

**University of KwaZulu-Natal**

**TECHNOLOGY TEACHERS' PERSPECTIVES ON THE TECHNOLOGY  
CURRICULUM**

**By**

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**Date submitted: July 2019**

## **DEDICATION**

**I dedicate this thesis:**

*To my loving parents*

Renuca & Rabi Janak

**You are my greatest inspiration**

## DECLARATION...

I, Raksha Janak, declare that:

1. The research reported in this thesis, except where otherwise indicated, is my original research.
2. This thesis has not been submitted for any degree or examination at any other university.
3. This thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.
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## **ABBREVIATIONS IN THE STUDY**

BETT	British Education and Training Technology
C2005	Curriculum 2005
CAPS	Curriculum and Assessment Policy Statement
CASS	Continuous Assessment
CHE	Council on Higher Education
CK	Content Knowledge
CCK	Common Content Knowledge
CPTD	Continued Professional Teacher Development
DBE	Department of Basic Education
DOE	Department of Education
EGD	Engineering Graphics and Design
FET	Further Education and Training
GET	General Education and Training
HOD	Head of Department
IBM	International Business Machines
ICT	Information and Communication Technology
IT	Information Technology
ITEA	International Technology Education Association

IWB	Interactive Whiteboard
KCS	Knowledge of Content and Students
KCT	Knowledge of Content and Teaching
KZN	KwaZulu-Natal
LTSM	Learning and Teaching Support Materials
MINI-PAT	Miniature Peer Assessment Tool
NCS	National Curriculum Statement
NDP	National Development Plan
NQF	National Qualifications Framework
OBE	Outcomes-Based Education
PAT	Practical Assessment Task
PCK	Pedagogical Content Knowledge
P.E	Physical Education
PISA	Programme for International Student Assessment
PK	Pedagogical Knowledge
PPN	Post-Provisioning Norm
RNCS	Revised National Curriculum Statement
SADTU	South African Democratic Teachers' Union
SCK	Specialised Content Knowledge
STEM	Science, Technology, Engineering and Mathematics
STEMEC	STEM Education Committee

TIMSS	Trends in International Mathematics and Science Study
TPACK	Technological Pedagogical Content Knowledge
UKZN	University of KwaZulu-Natal
UNESCO	United Nations Educational, Scientific and Cultural Organisation
Wi-Fi	Wireless Fidelity



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## **ABSTRACT**

South Africa's new democratic government adopted widespread reforms aimed at transforming the country's education system and redressing apartheid inequities. The new curriculum framework based on Outcomes Based Education (OBE) introduced nine new learning areas, including Technology. However, many challenges such as contextual constraints, unqualified teachers, inadequate training of teachers, the lack of resources and varied interpretations of the Technology curriculum were encountered during its implementation that led to several curriculum reviews. It is against this backdrop that this study explores Technology teachers' perspectives of their experiences in interpreting and implementing the Technology curriculum in the classroom.

The conceptual framework that was adopted enabled an understanding of the term perspective, the philosophical background of perspectives and the kind of knowledge that could be obtained from such. The theoretical framework comprised of Nietzsche's (1882) theory of 'perspectivism' on which this study relies heavily to understand Technology teachers' perspectives. Perspectives operate on the general notion that that they are altering all the time. Hence, Nietzsche postulates that there should be no stopping points to arrive at an understanding of a perspective. As a result of this, there were various interpretations obtained to synthesise the data obtained. Nietzsche's (1882) theory of affects in 'perspectivism' namely, coherency, legitimacy and practicality, were used in understanding the perspectives of teachers. Thus, the multiplicity of perspectives used in the study crystallised the understanding of this study. The various interpretations of the data obtained as well as the findings align with Nietzsche's proliferation of perspectives for interpretation to be correct.

A qualitative research design and an interpretive paradigm were adopted to gather rich, detailed data within the participants' real contexts. Four participants were purposefully selected from four different school contexts. A case study methodology was employed to gain insight into Technology teachers' perspectives. Data collection techniques utilised in the study included individual semi-structured interviews, a video recording of each teacher's Technology lesson, followed by a stimulated interview. The semi-structured interviews were believed to provide in-depth information as well as elicit perspectives that would have historical underpinnings of the participants. Video recording of a Technology lesson followed much later by a stimulated interview would ensure that richer data was generated for better understanding of individual teacher's perspectives on the curriculum.

The data was sorted using thematic analysis. In the data analysis chapters, nine themes were constructed and analysed with the literature and understood using the conceptual and theoretical framework to assist with the ontology. The main finding in this study is that the Technology curriculum is not only widening the gap between the privileged and underprivileged schools, but is implicated in the reproduction of inequalities in South Africa. The findings reveal that South Africa's education system as a whole is plagued by several challenges confronting the teaching of the Technology curriculum, which include the disruption of university preparation of Technology teachers due to constant curriculum changes and the constraints of a rigid curriculum which leave little room for flexibility. Learners' use of technological devices is disapproved, a universal Technology curriculum for a diversity of school contexts is set and teacher beliefs and Technology curriculum pedagogy are not synchronised. The Technology curriculum is viewed as unfair in terms of its expectations in poorly resourced schools. Assessment was found to be unrealistic, impractical and irrelevant in the Technology curriculum.

Furthermore, the Technology curriculum revealed how learners from underprivileged schools lacked cultural capital which hinders them from competing at a global level, creating even further inequalities. Based on these findings, it is recommended that the Department of Education (DoE) keeps Technology teachers up-to-date about curriculum matters and supports teachers during implementation and ensures that the sharing of resource on wheels be implemented so all schools have access to some resources. It is also recommended that Technology teachers should be part of the curriculum design process and that perhaps schools can be used as centres to keep parents of the community up-to-date with technological developments.

**Key Words: Technology, Technology curriculum, Perspective**

# CHAPTER ONE

## ORIENTATION TO THE STUDY

### Introduction

Technology has increased the intensity and complexity of the lives of literate people in their environments. Unlike the past when the three Rs (Reading wRiting and aRithmetic) were rudimentary precursors for a successful career, in the Twenty-First Century, a literate person requires a wider range of abilities and competencies in order to thrive in a rapidly evolving, technology-mediated world (Tan, Choo, Kang & Liem, 2017). The wider range encompasses the ability to use online platforms for everyday transactions, for example, from banking, paying accounts, buying goods, communicating via social media applications (Facebook, Twitter, Instagram, and WhatsApp) to the use of electronic and remote devices for home and vehicle security amongst a host of other uses (Tan *et al.*, 2017). Robotics research is on the rise: home appliances will be fitted with intelligent design that responds to electronic signals via computers. These are just some of the developments that require Twenty-First Century skills such as “critical thinking, problem-solving, resilience, co-operation and curiosity, which are increasingly becoming fundamental” (Schwab & Martín, 2015, p. 1). Research suggests rethinking of the education we offer to those who attend schools and also that those who teach will need to be technology smart. To inculcate Twenty-First Century skills into learners, schools have taken the responsibility to teach learners for a technology-based future, which has become an important aim in education. It is not surprising, therefore, that in recognising the importance for developing citizens in a technology-oriented world, educational policy has integrated Technology as a subject into the school curriculum (Rasinen, 2003).

However, despite the introduction of Technology to the curriculum internationally and locally, there is sufficient evidence to suggest that Technology is not making a significant impact as it should to develop technologically literate citizens who are able to think critically and solve problems (Rasinen, 2003; McLaren & Dakers, 2005; Schwab & Martín, 2015; Cloete, 2017). In a review of Science, Technology, Engineering and Mathematics (STEM) education in five

countries to find out how Technology is promoted in schools, case studies revealed that in spite of its importance, Technology is often considered the least important content discipline compared to other curriculum areas in the United States (Wright, Reeves, Williams, Morrison-Love, Patrick, Ginestié, Mammes & Graube, 2018). In Scotland, it was found that there is a risk that ‘Technology may receive less policy and funding attention than other STEM subjects because the Scottish government focuses strongly on attainment in literacy and numeracy in primary school’, and underperformance by secondary pupils in Maths and Science as evidenced in large scale studies like Trends in International Mathematics and Science Study (TIMSS) (2018) and the Programme for International Student Assessment (PISA) (2018) (*Id.*). Furthermore, Technology tends to be less important than Mathematics and Science in discussions among key STEM groups. For example, between January 2014 and January 2015, the minutes of meetings of the independent STEM Education Committee (STEMEC), set up to enhance STEM in schools, the word ‘Science’ was mentioned 208 times, whilst ‘Technology’ appeared on only four occasions (*Id.*). From the above, it appears that Technology is not equally valued when compared to other subjects in the STEM group and that the Technology and Engineering aspects often become lost or are seen as subordinate disciplines. This lack of consideration of Technology, and the emphasis on Science and Mathematics, does little to reflect the importance and the value of the inclusion of Technology in the curriculum and the role of Technology teachers’ in enhancing young people’s educational experiences. This matters because STEM education is seen as an area of concern by several nations, as STEM education policy is shaped by, and responds to, the perception that STEM knowledge and innovation drive economic growth and recovery in a post-industrial globalised world (DiCataldo & Rodríguez-Pose, 2017). The inattention to the Technology curriculum by large educational groups such as STEMEC impacts on Technology teachers as this could indicate a lack of support for Technology.

A statistical study conducted in England revealed that there is a “decrease in the number of universities offering Technology degrees” leading to a nationwide shortage of Technology teachers (Gray & Daugherty, 2004, p. 5). Technology teacher shortages since 2004 are not peculiar to England, but still exist at present in Germany. In Germany, teacher training in “Technology is necessary, but rarely practiced to any depth”, as teachers generally study only

two subjects during their training (Wright *et al.*, 2018, p. 48). The shortage of Technology teachers in England and lack of concern in German teacher colleges to prioritise Technology indicates a cause for concern since Technology teachers are crucial in imparting Twenty-First Century skills to learners. Teachers who do not receive sufficient training in Technology directly impact on skills acquisition by learners as teachers are uncertain about assessment, methodological aspects as well as preparation in implementing the Technology curriculum. In the search for evidence of the impact of Technology, which in England is referred to as Design and Technology (D&T), Wilson and Harris (2004) administered a survey questionnaire to a group of Technology teachers and found that the method of instruction used in their classrooms reflected a predominantly teacher-led problem solving one rather than a collaborative one and it did not align with the vision of the Technology curriculum of England (Wilson & Harris, 2004). Clearly, the method used in the study by Wilson and Harris (2004) lacks teachers' actual responses for using such teaching methods and does not illuminate the factors preventing such teachers from using the desired approach as stipulated in the Technology curriculum. In other words, the desire to understand Technology teachers' perspectives was not achieved.

