he provides extra lessons after school to some learners and community members on welding and carpentry. During the interview he said this about the extra lessons:

 "*I am teaching it from a practical point of view, we teach it for you to get a job, how to become a welder, how to become a carpenter or a motor mechanic. We are formalising it.*"

Mr Rutendo strongly expressed the need for vocational training again when he remarked:

"*We need to be like Singapore and China, we need to train kids vocationally, and not every child is going to be a lawyer.*"

Mr Maswazi shares the same view:

"*I say we can have our own extra skills training, like how to lay tiles on the floor or even wall tiles. When learners go out, they pursue what they liked here at school.*"

He was expressing his view on the fact that learners need to acquire basic skills in Technology. Hall and Hord (1987) assert that during an innovation teachers may consider or make modifications to it in a stage called refocusing. In the data generated it is revealed that the participants want to find better ways to reach and teach the learners like giving them extra vocational skills like laying floor and wall tiles even after school hours. In their analysis of the historical development of Technology by Jones et al., (2013) vocational training was indeed identified as one of the seven representations of the subject in ten countries. Jones et al., (2013) assert that in some countries the vocational emphasis is politically driven, like when there is a strong demand for skilled labour, however, it is important to note that in the South African context the intention of the Grade 9 Technology curriculum is to introduce the basics needed in different fields like Civil, Mechanical, Electrical Technology, Engineering Graphics and Design (Department of Basic Education, 2011a). Learners must be exposed to all the basic aspects of the subject not just the

practical aspect. Teachers need to incorporate both the theory and the practical part of the subject when they implement the curriculum in the classroom.

4.2.4 Theme 4: Subject Specialisations

There is some evidence in the data generated that the teacher subject specialisations had a huge impact on the implementation of Technology in all three schools. Potgieter, (2004) and Rauscher, (2011) assert that Technology teachers were generally sourced from subjects like Woodwork, Metalwork, Science and Home Economics and therefore when teaching they tend to draw and rely on their background knowledge of traditional subjects. To the question: how has your teacher training at Tertiary assisted you to effectively implement Technology in Grade 9?,

Miss Sinabo answered:

> *Yes, yes, yes I did Consumer Studies; there are a lot of practicals that we do, like learners have to make packaging. In Grade 8 & 9 learners also do packaging for different products. I majored in Consumer studies and it helps most of the time. Some topics are the same like processing and packaging.*

Mr Rutendo responded similarly:

> *Greatly, in tertiary the first few years I did an FDE (Further Diploma in Education. It consisted of Metalwork 1 and Woodwork 1 and Electronics. In the second year there was Metalwork 2 and Woodwork 2 and Electronics again. I found that these subjects gave me practical experience and allowed me to understand the world of Technology.*

Mr Maswazi also added:

> *"I did Arts, things like drawing portraits and learning how to shade." I probed further: Is that why you like graphic communication? He responded: "Yes".*

The data suggests that the teachers' subject specialisation seems to assist them in understanding some concepts in Technology and implement the Grade 9 curriculum effectively.

As a result of Technology being closely related to so many subjects many teachers are known to comfortably think of Technology along the lines of Science, Engineering and other subjects (Jones & Carr, 1992; Rennie 2001). This was confirmed by the data generated in the interview. Mr Maswazi kept referring to the subject as Science and Technology. When asked if he was a specialist Technology teacher he said that he only had experience in the subject from participating in Science and Technology. The issue of the teacher specialisations came up randomly even when teachers were asked questions unrelated to it. When he was explaining how he hoped to overcome the challenge of the unavailability of resources Mr Maswazi remarked:

"I am now trying to formulate and put all things together like getting the Science and Technology kits."

To the question: Do other subjects that you teach or understand influence how you teach Technology to your learners? Specific reference was made to Science. Mr Maswazi responded:

"Yes, because the thing is it's Science and Technology but it's NS (Natural Sciences). In the primary schools the subject is called Natural Sciences and Technology but here in high school it is divided. It is the same thing. This helps."

Mr Rutendo said:

"I enjoy watching Science and Technology programmes. I enjoy reading about Science and Technology all the time." He was explaining why he thought that he has sufficient content knowledge of Technology."

The responses above suggest that it is indeed easy for teachers to associate Technology with other subjects. Mr Maswazi even mentioned that in high schools the subject was divided into Natural Sciences and Technology but it was actually the same thing. Mr Maswazi has an Advanced Certificate in Science and also teaches Science to other grades within the school. He seems to rely on his knowledge of this subject in order to be able to teach Technology. Although Mr Rutendo does not teach Sciences, like Mr Maswazi he constantly referred to Technology as Science and Technology in his responses during the interview. There has always been a

strong historical linkage between Science and Technology (Jones et al., 2013). There is also a promotion of Maths, Science and Technology in schools by the Department of Basic Education through various programmes which could be influential in why participants perceived these subjects as a combination. The data generated suggests that all participants believe that their subject specialisation is beneficial as it assisted them to comprehend some Technology content and be in a position to deliver this content in a Technology classroom. Subject backgrounds seem to have a positive effect on participants. Even Mr Maswazi, who has never been trained formally in Technology, is able to draw knowledge from Science. It is important to emphasise that Technology is a subject on its own, with its own goals, specific aims and curriculum demands that need to be achieved. Jones et al. (2013) assert that it is crucial for learners' development that Technology is not dominated by stronger Science and Mathematics subcultures as this could be detrimental to the subject.

4.2.5 Theme 5: Link with subjects offered in the FET phase and the status of Technology in the curriculum

Grade 9 is an exit grade in the General Education Training Band (GET). The Grade 9 Technology curriculum aims to provide learners with knowledge and experience to assist them to make career oriented subject choices at the end of the grade. The knowledge and skills that the Grade 9 learners will acquire are supposed to provide a solid foundation for several FET subjects (Department of Basic Education, 2011a). The Grade 9 teachers are always concerned about the study fields that are linked to Technology in Grades 10-12 in the FET band and how their learners will fit in. This was evident in the data generated during the interviews. To the question: Do you have or teach a Technology subject in the FET and how does this affect the learning and teaching of Technology? Miss Sinabo responded that she taught Consumer Studies and her knowledge of Consumer Studies does assist her to teach Technology content such as food preservation. She added that there was a link between Technology and Consumer studies. She, however, remarked that "*it would be advisable if this Technology could move up even to Grade 12*". She said that she had done justice when teaching Electricity and her learners would not have a challenge if they were to choose Physics as a subject in Grade 10 next year. When

Miss Sinabo was probed further on why she wanted the subject to continue to Grades 10-12, she remarked:

> *"Sometimes my learners do not take Technology seriously because they always tell me that it is not in the FET phase."*

Mr Rutendo commented that they did not have a Technology subject in Grades 10-12 at his school. Like Miss Sinabo, he believes that Physics is the only subject that is linked to the Technology he teaches in Grade 9. He indicated that some learners leave their school to *"… a neighbouring school, Rose High (pseudonym) because they offer Technology subjects in Grade 10"*.

Mr Maswazi echoed the same concern when he remarked that there was no Technology subject in the FET phase at his school. *"There is no continuation of Technology in the FET, it's good riddance from Grade 9. It is a compulsory thing. They get rid of Technology in Grade 9."*

He expanded on the issue by mentioning a practice that is done at his school:

> *You know if learners fail or struggle in Grade 10, 11 or 12 they are advised to go to FET colleges so that they do skills training. I always say how can you ask that, how do you send learners there without basic skills from Technology. If you take Technology as a practical subject and you don't have practice on it still they are going to perform poorly at the FET College.*

All participants expressed their concern over the fact that there is no continuation of Technology in the FET phase in their schools. Stevens (2006) argues that the inclusion of 'general' Technology in the FET phase is essential and he maintains that this will have a motivating 'pull' on the teaching and learning of Technology. It is clear from the discussion above that it is important for the Grade 9 teachers to see a progression of content from what they teach to the higher grades and they want their learners to pursue the subject in higher grades. The participants are clearly at the consequence stage, according to the CBAM, which is when teachers are concerned about the effects of the innovation on learners and want to improve the programme. At this time they would have reached an impact level, according to Hall and Hord

(1987). If these concerns are not addressed they could have an adverse effect on curriculum implementation. Stevens (2006) suggests that one of the factors that hampers curriculum implementation in Technology is the lack of Technology subjects both in the FET 10-12 band and at tertiary level. Technology as a subject has been designed to provide a foundation for all Technology subjects in the FET phase. It is, however, of concern that not a single school in this study offers a Technology subject in the FET phase except for Physical Sciences. For the participants there is no continuation of the Technology subject. It becomes a dead-end subject in Grade 9. Reid (2000) also raises a similar concern when he argues that the lack of understanding careers and progression to pathways to tertiary education is a barrier to implementation in Technology.

Mr Rutendo explained that he had to get rid of Mechanical Technology at his school. When further probed on his reasons, he commented"

> *I can't teach it anymore because the kids do not want to do the straight Mathematics that goes with it. Technology is paired with straight Maths and the kids don't want to do straight Maths because it's difficult and the kids that do straight Maths don't want to do Mechanical Technology because it is not weighted at University, it's not going to allow them to go to university.*

The data above suggests that Grade 9 Technology teachers are faced with a dilemma that all the Technology subjects in the FET do not allow learners to gain entry into University except for Engineering Graphic and Design. This is stipulated in all the CAPS documents for Civil, Mechanical, and Electrical Technology. The following is a statement from CAPS Mechanical Technology: Mechanical Technology does not have the distinction of being a Grade 12 exemption subject; it has the advantage of giving the learner the background of what is expected from them when enrolling in any mechanical study opportunities (Department of Basic Education, 2011b). These Technology subjects are paired with pure Mathematics. Mr Rutendo feels that this exacerbates the problem as pure Mathematics is too difficult. Grade 9 Technology teachers are supposed to help learners make subject choices at the end of this grade, however, the data generated suggests that this is not happening due to a lack of FET technology subjects in the three participating schools. It is

demotivating for the teachers and they expressed a concern about the future of their Grade 9 learners. The issue discussed above has a negative impact on how the participants view the subject. In agreement with the point made above, Reid (2000) argues that the lack of understanding careers and progression to pathways to tertiary education is a barrier to implementation in Technology.

The status of the Technology subject in all the participating schools seems to concern teachers in various ways. To the question: do you think Technology enjoys the same status with other subjects at your school? Miss Sinabo expressed her concern about the fact that Technology was being managed under the Food and Beverages Department at the school. She said:

"*I think it would be better if Technology was under the Science Department here at school because in Science we do have a company that usually sponsors the subject. With the Department that I am in we don't get sponsors.*"

Mr Rutendo responded:

"*No, I told you Technology is treated as filler subject but remember not everybody can teach Technology.*" He added that not every teacher would understand levers, electricity, gears and drawings. "*Technology should be taken seriously because it is a specialist subject.*"

Mr Maswazi added*:*

"*It does not, like even with ordering books the GET cannot order sufficient books, the focus is up there at the FET level. Before, we could not order textbooks; the budget was for the FET.*"

Siksin (2001) contend that school subjects like Maths, English, Science are regarded as basic in the curriculum. This claim suggests that high status subjects such as Science and Mathematics may receive more resources and power within the school and community than lower status subjects like Arts. The data suggests that Technology has a lower status than other subjects in all the schools and as a result teachers sometimes do not get resources because other subjects like Science are prioritised. Mr Rutendo explained that the subject was taken as a filler subject with

every teacher thinking they could teach it. He emphasised that Technology was a specialised subject and not just anyone could teach it.

4.2.6 Theme 6: Subject Content knowledge

Jones and Moreland (2003) argue that it is pivotal to construct a knowledge base for technology teachers in order to ensure effective teaching and learning. When the participants were asked if they thought they had sufficient content or subject knowledge that enables them to teach Technology, Miss Sinabo, who possesses an Advanced Certificate in Technology, said she had the subject knowledge to teach Technology. However, this contradicted what she had shared earlier about her having a challenge with the graphic communication content and admitting that she needed assistance with it. She later responded:

> *"Yes, there are topics that are challenging, especially with graphic communication; yes that is my major worry."*

Mr Rutendo, who has received formal training in Technology Subjects like Civil and Mechanical Technology and Electronics, cautiously answered:

> *"Well, I think anybody that says they have sufficient knowledge is boasting." He went on to say: "At the same time I do feel I have sufficient knowledge to effectively put across Technology, yes I do…I would say it is a learning process for me as well."*

Mr Maswazi, who has never received any formal training in Technology but has been a Science and Technology facilitator for an NGO previously, expressed his confidence in having sufficient subject knowledge. He explained:

> *"Ya, my day to day bible is the CAPS document; I think that one guides me very well."* He added that his knowledge came from CAPS and that he was confident with all the concepts and content in Technology.

The data generated above suggests that both Mr Rutendo and Mr Maswazi believe that they have sufficient content knowledge. Mr Rutendo, however, admits that it is a learning process for him as well while Mr Maswazi strongly believes that the CAPS document provides him with content knowledge and he repeated this statement several times during the interview. The CAPS document provides a guideline and

stipulates content that must be taught in a particular grade in each term (Motshekga, 2011). The CAPS document does not provide the understanding of content knowledge contained in it. It is problematic for Mr Maswazi to assume that the CAPS document will provide him with sufficient knowledge to teach the subject in the classroom. CAPS may provide the content but as a teacher he must be able to interpret and impart this knowledge to learners. Miss Sinabo admitted that she was not well-versed with the graphic communication content in Technology and this suggests she may have a challenge in imparting the graphic communication knowledge to learners which may adversely impact on the implementation of the Technology curriculum in the classroom. Jones et al. (2013) argue that teacher knowledge in Technology is crucial for the development of learners' knowledge and practice and if one looks at Miss Sinabo's case it is the opposite with graphic communication. If she does not have the content knowledge of graphic communication it clearly means it is difficult for her to impart this content to the learners. Teachers need to be competent and confident in using the curriculum first otherwise implementation may take some considerable time (Marsh, 2009).