Technology teachers in neighbouring countries like Botswana experience challenges in teaching the curriculum within their context as reflected in a study conducted by Molwane (2000) when it was discovered that there are variances in Technology teachers' assessment practices in junior secondary schools, which included subject content coverage and subject pedagogy, different interpretations by teachers of what counts as proper teaching of Technology and the appropriate assessment of student performance (p. 127). Molwane, Ruele and Mwendapole (2008) argued that Botswana's extensive borrowing from the British syllabus, teaching approaches and even use of British textbooks makes it hard for teachers and students to conceptualise teaching and learning Technology in a contextualised way. The new Design and Technology curriculum was officially introduced into all senior secondary schools in Botswana in the year 2000 (Molwane, 2000). However, as was experienced in England in the early 1990s when the Design and Technology curriculum was introduced into the British education system, the implementation of the new curriculum in Botswana remained polarised between those who were still trying to protect what they preserve to be their individual subject boundaries (the old woodwork and metalwork teachers) and those who believe in the need for hard technology and a sound knowledge base (the newly trained teachers) (Molwane *et al.*, 2008). Locally, a study conducted

by Heymans (2007) to determine how successful the Technology curriculum was in South African urban schools, revealed that few teachers felt that the implementation of Technology was successful; schools were ready for the implementation whilst a high percentage of teachers felt that the subject only had a place in the Further Education and Training (FET) band (The FET band runs from Grade 10 to Grade 12 in public and private schools). In the same study, it was also found that a need exists for specialised trained Technology teachers, appropriate equipment and physical facilities to teach the Technology curriculum (*Op cit.*, p. 41). In addition, while some teachers felt they were ready for implementation, others felt that it did not have a place in FET implying that it should only be offered at the General Education and Training (GET) band level. In South Africa, the GET band operates from Grade 0 or Grade R to Grade 9 in public and private schools. While some teachers revealed a lack of interest in Technology because they felt that the basics in Technology were sufficient at GET level, it is important to acknowledge that technology is advancing and a Twenty-First Century learner will certainly require more than just basic skills to execute tasks in the future. Heymans's study in 2007 therefore provides a short sightedness by some teachers towards the future, as it could be predicted that if those very same teachers in Heymans's study were interviewed ten years later, their interpretations would probably be different because of the advancement in technology and changes in the Technology curriculum. While the teachers' perspectives in Heymans's (2007) study are fourteen years old, this study might just help us to arrive at the latest perspectives of Technology teachers as experienced in schools. In addition, if a lack of facilities to teach Technology is problematic in an urban school, it raises concerns as to how the Technology curriculum is received in schools with fewer resources, especially in the rural parts of South Africa. Since the Technology curriculum relies heavily on resources, a survey conducted by British and Training Technology (BETT) of fifty teachers in South Africa to find out if teachers were using technology resources during the teaching of the curriculum, found that only 48% reported using technology in teaching the Technology curriculum. Furthermore, 52% lacked proper training to understand and implement Technology in the classroom (Joseph, 2017). The use of percentages in the study masks how small and inadequate it is to draw any kind of generalisation from it, as it provides an illusion that a large group of Technology teachers were involved when in reality it was merely twenty-four teachers for the first finding of 48% and twenty-six teachers for the second finding of 52%. Once more, an attempt to understand Technology teachers' perspectives for not using

resources in teaching is absent from the BETT study and can only be understood through a study that focuses solely on teachers' perspectives.

The aforementioned findings, both international (Molwane, 2000; Gray & Daugherty, 2004; Wilson & Harris, 2004; Molwane *et al.*, 2008; Wright *et al.*, 2018) and local (Heymans, 2007; Joseph, 2017) not only highlight the lack of teaching resources and inadequate teacher expertise and skills to teach the Technology curriculum, but more importantly, they reveal that the teachers' perspectives are invisible as these findings were mostly statistical in nature and did not capture the essence of teachers' personal experiences about the Technology curriculum and what shapes their perspectives. Whilst it is at national level that policies are framed to develop the technological advancement of its citizens, it is Technology teachers who are the crucial drivers of the intended curriculum. Some of the experiences at school, the contexts in which they teach, as well as the learning abilities of the learners they teach are not factored into the design of the Technology curriculum (Stevens, 2004). As a result, Stevens (2004) argues that varied interpretations of the Technology curriculum by teachers have resulted in an unequal implementation of the Technology curriculum at schools in South Africa.

A perusal of the literature reveals that when compared to other subject curricula, the Technology curriculum has brought many challenges to teachers (Rauscher, 2010) and that some of these challenges experienced by Technology teachers include the interpretation of the curriculum, as well as pedagogical, technological and contextual factors, such as, the difficulty and the uncertainty of how to execute the Technology curriculum in their classrooms (Vandeyar & Killen, 2003; Stevens, 2004; Ankiewicz, De Swardt and Engelbrecht, 2005; Rausher, 2010).

Before proceeding further, it is important to reveal that education in South Africa underwent numerous circular changes over the past decades, and these changes were often accompanied by challenges. It is not the intent of this study to go into great historical detail regarding the evolution of the South African education system and the reasons for inclusion of Technology in the curriculum. However, a brief outline is necessary so that the study can be located in the correct educational context, as espoused by Ankiewicz (1995) who states that "if a person wants to engage in any meaningful discussion on curriculum in South Africa, it has to be



done against the background of the historical and political developments in the country” (p. 245).

### **Curriculum in South Africa Prior to 1994: An Apartheid Agenda**

The apartheid era (1948-1994) was characterised by a system of government that classified individuals into racial groups, namely, White, Black, Indian and Coloured, with separate geographical living areas demarcated for each group (Stevens, 2004). Education in South Africa was governed by apartheid prescripts, the most tormenting being the Bantu Education Act of 1953, a South African segregation law which was not on the side of the black community and was introduced in order to reinforce the segregated ideologies of the apartheid legacy.

Introducing Bantu Education in 1953, Henrik Verwoerd stated:

*I just want to remind the Honourable Members of Parliament that if the native in South Africa is being taught to expect that he will lead his adult life under the policy of equal rights, he is making a big mistake. The native must not be subject to a school system which draws him away from his own community, and misleads him by showing him the green pastures of European society in which he is not allowed to graze (Osman & Hornsby, 2017, p. 60).*

The above statement dictated the intentions of the apartheid curriculum. Such a curriculum reflected the desire of the government to ensure that non-whites understood their inferior status. Education for non-whites was not meant to develop them to a point where they could demonstrate the same intellectual ability as white people, as education for whites was designed to provide them with access to every opportunity to resume their places in local, national and international domains. Racial segregation privileged white people over non-white people in all aspects of life. In education, white learners enjoyed privileges such as substantial resources, various sporting facilities and infrastructure for technical subjects such as Home Economics (a field of study that deals with economics and the management of the home, family and community) and Woodwork (a subject devoted to the design and production of products mainly manufactured from wood), while schools for non-whites received very little or, in most cases, no provision for technical subjects (Makgato, 2003). Along with the Bantu Education policy, the Afrikaans language was developed as a compulsory language and was imposed as a language of

instruction in some schools. None of the mother tongue languages spoken by Black South Africans were recognised and as a result, they were marginalised in the education system. As mentioned by Stevens (2004), “black people had no say in the design of the curriculum” (p. 3). “Authoritarianism and rote learning” were the crucial components of the apartheid curriculum, along with examination criteria and procedures which were instrumental in promoting the political perspectives of those in power and allowed teachers very little freedom and latitude to interpret the curriculum (Jansen, 2001, p. 45). It was only in 1976, when, for the first time, non-white learners challenged the curriculum of Bantu Education. They expressed disgust and rejected the curriculum which sparked the famous ‘Soweto Uprising’ in June 1976, which signalled the beginning of the end of apartheid. The Soweto Uprising was a tragic event in history in which learners lost their lives fighting for an education that reflected inequality. It was clear then and now too, that the said curriculum was politically and ideologically designed for the apartheid agenda.

### **Post-Apartheid Curriculum Changes**

The dawning of democracy in 1994 ushered in radical changes in the South African education system as the new government sought to address the inequalities of the past. After the abolishment of apartheid, curriculum changes were necessary to create an equal education system that applied to the entire country (Brook, 1997). Such change was largely driven by humanistic, social justice and human rights initiatives to bring about equal access to all. The then Minister of Education, S.B. Bhengu, introduced a new curriculum called Curriculum 2005 (C2005) which was scheduled for implementation in 1998 at Grade 1 level, and in 1999, at Grade 7 (DoE, 1997). The implementation of C2005 was expected to be in full operation in all classes by 2005. The main features of C2005 were namely Outcomes-Based Education (OBE), an integrated knowledge system, a learner-centred education and the implementation of eight compulsory subjects, with Technology being one of them (DoE, 1997). The main objective of the OBE system in C2005 was to promote learner involvement in all aspects of the teaching and learning process so that learners could achieve their maximum potential (DoE, 2002), which was in stark contrast to the Bantu Education Act of the apartheid regime. The introduction of C2005 brought extensive changes in terminology throughout its policy. Teachers were now “facilitators”, subjects were “learning areas”, and pupils were “learners”. The goal of a lesson

was now changed to “learner outcomes” and teacher-centred learning was now changed to learner centeredness with a predominance of group work (Edwards, 2001, p. 39). However, teachers were confused by the new terminology, and the lack of clarity regarding assessment policy and practice. It became evident that teachers were inadequately trained for the new curriculum; there was no alignment between curriculum and assessment policy; textbooks varied wildly in quality and were often unavailable and the time frames were unmanageable and unrealistic (Maphalala, 2006; De Jager, 2011). The challenges raised by the teachers, teacher unions and other eminent scholars surrounding C2005 led the next Minister of Education, Kader Asmal to call for its review in 1999 (Chisholm, 2000). Consultations with relevant stakeholders gave birth to a more streamlined curriculum called National Curriculum Statement (NCS) which was issued in 2001. The aim of the NCS was to provide a simpler and more user-friendly policy document to assist teachers who regarded the previous curriculum as challenging (Chapman, 2002; Stevens, 2004; Ziqubu, 2006). However, with the NCS, challenges related to implementation did not disappear and there were still calls from the teachers to deal with problems inherent in the curriculum. Teachers were not properly trained to grapple with the changes and were not provided with guidelines for handling basic principles of learning assessment (Jansen & Taylor, 2003; Rietsma & Mentz, 2006). Numerous complaints regarding the implementation of the NCS were forwarded to the next Minister of Basic Education, Angie Motshekga, and as a result, the NCS was later reviewed into becoming the Revised National Curriculum Statement (RNCS) in 2005 [Department of Basic Education (DBE), 2011]. However, this did not signal an end to the challenges. The RNCS implementation shortcomings also necessitated its refinement. In 2009, the Ministerial Committee was tasked with the review of the implementation of the Revised National Curriculum Statement, resulting in a Curriculum and Assessment Policy Statement (CAPS). The CAPS was introduced to strengthen the RNCS in order to improve the quality of teaching and learning in our schools (DBE, 2011). With the introduction of CAPS, every subject in each grade had a single, comprehensive and concise policy document that provided details on what teachers needed to teach and assess on a grade-by-grade and subject-by-subject level. According to the Minister, Angie Motshekga, CAPS was also intended to ease the administration burden on teachers and to provide more clarity on what is to be taught and assessed. At present, the implementation of CAPS still appears to be problematic for many teachers in South Africa (Jones, Bunting & De Vries, 2013). Since the

introduction of democracy in 1994, South Africa had been subjected to four curriculum revisions (C2005, NCS, RNCS and CAPS). These changes had impacted the teaching of all subjects including Technology as will become evident as the thesis unfolds.

### **A Technology Curriculum for South Africa: Problem Statement**

Technology was not offered in South Africa prior to 1994. South Africa incorporated Technology as a learning area in the curriculum, but it was modelled on the English Design and Technology approach blended with South African culture, values and context with an outcomes-based education as a guiding principle (Stevens, 2011). The Technology curriculum policy document in the National Curriculum Statement policy document (NCS) was first issued to the public in October 1997. The constituents of the Technology curriculum included a combination of technical subjects such as Metalwork (an activity-based course focusing on metal), Needlework (a decorative sewing and textile arts plus handicrafts syllabus) and Woodwork (an activity focusing on structures made from wood), amongst many other subjects that existed prior to OBE. Such subjects were practically orientated rather than theory-based.

The problem statement, the researcher argues, can be found in the intentions of the Technology curriculum against the challenges to which curriculum design, redesign and revision, the legacy of teacher education and educational inequality have given rise. Allow us to look at the intentions of the Technology curriculum as described below:

*Technology was introduced in the South African curriculum in recognition of the need to produce engineers, technicians and artisans needed in modern society and the need to develop a technologically literate population for the modern world (DoE, 2011, p.8).*

However, the vision as stipulated in the Technology curriculum to transmit skills to learners is, probably, largely unattainable as teachers struggle to meet the demands of Technology within the CAPS policy guidelines (Jones, Bunting & De Vries, 2013). Since CAPS has focused on continuous assessment, it has left many Technology teachers feeling pressurised not only by its demands, but by the lack of knowledge they should possess. Insufficient training also presents a problem (Rietsma & Mentz, 2006). Moreover, the

Technology curriculum offers “little guidance and once more allows for varied interpretations by teachers” leaving less hope for standardisation for implementation across the country (Vandeyar & Killen, 2003, p. 133). Schools in South Africa operate on a quintile basis ranging from one to five. Schools labelled as quintile one and two are regarded as the poorest schools in South Africa that continue to suffer the wrath of apartheid in the absence of basic resources to facilitate learning. Quintile three schools are usually supported by basic resources, while schools of quintile four to five ranking, formerly known as ‘model c’ schools which are schools that were once attended by white learners during apartheid, have the privilege of a variety of resources that can enable successful implementation of the Technology curriculum (Rietsma & Mentz, 2006). As a result, some schools in South Africa have excellent infrastructure, while many more lack basic services such as water and sanitation (Gibberd, 2008). Following several curriculum reviews, Technology teachers were being pushed from one curriculum to the next without much choice. According to Van der Nest (2012), a change in curriculum therefore ‘necessitates a change of the function of the teacher’ (p. 5). Technology teachers had to find ways to accommodate the requirements of the new curriculum; as such, curricular changes were not specially done with Technology in mind and more importantly, teachers were not asked to be part of the curriculum design for Technology (Jones, Bunting & De Vries, 2013). Such a curriculum was rather imposed upon Technology teachers. Despite teachers not being trained as curriculum designers, their experiences in teaching the Technology curriculum were not considered. Clearly from the history of curriculum in South Africa, it shows that the political and ideological agenda that underpins it were myopic and unconcerned with the impact of changes on teachers. Instead, curricular changes aimed at trying to change the philosophy of teaching and learning, irrespective of the requirements of subjects like Technology. Hence, the Technology curriculum lacks the absence of Technology teacher perspectives, voices or input in curriculum design in South Africa, which this study addresses.

In summary, the entirety of curriculum changes to equalise education in South Africa, has brought about various other problems in education, which South Africa hopes to address through the introduction of CAPS, even when the policy seems to be ineffective (Van der Nest, 2012). There are problems with implementation, teacher preparedness and resource availability which have triggered a desire to find out how Technology teachers enact a curriculum that is imposed

on them (Stevens, 2004) and to understand how they deal with it, especially, the non-specialist Technology teachers. Hence, this study attempts to shed light on the phenomenon of teachers' perspectival view on aspects pertaining to the Technology curriculum and to understand the recipients' perspectives which in this case are Technology teachers who are also curriculum consumers.

### **Rationale for the Study**

As mentioned in the introduction, the demands of the current technological era are very high and require learners with Twenty-First Century skills such as curiosity and creativity; rational thinking; problem solving tactics; leadership skills and influence; effective interaction and conversational skills; examining and manipulating information skills. However, a recent study, conducted by the World Economic Forum on nearly a hundred countries to define what the most critical Twenty-First Century skills required to prepare students for life beyond school are, revealed that too many students are still not getting the education they need to prosper and that there are still large gaps for skills acquisition in developed and developing countries.

According to the World Economic Forum report:

*...these gaps are clear signs that too many students are not getting the education they need to prosper in the Twenty-First Century and countries are not finding enough of the skilled workers they need to compete (Schwab & Martín, 2015, p. 1).*

It was found that developed countries such as the United States, Germany, Japan and the United Kingdom tend to perform much better on average across most skills than developing countries such as Brazil, Malaysia, Turkey and South Africa (Schwab & Martín, 2015, p. 4). The acquirement of Twenty-First Century skills are crucial as encapsulated in the words by Kellner (2000) when he claims that:

*We have to prepare our kindergarten students for the life in the world after twenty years when they are expected to be the graduates. At present they are facing issues like global warming, famine, poverty, health issues, exponentially*

*increasing human population and other cultural, environmental and interpersonal problems (p. 255).*

Hence, a learner in this era needs to be able to handle issues such as these and to develop and adjust personally, socially, economically as well as politically on local, national as well as international levels. In meeting the demands of the Twenty-First Century learner, the image of the Technology teacher should change from traditional to transformational. Technology teachers are expected to plan, teach, assess and implement new teaching methodologies that are a complete change from traditional ways of teaching. As a result, they need to keep up to date with the fast-paced world: they have broad horizons to cope with, which incorporate tremendous rates of innovation in Science and Technology. The task of the Technology teacher no doubt becomes more challenging as it is not just about imparting only content-based conceptual knowledge any longer, but rather about dealing with transmitting and equipping learners with information, communication-related knowledge and skills and building responsible citizens who show a concern for the environment. Thus there is now a need for Technology teachers to integrate the aforementioned skills in their lessons to bring into consciousness the human aspect that should be embedded in education. This study does not deal with the latter mentioned aspect, but it is about highlighting the importance of Technology teachers who bring these extra-curricular social issues into the classroom that are important for the survival of the planet. However, despite the importance of Technology teachers, it is often said that they are to be blamed for poor implementation of the Technology curriculum. According to Reddy, Ankiewicz and De Swardt (2008), Technology teachers were being blamed for their apparent inability to prepare their learners with the knowledge and skills needed to keep up with the changing technological world.

Literature consulted (Gray & Daugherty, 2004; Wilson & Harris, 2004; Heymans, 2007; Joseph, 2017; Wright *et al.*, 2018) further suggests that the implementation of the Technology curriculum is proving to be problematic for teachers both locally and internationally. One of these issues was raised by Welch (1998) who claimed that in Canada, assessment practices in Technology curriculum were constantly being debated by teachers. Moreover, Technology teachers commonly experience inaccurate assumptions of the goal purposes and activities of the Technology curriculum (Wicklein, 2005). Other challenges that continue to plague the

Technology teachers worldwide include “varied understandings of the envisaged curriculum, inadequate resources” to teach the curriculum and inadequate teacher training (Ankiewicz, De Swart & Engelbrecht, 2005, p. 580). Such challenges indicate the gap that exists between theory and practice and that there is a need for research to be conducted to explore the perspectives of Technology teachers to understand their experiences in the enactment of the curriculum. Since teachers are at the forefront of implementation of the curriculum, their wellbeing is crucial and it is therefore no surprise that they are often under immense pressure when implementing the Technology curriculum in their classrooms (Vandeyar & Killen, 2003; Stevens, 2004). This claim is supported by Bantwini (2010) and Remillard (2005) who mention that curriculum developers ignore the central role that teachers play in curriculum development.

The fact that the majority of teachers were not part of the design of the curriculum that they are expected to implement exacerbates the challenges (Reid, 1978). It is therefore important to determine teachers’ perspectives of the Technology curriculum as this will impact on how they interpret it (Cornbleth, 1985). It is against this backdrop that the rationale mentioned forms the basis for the development of this study. It is hoped that the study’s findings will assist in understanding the perspectives of Technology teachers, as well as the nature of their perspectives.