During the lesson observations all the participants displayed good understanding of the content being taught, however, the data generated during Mr Maswazi's lesson observation revealed a limitation on the understanding of a concept by the teacher. The lesson was on the design brief and the teacher requested the learners to come up with one. He had already provided the definition of the design brief to the learners as 'a statement that describes the problem'. Learners were referred to a scenario in the textbooks.

Learners came up with the following design briefs:

1. **"Emily needs an outdoor light."**
2. **"Emily has a problem when she gets home when it is dark; she needs an outdoor light that will help detect light and day."**

He then asked learners if they wanted to hear his design brief. The teacher then wrote the design brief on the chalkboard as:

"Improve Emily's security in her house."

He then said this statement encapsulated all the problems in the scenario and was the design brief.

The data reveals that the answer that was provided as the design brief by the teacher did not match the definition he had provided. It did not describe the problem that was supposed to be solved in this scenario. Instead, the answer number 2 that was given by a learner could have been the closest answer as it gave a description of the problem in the given scenario. In Technology a design brief is a statement that is supposed to describe what the problem is and who will benefit from or use the solution (Siyavula workbooks, 2013). In a design brief one should get an idea of what is it you are going to make, why you are making it and for whom. All learners had to adopt the teacher's definition as per his instruction which was not accurate as it does not say what the problem is nor give an idea of what is going to be made. The data above confirm findings by Ntshaba (2012) where she discovered that the teaching and learning practices are sometimes not aligned to the curriculum expectations because of lack of confidence with regard to content by teachers and their limited understanding of the curriculum.

4.2.7 Theme 7: Teacher training and professional development

Jones et al., (2013) point out that in all countries teacher education and professional development is the keystone in the implementation of curriculum.

The participants were asked if they were trained to teach the Technology content as contained in the Grade 9 Technology CAPS policy and if they thought the training was helpful. Miss Sinabo remarked: *"No, we were not; the only thing is that there is a subject advisor who helps me."*

During the course of the interview she, however, mentioned a different view about the training workshops she received. She said:

> *"Yes, they were helpful. The most part of the help is that I could not understand how to record and how to do the Mini PAT. They really helped."*

Mr Maswazi was also of the same view:

No, I have not been trained like that. If I am hearing you well you are referring to where we are in a common centre, cutting papers if we need to, we put things together, do practicals, and we do lesson preparations and present them in front of other colleagues. No! That was done in workshops a long time ago when there was this implementation of OBE. It was done back then but with CAPS no content workshops but it's the CAPS workshops.

Mr Rutendo had a different view:

"Yes I have, I think so because this year when we came for training at Victoria High School (pseudonym) that material we were given was very good, it's good stuff. I used it for my first Mini Pat, you know from there using the material I aligned myself to it, I found that the rest of it gets pretty easy."

Davis (2011) asserts that colleagues' support, input by curriculum officers, adequate training and teacher development contribute positively to curriculum implementation. It seems that some input by subject advisors positively contributed to how Miss Sinabo and Mr Rutendo implemented the curriculum, however, they both felt that the training workshops offered by the Department of Education were not sufficient as they only focused on theory and orientation on policy - CAPS. On the other hand, it is clear that Mr Maswazi is of the opinion that he has not benefited from the training workshops offered by the Department of Education.

On a follow up question on what the participants thought could be improved in the training workshops offered by the Department of Education, Miss Sinabo's response was:

"Ok, like I would really like for the subject advisors to come and explain when we are doing things like mechanisms; they can try and train us on those aspects, like how to show learners how to do things like that to get help from them."

In agreement, Mr Rutendo responded:

"The problem that I find is that there are a number of teachers in a number of schools that have no experience in the workshop. They make Technology a very theoretical subject; they do everything on the chalkboard and everything on the notebook. I think we should invite these teachers. We should bring them and perhaps spend one or two days with them, one day on metalwork, the other day on woodwork, maybe the third day on drawings so that these teachers are armed to teach Technology effectively especially the practical aspect."

Mr Maswazi was of the same view:

"The practical aspect could be improved like being exposed to practicals like processing. It would be better if we could share simple practicals so that we can show them to the learners."

Technology is largely practical in nature and teachers therefore should be confident with how they address the practical aspect of the subject in the classroom. The data generated suggests that teachers lack the capacity to administer the practical aspect of the subject and this could negatively influence how they implement the curriculum in the classroom. All these views from the three participants evidently show that teachers urgently require support in the form of practical workshops which will give them skills and practice so that they are able to assist their learners in the classroom. Davis (2011) asserts that colleagues' support, input by curriculum officers, adequate training and teacher development contribute positively to curriculum implementation. It seems that some input by subject advisors positively contributed to how Miss Sinabo and Mr Rutendo implemented the curriculum, however, they both felt that the trainings were not sufficient as they only focused on theory and orientation on policy. One of the key issues to be taught in Technology as stipulated in CAPS is practical skills (Department of Basic Education, 2011a). The data generated above confirms Bondy's (2007) statement that in order to achieve successful curriculum implementation there is a need for robust, on-going teacher professional development.

Both Miss Sinabo and Mr Rutendo indicated the need to improve their understanding of Technology content through furthering their studies in order to improve their teaching in the classroom. This in line with an argument by Msibi and Mchunu (2013) who state that teachers need to be experts in the subjects they teach, they should demonstrate the subject content knowledge and show an interest in furthering their studies.

To the question on whether the participants were trained to teach Technology as contained in CAPS, Miss Sinabo responded:

> *"I would not say so cause for now, maybe next year I can go to DUT or Edgewood and get trained on the practical work in Technology because I like only did it with UNISA, in UNISA they don't like give enough practicals. In Edgewood it's the best because I have seen my uncle, he did it two years back, Wow! He is so much advanced with Technology, I cannot imagine, they build cars, the cars can walk (move), they even got engines of cars, Wow, if I can go and try to do it at UKZN."*

Mr Maswazi expressed a similar view:

> "*I was also wondering if I could take Honours Degree in Technology but now one thing that discouraged me is that at the school we are only taking this Technology up to Grade 9. After Grade 9 there is no Technology".* He was responding and expanding on the question: How has teacher training assisted you to effectively teach Technology?"

It is clear that the need for self-development is informed by some content gaps or needs that these teachers have identified. The participants seem to be concerned about their ability to implement the new innovation at this stage called informational and are interested in learning more which is a self-type of concern in the CBAM (Hall & Hord, 1987). The focus of CBAM is on factors that relate to change in education that affect individuals (Hall & Hord, 1987). It is evident that at this stage the teachers are concerned about some content in the CAPS document but are willing to improve. Enhancement of teacher professional development is fundamental to successful implementation of a curricular innovation (Park & Sung, 2013)

4.2.8 Theme 8: Teacher collaboration and communication

The need for collaboration was a view expressed by all three participants during their individual interviews. Even though Miss Sinabo felt she was not adequately trained by the Department of Education, she remarked that:

> "*I am a fighter. I don't want to tell myself that I cannot do something. I go to teachers who were trained in UKZN from primary schools during weekends. I come back with the knowledge and teach my learners. I don't like to sit around and say that I cannot do it, that's not like me.*"

It was evident in the lesson observation that Mr Rutendo was also open to working with other teachers; the Science teacher was part of the lesson because Mr Rutendo was addressing a Science aspect in Technology-Electricity and she assisted leaners with the practical on conventional current. It was also evident during the interview when he remarked:

> "*The Science teacher is a lot of help; we complement each other especially with electricity. I can go up to her at any time; she is prepared to work with me anytime. If I have any problem I will go to her like right now, she and I are busy arguing about conventional current.*"

During the interview on the issue of resources and tools and the role they play in the effective implementation of Technology Mr Maswazi remarked:

> "*The other thing that I thought of, to counter the lack of resources is if in a circuit or ward we find out which schools do this Technology and then we can partner with well-resourced schools.*"

It is evident from the data generated above that the participants at this time are at the collaboration stage of the CBAM whereby teachers are interested in working with other teachers to improve the benefits of using the curriculum for their learners (Hall & Hord, 1987). Teachers at this stage want to work jointly with others to improve the outcomes of the innovation. Allowing teachers to work with others could facilitate the

implementation of the curriculum as they could share ideas, good practices and therefore benefit from each other. This is why Ornstein and Hunkins (2012) are of the view that communication among peers needs to be ensured and encouraged for successful implementation and people should be brought together to discuss new curricula because feedback from teachers is essential to the curriculum process. This discussion then suggests that the teachers are not provided with a conducive environment to work with other teachers and this may have an adverse impact on curriculum implementation.

Data generated also revealed how teachers feel about the lack of communication and involvement of teachers when curriculum was developed.

Mr Rutendo commented:

> *The problem is that curriculum is being developed by people in ivory towers, unfortunately university professors. When they develop the curriculum they should come down to the ground and talk to the teachers and see what resources are available. Curriculum should not be implemented top down; it should be from down to the top. That's what we need to do.*

Van der Akker et al. (2009) emphasise teacher involvement for successful implementation to be achieved. One of the important assertions that underlie the CBAM as listed by Hall and Hord (1987) is that it is important to understand the view of the people involved during the change process. Data generated during the interview suggests that Mr Rutendo feels that there was no teacher consultation when the Technology curriculum was developed. Fullan (1992) explains that curriculum implementation is more effective if teachers feel that there is a need for change, there is clarity about the goals and needs, the extent of change required from teachers is understood and when the innovation is practical and not too complex. This suggests that if teachers are not involved and well-informed about a curriculum innovation their commitment to the implementation may be adversely affected.

4.2.9 Theme 9: Monitoring and support

In all three schools the data suggests that the teachers received very little, if any, help from the school management team and other teachers within the school.

Miss Sinabo shared:

> *I would be lying, none or whatsoever. It's like something they don't take notice of, they are not interested to know, and they don't even care or ask about Technology. With Consumer they always ask. When I am setting Technology paper other teachers will ask "Oooh! You also teach electricity in Technology? How come?"*

On the question of whether she received any support from her HOD, she responded:

> *"No, in Grade 8, I did order books then all of a sudden the SMT decided alone that they will not be buying books for the grade without asking me."*

When further probed if the HOD was able to assist her with resources, she added:

> *"I did ask the HOD for syringes and she said definitely Ooh! I will get about ten for you, even now. I had to go to other people I don't even want to bother them anymore. If I buy something I don't even want to bother, I don't ask her. In Consumer Studies I usually write letters to the SMT and I get funds."*

Mr Rutendo responded:

> *"I do get support although there is not much that my HOD can offer in terms of content. She comes from a Mathematics background; she has never taught Technology before."*

Mr Maswazi indicated that:

> *"Maybe the only support I get is to be reminded that learners are alone in the class and it is a Technology period, otherwise nothing. At some point when I started I would buy my own textbook and a teacher copy."*

He also added:

> *"The only thing she can do is to download information from the internet like lesson plans then she says, 'I have got some lesson plans' but most of the time I already have that because I am a person that is also able to access the internet."*

It is evident from the data generated that at Ruby school the HOD is willing to support Mr Rutendo but this is hampered by her lack of Technology content knowledge. In both the other schools, Silindile and Mayenziwe, the data generated suggests that the participants feel that their HODs are not concerned about assisting them to effectively implement the curriculum in Technology because they cannot provide them with resources to teach in the classroom. Barnes (2005) argues that a supportive environment during curriculum implementation is crucial and lists the main contributors as: the principal, head of department, parents, time, materials, giving teachers freedom to change, and personal reflection.

The study also revealed that because of very little or non-existent support from the SMT the participants have resorted to funding the subject themselves. I noted to Miss Sinabo during the interview that it was unfortunate that during her lesson the learners could not assemble the circuits. She responded:

> *"Yes the challenge is that even though I had a circuit in front of me but the challenging part is we did not have bulbs, we didn't have batteries etc. I have been buying a lot of things using my money. I am scared to collect money from learners to buy these things."*

She also mentioned that she regularly buys data bundles to search via Google for information required so that all learners are able to see what she is teaching them.

Mr Rutendo indicated:

> *"I get my own resources. I am pretty well known in the community. The school has limited resources."*

Mr Rutendo further explained that he was able to get sponsors from the community and buy what he needed. He has worked for many years at the school and has close relationships with individuals and businesses in the area.

Mr Maswazi also indicated:

"At some point when I started I would buy my own textbook and a teacher copy."

This practice of buying resources for projects was prevalent among all participants. The question is what happens in instances when teachers cannot afford to buy these resources? The CAPS document clearly states that schools must take responsibility for providing both tools and materials and it goes on to say that the Head of Department for Technology must plan for the acquisition of resources to enable the practical aspect of the subject to happen (Department of Basic Education, 2011a). Ali (2006) suggests that technical and financial resources, along with quality human resources, are key and contribute to a proper curriculum implementation.

Even though there is a long list of materials and tools that is provided in the CAPS document, the challenge still remains that those materials and tools are not available in schools. Ornstein and Hunkins (2012) caution that new curricula can fail because of inadequate financial support by those that develop the curriculum such as money for new materials and equipment towards the innovation itself. I argue that if School Management Teams do not provide teachers with a conducive environment, encouragement and emotional and financial support the implementation of curriculum may not be successful. In her study Davis (2011), among other things, revealed poor support by administrators or managers as a barrier to curriculum implementation in Technology.

The data generated during interviews also revealed the level or kind of support that the participants expected from the officials of the Department of Education for the effective implementation of the Technology curriculum.

Mr Rutendo said:

There should be a workbook for every single subject. We should not worry about teacher files so much, a teacher could have a polished file and the work is something else. An inspector should not call teachers to him, he should come to the school, he should go and sit in the class and say 'people let me see what you are doing' but SADTU will say no to that.

He further added:

> *"If you want to monitor what is done in class not to bully or shout at the teacher, if you want to check number one, if what you want done is done, to check if implementation is effective, the only way you can do that is to come and see me, check the children's books and this will give you a true picture. The reality is that you must look at the kids' books. You will never know what a teacher is doing by looking at the teacher's files."*

Mr Maswazi explained that he has not received adequate training and what he does was out of passion and experience.

> *"…but if someone comes the only defence I would have is to say, wait build me instead of criticising me. I have put my effort on this one. Come with your assistance first then you can tell me I have not done it correctly. You can't just drop a book and say you will come next time and check. There are things on the book that need some elaboration, that need some discussions."*

The discussion above reveals that the participants welcome the visits, advice and monitoring by the Department of Education officials such as the subject advisors. Continuous contact with the teachers and providing help and advice, clear communication to supply answers to queries and illustrate different roles, and provision of support service by the education department and/or school, for example supplying material and encouraging teachers, have been identified in the literature as factors that determine the success of curriculum implementation (Carl, 2009). The data suggests that participants require constant support, assistance, elaboration, discussions on content and other issues, and a close working relationship with officials instead of being 'bullied', 'shouted at' or 'criticised' as mentioned by Mr Rutendo and Mr Maswazi during the interview. Another issue that became evident was the sometimes complicated association between the Department of Education and the unions. Mr Rutendo requires the officials of the Department of Education to come to the classroom and observe what he does with his learners but this cannot materialise because the teacher union he is affiliated to, is opposed to this practice. If teachers do not receive the kind of support they need, effective curriculum implementation in the subject could be hindered.

4.2.10 Theme 10: Teaching and learning in Technology and the time allocated for the subject

All three participants indicated that their learners loved the subject. However, the data generated during the interviews also revealed that some learners experience challenges with content. When participants were asked if learners had any difficulties in terms of learning and understanding the Technology content, Miss Sinabo responded:

> *"I think the part where they usually have a problem is this graphic communication. I think that is the major part that they cannot grab it properly."*

She, however, added, *"Some who are gifted in drawing are ok."* Again she expressed that the calculations for Mechanisms were challenging for learners and she has to repeat them often in the classroom.

Mr Rutendo responded similarly:

> *"Yes, there are some sections like drawing. Let me tell you something Mam, to be someone that draws well you must be able to think in 3D (Dimension). Not everybody can do that, I had to train myself. I had to refocus my brain to be able to understand 3D. One of the weaknesses would be drawing, not everyone is going to be somewhere where they can do engineering and drawing. Another reason would be some children are most suited than others for an example a child that spends time in the mechanic yard, that spends time welding will have a better understanding of certain things. Certain kids will have a better bias to Technology because they have a better understanding; they know how a motor car works. I mean you are teaching mechanisms so they would understand that. Generally speaking most kids understand the theory part but some kids are more applied to the practical part, they understand it better."*

During the interview Mr Maswazi commented that his learners did not experience any learning difficulties. He even remarked about his learners: *"Others can even fix a*

TV." The data above confirms the findings that teachers seemed to consider the learners' backgrounds and abilities when implementing the Technology curriculum (Bondy 2007). Both Mr Rutendo and Mr Maswazi are of the idea that learners that have a better understanding of some concepts in Technology are those that possess practical skills while Miss Sinabo believes that graphic communication is only understood by the 'gifted' learners.

Technology as a subject should stimulate learners to be innovative and develop their creative and thinking skills (Department of Basic Education, 2011a). This implies that a Technology teacher needs to provide learners with opportunities to solve problems using a variety of skills like critical and creative thinking so that they will understand the concepts and knowledge used in Technology. Ankiewicz, Adam, De Swardt & Gross (2001) points out that Technology is viewed as an innovation towards the development of a more thinking framework. This requires a different role for Technology teachers; they are expected to be facilitators of the learning process and shift from the traditional notion of being authoritative and imparting knowledge to learners. They further argue that this poses serious challenges to teachers who have been informed by a curriculum framework characterised by authoritarian and rote approaches to learning and teaching. "Simply put, curriculum activity is change activity" Ornstein & Hunkins (2012) p.253, and Technology teachers need to align their teaching methods to the new demands of the subject in order to effectively implement the curriculum.

The data generated from the interviews suggests that language barrier is a major challenge towards the effective implementation of Technology in two of the three participating schools. Mr Maswazi commented:

> *"The major thing is the language barrier; you know they want to express themselves in isiZulu. But if you have the practical part of it I know the concept is grilled easily if you explain some more it might take some time. Language is a barrier especially the terms; they are not difficult but the name of the component without seeing it easily goes away but if you see it or touch it, it registers in your mind."*

Miss Sinabo also raised a similar concern:

"*They find it hard if you are teaching in English… they always have to try and understand concepts.*"

She has adopted a strategy to overcome the language barrier challenge

"*Most of the time we do new words, we take the dictionary I explain what does each word mean. That always helps me. We are not supposed to teach Technology in isiZulu.*"

It is important to recognise that for effective implementation of Technology in the classroom teachers should be able to address barriers to learning and teaching in a manner that caters for learners with different capabilities in the classroom. The Department of Basic Education Guidelines for Inclusive Teaching and Learning, (2010) suggest that programmes in the school should ensure support and supplementary learning in that problematic language is provided until learners are able to learn effectively in that language This document states that it is the responsibility of the subject teacher to ensure that the language of teaching and learning is not a learning barrier. This requires teachers to change and adapt their teaching strategies, as displayed by Miss Sinabo in the data presented, which will clearly slow the pace of teaching and learning. This represents the refocusing stage of the CBAM where teachers can make modifications to the innovation because they are concerned about finding better ways to teach their learners (Hall and Hord, 1987).

The data generated suggests that Mr Maswazi is of the opinion that his Grade 9 learners understand all the content in the Technology curriculum. He provided the following justifications:

They understand different types of drawings, I am having these colours in the textbooks; they can see the different components unlike black and white. They can draw it and use their crayons to do it on their paper. It's not that bad.

When asked about the learners' understanding of electricity and electronics he was adamant:

"All of that is okay, I have some videos, I have downloaded some of the concepts from You-tube so after teaching that particular topic they watch that video they look at that video now with colours and it is more practical than we were doing it."

When asked which strategies she used to teach Technology and if they were effective in class, Miss Sinabo admitted that she did not know if her strategy was effective or not but she said she used her laptop to "Google" different pictures of bridges. For big pictures and structures she uses a big screen with the overhead projector to show to the learners. She says her learners love the big screen *"…they will be so amazed to see the structures in the overhead projector".* Both Miss Sinabo and Mr Rutendo echoed a similar concern about the fact that their learners cannot see what they are being taught. Mr Maswazi said: *"It's a challenge because even those small drills you can't show them, you just have to tell them: Do you know a drill?"*

Miss Sinabo indicated that she used a computer most of the times in her classroom because "*I cannot take them to a construction area where they will see the pulleys. I also don't like to ask them questions like, "Do you go to Megacity"? I don't like to do those things. Others will say no, I didn't see the pulleys and others will say yes I did. They must all see."* Both Miss Sinabo and Mr Maswazi emphasise the use of colourful pictures and videos from the internet when teaching Technology because they think it assists learners to understand concepts like drawing, structures and electricity in Technology. Data generated suggests that in both Silindile High and Ruby Secondary schools the participants are content with the fact that the learners watched colourful videos, and saw big and colourful pictures of structures and bridges. The participants strongly believe that their learners are able to understand content in Technology through watching these pictures and videos. Stevens (2006) points out that the perception that Technology is synonymous to computers is a persistent one and teachers need to undergo a mind-set shift. The use of computers in the teaching of Technology, like in any other subject, may be beneficial in facilitating and enhancing the understanding of content, however, it must be noted that learners in Technology should use and apply the knowledge they have been taught in practical work. Knowledge is important but the learners must show that they

are able to apply it. Computers cannot replace good teaching strategies but can enhance teaching and learning in the Technology classroom.

Mr Rutendo explained:

> *"I combine the theory and the practical. After discussing theory, discussing it and try to make it work in their minds, make them understand the content or theory then I will give them practical work. I then let them feel it with their hands. We apply the theory and I think that's what Technology is about. Once you have that understanding and you see that bulb lights up, you understand."*

Mr Rutendo is using the methodology that is recommended in Technology, which is teaching content, and allowing learners to apply it through practical work.

Mr Maswazi presented a different method. He said:

> "*I use action research mostly. Then I allow my learners to learn in groups especially because of the lack of resources.*"

He described action research as a teaching method "*that allows them to ask questions and evaluate their projects".*

When probed on whether he thought these methods were effective in class, Mr Maswazi responded:

> *"No, some learners do not participate in group work. Most of the time there are no resources and learners cannot do the work."*

It is evident from the data collected that Mr Maswazi does not seem to have a clear understanding of action research. Action research is not a teaching strategy but can instead be used by the teacher himself to reflect and then improve on his practice. Grouping learners is also not effective because of the unavailability of resources. The participant does not seem to have a teaching strategy that is effective and that could have a negative impact on implementing the curriculum.

The data generated during the lesson observations of all three participants revealed that they mostly used the question and answer method to teach Technology. All participants asked questions throughout the lesson. Learners were encouraged to

look and find answers from their textbooks. Mr Maswazi repeatedly asked questions about the scenario and learners were unable to answer. He referred learners to the textbook and commented:

"You are researchers and should use the textbook as a source to identify Emily's problem in the scenario."

The data generated suggests that the two hours per week stipulated for teaching and learning in CAPS seem to be a hindrance to curriculum implementation in Technology. To the question: do you think the time stipulated in CAPs is sufficient to cover all content in Technology? Miss Sinabo responded:

Definitely not, it is not and this is affecting me." She then explained that she liked to emphasise content after a lesson and as she did this time was wasted. When exams draw closer she rushes to finish the next topic and does not emphasise content.

She said *"…with that aspect they will fail because I did not put too much emphasis…"*

Mr Rutendo agreed that the time was not enough if one looked at the amount of work Technology teachers have to cover. He added: *"Then you will have a fun run, you have water crisis at the school, it's too little, two hours is too little."*

Mr Maswazi is of the same view as the other two participants. *"No, it's not…..If you are to drill content you can't do it in two weeks."* When further probed on whether he would be able to complete the Mini PAT with the learners as he had indicated that exams were underway for the FET phase, he admitted that he could not answer the question because he was expected to invigilate the exams.

The participants' concerns about teaching and learning time stipulated for Technology in CAPs represent the management stage in the CBAM whereby teachers may be concerned about their abilities to fulfil the task such as managing the implementation of the new innovation and its logistics like time management (Hall & Hord, 1987).

4.2.11 Theme 11: The Design process

The design process is referred to as the backbone for methodology in teaching Technology. Learners need to work with others doing practical projects using the skills of the Design process such as investigating, designing, making, evaluating and communicating (Department of Basic Education, 2011a).

It is evident in the data generated from the lesson observations that all participants considered and somehow used the Design process in the classroom. During the lesson observations in two of the three participating schools the focus of the lesson was on the design process. Mr Rutendo's lesson focused on investigation skills while Mr Maswazi focused on the design skills of the design process. However, Technology teachers sometimes tend to put more emphasis on the making aspect of the Design process (Moreland & Jones, 2000; Naidoo, 2013). Jones and Moreland (2003) assert that the decision-making and the actual process of thinking is more important than the products that the learners make.

On a number of occasions during the interview participants placed more interest on the end product which represents only one aspect of the design process. Moreland and Jones (2000) suggest that the reason for this is that teachers tend to miss the 'bigger picture' as they eagerly try to cover as much Technology content of the curriculum as possible, coupled with their desire to design and make products. The participants made the following comments which indicated that they usually focus on the 'end-product'. Miss Sinabo indicated that:

"It is nice to build something, at the end of the day you feel that you have achieved something."

"Even though we have a problem with resources I always make it a point that that the product will come out."

"Hey, I enjoy teaching like especially electricity like whenever we do something and then we see the light coming out. Learners will be so excited for an example when the light shines when making circuits we become so happy, it is fulfilling…"

"Even though we came up with the best product, it was ugly. That is the bad part."
She was referring to a project that was made by her learners for a District Technology Expo that won first place.

Likewise, Mr Maswazi remarked:

> *"If they (other people within the school) could see the finished products, we (in Technology) are not only about collecting tins and cardboard. It is something different when you say this is a model of a house and if you open this switch it will light up."*

Mr Maswazi felt that this would change other people's perspectives about Technology. It must be noted that there is a range of processes that the learner must go through before making the product. Naidoo (2013) notes that making a product is an important part of Technology and cannot be avoided, however, it becomes a problem when making the product becomes the main focus.