### **Focus of the Study**

The focus of this study is to explore the perspectives of selected Technology teachers about the Technology curriculum and to gain a deeper understanding about the nature of their perspectives. According to Olsen (2017), “teachers are more important than ever in preparing students for an ever-changing world with infinite access to all types of information” (p.1). Despite the importance of teachers in the implementation of the curriculum, most matters concerning the Technology curriculum, specifically, shed light on issues of subject matter, curriculum reform, structural design of a curriculum, Educational Technology, its integration into teaching and learning and learners’ perceptions of the Technology curriculum. There still is a paucity of research on Technology teachers’ perspectives on the Technology curriculum (Montrieux, Vanderlinde, Schellens & De Marez, 2015). As part of South Africa’s curriculum reform initiative, and several efforts in the form of curriculum revisions to improve the quality of



teaching and implementation, not enough attention has been given to Technology teachers and in particular, the nature of their perspectives. The DBE, the researcher argues, views all public schools as being equal in terms of facilities and infrastructure and expects all teachers to implement the curriculum accordingly. Hence, one policy is designed for every school without factoring in the realities that Technology teachers experience or endure across schools. This study aims to understand the perspectives of Technology teachers through the lens of Nietzsche's (1882) philosophy of perspectives as an attempt to interpret their experiences in the enactment of the Technology curriculum first hand and what their concerns might be.

### **Significance of the Study**

The study is important because it sheds light on an issue that is understudied and offers direct evidence of Technology teachers' perspectives as consumers of the Technology curriculum. Technology teachers' perspectives are interpreted using Nietzsche's (1882) philosophy to understand the reasons and the nature for such perspectives. Drawing on Nietzsche's (1882) 'perspectivism', the theoretical orientation used for the study and the notion of historical influence on perspectives, the points of view in the spaces of practice may bring about new insights around Technology teachers' perspectives about the curriculum. This will be expanded in the last chapter where the significance of this study will become more apparent.

There is an assumption that the Technology curriculum would not only bring learners into the Twenty-First Century, but that it would be a way to deal with inequalities in South Africa. The contribution this study makes is that a deeper understanding around inequalities are shaped and reinforced by curriculum design. The selection of teachers and schools for this study, especially as these were under-resourced schools, reveals some unexpected outcomes that subvert the intentions of the curriculum designers as will become evident in the final chapter. The study is also significant because it could assist various national and international stakeholders involved in curriculum development to understand the perspectives of Technology teachers and possibly help them to address inhibiting factors to implementation. It is hoped that a better understanding of Technology teachers' perspectives on the Technology curriculum will be gained, so that the gap between policy and practice is reduced or bridged.

## **Critical Research Questions**

This research study focuses on Technology teachers' perspectives on the Technology curriculum. It is underpinned by three critical research questions.

### **Key Questions**

- 1.) What are the selected Technology teachers' perspectives on the Technology curriculum?
- 2.) What is the nature of Technology teachers' perspectives?
- 3.) What are the implications of Technology teachers' perspectives on the Technology curriculum?

## **Participants and Their Places of Employment**

This section presents a description of each participant and the contexts in which the study was conducted. This is necessary as schools are quite different from one another in terms of geographical location and facilities (Amin, 2008). As mentioned earlier in the chapter, South African public schools are categorised into five groups, called 'quintiles', largely for purposes of funding whereby quintile one and two are the "poorest" quintile, while quintile five is the "least poor", implying that it has maximal resources and infrastructure or, to state it differently, is the best resourced (Longueira, 2016). Four participants from four different schools provided data for analysis. The justification for the recruitment of one teacher per school stems from the reality that there is just one Technology teacher per school. The schools in this study ranged from under-resourced to highly under-resourced and underprivileged schools. The schools include three urban schools and one rural school. Each of the schools selected for the study is co-educational, admitting both male and female learners. They are all public schools and are therefore open to all, regardless of religious or ethnic background. Learners that attend these schools are from multi-racial and diverse cultural and ethnic backgrounds.

### **Taimur.**

Taimur is a male teacher who started teaching almost twenty-one years ago at Nasa Primary School where he is still employed. He was nominated for the National Teacher Awards in recognition of his outstanding contribution to teaching and learning. Taimur's subject

specialisations include Mathematics. He has been teaching Technology for fifteen years and is currently the Technology teacher for Grade eight. He feels that although Technology is an interesting subject, there are significant challenges when it comes to imparting knowledge to the learners at his school.

### **Nasa Primary.**

Nasa Primary is a small school that is situated within the heart of a small rural community about 10 kilometres from a central town. The road to Nasa Primary is made of gravel. The school is surrounded by sugar cane, gardens and a few small houses owned by farmers. The school buildings are made from cement and are painted a bright shade. Water is supplied by tanks. Nasa Primary is a quintile two school as well as a no fee school. The school relies on financial support from the Department of Education (DoE). At the time of fieldwork, there were four hundred and sixteen learners and twelve level one teachers, two heads of department (HoD), and the principal. Most learners come from poor homes where finding their next meal is their first priority over school. Many learners' parents are either unemployed or farm workers or receive a child support grant from the state. The majority, if not all the learners that attend Nasa Primary, are Isi-Zulu speaking and English is their second language. However, this is an English medium school. Nasa Primary is also an eco-friendly school which follows an international programme that guides schools through a seven-step process to help them address a variety of environmental issues, ranging from litter and waste to healthy living and biodiversity. The DoE provides beans, rice and mielie meal (a meal made from corn which is a staple food for many people in South Africa), among other food, for learners. The female school caretaker prepares meals that most of the learners eat because they cannot afford to bring their own food.

In terms of infrastructure, Nasa Primary has a small car park with an area next to it that is used for morning assembly. The office area is small with a tiny office for the secretary and a separate principal's office. The school also has a small staffroom. Nasa Primary is fortunate to have a large sports ground where most learners enjoy a game of soccer during breaks. There are eleven periods of thirty minutes each in a normal school day. The only technological equipment is six computers with a wireless fidelity (Wi-Fi) connection available to teachers only, a photocopying machine and a Technology kit (A kit which is housed in a sturdy plastic trunk, is

CAPS aligned and contains material for learners, activities, a teacher's guide and worksheets for learners). The school has small classrooms that accommodate an average of fifty learners. Each classroom has a chalkboard facility. The desks and chairs are organised in rows that are very close together with not much space for movement.

### **Zarah.**

Zarah is the youngest participant in the study and began her teaching career six years ago at Earth Primary where she continues to teach. She holds a Master's degree in Education and is currently studying towards a Doctorate in Education. Zarah specialised in Technology at university and therefore had formal training in Technology. She teaches Technology to Grade Seven learners at Earth Primary. Zarah stated that Technology is an interesting subject and that her learners enjoy practical work over theory.

### **Earth Primary.**

Earth Primary is located within an urban residential area about fifteen minutes from its central town. It is a minute away from Jupiter Primary and caters for learners from Grades R to Seven. The school buildings are made from face brick and the doors and ceilings are brightly painted. School fees are R600 per learner. This is a quintile three school. Quintile three schools receive less funding from the government as they are allowed to supplement their revenue by charging school fees. Earth Primary has a staff complement of thirty level one teachers, four heads of department, a deputy principal and principal, and two secretaries. The school has four caretakers. The school accommodates one thousand, one hundred learners. Despite being located in an urban environment, the majority of learners come from rural communities. Most hail from disadvantaged backgrounds and English is their second language. Furthermore, most learners do not have access to any technological devices at home. The school has a large car park, library, sports ground, and an assembly area as well as a laboratory. There is a security guard at the main gate who monitors visitors entering and leaving the school premises. Earth Primary has four computers which are only accessible to teachers. The Wi-Fi password is only available through the deputy principal and principal. There are approximately fifty learners in each class. The classrooms are relatively small and there is often no space for movement.

## **Emma.**

Emma began teaching in 1987 and was appointed at Saturn Secondary in 1993 where she continues to teach. She obtained her degree in Education from a College of Education and her subject specialisation is Mathematics. However, she has not been afforded the opportunity to teach her subject major and instead teaches Hospitality and Technology. In the past, Emma has taught Technology to Grade Seven and Nine learners and is presently the Technology teacher for Grade Nines at her school. She stated that she enjoys teaching Technology because it is a practical subject and certain sections are quite exciting.

## **Saturn Secondary.**

Saturn Secondary is a public high school that is situated on a hill top in a residential area. Although Saturn Secondary is a high school, it caters for Grade Seven learners as well, which is not usually the case for a high school. Generally a high school in South Africa would begin from grade eight to twelve. However, Saturn Secondary begins from grade seven to twelve. This large school has several buildings made from face brick. The doors and ceilings are brightly painted. The school is fortunate to have security guards that assist with bunking learners, theft or any problems. A guard house is located at the main gate where visitors sign in. Saturn Secondary is a quintile four school so one expects that the school will be well resourced. Saturn Secondary accommodates one thousand two hundred learners from different religious, cultural and socio-economic backgrounds. Most come from low to middle income backgrounds. Some of the learners from disadvantaged backgrounds work after school and on weekends. The staff complement comprises thirty-six level ne teachers, five heads of departments, two deputy principals and a principal, two administrators and a librarian. There are five caretakers and a person in charge of school maintenance. School fees are currently set at one thousand, four hundred rand per learner which goes towards school infrastructure. Parents that are unemployed can apply for an exemption or fee reduction. A normal school day at Saturn Secondary consists of eight periods of forty minutes each. The school is well-endowed in terms of infrastructure, with many specialised rooms including two laboratories, a metalwork room, a Hospitality room, a Technology room, a library, and a hall as well as a computer room that houses thirty-eight computers. The large staffroom includes a kitchen with a microwave and refrigerator. The school has massive main grounds, separate netball and volley ball courts and a large assembly

area. It also has a tuck-shop that opens during breaks. Apart from the specialist classrooms, the classrooms are generally very small and they accommodate forty-eight to fifty learners. The desks are very close to each other, almost reaching the front chalkboard. Most of the classrooms have no fans.