The design process is weighted 50% in tests and exams and this should guide the approach to teach Technology. Learners need to present the design process in the Mini PAT which makes up the main formal assessment in each term. Assessment in a Mini PAT must address the aspects of the design process. The design process becomes a critical aspect to teach during the implementation of Technology in the classroom and should be incorporated in the assessment as well. (Department of Basic Education, 2011a). Assessment plays an important role in determining the success of the teaching and learning process (Carl, 2009). It is then important to ensure that the learners complete the Mini PAT under teacher supervision so that the important skills in the design process are formally assessed. This study revealed that there was a challenge with administering the Mini PAT in all three schools. During the interview Miss Sinabo said:

> *"…After school from half past two to four o'clock we will be doing our practicals, the Mini PAT and also maybe to emphasise content. But now sometimes most of the learners are gone…"*

Mr Rutendo commented that:

> *"Yeah, they love it, some of the PATs they do at home and some of the PATs they do in the workshop."*

This was in response to the question of whether his learners were able to do Mini PATs as stipulated by CAPS.

Mr Maswazi, on the other hand, indicated that:

> *"The PAT is supposed to be done in your presence. Here we do not have resources at the school which we are supposed to provide, so the learners cannot present."*

The practical aspect of the subject is addressed though the Mini PAT and it constitutes 70% of each term's mark. This mark is used for promotion and progression of the learners and makes up more than half of the learners' marks at the end of the year. It is then crucial for the Mini Pat to be done under the supervision of the teacher (Department of Basic Education, 2011a). It is evident from the data generated that in two of the schools, Silindile High and Ruby Secondary, the Mini PAT is done outside of the teaching and learning time and in the third school, Mayenziwe High, it cannot be done because of lack of resources. The authenticity and validity of the Mini PAT mark is questionable in all three schools. CAPS stipulates that work done 'off campus' should not form part of formal assessment (Department of Basic education, 2011a). Jones et al. (2011) contends that sometimes when the teachers' understanding of technological ability is limited there is a tendency for teachers to focus on the production of the product rather than the processes, innovation and key learning that is involved. If the Mini PAT is done at home it suggests that the teachers are mostly concerned with the finished product because they will not be able to monitor and assist the learners as they go through the design process. In her study Naidoo (2013) discovered that teachers placed greater emphasis on completed tangible products rather than the designing and learning process that the learner engages in.

Although all the participants shared a positive attitude about the Mini PAT as a formal assessment, slightly different views were forthcoming when the participants were asked about how they felt about the inclusion of the Mini PAT in each term.

Miss Sinabo responded: *"They are excellent, they are fine."*

Mr Rutendo said:

> *"There is no problem with the Mini PAT except that we should not have a Mini PAT in the fourth term. There is no time; you come in for two weeks and then you going into examinations after that. I mean why do we have that? Come on, the Department of Education should think about that. They should do away with that. It should be three Mini PATS. What happens in the fourth term is that we hash it up. You have to make it work, there really is no time. The Matric exams start immediately; I teach grade 12s. We are going out as matric teachers."*

Mr Maswazi commented: *"The teaching methodology in the Mini PAT is fine."* He, however, expressed concern on the percentage it contributes towards the end year mark. He expressed concern over the fact that the Mini PAT only contributes 20% towards the learner's pass mark at the end of the year and yet it is a lot of work. He is of the opinion that Mini PATs must be relevant to the school community. He said, for example, learners were expected to make a head gear although his learners had never seen a head gear and there were no mines around the school. This was a challenge for learners: being expected to make a head gear as a project when they have never seen one. Ornstein and Hunkins (2012) share the same view when they argue that the new curriculum should be tailored to the school because each school is unique.

The data generated reveals that Mr Rutendo cannot effectively assess the Mini PAT because of time constraints and other programmes within the school. He is also involved in the marking of the National Senior Certificate Examinations and they have a very short fourth term as Grade 12 teachers because have to leave for the marking centres. It is clear that Mr Rutendo's involvement in other programmes poses challenges with regard to curriculum coverage. Content stipulated for term 4 is not adequately addressed and the involvement of Grade 12 teachers in the marking of the National Senior Certificate (NSC) Examination exacerbates this problem. Other programmes and the Grade 12 exams are prioritised over the Grade 9 Technology content and this will adversely impact on the curriculum implementation in the subject. Govender (2013) argues that high school teachers who teach across

the grades have a tendency of focusing on the senior grades while Grade 8 and 9 learners are neglected and not given the necessary support.

4.3 Findings from lesson observations

The lessons that were observed in the three participating schools were on different aspects of the Grade 9 content. The focus on Miss Sinabo's lesson at Silindile High was on Electrical Systems and Control and the content covered was component symbols. At Ruby Secondary School the focus of the lesson was also on Electrical Systems and Control and the content being addressed was potential difference and revision of circuits. This was a practical lesson to measure the potential difference and revise simple circuits. Mr Maswazi's focus of the lesson at Mayenziwe High School was on the design skills. He was addressing the design brief.

4.3.1 Miss Sinabo's lesson at Silindile High School

The lesson was conducted in a spacious Consumer room. There were 52 learners in the classroom during the lesson. The room had five big tables and high chairs for learners. There were not enough chairs and the teacher instructed learners that were not seated to collect chairs from the music room. This caused distractions because a number of learners moved out to get more chairs. Although the room was big the teacher could not move freely in between the tables because they were closely packed. She could, however, move back and forth in one row in the middle of the class. For the most part of the lesson the teacher was standing at the front. Some learners arrived late and the teacher had to ask them to settle down. The teacher started by establishing if all learners had textbooks and they confirmed that. The learners were sharing the textbooks; there were about four learners sharing each textbook. The teacher introduced the lesson very well by recapping on previous work. Learners were asked a number of questions on electricity. In most cases the learners gave correct answers because they were allowed to refer to their textbooks. She confirmed the learners' answers and added more information where necessary. The teacher showed good command and knowledge of the content. She then informed learners that they were going to learn about component symbols. She explained that it was important to know, recognise and draw these component symbols when working with circuits. She then referred learners to the textbook. She

would then show the learners the picture of a component for example, a cell. Miss Sinabo also had components on the table as a resource; she would then pick these up and show them to the learners. They were then asked to name the function of the component. This was done for all other components, namely the batteries, bulb, switch, conductor, LED. Learners provided the teacher with answers that they were reading from the textbook.

The teacher would add more information about that component if learners had not covered everything. She then said that now that they had learnt the component symbols they would be able to use them when they drew circuit diagrams.

She then asked learners to look at a simple circuit in the textbook. Learners were asked to come to the front and draw that simple circuit. A learner then came and drew on the chalkboard. While that was happening the teacher would list all the components that the learner should draw. She instructed the learner to caption the diagram. She read out aloud the caption for the learner to write e.g. a simple Circuit.

The teacher asked learners to draw more of these diagrams such as: A circuit with a lamp, switch and two cells in parallel, a circuit with a lamp, switch and two cells in series. The same method which was applied in the first diagram was followed with all diagrams. The concept of parallel and series was now being dealt with in some diagrams. Learners were asked about the flow of current in the diagrams. Learners were asked to explain the advantage of connecting cells in parallel in a circuit. The teacher asked about the brightness of the bulbs if a circuit was connected in a certain way. At some point a learner had to draw a closed and open switch and the teacher explained the flow of current in each case. She encouraged learners to refer to the textbook so that they could be able to draw these circuit diagrams. If there was something wrong with the drawn diagram she would ask the whole class what was wrong and point at another learner to come and make a correction. This became the main part of the lesson. Different learners came to the front to draw more circuit diagrams. The teacher would check if they were correct and ask leaners to label them. She then told learners that they would now do the enabling task. She had made copies of this task, she asked one learner to distribute it to the whole class and she read out the activity to the learners. The learners were expected to draw more symbols of components and circuit diagrams in this activity.

4.3.1.1 Analysis of the observed lesson

It was evident from the data generated that the teacher was knowledgeable about the content being taught. The lesson was well introduced by recapping on previous work. Learners were attentive, participated actively and seemed interested in the lesson. However, the whole lesson seemed to be a recap of previous lessons. The lesson did not develop and no new content was imparted on this day. Instead the lesson was more on checking the learners' knowledge until the end. The main challenge was that the relevant resources and tools to support this lesson were not available. The content taught in previous lessons could have been applied through practical work during this lesson but leaners could only draw the circuit diagrams on the board. Learners could not work collaboratively with others to use a variety of skills. This lesson was the perfect opportunity for practical work but it could not happen. The unavailability of resources impacted negatively in this lesson. The use of textbooks was not appropriate; it was not easy to measure if the learners understood because they had their textbooks open throughout the lesson. They referred to them during recapping as well as when they had to draw the circuit diagrams. This lesson was supposed to be an enabling activity which would give learners practical skills to do the Mini Pat but this could not be achieved. It will be difficult for the learners at this school to assemble and connect components when they design and make an electronic circuit during the formal assessment. The teacher was unable to translate theory to practice because of the unavailability of resources. The teacher tried her best to engage the learners.

4.3.2 Mr Rutendo's lesson at Ruby Secondary School

The lesson was conducted in a science laboratory since the focus was on a science aspect of Technology. All learners had tables to work on, however, there was no space for the teacher to move in between the desks because they were not well spaced. Teacher could move at the front and sides of the laboratory. The school does have a Technology workshop, however, it was not used for this particular lesson. The teacher started by laying out the objectives of the lesson which was to carry out experiments to prove what the learners have been taught on ohms law, resistance, voltage and current. He recapped on previous work by using the question and answer method. His questioning was clear and he used a loud voice. Learners

were encouraged to use their textbooks to look for answers during recap. He was very fast in asking these questions and learners would raise their hands and he would point at them but in most cases learners gave the answer in unison. He would move to the next question. Recapping seemed to take up a huge chunk of the lesson. The teacher was clear on the subject matter. The teacher was able to summarise important points from the learners' answers and provide more information on what they were recapping.

The teacher used the collaborative method by bringing in a Science teacher to assist with the practical work for this lesson. Learners were split into two big groups and two different practicals were done concurrently. Group 1 did the basic construction of a circuit with the Technology teacher and group 2 did an experiment on potential difference and current. Both teachers conducted the practical and then asked questions based on what the learners could observe.

In group 2 the Science teacher arranged the learners into a circle. The teacher asked learners to observe the equipment in front of them. One learner was tasked with taking recordings of the readings. The teacher pointed at and explained the different components of the circuit e.g. resistor, ammeter, switch, power supply. She asked learners what was used to measure potential difference. She showed them the negative and positive points of the power supply. She then drew the circuit diagram of the circuit on the chalkboard. She basically explained how the circuit was connected. She was demonstrating to the learners and manipulating the circuit and learners had to observe the readings on the scale. They then measured the potential difference. The one learner took down the readings. She would ask learners questions during the experiment. After the experiment the teacher instructed the learners to draw the circuit diagrams in their exercise books.

In Group 1 the Technology teacher was busy with the experiment of assembling different components to build a circuit. He would ask questions like: why must you make sure that the cells are in contact in the circuit? Learners had to observe the brightness of the bulbs. The circuit was connected in parallel and in series and learners had to observe the brightness of the bulbs. The groups were then swopped. Group 1 went to the Science teacher and group 2 went to the Technology teacher.

The Technology teacher then addressed all learners and explained ohms law and a calculation was done on ohms law. The formula for ohms law was written on the chalkboard. He then gave the learners homework based on the readings. They had to do calculations on ohms law. The teacher consolidated by explaining the formulas on the board. Learners were given four calculations to do. They were then required to complete a table by filling in the resistance value.

4.3.2.1 Analysis of the observed lesson

It is clear from the data generated that Mr Rutendo wanted to use practical work in order to apply the theory that was taught in previous lessons on ohms law, resistance, voltage and current. However, what was set out to be practical work for learners ended up being a demonstration lesson. The lesson was dominated by the question and answer method. The learners were not fully involved in the practical and only the teachers were able to handle the material while the learners observed. This was a well-planned lesson but the unavailability of tools and resources compromised the effective teaching and learning during this lesson. Although learners seemed genuinely interested in the lesson they did not acquire the practical skills as expected in Technology as they could not interact.

4.3.3 Mr Maswazi's lesson at Mayenziwe High School

The lesson was conducted in a standard classroom but seemed overcrowded because of the large number of learners. Learners were seated in rows. Three learners shared one desk and one textbook. The teacher was able to navigate in between the rows of desks to interact with learners even though it was not an easy task. There was a lot of noise around the classroom as most learners were standing and chatting outside. Sometimes it was difficult for the teacher to hear learners when they were responding to questions. At the beginning of the lesson the teacher laid out the objective of the lesson and explained to learners that they would be learning about the design brief. Recapping on previous work was not done. Learners were asked to name four things that were required to write a design brief. They could not identify the things required to write a design brief. The first part of the lesson was mostly about the teacher asking questions and learners being unable to respond. This questioning and answering went on until the learners were asked to refer to a scenario in their textbooks. The teacher guided learners by asking probing questions

about the scenario. The teacher wrote answers on the chalkboard (things that are required to write a design brief). After writing these on the board the teacher then asked the learners to write a short statement describing the problem and he then revealed that that statement was called a design brief. Learners had to come up with their design briefs and these were discussed. He gave his version of a design brief which was missing the traits of a design brief. Design specifications were also discussed and the teacher asked for a definition from learners which they could not provide. Again learners had to refer to the textbooks to get the answer. Learners were asked to describe what constraints were and again the learners battled to give the correct answer. The teacher ended up being the one to transmit the knowledge while the learners listened and answered when they could. The teacher provided examples of constraints without defining them. He then said that constraints were similar to specifications which was not accurate. This could be misleading to learners.