### **Aryan.**

Aryan began his teaching career in 1997. He taught Engineering Graphics and Design (EGD), a subject that is taught in the FET band in South African schools. Aryan taught in a high school for many years, before moving to an ex-Model C school (A now semi-private, whites-only government school introduced by the apartheid government in 1991) and then to Jupiter Primary where he continues to teach. Aryan specialised in Industrial Arts and has no formal training in Technology at university level. He teaches Technology to Grade Seven and Eight learners. Aryan said that Technology is a very interesting and practical subject to teach that fits into our daily lives. Technology helps with problems at home, for example, if a pipe needs fixing, one will be able to handle it.

### **Jupiter Primary.**

Jupiter Primary is a quintile three school that is located in an urban residential area about two minutes from its central town. The school buildings are made from face brick and the school colours are yellow and brown. Aryan stated that the school receives very little funding from the DoE. The staff complement includes seventeen level one teachers, three head of departments, a deputy principal and principal and an administrative officer. School fees are five hundred and fifty rand per a learner. In terms of facilities, the school has a library, a car park and a small assembly area. Jupiter Primary accommodates seven hundred and forty learners. Aryan described the learners as coming from very poor backgrounds; some do not have electricity in their homes. Domestic problems prevent many learners from coming to school, with adverse effects on their results. The school has five computers with a Wi-Fi connection that is only accessible to teachers. The classrooms are relatively small and overcrowded. There are no fans and although the classrooms have windows, it is generally very humid because of the large class sizes and little ventilation. Each classroom has a chalkboard.

## **Research Design, Methodology and Paradigm**

This study lent itself to the interpretivist paradigm that provided a platform to explore four Technology teachers' perspectives of the Technology curriculum in selected schools. An interpretivist approach takes cognisance of the multiple realities and multiple truths that co-exist simultaneously and allows access to the multiplicity of perspectives of the participants.

Qualitative research design and case study research methodology were thus employed. Data production tools included interviews, and video recordings of a Technology lesson followed by stimulated interviews. Each interview was conducted face-to-face with individual participants. Semi-structured interviews were conducted that enabled the participants to freely express their views to the interviewer. Once all the interviews were completed, they were transcribed, a process that took several days.

## **Organisation of the Study**

### **Chapter One.**

Chapter One provided an introduction and background to this research study. It also highlighted the study's focus and purpose, the rationale and significance for the study and the critical research questions. This was followed by a detailed synopsis of the participants and school contexts, as well as the research design and methodology. Finally, the organisation of the thesis provided an overview of the entire study and the chapter concludes with a summary.

### **Chapter Two.**

Chapter Two presents a review of the literature on the landscape of curriculum. The chapter provides an introduction to curriculum theory and concepts of curriculum as well as aspects related to curriculum that are vital to the study. The chapter presents a discussion on the typologies of curricula and their restrictions, an incongruence between the intended, implemented and attained curriculum, curriculum design and its components and lastly the tensions between curriculum design and adaptation to context. The chapter concludes with a summary.

### **Chapter Three.**

Chapter Three presents a review of literature on Technology, Technology teachers and the curriculum. This chapter is divided into two sections. Section A provides the historical significance of technology in general and the definition of the term 'technology'. An overview of literature, on the development of technology in education as well as the dangers of technology in education, is presented. A clarification between Educational Technology and Technology Education is also made. Section B focuses on current literature relating to Technology teachers and the Technology curriculum. This section presents the type of knowledge that is required by a Twenty-First-Century Technology teacher to teach the Technology curriculum. It also discusses Technology teachers' espoused beliefs in implementing the Technology curriculum and approaches to teaching the Technology curriculum. Literature on teaching the Technology curriculum and the use of technological devices is also presented. The chapter ends with a summary.

### **Chapter Four.**

Chapter Four presents and discusses the conceptual and theoretical framework that underpins this study. The conceptual framework incorporates concepts relating to the philosophical notion of a perspective and what knowledge is acquired through a perspective. The theoretical framework centres on Friedrich Nietzsche's (1882) notion of 'Perspectivism', his theory of multi-perspectivism and the concepts utilised in his portrayal of 'perspectivism' that assisted the researcher to understand the various perspectives of Technology teachers in relation to the Technology curriculum. The term 'perspectivism' was explained through its Latin roots and its use in the art world explicated. This was followed by 'perspectivism' and "truth" as understood by Nietzsche. Thereafter, Nietzsche's perspective theory of the affects was outlined to explain the classes of conditions embodied therein, namely, affect of coherence, affect of legitimacy and the affect of practicality. The chapter concludes with a summary.

### **Chapter Five.**

Chapter Five focuses on the methodology employed for this study. It discusses the qualitative design and case study research approach. The chapter also discusses the research methods employed and the data collection instruments used to gather information. All other



pertinent issues relating to research such as: participant recruitment, sampling, data production plan, validity, reliability, authenticity and trustworthiness are discussed. The data analysis tools are also discussed and the study's limitations and strengths are highlighted. Finally, the chapter discusses the ethical considerations taken into account in conducting this study. A summary concludes the chapter.

### **Chapters Six, Seven, Eight and Nine.**

Each of these chapters provides a detailed descriptive analysis of each of the selected Technology teachers' perspectives on the Technology curriculum. These chapters provide an analysis of the data infused with the conceptual and theoretical framework, literature reviewed as well as new literature that fitted into the study. Each of the chapters has nine themes discussed under separate headings. The themes are:

- Perspectives on the goals of the Technology curriculum;
- Perspectives on lesson planning for the Technology curriculum;
- Perspectives on resources for teaching Technology;
- Perspectives on the use of devices to teach Technology;
- Perspectives on teaching the Technology curriculum;
- Perspectives on methods used in the teaching of the Technology curriculum;
- Perspectives on time allocated to teach the Technology curriculum;
- Perspectives on assessment in the Technology curriculum;
- Factors that influence Technology teachers' perspectives in the teaching of the Technology curriculum.

The findings are presented in a qualitative format. Chapter Nine ends with a summary of all the analysed chapters.

### **Chapter Ten.**

Chapter Ten presents a discussion of the findings that emerged from the study. The findings that emerged from the data were organised and presented into eight themes and are supported with literature and the theoretical framework. The findings are a) constant curriculum change disrupts university preparation of Technology teachers; b) a rigid curriculum is

constraining; c) the irony of disapproving learners' use of technological devices; d) a universal Technology curriculum for diverse school contexts; e) teacher beliefs and Technology curriculum pedagogy; f) Technology curriculum as an unfair curriculum; g) unrealistic, impractical and irrelevant assessment in the Technology curriculum and lastly, h) cultural capital is lost as Technology education perpetuates social inequalities. It also presents the researcher's personal reflections on this study. The chapter terminates with a summary.

### **Chapter Eleven.**

Chapter Eleven is the concluding chapter which presents and discusses the thesis-statement of the study. The chapter presents the implications of the study's findings and offers recommendations arising from these findings as well as suggestions for future research. It also presents an overall conclusion to the study.

### **Summary of Chapter One**

This chapter outlined the background to this study. It focused on its purpose, significance and the rationale for the study along with the key research questions. This chapter also highlighted the study contexts, and the methodology employed. The chapter concluded with an overview of the structure of the study. The following chapter presents a review of the literature relevant to this study.

## **CHAPTER TWO**

### **THE CURRICULUM LANDSCAPE**

#### **Introduction**

This study foregrounds curriculum theory with a focus on Technology teachers' perspectives on the Technology curriculum. As a backdrop to understanding Technology teachers' perspectives, this chapter reviews literature of relevant research in the field of curriculum studies. A brief overview of curriculum theory, along with concepts of a curriculum is offered. Curriculum is discussed as 'technocratic' and 'critical' which leads to a discussion of the hidden curriculum. The chapter presents literature related to curriculum design and its components. Typologies of curricula and its restrictions reveal how curriculum designs are limited when compared against each other. The chapter also discusses the incongruence between the intended, implemented and attained curriculum. Lastly, a discussion of tensions between curriculum design and adaptation to context is provided. My aim is not to provide an in-depth overview of curriculum theory, since the focus of this study is not on a curriculum but rather on Technology teachers' perspectives on the Technology curriculum. It is nevertheless, important to understand teachers' perceptions against scholarly conceptions of curriculum. Finally, a summary of this chapter is provided.

#### **Theory and Concepts of Curriculum**

The term curriculum just like technology is difficult to define in that its broad nature makes it almost impossible to narrow into a single definition (Omstein & Hunkins, 1993; Afdal, 2005). Glare (2000) contends that the concept 'curro' (I run) is of Latin origin and refers to a race, a track or a racetrack. This description of a curriculum as a race with distance markers, signposts, water stations, officials and coaches along the route is a metaphor for what the curriculum has become in educational terms, as learners move under leadership of their teacher on the way to adulthood (Wilson, 2005). The main concern is not to arrive at a specific definition but rather to be aware that curriculum means different things to different people as a particular ideology about education, design and context (Lovat & Smit, 2003). The contemporary conception of

curriculum is that of “courses offered by an educational institution or a set of courses constituting an area of specialization” (Merriam, 2009). At a general level, the concept of curriculum offered by Merriam (2009) may be narrow in nature as a narrow concept of curriculum would pertain specifically to just a written plan or statement. However, since the 1980s, concepts concerning curriculum theory broadened to include much more than just a written statement to be followed (Department of Education and Science, 1980). With time the extent as to what a curriculum should contain as meaningful and valuable to learners is contestable giving rise to various perspectives. Gwynn and Chase (1969) suggest four basic, yet interrelated, determinants for curriculum theory namely, philosophy, psychology, sociology, and beliefs about the structure of knowledge (p. 581) and describe curriculum theory as “a set of beliefs that, when accepted and internalised by the individual, serve as a basis for decision-making in curriculum development and implementation” (p. 583). Contrary to Gwynn and Chase (1969), Goodson (1994) cautions that curriculum theory has tended to become alienated from reality, as the theory becomes "prescriptions" of "idealised practice" (p. 26). However, Vallance (1982) counters this statement, arguing that curriculum theory "...is practical and based on real situations", suggesting that curricular experts should survey, analyse, synthesize and test the knowledge available about curriculum teaching and learning (p. 10). Cornbleth (1990) introduces the concept of curriculum as follows:

*“How we conceive of curriculum and curriculum making is important because our conceptions and ways of reasoning about curriculum reflect and shape how we see, think and talk about, study and act on the education made available to students”* (p. 12).

This statement highlights the needs for policy makers, curriculum designers, principals, as well as teachers, to have a solid base in curriculum theory. I discuss three concepts of curriculum theory which are important for this study.

### **Curriculum Theory as ‘Technocratic’.**

Curriculum theory identifies a type of curriculum referred to as ‘technocratic’ (Cornbleth,1990). Cornbleth (1990) argues that mainstream conceptions of curriculum are usually technocratic which means that curriculum is viewed as a tangible product, usually as a document or plan for instruction in a particular subject (p. 13). According to Popkewitz (1982) the technocratic concept of curriculum falls within the empirical-analytic paradigm and therefore gives the notion of “being scientific, conveying images of efficiency, effectiveness and progress” (p. 5). Popkewitz (1982) argues that a technocratic curriculum with pre-identified aims and objectives does not consider context and can be viewed as consisting of a number of variables which are analytically separate parts of an interacting system. Posner’s (1995) view of curriculum seems to be aligned with Cornbleth (1990) and (Popkewitz, 1982) though he refers to the technocratic curriculum as a technicist approach (p. 16). Posner (1995) building on the theoretical framework of Tyler (1949), advances curriculum as a 'step-by-step' process (p. 13). These ideas resonate with the design process which forms the heart of the technology curriculum, as structured, predetermined steps to problem solving. Thus curriculum development can be viewed as a process of problem-solving through designing, making and appraising.

### **Curriculum Theory as ‘Critical’.**

In contrast to the theoretical views of the technocratic curriculum, in a critical curriculum, there assumes to be more to a curriculum than simply reaching a predetermined aim. As a critique to the technocratic curriculum, Eisner (1967) believes educational objectives which are clearly and specifically pre-identified can hinder as well as help the ends of instruction. Eisner further advocates that an unexamined belief in pre-determined objectives in a curriculum can easily become dogma which may in fact hinder the very functions the curriculum was originally designed to serve. Hence, Eisner (1967) places a focus of curriculum on the growth of the learners and advocates personal growth in learners. Cornbleth (1990) supports the view shared by Eisner as he also believes that apart from a technocratic curriculum, a curriculum may also be one that is critical. According to Cornbleth (1990) the critical curriculum invites subjectivity and assumes that knowledge is produced through a process involving human judgement and the development of consensual meanings. Contrary to the technocratic curriculum, the critical

curriculum considers context and assumes that behaviour cannot always be predictable; it focuses on classroom interaction and produces opportunities for learning, rather than on predetermined outcomes (Frame, 2003). The critical theory of curriculum equates to what Wittenberg-Lyles, Greene and Sanchez-Reily (2007) refer to as a curriculum to develop “personal attitude”, that there is more to a curriculum than just learning knowledge and skills, rather the critical curriculum involves reflection and aims to make a learner able to make “sound judgements” (Frame, 2003, p.24).

From the literature, it is clearly visible that while the technocratic view of curriculum tends to decontextualize curriculum conceptually and operationally, the critical view supports contextualisation in the classroom. Curriculum designers however, as Cornbleth (1990) advocates work collaboratively in curriculum reform, bringing both perspectives to bear (p. 202). However, Samuel (2000) does not seem to agree with Cornbleth’s (1990) statement as he argues that the attempts to transform the curriculum in a post-apartheid South Africa have resulted in teachers having to bear the responsibility of curriculum transformation without curriculum designers understanding the constraints of their daily practice (p. 11). Samuel (2000) further argues that curriculum transformation has been too firmly fixed on the alignment with global educational trends. This accusation is relevant to the Technology curriculum in that it drew extensively from international curriculum models.

### **Curriculum Theory as ‘Hidden’.**

Curriculum theory as hidden takes cognisance of the fact that not all learning can be planned for by curriculum designers as stipulated in the intended curriculum. According to Chalufu (1996) the hidden curriculum relates to a wide variety of planned as well as unplanned experiences which pupils and teachers have at schools but which are not stipulated in specific syllabuses (p.96). Similar to Chalufu (1996), Solomon’s (2009) idea of the hidden curriculum relates to the unintended learning that occurs through the implementation of the curriculum. In his work, *Experience and education*, American philosopher Dewey (1938) defined the notion of “collateral learning” (p.48), which is often the foundation of most definitions of the hidden curriculum. Dewey (1934) defined collateral learning as the affective elements that students develop from their learning of subject matter (for example, behaviours, attitudes and habits) and

argued that the development of such behaviours, attitudes or habits were more significant than their content learning in the subject, as they also permeated a student's future interactions with the subject matter. Other curriculum writers such as Longstreet and Shane (1993) draw on the definition of Dewey when they define the hidden curriculum as "the kinds of learning children derive from the very nature and organisational design of the public school, as well as from the behaviours and attitudes of teachers and administrators" (p. 46). An example to illustrate this definition of a hidden curriculum is provided by Longstreet and Shane (1993) as one when a teacher spends a lot less time on a certain topic, hence, giving learners an idea that, that particular section of the work might not be important, or if a certain part of the work is not assessed students may get the unintended message that the work is not important (p. 47). Other researchers have attributed the term 'hidden curriculum' to other aspects of curriculum, asserting that it can be the avenue for other political agendas or priorities (Pinar, Reynolds, Slattery and Taubman, 1995). Eisner (2002) supports the view shared by Pinar *et al.* (1995) by drawing attention to the negative sides of social interactions between teachers and learners in navigating through the curriculum: "the functions of the hidden curriculum have been variously identified as the inculcation of values, political socialisation, training in obedience and docility, the perpetuation of the class structure – functions that may be characterised as social control" (p. 46). Apple (1982) believes that schools and associated curriculum are but one of many products of powerful interests and forces, and practices and performances of schooling are causeways for the flow of power as regulated by authorities. However, contrary to the hidden curriculum is usually viewed as negative or detrimental to the learner, but this is not always the case. As Print (1989) states, "the hidden curriculum may be described as positive or negative, although it depends to some degree on one's point of view (p.6). Clearly, one can view that the intentions of curriculum are now widened to incorporate for the hidden aspirations of teaching and learning to suit the needs of those in power, usually the state and not purely for the betterment of man. Therefore, each of these aspects, whether describing the unplanned activities in the lesson (Solomon, 2009), the social and political issues that permeate learning (Pinar *et al.*, 1995) or the values and attitudes that spark a life-long love of learning (Dewey, 1934), constitutes a potential deviation from what is presented in the intended curriculum. Each of these aspects provides a plausible deviation in the classroom from what the students are intended to learn in accordance with the curriculum as set by the curriculum authority. Each definition of the hidden curriculum

has provided a different slant on what encompasses the hidden curriculum. In Porter's view, each of these aspects could further contribute to a misalignment between what has been intended by the curriculum developer (intended curriculum) when compared with the actual interactions of the classroom (enacted curriculum).

### **Typologies of Curricula and Their Restrictions**

There are numerous ways of categorising curricula. One of the most common ways is found in the work of Lawton (1996). Lawton (1996) classifies these curricula according to the base from which they draw the outcomes. Lawton (1996) classifies curricula according to the essential base from which they draw their outcomes, namely: subject-centred (curricula draw from discipline-based knowledge), child-centred (curricula draw from the needs and lives of children), knowledge-centred (curricula draw from knowledge more broadly than disciplines or subjects) and society-centred (curricula draw from the needs and lives of society). However, Ornstein and Hunkins (2013) contends that the categorisation of curricula leads to restrictions. For instance, the Subject-centred curriculum tends to focus on the subject or discipline rather than the learner and usually describes what needs to be studied and how it should be studied. An example of a subject-centred design is the core curriculum which can be standardized across schools and the country. In standardized core curricula, teachers are provided with a pre-determined list of things that they need to teach their students, along with specific examples of how these things should be taught (Ornstein & Hunkins, 2013). The restrictions of a subject-centred curriculum is that it does not foster the individuality of a learner. This form of curriculum design is constructed without taking into consideration the specific learning styles of the learners which Schweitzer (2019) asserts can cause problems with student interaction, motivation and may even cause learners to fall behind in class. Contrary to a student-centred curriculum, a learner-centred or child centred curriculum type can be described as a practice in which "students and teachers learn from one another" (Dewey, 1916, p.15). The learner-centred curriculum design takes each learner's needs, interests, and goals into consideration. However, the shortcoming to this form of curriculum design as Ornstein and Hunkins (2013) is that it is labour intensive. Developing differentiated instruction puts pressure on the teacher to create instruction and find materials that are conducive to each learner's learning needs. Teachers may not have the time or may lack the experience or skills to create such a plan. Like learner-centred



curriculum, problem-centred curriculum is also a form of student-centred design. Problem-centred curricula focus on teaching learners how to look at a problem and come up with a solution to the problem (Ornstein & Hunkins, 2013). Learners are thus exposed to real-life issues, which helps them develop skills that are transferable to the real world. Problem-centred curriculum increases the relevance of the curriculum and allows learners to be creative and innovate as they are learning. The drawback to this form of curriculum is that it does not always take learning styles into consideration. Lawton (1996) favours a problem-centred curriculum as he believes that schools should be concerned with preparing the youth for the world of work after school life. Spady (1994) resonates with Lawton that curriculum should be designed down from exit outcomes which should consist of roles that learners will have as adults in society. These ideas were part of the reason for the emergence of the technology education curriculum in South Africa which will be discussed in greater detail in chapter three. In contrast to Lawton's (1996) and Spady's (1994) preferred type of a curriculum, Stenhouse (1975) favours a more teacher approach. In this approach, curriculum is viewed as a probe through which to explore and test hypotheses and not as a curriculum to be adopted. The teacher approach type of curriculum is also favoured by Taba (1962) who argued that "those who teach curriculum should participate in developing it..." (Ornstein & Hunkins, 1993, p. 268). However Lawton criticizes Stenhouse's (1975, p. 183) proposal for not specifically suggesting criteria in recognizing what would be suitable for learners to learn and what would not.