4.3.3.1 Analysis of the lesson observed

The lesson was based on a well-prepared lesson plan and content that was stipulated for the grade but learners did not seem to understand what was being taught. The lesson was addressing the initial stage of the Mini PAT where learners learn about the scenario and design skills. The initial stage is the basis of this formal assessment and at this stage learners have to identify the problem so that they can come up with a solution. The design brief, specifications and constraints should assist them to do that. The learners relied on the textbooks to provide correct answers and they did not seem to have a clear understanding of what a design brief was. Learners engage in developing a design brief every term so they should know what it is. In the end the design brief, specifications and constraints in the scenario were not clearly articulated and this will impact negatively on the making of the product. The teacher was very confident and possessed the knowledge but when he translated this knowledge to the learners there would always be something amiss. It was just not clear.

4.4 Conclusion

This chapter has presented and analysed findings by focusing on the themes that were generated from data. These themes were as follows: unavailability of resources

and tools, teacher experience, Technology as a vocational subject, subject backgrounds, link to the FET band, subject content knowledge, teacher training and development, teacher collaboration and communication, monitoring and support, teaching and learning in the classroom, the design process, teaching and learning time and the status of Technology in the curriculum. In this study it is apparent that quite a number of factors contribute (positively or negatively) towards the implementation of the Technology curriculum. It is important to note that once implementation is underway getting and supporting people who are involved is of utmost importance. In the next chapter I will discuss these findings and outline how the findings of this study respond to the research questions and thereafter provide implications for further research and practice.

CHAPTER 5

Recommendations and Conclusion

5.1 Introduction

The study was set out to explore factors that influence how teachers implement the Technology curriculum in Grade 9 in secondary schools. The study also sought to understand how these factors influenced the teachers' implementation of the Grade 9 Technology curriculum as well as the reasons why teachers implement the curriculum the way that they do. In this chapter I provide a brief discussion of the contributions that this study has made to the study of Technology curriculum implementation. Research questions are aligned to and presented together with the relevant findings of the study. This alignment is done so as to show how the research questions were addressed in the study. Thereafter the implications of the study are also discussed and, lastly, I will conclude with recommendations for further research.

5.2 Findings of the research

In this section I will show how the findings respond to the three critical questions of this study. The first two critical questions will be addressed simultaneously to provide a better understanding of what factors influence curriculum implementation and how these factors influence the teachers.

Research Question 1: What are the factors that influence the way that teachers implement the Grade 9 Technology curriculum in secondary schools?; and Research Question 2: How do these factors influence the teachers' implementation of the Grade 9 Technology curriculum?

As it has been shown in chapter four, teachers encountered various challenges when implementing the Grade 9 Technology curriculum. The unavailability of resources and tools to support learning and teaching in Technology was revealed by all three teachers (from three different schools) who participated in this project to be an inhibiting factor towards the effective implementation of the Technology curriculum in Grade 9. Through observations it was evident that teachers were

handling a subject that was practical in nature with very few necessary resources to support the teaching and learning processes.

From the lesson observations it became clear that two of the three teachers were struggling to translate theory into practice. I am arguing that these teachers were struggling to translate theory into practice because they were unable to assist the learners in the application of the skills and knowledge that they had acquired during the learning and teaching processes. The nature of the subject requires learners to use the skills and knowledge grasped during teaching and learning to create solutions to problems (Banks, 2000; Rauscher, 2011), in this case designing and making a product. Therefore, the unavailability of resources was seen to have not only impacted negatively on the learners' understanding but on the teaching time as well because I observed that the teachers seemed to spend more time improvising and organising tools and materials instead of delivering the content. It also emerged that insufficient resources indirectly compelled the teachers to use large groups during practicals which resulted in learners not being actively involved and thus not gaining any practical skills needed in the Technology subject. According to the teacher's interviews, in all three schools the things that are regarded as the school's responsibility were made to be the Technology teacher's responsibility like buying their own textbooks, and materials for projects, and getting sponsors to fund the subject. Chapman (2002) asserts that if there is to be a chance of successful implementation the government needs to provide funds for infrastructure and purchase of equipment and materials to finance the published curriculum.

Each of these issues mentioned above are inhibiting factors to the effective implementation of the Technology curriculum. It is obvious that in all three schools the teachers had limited resources available for the effective implementation of the curriculum in Grade 9.

However, it was clear during observation that all the teachers displayed good understanding of the Grade 9 Technology content and this can be said to have facilitated curriculum implementation in the classroom. The subject content knowledge that the teachers possessed enhanced the learning during the lessons and in turn supported the successful implementation of the curriculum in the

classroom. However, it also emerged from the observations that in some instances even if teachers possessed good content knowledge they were sometimes unable to correctly interpret that knowledge for their learners. For instance, one teacher gave a correct definition of a concept but was unable to translate that knowledge into a practical example that learners could relate to, thereby providing learners with inaccurate information. While this teacher understood the concept he could not successfully unpack it for the learners to make meaning of what was taught during that lesson.

This factor can be said to have compromised the effective implementation of the curriculum. Weimer (2007) argues that understanding and knowing content and being able to teach it are two different things. This implies that over and above their content knowledge Technology teachers need to have strategies and methods to effectively impart knowledge to the learners. Insufficient knowledge in graphic communication was an impediment to curriculum implementation in the classroom for one teacher in the study and as a result her learners struggled with the same content as well. The findings in this case suggest that lack of content knowledge is an impediment to effective teaching in the classroom.

The study revealed that what goes on during the actual teaching and learning in the Technology classroom impacted heavily on the curriculum implementation. Two of the three participating teachers revealed that while learners generally enjoyed the subject some of their learners had difficulties in understanding Technology content such as graphic communication and calculations in the mechanisms content. Language barrier was identified by the teachers as a major inhibiting factor during teaching and learning in Technology in two schools. Teachers revealed that learners struggled to grasp concepts when taught in English.

Teachers mentioned in the interviews that they have adopted certain strategies and methods in order to improve and enhance the learners' understanding in the classroom. Two of the teachers indicated that they were supported by computers to implement their lessons; they used Google to search for information, a projector to display pictures, and downloaded videos to explain concepts. The use of computers can enhance teaching in learning but cannot replace good teaching strategies in the classroom. One teacher displayed an understanding of the teaching strategy adopted in Technology when he indicated that he taught knowledge and then applied

it in practical work. One teacher revealed that to overcome the language barrier she employed a strategy whereby learners used dictionaries to check the definitions of the words. She then explained them to help her learners understand. I observed that all teachers mostly relied on the question and answer method during the lesson observations which in most cases was not effective because the learners were allowed to refer to their notes and textbooks for answers. It was therefore not a good measure of whether they knew or understood the content that had been taught. Two of the three teachers admitted that they were not sure or did not think that their teaching strategies were effective in the classroom, particularly group work, because some learners did not participate and because the lack of resources made it difficult for learners to engage in group work. While some of the strategies, such as applying knowledge in practical work, incorporating computers in teaching and learning, and the use of dictionaries to enhance learners' understanding of Technology concepts seemed to assist the teachers to effectively implement the curriculum during teaching and learning, teachers were not confident with other strategies, for example group work.

It was evident that teachers held varied beliefs about how scholars learn. One teacher strongly believed that only the gifted learners were able to grasp the graphic communication content in the classroom. Another teacher stated that some learners were more suited than others and had a better understanding of Technology because they knew how a car worked or they had spent time in the mechanic yard. Another teacher revealed that most learners understand the theory part of Technology but some are more applied to the practical part of the subject. In a study conducted by Kennedy (2005) she discovered that some teachers held unproductive and dysfunctional beliefs about how learners learn. In this study the beliefs that the teachers held negatively interfered with curriculum implementation because learners were boxed into these categories and were regarded as more suited than others or gifted.

It was evident that teacher attitude towards the implementation of the innovation impacted positively on the curriculum implementation. All teachers responded that the new content that has been included in Grade 9 was fine and laid a good foundation for higher grades. In all three schools it was evident that CAPS was used as a guideline and being followed and all content being taught was CAPS compliant.

I observed that the enthusiasm the teachers displayed in the classroom created a suitable atmosphere for teaching and learning in the subject.

It was evident from the lesson observations that teachers were aware of the importance of the design process in the subject and during the lessons all the teachers were addressing a particular aspect of the design process such as the investigation and design skills. The design process is regarded as the backbone of Technology (Hill, 1998; Mawson, 2003) and if it is addressed adequately it promotes the effective implementation of the subject. All the skills of the design process, which are to investigate, design, make, evaluate and communicate, are equally important (Department of Basic Education, 2011a). The interviews revealed that the teachers put more emphasis on the 'make' part of the design process which is the making of the product and this compromised effective implementation. Putting an emphasis on the product poses a challenge because it focuses on the end product and neglected the learning and thinking process that the learners engage in during the designing of the product (Jones & Moreland, 2003).

In Technology the aspects of the design process are assessed formally through a task called a Mini Practical Assessment task - PAT. As described earlier in chapter 2, a Mini PAT is a short practical assessment task which makes up the main formal assessment of a learner's skills and knowledge application during each term (Department of Basic Education, 2011a). The emphasis on the end product also has an adverse effect on the administering of this Mini PAT. Teachers mentioned in the interviews that they allowed the learners to do this task at home without teacher supervision. One teacher revealed that allowing learners to do the Mini PAT at home was because of the unavailability of resources, while another teacher admitted to administering the Mini PAT after school hours when half the learners had gone home. It was then clear that for these teachers the Mini PAT was not done under suitable and formal conditions as prescribed in CAPS and this can be said to have compromised the quality of this assessment. Assessment is part of teaching and learning and it must be properly monitored and done to ensure effective implementation in Technology.

During the interview the teachers put more emphasis on the vocational aspect of Technology. Extra lessons on welding and carpentry were provided for learners in one of the schools. In one school the teacher was working on ways to provide learners with vocational skills like laying floor and wall tiles. It is clear that the teachers placed an emphasis on preparing learners for a certain trade, craft or job. It was clear that the teachers think that Technology as a subject lacks the vocational skills required in the workplace. This emphasis on vocational training strongly influenced how the teachers approached teaching in the classroom. It presents a challenge for the subject because it neglects the other aspects of the subject, it also deviates teachers from implementing the curriculum as stipulated in policy. The intention of the Grade 9 Technology curriculum is to introduce the basics needed in different fields like Civil, Mechanical, Electrical Technology, Engineering Graphics and Design (Department of Basic Education, 2011a). This implies that teachers must expose learners to all the basic aspects of the subject, not just the practical aspect. If teachers do not incorporate both the theory and the practical part of the subject when teaching in the classroom, effective implementation is compromised.

The teachers revealed their concern during the interviews about the low status of Technology when compared to other subjects within the school curriculum. All the participating teachers revealed that this low status had far-reaching effects on the curriculum implementation in their schools. Teachers mentioned that Technology was treated as a filler subject and that it was given to any teacher within the school. One teacher mentioned that because of the lower status of the subject he could not order textbooks at his school because funds were allocated to other subjects in the FET phase which are deemed to be more important. Another teacher revealed that if Technology was managed under the Science Department at her school she would receive resources. She also indicated that an order for Technology textbooks was cancelled by the SMT without consultation. The teachers mentioned that the lower status of Technology led to poor distribution of resources and exclusion of Technology teachers in curriculum decisions in all the schools. The School Management Teams (SMT) at these schools are not prioritising Technology. All teachers are negatively affected by the lower status of Technology. Paetcher (1993) contends that teachers of low subjects often find it very difficult to have their voices heard in the wider curriculum and management decisions. To ensure effective

implementation Technology needs to take its rightful place as a subject in the curriculum at these schools.

The lack of Technology subjects or continuation of Technology to Grades 10-12 in their schools was mentioned as a major concern by all teachers. In Grade 9 learners are supposed to make choices on Technology subjects they will study from Grade 10-12 which will impact on their career paths in future. For all schools the teachers felt that their learners did not have an option of choosing subjects that will lead them to Technology careers because their schools do not have Technology subjects in the FET phase. The progression of Technology both to the FET phase and tertiary level was not clear for the teachers. All three teachers indicated that this was a major demotivating factor which impacted negatively on the implementation in the classroom. Technology seems to be a dead end subject in Grade 9. One teacher in particular revealed that the subject combination in schools did not favour the learners to choose Technology subjects. The teacher shared that Technology subjects were paired with pure Mathematics which, according to the teachers, are too difficult for practically inclined learners. All Technology subjects will not allow a learner to gain entry at a University as per the findings of the study which is seen as undermining Technology as a subject. In one school Technology subjects have been discontinued due to learners opting for academic subjects and a drop in the Technology subjects enrolment. Teachers want their Technology learners to also gain entry to degree qualifications at Universities.

5.2.2 Why do teachers implement the Grade 9 Technology curriculum the way they do in secondary schools?

The teachers indicated that their subject specialisations had a huge impact on the implementation of Technology in all three schools. The teacher who came from an Art background highlighted that he enjoyed graphic communication in Technology because of the drawings, shading and colouring which are skills related to Arts. Another teacher conceded that teaching packaging and processing content in Technology was easier because of her Consumer Studies knowledge. The third teacher also stated that his knowledge of metalwork, woodwork and electronics gave him practical experience and assisted him to understand Technology. This

discussion paints a compelling picture of the impact of teacher subject background. Clearly, because all the teachers already knew some Technology topics from their background subjects it was easier for them to teach some Technology content and this had a positive effect on curriculum implementation.

The teachers admitted that they relied on their experience to teach Technology in the classroom. In the results presented by the interviews, one of the teachers who has never been formally trained in Technology relied heavily on his experience. The teacher experiences ranged from being a workshop teacher, a handy man to a Consumer Studies teacher. Rodrigues and McKay (2010), however, argue that teaching experience does not guarantee that the teacher will be an expert in a particular subject. While teacher experience facilitated curriculum implementation in this study, it was also apparent that these teachers needed to develop extensive knowledge related to the nature of Technology, technological practice and general technological pedagogical knowledge (Jones, 2002).