### **An Incongruence between the Intended, Implemented and Attained Curriculum**

The mandated curriculum is organised by one-size-fits-all objectives and standards intended for designated grade level instruction. Meidl and Meidl (2011) argue that incongruence occurs when designers of mandated curriculum presume learners have the prerequisite skills necessary to introduce new skills. Van Den Akker (2003) asserts a basic analysis concerning curriculum improvement that comprises three distinct levels, perspectives or representations, namely the intended, implemented and attained curriculum. These three levels are intrinsically connected to the extent that curriculum implementation cannot be considered without account of the intended, implemented and attained curriculum. Van Den Akker (2003) claims that curriculum has to be invented, articulated and implemented by relevant stakeholders. These three aspects of curriculum constitute a chain with strong links that cannot be ignored in a critical

appraisal of curriculum change; hence it is deemed necessary to revisit them to clarify the purpose and direction of this research study. The table below (Table 1) summarises the three representations of the curriculum as described by Van Den Akker (2003).

**Table 1**

***Three Representations of the Curriculum - Curriculum as intended, implemented and attained***

<b>Intended</b>	Ideal, Formal, written	<p>-Vision (rationale or basic philosophy underlying a curriculum)</p> <p>-Intentions as specified in curriculum documents and/or materials.</p>
<b>Implemented</b>	Perceived, Operational	<p>-Curriculum as interpreted by its users (especially teachers)</p> <p>-Actual process of teaching and learning (also: curriculum-in-action)</p>
<b>Attained</b>	Experiential, Learned	<p>-Learning experiences as perceived by learners</p>

-Resulting learning outcomes of learners
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(Source: Van den Akker, 2003, p. 3)

The intended curriculum is often presented in literature through the guise of other names such as a written curriculum (Print, 1993; Van Den Akker, 2003), an ideal or formal curriculum (Van Den Akker, 2003), an official curriculum (Cuban, 1992; Bouck, 2008; Kurz, 2010), a planned curriculum (Brown & Brown, 2010) or a prescriptive curriculum (Ellis, 2004).

Although the terms may differ, the perspectives of these writers are similar in most respects. Van Den Akker (2003) argues that an intended curriculum constitutes of the vision or basic philosophy underlying a curriculum whose intentions are specified in curriculum documents or materials (p. 3). Print’s (1993) notion of an intended curriculum although a narrow description also relates the intended curriculum to the written curriculum which provides guidelines for teachers, whilst Brown and Brown (2010) assert that the intended curriculum refers to what is planned (p. 3). However, a shortfall in Print’s (1993), Van Den Akker’s (2003) and Brown and Brown’s (2010) perspective of a curriculum is that they have narrowed the conception of an intended curriculum to strictly mean its intentions, vision and what is planned but does not acknowledge the inclusion and importance of goal attainment for progress while Billett’s (2006) perspective of the term ‘intended curriculum’ in the educational field is comparable to a goal-directed plan as he claims that it includes “the activities, the goals to be achieved and the means by which progress and attainment can be secured” (p. 34). However, literature revealed that a more comprehensive description of an intended curriculum suggests that it pertains to a lot more than just the goals, guidelines and visions, but rather it is usually embodied in curriculum guides, syllabi, textbooks, teacher guides, content of tests and examinations, regulations, policies and other official documents (Bouck, 2008; Kurz, 2010; Brown & Brown, 2010). Since the intended curriculum is a stage where the devising of goals are created, the intention of what goals the curriculum should aspire for becomes crucial. Billet (2006) proposes that basic purpose of the goals is to effectively direct students to achieve the intended educational or school’s goals. In considering the nature of goals of the intended curriculum, it is difficult to avoid Ralph Tyler’s (1949) first fundamental question: What educational purposes do we seek to attain?, as this

question explored educational objectives from various perspectives which included learners and their life outside of school, learner's interests, and learning psychology. The notion of educational objectives underpins the goal-directed educational plan as suggested by Billett's (2006) intended curriculum. In his discussion, Tyler (1949) argues that "these educational objectives become the criteria by which materials are selected, content is outlined, instructional procedures are developed and tests and examinations are prepared" (p. 3). Tyler emphasises that, for designing a sound educational plan and for its progressive improvement, it is essential to recognize the goals of an educational program and the educational objectives are aimed at "accomplishing basic educational purposes" (p. 3). In the work of Porter (2002) it was discovered that the intended curriculum relates to aspects that society envisages as important to learn which a shift from what is planned, to who influences its plan. In comparison to Billett's intended curriculum, Tyler's discussion of educational objectives is more comprehensive as it involves the 'student factors' that have not been mentioned in Billett's (2006) intended curriculum, such as the impacts from students' interests. Several writers of curriculum argue that the intended curriculum is influenced by external forces such as society, the state and policy makers (Tyler, 1949; Cuban, 1993; Porter, 2002; Billet, 2006). Billet (2006) claims that government bodies, the states and religious organisations amongst many others have the tendency to influence the visions of the intended curriculum (p. 34), while Tyler (1949) addressed the influences from the point of view of subject specialists, such as the Committee of Ten of America, and various other committees, as well as National Councils of Teachers in different areas (for example, English, Social Studies, and Mathematics). Other writers also agree that the intended curriculum is determined or defined by the officials at state level and that topics are presented by standards set by the state (McKnight, Cross White, Dossey, Kifer, Swafford, Travers and Cooney, 1987, p. 25).

The implemented curriculum just like the intended is equated with other terms such as the "enacted curriculum" that describe its nature (Billet, 2006). Van Den Akker's (2003) conception of the implemented curriculum as described in table 2 relates to curriculum as interpreted by its users, especially teachers (p. 3). He further elaborates that the implemented curriculum is a process of teaching and learning (Van Den Akker, 2003, p. 3). Brown and Brown (2010) reinforce this idea when he states that "the implemented curriculum is what teachers actually do

in their classroom (p. 3). Billett (2006) share similar sentiments to Van Den Akker and Brown and Brown when he mentions that the concept of enacted curriculum could be seen as a practical action-related process as it represents “what actually happens when the intended curriculum is enacted” (p. 32). However, upon further elaboration, the difference in Billet’s (2006) idea of an implemented curriculum is that he acknowledges learners as being equally important to teachers at this level, which Van Den Akker (2003) ignored in his conception of an implemented curriculum as seen from the table above. In view of the implementation practice in the classroom, Billet (2006) argues that there seem to be two specific foci: teacher-centred (how teachers deliver the intended curriculum), and student-centred (what students receive through such a curriculum) (p. 36). Ellis’s (2004) perspectives of the implemented curriculum highlight engagement of the prescribed curriculum in the classroom with the students, while Porter’s (2004) implemented curriculum further specifies the responsibility of the teacher, as it is an aspect of the teacher’s delivered instruction. Several writers define the implemented curriculum as that curriculum which describes how teachers translate the intended curriculum into practice. Their argue that it includes that part of the intended curriculum that is taught, the instructional practices and tools employed, and the conditions under which those things happens. It has direct implications for how course content is covered, how much time is available for other topics, and ultimately, how much and how well students might learn (McKnight *et al.*, 1987, p. 25). Bouck’s (2008) interpretation of the implemented curriculum reflected a transactional process performed by teachers based on their decisions and interpretations of the curriculum. However, according to the guidelines indicated in the Common Core State Standard of the United States, a study by Porter (2006) indicated that the implemented curriculum explicitly focuses on “the content of the intended curriculum” (p. 103) to be learned by students, rather than on how that content is expected to be taught by teachers. Aspects of the implemented curriculum that might reflect school quality include not only the content of the implemented curriculum (the curriculum topics usually addressed in the classroom), but also the pedagogy (or instructional practices), the materials and equipment (such as technology), and the conditions under which the curriculum is implemented (such as the number of students in the class) (Robitaille & Garden, 1989; Pelgrum & Plomp, 1993; Ottevanger, 2001, p.23). In fact, the implemented curriculum can sometimes vary greatly from the intended curriculum (Grundy, 1987; Cornbleth, 1990). It often encompasses those experiences outlined in the planned curriculum, however, it can be flexible

enough for adjustments to be made to cater for the needs of all learners, and consequently may contain more or less of the learning experiences identified in the planned curriculum dependent upon a number of influences. Typically, these influences relate to the teacher's knowledge and beliefs (including knowledge of their students' understanding and knowledge of assessment), time constraints and access to teaching resources.

Solomon (2009) stated that the implemented curriculum may constitute activities or learning experiences that are not "written" into the plan. Thereby, she has positioned the planned curriculum as the plan that the teacher has developed for covering the intended curriculum, but not the act of teaching the curriculum in the classroom. Thus, the planned curriculum is part of teacher preparation not created during classroom enactment of the curriculum.

As with the intended and implemented curriculum, the attained curriculum is sometimes referred to as the achieved or assessed curriculum (Porter, 2002) and relates to what students learn. Van Den Akker's perspective of the attained curriculum is rooted in the learning experiences as perceived by learners and the resulting learner outcomes of the learners (p.3). The last level is crucial to the design as this will determine if the curriculum was successful or not in achieving its goals (Van Den Akker, 2003). In relation to the context of curriculum reform in South Africa, OBE was used as a point of departure for invention of a new curriculum design (Ankiewicz, De Swart & Engelbrecht, 2005, p.1). In contrast to the implemented curriculum where both the teacher and the student were expected to be involved, the attained curriculum seems to commonly be related to students (or learners) only. This is exemplified in two studies: Hume and Coll's (2010) study of the alignment between the New Zealand national science curricula (addressed as intended curricula) and the student-experienced science curricula (or operational science curricula), and Watters and Diezmann's (2005) study of the contrast between the intended curriculum (focused mainly on university goals) and experienced curriculum (focused mainly on assessment and student learning experiences). It was discovered that in both studies the experienced curriculum was closely connected to students' learning results. However, Billett (2006) warns that there is no guarantee that what is enacted will be experienced. In other words, what teachers' teach cannot be equated to what learners learn. Additionally, Billett (2006) emphasised that the experience of curriculum plays an influential

role in the intended curriculum decision-making and the enacted curriculum performance. This argument conforms to questions two and three of Tyler's (1949) four fundamental questions. Question Two asks, "What educational experiences can be provided that are likely to attain these purposes?" (p. 2) and its revision: "How can learning experiences be selected which are likely to be useful in attaining these objectives?" (p. 63). These questions imply that learning experiences (or educational experiences) can become potential influences on the intentions of an education program.