The lack of training and professional development was an area of concern for all the teachers in this study. It appeared from the interviews that teachers were appreciative of the trainings provided by the Department of Education officials, but they were not efficient as they mostly focused on theory and orientation on policy. Instead, the teachers expressed their urgent need for hands-on practical training workshops that would equip them with practical skills so that they could effectively implement the curriculum in their classrooms. The teachers mentioned that they wanted to be involved in workshops where they could cut paper, put things together, do practicals in woodwork, metalwork and drawings, and be exposed to processing of materials. It was clear that training offered to Technology teachers have very little positive influence on teaching and learning in the classroom and this impacted negatively on the implementation of the subject. Even after training it was observed that teachers still lacked adequate capacity to administer the practical aspect and were therefore unable to assist their learners with practical work in Technology. Fullan (1992) asserts that insufficient training and support for teachers may lead to them becoming frustrated about implementing the new curriculum.

Inadequate support from the SMT was one of the concerns expressed by teachers. Two teachers revealed that their HODs did not possess sufficient Technology content knowledge to assist and support them to effectively implement the curriculum. It was revealed during interviews that the SMT in all schools could not provide the teachers with resources and tools to effectively implement the curriculum. In order to improve teaching and learning in the Technology classroom teachers need to be supported.

The teachers indicated that collaboration and communication with other teachers was not sufficient. Teachers mentioned the need for working with other teachers who have been formally trained, partnering with well-resourced schools, conducting training workshops on the practical aspect for neighbouring schools and forming clusters within the circuits. The teachers felt that it was important for them to share with other teachers their resources, strategies and skills that they use in the classroom in order to effectively implement the Technology curriculum. I also learned that one teacher was, however, able to partner and work with the Science teacher within the school and he mentioned that this partnering was beneficial for him and assisted him to effectively teach some content in the classroom. Ornstein and Hunkins (2012) are of the view that communication among peers needs to be ensured and encouraged and for successful implementation people should be brought together to discuss new curricula because feedback from teachers is essential to the curriculum process. The lack of communication and teacher involvement during curriculum development is an issue that was raised by the teachers who participated in this study.

5.3 Implications and recommendations

The findings of this study suggest that the factors that negatively impact or hinder the Grade 9 Technology curriculum implementation can be overcome if a concerted effort is made by the relevant stakeholders. The study has implications not only for the rural or township schools (schools that are often under-resourced), but for urban schools (schools that are usually better resourced) as well. The implications of this study involve various stakeholders, such as the government (Department of Basic Education), curriculum developers, officials of the Department of Education at district

levels (subject advisors), Technology teachers, the school (management and other teachers), and perhaps learners. The study therefore recommends the following:

- ➤ The subject advisors need to find strategies to identify the teachers' content knowledge gaps so that they will be able to design and provide training that targets the needs and concerns of the teachers. The teachers in this study clearly wanted professional development in a specific area of Technology which is practical skills. The officials need to have the resources to engage Technology teachers in practical situations and possess expertise in content knowledge in order to assist teachers. Teacher training workshops must be based on the teachers' needs in order to positively influence curriculum implementation in the Technology classroom. Other areas that the training could address are:
  - ▪ Teachers must be assisted on how to incorporate other skills of the design process as they help their learners to develop solutions in Technology instead of mainly focusing on the making of the product.
  - ▪ Giving teachers strategies, methods and support on how to address the language barrier challenge in their classrooms and thus facilitate effective curriculum implementation in Technology.
- ➤ If Technology as a subject is supposed to produce learners who are innovative, creative and critical thinkers as envisaged in CAPS, the Department of Basic Education needs to provide schools with resources, tools and equipment that are required to implement the curriculum in Technology. It is time for the curriculum developers to consider the practical nature of the subject and the demands of the curriculum entrusted to Technology teachers by providing the necessary support to schools. Schools that have Technology in the curriculum should be provided with a designated Technology room/workshop so that teachers can effectively assist learners to do practical work and store their resources and finished products. The unavailability of resources is a crippling factor to effective curriculum implementation.

- ➤ School Management Teams need to create time and provide platforms for teachers to work collaboratively at school level. This can be done by adapting

their timetables so that teachers can find time to share knowledge, ideas and experiences, ask questions, try out new strategies and discuss challenges they encounter during the implementation of the Technology curriculum. Officials of the Department of Education can co-ordinate and assist the teachers to form clusters so that they can network and share ideas with teachers from neighbouring schools.

➤ School Management Teams, in particular HODs that are in charge of Technology, need to be capacitated on content knowledge by the Department of Education officials so that they will be able to promote and enhance a high standard of teaching by teachers that they supervise. HODs need to ensure that Technology is prioritised as a subject by providing teachers with resources and tools required to effectively deliver the curriculum.

➤ The Department of Basic Education has addressed the concerns expressed by many stakeholders (including the teachers in this study) about the role of Technical subjects and the compulsory pairing of pure Mathematics and Physics with Technology by revising and amending policy. New Technology subjects have now been included in the curriculum, that is Technical Mathematics and Technical Sciences, to promote improved access to vocational career paths and these will be implemented from 2016 to 2018 as stated in Circular S7 of 2015 by the Department of Basic Education. While this concern has been addressed, the Department of Education at district level needs to ensure that qualified teachers are appointed and available in schools for the smooth implementation at the beginning of 2016.

➤ Technology teachers in schools without Technology subjects in the FET Phase must be supported by curriculum specialists from the Districts so that they will understand their role and be able to facilitate the transition and progression of Grade 9 learners to the FET phase right through to tertiary level.

➤ The Department of Basic Education needs to include Technology subjects in the FET phase and they need to count for admission to universities like other

academic subjects so that the status of the Technology in Grade 9 will be raised and the Grade 9 learners will be encouraged to choose and follow Technology career paths.

5.4 Limitations and recommendations for future research

Limitations of the study are pointed out in this section in order to direct future research in the field of Technology. The following suggestions are some potential areas for future research which can contribute to the already existing research in Technology.

> ➢ This was a small scale study which only focused on three teachers in three schools within the Umlazi District. Like other qualitative studies it cannot be generalised to other contexts, however, this did not affect the quality of my findings. In future this study could be applied to a new content and new location. It could be extended to other districts and the number of schools could be increased. I believe this will provide even more understanding on the factors that influence curriculum implementation in the subject.

> ➢ When planning for this study, the intention was to also involve at least one school that offered Technology subjects in the FET phase, however, it was discovered during the course of the study that the identified school had recently discontinued Mechanical Technology. A comprehensive study similar to this one could be conducted in schools that have Technology subjects in the FET or in Technical schools to examine the influence that these have on the effective curriculum implementation in Grade 9 Technology.

5.5 Lesson learnt from this study

Conducting this research provided me with an opportunity to learn and gain good insight about my topic of interest which is the implementation of the Technology curriculum. Understanding different views from teachers was beneficial. Lessons learnt were both personal and academic. Conducting this study was a rewarding learning experience as it provided an opportunity for me to fully understand how a successful study should be conducted by seeking consent from participants and schools, and collecting and analysing data. The little knowledge of research methods

that I had was vastly improved. I have also gained vast knowledge about the Technology field and curriculum implementation because of the extensive reading I engaged in. It was tedious but worthwhile.

I was very sceptical and uncomfortable about approaching the teachers to participate in this research but I was pleasantly surprised by their willingness to assist me. I initially had a teacher who agreed to take part in the study but withdrew later because of personal reasons. As a result, instead of four participants I ended up with three. Through communicating with other fellow students I was reminded that this was not personal; it was just the nature of research. Participants could withdraw if they wished to do so.

Seeking consent from schools took much longer than I had expected. My appointments with the school principals were cancelled many times which delayed the process. I had to exercise patience until I was able to meet with all of them and ask for permission to conduct research in their schools which was granted immediately.

5.6 Conclusion

The aim of this study was to explore the factors that influence the Grade 9 Technology curriculum implementation and how teachers are influenced by these factors in their implementation of the curriculum. The factors identified in this study were teachers' positive attitude towards the subject; unavailability of resources and tools to effectively implement the curriculum; teacher emphasis on the end product; teacher emphasis on the vocational aspect of the subject; lack of continuation of Technology to FET phase right through to tertiary and lack of clear Technology career paths for learners; lower status of Technology within the curriculum, language barrier in learners, teacher content gaps and learner difficulties in grasping some Technology content. The following factors seemed to provide reasons why teachers implemented the Technology curriculum the way they do in Grade 9: teacher subject background and teacher experience, lack of teacher training and professional development, need for collaboration and communication, and lack of support at school level.

The study managed to reveal a number of factors which may influence curriculum implementation in Technology. Understanding these factors can assist schools to implement Technology in a manner that will positively influence teaching and learning in the classroom. The study revealed that the teachers value Technology as a subject in the curriculum, are aware of the Technology curriculum and, most importantly, are attempting to implement it. Although the teachers are implementing the curriculum, only a few factors seem to facilitate effective implementation. Teachers are overwhelmed by a large number of factors that are a hindrance to effective curriculum implementation in Technology. This study therefore managed to highlight not only the factors that influence teachers' implementation of the curriculum, but also the approaches that can be used effectively by teachers in order to ensure competent Technology curriculum implementation. Irrespective of the context, curriculum implementation is a complex process which largely depends on competent continuous support to be provided to teachers for teaching and learning to be meaningful for learners.

References

Adams, J. (2002). *Technology as a new learning area in the South African school curriculum: a critical reflection.* Stellenbosch: Stellenbosch University

Altrichter, H. (2005). Curriculum implementation–limiting and facilitating factors. *Context based learning of science*, 35-62.

Ankiewicz, P. (2003). Technology education at school: Illusion or reality. *Unpublished professorial inaugural lecture at the Rand Afrikaans University, Johannesburg. Ankiewicz, PJ*, 76-81

Ankiewicz, P., Adam, F., De Swardt, A., & Gross, E. (2001). The facilitation of critical thinking in a Technology education classroom. *Acta Academica-University of the Orange Free State, 33*(3), 188-206.

Banks, F. (2000) Teaching design and technology. In G. Owen-Jackson (Ed.), *Learning to teach design and technology in the secondary school. A companion to school experience* (pp.151-168). London: Routledge Falmer.

Barnes, R. (2005). Moving towards technology education: Factors that facilitated teachers' implementation of a technology curriculum. *Journal of Technology Education, 17*(1), 6.

Bitan-Friedlander, N., Dreyfus, A., & Milgrom, Z. (2004). Types of "teachers in training": the reactions of primary school science teachers when confronted with the task of implementing an innovation. *Teaching & Teacher Education, 20*(6), 607-619.

Bondy, A. (2007). The intended and interpreted technology curriculum in four New Zealand secondary schools: does this all mean the same?: a thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Education, Massey University.

Booysen, C., & Du Plessis, E. (2008). *The educator as learning programme developer.* Van Schaik.

Bufalino, B. (2013). Curriculum and teacher identity: tangled vines. *Leadership in Focus, (30)*, 10-13.

Carl, A. E. (2009). *Teacher empowerment through curriculum development: Theory into practice.* Juta and Company Ltd.

Carless, D. (2004). Issues in teachers' reinterpretation of a task-based innovation in primary schools. *Tesol Quarterly, 38*(4), 639-662.

Chapman, G. A. (2002). *Design analysis of the Grade 9 technology curriculum in South Africa.*

Cohen, L., Manion, L., & Morrison, K. (2011). Research Methods in Education. London & New York: Routledge.

Creswell, J. W. (2012). *Qualitative inquiry and research design: Choosing among five approaches.* USA: Sage publications.

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory into practice, 39*(3), 124-130.

Davis, E. (2011). *Teachers' experiences in the implementation of Technology Education curriculum in one Secondary School in the St George East District in Trinidad.* (Masters, University of the West Indies)

De Jager, R. (2011a). *Latest changes in the Technology Education curriculum in South Africa.* Paper presented at the Conference Proceedings of PATT 25: CRIPT.

Department of Basic Education. (2010). Guidelines for Inclusive Teaching and Learning, Education white paper 6.

Department of Basic Education. (2011a). Curriculum and Assessment Policy Statement (CAPS) Technology Grades 7-9.

Department of Basic Education. (2011b). Curriculum Assessment Policy statement (CAPS) Mechanical Technology Grades 10-12.

Department of Basic Education. (2013). Siyavula workbook, Technology grade 9.

de Vries, M. (2009). The developing field of technology education: An introduction. *International handbook of research and development in technology education*, 1-9.

Durlak, J. A., & DuPre, E. P. (2008). Implementation matters: A review of research on the influence of implementation on program outcomes and the factors affecting implementation. *American journal of community psychology, 41*(3-4), 327-350.

Engelbrecht, W., Ankiewicz, P., & De Swardt, E. (2007). An industry-sponsored, school-focused model for continuing professional development of technology teachers. *South African Journal of Education*, *27*(4), 579-596.

Finger, G., & Houguet, B. (2009). Insights into the intrinsic and extrinsic challenges for implementing technology education: Case studies of Queensland teachers. *International Journal of Technology and Design Education*, *19*(3), 309-334.

Fleer, M. (2000). Working technologically: Investigations into how young children design and make during technology education. *International Journal of Technology and Design Education, 10*(1), 43-59.

Flowers, J. (2001). The value of humor in technology education. *The Technology Teacher*, *60*(8), 10-13.

Fossey, E., Harvey, C., McDermott, F., & Davidson, L. (2002). Understanding and evaluating qualitative research. *Australian and New Zealand Journal of Psychiatry, 36*(6), 717-732.

Fullan, M. (1992). *Successful school improvement: The implementation perspective and beyond*. McGraw-Hill Education (UK).

Fullan, M. (1983). Evaluating program implementation: What can be learned from follow through? *Curriculum Inquiry*, *13*(2), 215-227.

Fullan, M. (1992a). *Successful school improvement: The implementation perspective and beyond*. McGraw-Hill Education (UK).

Fullan, M. (1992b). Causes/processes of implementation and continuation. *Managing change in education: Individual and organizational perspectives*, 109-131.

Fullan, M. (2007). *The new meaning of educational* change. New York: Routledge.

Fullan, M., & Stiegelbauer, S. (1991). *The new meaning of educational change with S. Stiegelbauer.* New York: Teachers College Press.

Gaotlhobogwe, M. (2012). The Impact of Lack of Resources on Declining Students' Enrolments in Design and Technology in Botswana Junior Secondary Schools. *Design and Technology Education: an International Journal*, *17*(1).

Govender, V. G., (2013). A survey of selected schools on the 2012 grade 9 Mathematics ANA results: Implications for teaching and learning.

Grumet, M. (2014). Imago, Imago, Imago. *Journal of the Canadian Association for Curriculum Studies*, *12*(1), 82-89.

Grumet, M. R. (2012). Restitution and Reconstruction of Educational Experience: An Autobiographical Method for Curriculum Theory. *Rethinking Curriculum Studies*, *20*, 115.

Guest, G., MacQueen, K. M., & Namey, E. E. (2011). *Applied thematic analysis*. Los Angeles: Sage.

Hall, G. E., & Hord, S. M. (1987). *Change in schools: Facilitating the process*. New York: Suny Press.

Hall, G. E., & Hord, S. M. (2001). Implementing change: Patterns, principles, and potholes. Needham heights: Allyn and Bacon.

Hall, G. E., & Hord, S. M. (2006). Implementing change: Patterns, principles, and potholes. Boston: Allyn and Bacon.

Hatch, J. A. (2002). *Doing qualitative research in education settings*. Albany: Sunny Press.

Hadwen, K. (2013). Rethinking Curriculum, Rethinking Practice. In *Portals of Promise* (pp. 141-153). Sense Publishers.

Heymans, J. H. (2004). *The Implementation of Technology Education in Secondary Schools in the Free State Province (urban Areas).* Central University of Technology, Free State.

Hill, A. M., & Anning, A. (2001). Comparisons and Contrasts Between Elementary/ 'Primary School Situated Design' and 'Workplace Design' in Canada and England. *International Journal of Technology and Design Education*, *11*(2), 111-136.

Hunkins, F., & Ornstein, A. C. (2012). Curriculum foundations, principles, and theory. Boston: Pearson.

Heymans, J. H. (2007). The implementation of technology education in secondary schools in the urban areas of the Free State Province. Interim: *Interdisciplinary Journal,* 6(1), 37-45.

Hoepfl, M. (2001). Alternative Routes to Certification of Technology Education Teachers. *Journal of Technology Studies*, *27*(2), 74-83.

Ismail, S. A. (2014). Factors affecting the implementation of information literacy education in Malaysian primary schools. Malaysia: Victoria University of Wellington.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational researcher*, *33*(7), 14-26.

Jones, A. (2002). 9 Teachers' Subject Subcultures and Curriculum Innovation: The Example of Technology Education. *Researching Teaching: Methodologies and Practices for Understanding Pedagogy*, 155.

Jones, A., Buntting, C., & de Vries, M. J. (2013). The developing field of technology education: A review to look forward. *International Journal of Technology and Design Education*, *23*(2), 191-212.

Jones, A., Harlow, A., & Cowie, B. (2004). New Zealand teachers' experiences in implementing the technology curriculum. *International Journal of Technology and Design Education*, *14*(2), 101-119.

Jones, A., & Moreland, J. (2003). Considering pedagogical content knowledge in the context of research on teaching: An example from technology. *International Journal of Technology and Design Education*, 14(2), 121-140.

Jones, A., & Moreland, J. (2004). Enhancing practicing primary school teachers' pedagogical content knowledge in technology. *International Journal of Technology and Design Education*, *14*(2), 121-140.

Jones, E. (2013). First Year Teachers' Technology Use: Perceptions of Factors Affecting Technology Integration. University of Kansas.

Kahn, M., Mphahlele, K., Volmink, J., Graube, G., Gyrenfurth, M., & Theurkauf, W. (2003). Modernizing the curriculum–The politics of technology education in South Africa. *Technology Education: International Concepts and Perspectives. Frankfurt: Peter Lang*, 253-261.

Kelly, A. (2004). *The intellectual capital of schools: Measuring and managing knowledge, responsibility and reward: Lessons from the commercial sector*. Springer Science & Business Media.

Kelly, A. V. (2009). *The curriculum: Theory and practice*. London: Sage.

Kennedy, M. M. (2005). *Inside teaching*. London: Harvard University Press.

Kentli, F. D. (2009). Comparison of hidden curriculum theories. *European Journal of Educational Studies*, *1*(2), 83 -88.

Lewis, T. (2006). Creativity: A framework for the design/problem solving discourse in technology education. *Journal of technology education*, *17*(1), 36.

Maree, K. (2007). *First steps in research*. Pretoria: Van Schaik Publishers.

Margolis, E. (2001). *The hidden curriculum in higher education*. Psychology Press.

Marsh, C. J. (2009). Key concepts for understanding curriculum. London: Routledge.

Marsh, C. & Willis, G. (2007). Curriculum: Alternative approaches, ongoing issues. Englewood Cliffs, N. J.: Merrill.

Mawson, B. (2003). Beyond The Design Process': An alternative pedagogy for technology education. *International Journal of Technology and Design Education, 13*(2), 117-128.

McMillan, J. H., & Schumacher, S. (2014). *Research in education: Evidence-based inquiry*. USA: Pearson Higher Ed.

Mkandawire, S. B. (2010). Impediments to curriculum implementation in learning institutions. *African Higher Education Review*, *8*(2).

Moreland, J., & Jones, A. (2000). Emerging assessment practices in an emergent curriculum: Implications for technology. *International Journal of Technology and Design Education*, *10*(3), 283-305.

Moreland, J., Jones, A., & Northover, A. (2001). Enhancing teachers' technological knowledge and assessment practices to enhance student learning in technology: A two-year classroom study. *Research in Science Education*, *31*(1), 155-176.

Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2008). Verification strategies for establishing reliability and validity in qualitative research. *International Journal of Qualitative Methods, 1*(2), 13-22.

Motshekga, A. (2010). Curriculum News. Improving the quality of learning and teaching. *Basic education*.

Motshekga, A. (2011). Statement by the Minister of Basic Education, Mrs Angie Motshekga, MP, on the progress of the review of National Curriculum Statement. *Retrieved on*, *17* August 2011.

Motshekga, A. (2011). *Curriculum News. Improving the quality of learning and teaching, strengthening curriculum implementation from 2010 and beyond*, 3. Pretoria: Department of Basic Education.

Msibi, T., & Mchunu, S. (2013). The knot of curriculum and teacher professionalism in post-apartheid South Africa. *Education As Change*, *17*(1), 19-35.

Naidoo, N. (2013). *An Exploration into Grade Seven Teacher Assessment Practices in Technology Education within the Pinetown District* (Doctoral dissertation, University of KwaZulu-Natal, Durban).

Neuman, W. L., (2000). *Social research methods: qualitative and quantitative approaches.* (4th edition) Boston: Allyn & Bacon.

Ntshaba, L. P. (2012). *Study of technology education instructional practices in grade nine classrooms a case study of three senior secondary schools in the King Williams Town district* (Doctoral dissertation, University of Fort Hare)

Orafi, S. M. S. (2008). *Investigating teacher's practices and beliefs in relation to curriculum innovation in english language teaching in lybia.* The University of Leeds.

Onwuegbuzie, A. J., & Collins, K. M. (2007). A typology of mixed methods sampling designs in Social Science research. *Qualitative Report, 12*(2), 281-316.

Onwuegbuzie, A. J., & Leech, N. L. (2005). On becoming a pragmatic researcher: The importance of combining quantitative and qualitative research methodologies. *International Journal of Social Research Methodology, 8*(5), 375-387.

Overbaugh, R., & Lu, R. (2008). The impact of a federally funded grant on a professional development program: Teachers' stages of concern toward technology integration. *Journal of computing in Teacher Education*, *25*(2), 45-55.

Park, M., & Sung, Y.-K. (2013). Teachers' perceptions of the recent curriculum reforms and their implementation: what can we learn from the case of Korean elementary teachers? *Asia Pacific Journal of Education, 33*(1), 15-33.

Patton, M. Q. (2005). *Qualitative research*. USA: John Wiley & Sons.

Pinar, W. F. (2011). *The character of curriculum studies: Bildung, currere, and the recurring question of the subject.* Palgrave Macmillan.

Pinar, W. F. (2012). *What is curriculum theory?* New York: Routledge.

Pinar, W. (2014). *Curriculum: Toward new identities.* New York: Routledge.

Pool, J., Reitsma, G., & Mentz, E. (2013). An evaluation of Technology teacher training in South Africa: shortcomings and recommendations. *International Journal of Technology and Design Education*, *23*(2), 455-472.

Potgieter, C. (2004). The impact of the implementation of technology education on in-service teacher education in South Africa (impact of technology education in the RSA). *International Journal of Technology and Design Education, 14*(3), 205-218.

Pudi, T. I. (2009). *Teacher attitudes towards the implementation of the learning area technology* (Doctoral dissertation).

Patton, M. Q. (2005). *Qualitative research.* USA: John Wiley & Sons.

Ramatlapana, K., & Makonye, J. P. (2012). From too much freedom to too much restriction: The case of teacher autonomy from National Curriculum Statement (NCS) to Curriculum and Assessment Statement (CAPS). *Africa Education Review*, *9*(sup1), S7-S25.

Rasinen, A. (2003). An analysis of the technology education curriculum of six countries.

Rauscher, W. (2011). The technological knowledge used by technology education students in capability tasks. *International Journal of Technology and Design Education, 21*(3), 291-305.

Reid, M. S. (2000). Toward effective technology education in New Zealand. *Journal of Technology Education*, 11(2), 33-48

Rennie, L. J. (2001). Teacher collaboration in curriculum change: The implementation of technology education in the primary school. *Research in Science Education, 31*(1), 49-69.

Richardson, V. (2003). Preservice teachers' beliefs. *Teacher beliefs and classroom performance: The impact of teacher education, 6*, 1-22.

Roach, A. T., Kratochwill, T. R., & Frank, J. L. (2009). School-based consultants as change facilitators: Adaptation of the concerns-based adoption model (CBAM) to support the implementation of research-based practices. *Journal of Educational and Psychological Consultation*, *19*(4), 300-320.

Robson, C. (2007). *How to do a research project: a guide for undergraduate students*. London: Blackwell.

Rolfe, G. (2006). Validity, trustworthiness and rigour: quality and the idea of qualitative research. *Journal of Advanced Nursing, 53*(3), 304-310.

Rodríguez, A. G., & McKay, S. (2010). Professional Development for Experienced Teachers Working with Adult English Language Learners. CAELA Network Brief. *Center for Adult English Language Acquisition.*

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information, 22*(2), 63-75.

Siskin, L. S. (2001). Subject divisions. *Sociology of Education: Major Themes*, *1*, 1420.

Smith, L. K., & Southerland, S. A. (2007). Reforming practice or modifying reforms? : Elementary teachers' response to the tools of reform. *Journal of Research in science Teaching*, *44*(3), 396-423.

Spillane, J. P., Reiser, B. J., & Reimer, T. (2002). Policy implementation and cognition: Reframing and refocusing implementation research. *Review of Educational Research, 72*(3), 387-431.

Stevens, A. (2006). Technology teacher education in South Africa. *International handbook of technology education. Rotterdam: Sense Publishers*.

Struwig, M., Struwig, F., & Stead, G. (2001). *Planning, reporting & designing research*. Cape Town: Pearson.

Pudi, T. I. (2009). *Teacher attitudes towards the implementation of the learning area technology* (Doctoral dissertation).

van As, F., & Grobler, B. Teacher perspectives on the implementation of the National Curriculum Statement (NCS) in Technology.

Vanderlinde, R., van Braak, J. & Hermans, R. (2009). Educational technology on a turning point.

Van den Akker, J., de Boer, W., Folmer, E., Kuiper, W., Letschert, J., Nieveen, N., & Thijs, A. (2009). Curriculum in development. *Enschede: Netherlands Institute for Curriculum Development.*

Vanderlinde, R., van Braak, J. & Hermans, R. (2009). Educational technology on a turning point.

Van den Akker, J., de Boer, W., Folmer, E., Kuiper, W., Letschert, J., Nieveen, N., & Thijs, A. (2009). Curriculum in development. *Enschede: Netherlands Institute for Curriculum Development.*

Walliman, N. (2001). Doing your research project. London: Sage.

Wang, W. (2006). Exploring teachers' beliefs and practice in the implementation of a new English Language curriculum in China: Case studies. In *Asia-Pacific Educational Research Association Conference, Hong Kong.*

Weimer, M. (2007). Intriguing connections but not with the past. *International Journal for Academic Development, 12*(1), 5-8.

Williams, P. J. (2000). Design: The only methodology of technology?. Journal of Technology Education, 11(2), 48-60.

Yan, C. (2012). 'We can only change in a small way': A study of secondary English teachers' implementation of curriculum reform in China. *Journal of Educational Change, 13*(4), 431-447.

Yin, R.K. (2011). *Applications of case study research.* London: Sage.

Yin, R. K. (2014). *Case study research: Design and methods.* London: Sage publications.

Ziqubu, T. S. L. (2010). *A case study of the constraints to the effective teaching of technology in grade 7 experienced by schools of a district in KwaZulu-Natal* (Doctoral dissertation).

Appendix A

education

Department:
Education
PROVINCE OF KWAZULU-NATAL

Ms ZS Mbongwe
15 Lilyvale Street
1 Strelitzia Gardens
PINETOWN
3610

Dear Ms Mbongwe

PERMISSION TO CONDUCT RESEARCH IN THE KZN DoE INSTITUTIONS

Your application to conduct research entitled: **"EXPLORING FACTORS THAT INFLUENCE HOW TEACHERS IMPLEMENT THE TECHNOLOGY CURRICULUM IN GRADE 9: A CASE OF THREE SECONDARY SCHOOLS AT UMLAZI DISTRICT",** in the KwaZulu-Natal Department of Education Institutions has been approved. The conditions of the approval are as follows:

1. The researcher will make all the arrangements concerning the research and interviews.
2. The researcher must ensure that Educator and learning programmes are not interrupted.
3. Interviews are not conducted during the time of writing examinations in schools.
4. Learners, Educators, Schools and Institutions are not identifiable in any way from the results of the research.
5. A copy of this letter is submitted to District Managers, Principals and Heads of Institutions where the intended research and interviews are to be conducted.
6. The period of investigation is limited to the period from 15 October 2015 to 31 October 2016.
7. Your research and interviews will be limited to the schools you have proposed and approved by the Head of Department. Please note that Principals, Educators, Departmental Officials and Learners are under no obligation to participate or assist you in your investigation.
8. Should you wish to extend the period of your survey at the school(s), please contact Miss Connie Kehologile at the contact numbers below.
9. Upon completion of the research, a brief summary of the findings, recommendations or a full report / dissertation / thesis must be submitted to the research office of the Department. Please address it to The Office of the HOD, Private Bag X9137, Pietermaritzburg, 3200.
10. Please note that your research and interviews will be limited to schools and institutions in KwaZulu-Natal Department of Education.

UMlazi District

Nkosinathi S.P. Sishi, PhD
Head of Department: Education
Date: 13 October 2015

KWAZULU-NATAL DEPARTMENT OF EDUCATION

Appendix B

UNIVERSITY OF ™
KWAZULU-NATAL

INYUVESI
YAKWAZULU-NATALI

03 November 2015

Ms Zamabongwe S Mbongwe 982207108
School of Education
Edgewood Campus

Dear Ms Mbongwe

Protocol reference number: HSS/1262/015M
Project title: Exploring factors that influence how teachers implement the Technology curriculum in grade 9: A
case of three secondary schools at Umlazi district
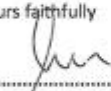
Expedited Approval

In response to your application dated 08 September 2015, the Humanities & Social Sciences Research Ethics
Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent
Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved
through the amendment/modification prior to its implementation. In case you have further queries, please quote
the above reference number. Please note: Research data should be securely stored in the discipline/department
for a period of 5 years.

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

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

Yours faithfully

....
Dr Shenuka Singh (Chair)

/px

cc Supervisor: Nomkhozi Nzimande
cc Academic Leader Research: Professor P Morojele
cc School Administrators: Ms B Bhengu, Ms T Khumalo and Ms PW Ndimande

---

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Telephone: +27 (0) 31 260 3587/8350/4557 Facsimile: +27 (0) 31 260 4609 Email: ximbap@ukzn.ac.za / snymanm@ukzn.ac.za / mohunp@ukzn.ac.za
Website: www.ukzn.ac.za

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Appendix C

Informed permission for the research from authorities

15 Lilyvale Street
1 Strelitzia Gardens
Ashley
3610

The Principal

Dear Sir/ Madam

I am Zamabongwe Mbongwe, currently a registered MEd student at the University of KwaZulu-Natal (Edgewood campus) in South Africa. As part of my professional development, I am undertaking a research study entitled 'Exploring factors that influence how teachers implement the Technology curriculum in grade 9: a case of three Secondary schools at Umlazi District'.   I am therefore seeking permission to interview and observe two grade 9 Technology teachers from your school. The interviews will be private and will take place in a mutually agreed upon location with the teachers. The observation will be conducted through observing a teacher presenting a Technology lesson. The school and the participants will be contacted well in advance about the time and duration of the observation period so that teaching and learning at the school is not affected in any way.

The study does not seek any information about the school or about specific individuals, i.e. either colleagues, parents or learners. Its focus is to gain an in-depth understanding on the factors that influence curriculum implementation in Technology and identifying reasons why teachers implement curriculum the way they do. The study is important because the role of teachers is pivotal in curriculum implementation and understanding influential factors could reveal what impedes or fosters effective implementation.

Permission to conduct this research study has been obtained from University of KwaZulu-Natal. Should you have any questions about its legitimacy, you can contact Ms Phume Ximba of UKZN Humanities and Social Sciences Research Ethics Committee (HSSREC) at ximbap@ukzn.ac.za or call her at +27(0) 31 2603587.

Should you need further explanations or clarifications about the study, feel free to contact me or my supervisor, Nomkhosi Nzimande. Our contact details are provided below.

Your understanding and co-operation in this regard will be highly appreciated.

Zamabongwe Mbongwe

_____
Student number: 982207108
Researcher: Zamabongwe Mbongwe   Supervisor: Nomkhosi Nzimande
Email address: Zamabongwe@gmail.com   NzimandeM2@ukzn.ac.za
Tel/ Cell: 031-9188500/ 0825149522   031-2603357/ 0722473065

Informed permission from Principal

I have read and understood all the terms stipulated for the conduction of this study. I do/do not grant the researcher permission to conduct the study using teacher/s from this school.

Name:_____   Date:_____

Signature:_____

School stamp:

Appendix D

Informed consent of research participants

Dear Sir/ Madam

My name is Zamabongwe Mbongwe; I am a Curriculum MEd candidate studying at the University of KwaZulu-Natal. As part of the requirements for the degree I am required to conduct a research study. My study is entitled 'Exploring factors that influence how teachers implement the Technology curriculum in grade 9: a case of three Secondary schools at Umlazi district'. I am requesting your participation in this study.

This study aims to answer the following questions:

- What are the factors that influence the way that teachers implement the grade 9 Technology curriculum in Secondary Schools?
- How do these factors influence the teacher's implementation of the grade 9 Technology curriculum in Secondary schools?
- Why do teachers implement the grade 9 Technology curriculum the way they do in Secondary Schools?

Please note that:

- Your confidentiality is guaranteed. You will be allocated a pseudonym to ensure confidentiality
- You have a choice to participate or withdraw from the research project. You will not be penalized for taking such an action
- Any information given by you cannot be used against you, and the collected data will be used for purposes of this research only
- No harm is associated with participating in this research
- You have a right not to answer specific questions but continue as a participant
- Your involvement is purely for academic purposes only, and there are no financial benefits involved
- Interviews and classroom observations will be used as a method of collecting data in this research project
- The interviews will be private and will take place in a mutually agreed upon location
- I would like to make an audio- recording of the interview
- Data will be stored in secure storage and destroyed after 5 years

Should you have any concerns about the research, its risks or about your rights as a research participant in this study, you may contact Ms Phume Ximba of UKZN Humanities and Social Sciences Ethics Committee at ximbap@ukzn.ac.za or call her at 27 312603587.

Thank you for your co-operation.

Zamabongwe Mbongwe

_____

Contact Details:

Researcher: Zamabongwe Mbongwe   Supervisor: Nomkhosi Nzimande

Email address: Zamabongwe@gmail.com   Nzimandem2@ukzn.ac.za

031-9188500/ 0825149522   031-2603357

Informed consent of participant

I have read the information sheet and understand my participation in the study.

I understand that my name will not be used in all write-ups of this study and that the information that I will provide will be used for this research project and other appropriate research presentations. I am also aware that:

- Participation is voluntary
- The interviews will be audio-taped
- I am not forced to answer questions that make me uncomfortable and
- I am free to withdraw from the project at any time
- There is no payment for participation

I hereby consent/ do not consent to have this interview recorded.

I hereby give consent to participate in this research project.

Signature-------------------------------- Date----------------------

Appendix E

Classroom observation Schedule

A. GENERAL INFORMATION

School name---------------------------------   District---

Name of teacher------------------------------   Time/ period observed-----------------------

Number of learners---------------------------   Date of observation-------------------------

Observer Name--------------------------------

(Tick the appropriate box below)

B. SUITABILITY OF CLASSROOM/ ENVIRONMENT

	Yes	No
Is it a designated Technology room?		
Is it a normal classroom?		
Are there enough cupboards to store away resources and projects?		
Do all learners have worktables/desks for practical work?		
Is there enough space between desks for the teacher and learners to move around?		

Comments/observations………………………………………………………………………………
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C. LESSON PRESENTATION

	Yes	No
Was the lesson well introduced with questions/ discussion linking the topic with learner's previous knowledge?		
Did the teacher probes learner's prior knowledge through questions?		
Is lesson is guided by specific aims which are contained in the CAPS policy?		
Is the lesson based on a well prepared lesson plan and content that is stipulated for the grade?		
Were relevant resources and tools used to support teaching and learning?		
Does the teacher display good understanding of content being taught?		

	Yes	No
Is the teacher questioning clear and engaging to learners?		
Is the lesson well structured?(introduction, development and conclusion)		

Comments/observation……………………………………………………………………………………

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D. TEACHING METHODOLOGY

	Yes	No
Is the lesson structured using the design process, at least one aspects? (investigate, design, make, evaluate, communicate)		
Is the content that is taught applied through practical work?		
Will the content and skills taught enable learners to design and create a solution as stipulated in the CAPS policy?		
Is the teacher facilitating learners through activities and projects?		
Is collaborative/ co-operative learning encouraged?		
Does the teacher foster problem solving skills that benefit learners?		
Is teacher and learner questioning encouraged?		
Are learners with different abilities catered for through teaching different Technology skills-investigate, design, make, evaluate and evaluate?		
Is feedback provided to learners during lesson?		

Comments/observation……………………………………………………………………………………

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E. LEARNER'S ENGAGEMENT IN LEARNING

	Yes	No
Are learners allowed to contribute and ask questions?		
Do learners seem interested in the lesson?		
Are learners paying attention and following instructions?		
Is active participation by learners evident?		
Do learners appear to understand Technology content and skills being taught?		

Comments/observation………………………………………...

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F. RESOURCES, TOOLS AND MATERIALS

	Yes	No
Are all tools and materials needed for the lesson available?		
Are textbooks being used appropriately in order to support teaching and learning?		
Are materials and tools handled and stored safely?		

In the absence of resources, was the teacher innovative and creative by using easily available material?		

Comments/observation……………………………………………………………………….

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G. ASSESSMENT

	Yes	No
Is there evidence of formal assessment?		
Is there evidence of informal assessment?		
Will the given activity enable learners to do the Mini Practical Task?		
Will the assessment given cater for a range of cognitive levels? (Low, middle and higher order)		
Is assessment relevant and does it consolidate content taught?		

Comments/observation…………………………………………………………………………

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Appendix F

Semi Structured Interview Schedule

Part 1

Introduction

I would like to welcome you and thank you for participating in this interview which is part of my study which seeks to understand the factors that influence how the grade 9 Technology teachers implement the curriculum in Secondary schools.

Part 2

General

1. Are you a specialist Technology teacher?

2. How long have you been teaching Technology in grade 9?

3. Do you enjoy teaching Technology? Why/ Why not?

Content knowledge

1. Do you think you have sufficient content / subject knowledge to enable you to effectively implement technology in the classroom? Explain.

2. What are the most challenging aspects/concepts to teach in Technology? Explain if any.

3. What aspects/concepts do you enjoy teaching in Technology? Why?

Training

1. Have you been trained to teach the Technology content as contained in the grade 9 policy (CAPS)? Do you think the training was helpful? Explain.

2. How has your teacher training at tertiary assisted you to effectively teach Technology in grade 9?

Resources

1. Do you have sufficient resources and tools to teach the Technology content contained in the CAPS document?

2. How does the lack of/ availability of resources and tools in your schools affect teaching and learning during Technology lessons.

3. What role do the resources and tools play in the effective implementation of Technology?

Learning of Technology

1.   Do your learners have any difficulties in terms of learning and understanding the Technology content?

2.   What are your learner's attitudes towards Technology? Explain.

Teaching of Technology

1.   Which strategies or methods do you use to teach Technology? Are they effective in your classroom?

Curriculum changes

1.   Do you think the time stipulated in CAPS is sufficient to cover all content in Technology?

2.   Do you think you are implementing the CAPS Technology curriculum effectively in grade 9? Why/ Why not?

3.   What is your view on the new content, skills that have been added in the grade 9 curriculum? Is it age appropriate?

4.   What is your view on the inclusion of the mini PATs in each term?

Link with the FET (phase)

1.   Do you have/ teach a Technology subject in the FET phase at your school? How does this positively/ negatively affect learning and teaching of Technology in grade 9?

2.   Do other subjects that you teach or understand influence how you teach Technology to your learners?

3.   Is there a link between what you teach in Technology with any of the subjects in grade 10 (FET)? How does this affect your teaching?

4.   Do you think that Technology enjoys the same status with other subjects at your school?

Support

1.   What kind of support do you receive as a Technology teacher from your other colleagues, school management team?

Appendix G