Porter (2006) defined the assessed curriculum as the curriculum measured by assessment and discloses the content that is the subject of assessment by the teacher: that which students are expected to know. According to Porter (2006) the assessed curriculum is a way of indicating that what is taught in the classroom is not always assessed; however he described that what is assessed is almost always viewed by the teacher as the most important elements of what the students' need to learn. Glatthorn, Boschee and Whitehead (2006) maintain that the attained curriculum has two meanings which comprise an experiential and learned curriculum. The experiential curriculum includes knowledge gained by the learners due to learning experiences, which is dependent on how the curriculum is implemented and therefore also on factors such as school climate. Hence, one intrinsic effect of the experiential curriculum is the "hidden curriculum", which according to Glatthorn *et al.* (2006) is sometimes referred to as the unstudied or implicit curriculum, which might be seen as those aspects of the learned curriculum that lie outside the boundaries of the school's intentional efforts (p. 23). Researchers have argued that the attained curriculum provides an explanation for the presence or lack of presence of alignment between learner expectations and assessment (Smith & O'Day, 1991; Webb, 1997; Elmore & Rothman, 1999; Elliott, Braden & White, 2001; Anderson, 2002; Pellegrino, 2006). For example, while assessment results may be low because of student background factors, they may also be low due to a lack of alignment among the learner expectations, what was taught, and what was assessed.

The intended curriculums, implemented and attained are considered equally important for effective curriculum implementation at school level. However, from the literature it seems that these three levels are largely incongruent with each other. Pellegrino (2006) advocates that intended curricula attempt to ensure educational interactions that lead to students' mastery of

state standards by systematically introducing concepts and skills at a predetermined pace. However, the degree of fidelity in implementation is mediated by individual by individual classroom teachers exercising “teacher prerogative” derived from their professional status (p. 2). Van Den Akkers’s (2003) three conceptions of curriculum seemed to relate the intended curriculum to the decision makers, implemented curriculum to the process of teaching and learning, and the attained curriculum to the learners’ learning experienced. However, it is suspected that a more complex relationship exists between the major stakeholders of an educational sector and these three conceptions of curriculum.

### **Curriculum Design and Components.**

Curriculum design commonly refers to the arrangement of the components of a curriculum (Tyler, 1949; Zais, 1976; Posner, 1992; Jansen & Reddy, 1994). Zais (1976) argues that such components include the selection of aims, goals, objectives, subject content, and learning experiences. Similar sentiments are shared by Barrow (1984) who believes that curriculum design has to do with “curriculum decisions in regard to what content to be included in the curriculum, how it should be presented and how evaluated” (p. 7). For Carl (2009), curriculum design relates to “both the creation of a new curriculum and to the re-planning of an existing one after evaluation” (p. 87). From this it is gathered that the components of a curriculum is subject to scrutiny and revisions. It also explains the call for curriculum reforms in a post-apartheid South Africa. Zais (1976) and Longstreet and Shane (1993) propose five curriculum components that may be useful when designing a curriculum, irrespective of the underlying philosophies of the curriculum. These components are namely, scope, sequence, articulation, balance, and consistency. On the contrary, Longstreet and Shane (1993) argue that when viewing a curriculum from different philosophical perspectives, social problems or characteristics of the learner may be adopted as core design elements (p. 361). This aspect of design elements is important for transformation and redress in South African curriculum design (Asmal, 1999, p. 17). Posner (1992) develops a more extensive set of curriculum components as a framework for analysis that originates from the work of Tyler (1949). Tyler proposed four elements for curriculum design namely selection of education purposes, determination of experiences, organization of experiences and provision for evaluation (Posner, 1992, p. 14). Such approaches from Posner and Tyler are regarded as technical-scientific approaches as they seek objectivity



and a more logical structure. In relation to the study, the notion of standardisation is applicable as the technology curriculum is expected to suit all learners in South Africa. Posner claims that the goals of education must be addressed in a linear structure. (Ornstein & Hunkins, 1993, p. 273). This is consistent with OBE in South Africa. The curriculum depends to a large extent on the emphasis placed upon it in terms of its design (Bennet, 2005). The need for globally equivalent skills raises the debate about curriculum relevance. Productivity and competitiveness depend on the ability to produce highly skilled and adaptive knowledge workers who have well-developed problem-solving skills and are able to continually adjust their repertoire of knowledge and skills to changing environments. Since world of work demands skilled people and there is a great need for designing the curriculum to prepare learners for the future and to fight unemployment (DoE, 1995). Similarly, Bennet (2005) argues that every curriculum design provides an economical basis on which to examine curriculum through the ideas of the purpose, content, method, organisation and evaluation of curriculum (p.16). Hence, countries have designed their school curriculum to suit the needs, abilities and interests of learners, communities and the demands of the world of work. This shall be reflected in the overview of the Technology curriculum of selected countries and South Africa in chapter three. Although the ultimate goal of curriculum design is to improve learning, Schweitzer (2019) claims that there are other reasons to employ curriculum design. Schweitzer (2019) argues that designing a curriculum for middle school students with both elementary and high school curricula in mind helps to make sure that learning goals are aligned and complement each other from one level to the next and if a middle school curriculum is designed without taking prior knowledge from elementary school or future learning in high school into account it can create real problems for the learners (Schweitzer, 2019).

### **Tensions Between Curriculum Design and Adaptation to Context.**

Maniates (2010) argues that curriculum is designed as a “one-size-fits-all” policy which is expected to be executed at all schools irrespective of the context in which it is being implemented and that such a curriculum does not address learner diversity in a productive way. In support of Maniates’s (2010) statement, Mukute and Pesanayi (2014) claims that much of the stipulated goals reflected in the curriculum design are not materialised in reality due to contextual factors. According to Mukute and Pesanayi (2014) “the contextualised curriculum

design and re-contextualisation of curriculum implementation reveal that creative tensions emerge throughout the translation process and that these have to be dealt with reflexively by multiple stakeholders” (p. 62). Such tensions arise from having to engage with the socio-economic and ecological factors that emerge within a specific school context (Mukute & Pesanayi, 2014). The fact that curriculum is created by the curriculum designer, it is usually a construct of their individual reality and does not consider the realities which exist. In most cases during curriculum design an ideal school is visualised when creating a policy (Ellis, 2004). An ideal school in general would consist of one that is endowed with excellent infrastructure and an abundance of resource along with specialist subject teachers. The curriculum dictates when specific concepts and skills have to be taught while making assumptions as to how certain concepts will be taught in order to prepare for the district and state assessments (Meidl and Meidl, 2011). Due to a “one-size-fits-all” curriculum, Meidl and Meidl (2011) claim that in some cases, teachers are forced to “tweak the curriculum” in order to adapt to its demands (p. 17). According to a study of teachers’ adaptation of the curriculum to context, Meidl and Meidl (2011) found that “tweaking the curriculum” as portrayed by teachers are ways curriculum is perceived to be adapted to create a “good program” with “what works in the classroom and what doesn’t” as they believed they could reconcile the limitations of the mandated curriculum by tweaking it to fit the children and learners in the class” (p. 17). Darder, Torres and Gutierrez (1997) suggest that while the document informs teachers as to what concepts and skills to teach, it also “fails to acknowledge the creative potential of educators to grapple effectively with the multiplicity of contexts they find in their classrooms and to shape environments according to the lived experiences and actual educational needs of their students” (p. 332).

Carl (2005) argues that the main reason teachers experience tensions when trying to adapt the curriculum to context is due to the fact that they were not involved during the design of the curriculum. Some studies have found that there is little or no teacher involvement in curriculum design (Carl, 2005; Oloruntegbe, Agbayewa, Adare & Laleye, 2010). For example, Oloruntegbe *et al.* (2010) found in their study in Nigeria that teachers are often implementers of curriculum reforms, but are rarely involved in the development and how best to carry out such reforms. Similarly, in a study in South Africa, Carl (2005) discovered that teachers were for the most part excluded from participation in curriculum development at curriculum levels outside the

classroom. The lack of interaction amongst local teachers as stakeholders are reflected in the statement by Maniates (2010) who states that “curriculum design proceeds with little engagement with the local context in which the programme resides” (p. 2). This further intensifies the tensions experienced by teachers when implementing a curriculum in context. Standardised or universal curricula designed to ensure that all learners receive the same instruction is pitted against teacher prerogative to design instruction to meet the needs of individual students (Carl, 2005). Helsby and McCulloch (1996) refer to this tension as a struggle between teacher professionalism and curriculum control. The use of a mandated curriculum may restrict students’ access to high quality instruction unless teachers freely use their expertise to adapt to local conditions, particularly in cases where teachers have extensive experience to draw from (Maniates, 2010, p.6).

### **The Design of a Technology Curriculum for a South African Context**

As mentioned in Chapter one, the introduction of a Technology curriculum in South Africa was as follows:

*Technology was introduced in the South African curriculum in recognition of the need to produce engineers, technicians and artisans needed in modern society and the need to develop a technologically literate population for the modern world (DoE, 2011, p.8).*

However to achieve such a goal in Technology, the design and implementation of the Technology curriculum for a country like South Africa became controversial. According to Amin (2008), schools in South Africa “vary in terms of poverty and wealth distribution, geographic locations, demography, language, culture, social morals, and religious beliefs” (p. 70). Despite this variation as indicated by Amin (2008) that exists, the Technology Curriculum was issued as a single national curriculum designed for all learners irrespective of the type of school in which they attended. Thus, the Technology Curriculum was designed with guidelines and topics which needed to be covered within a specific time frame. Assessments were predetermined by the curriculum and all learners are to adhere to the reflected tasks in order to be assessed (Meyer & Gent, 2016). However, different groups of individuals have access to different resources and forms of knowledge, depending on variables which according to

Bourdieu (1986) may include race, gender, ethnicity, nationality and even religion. For many learners, schools in South Africa stem from highly advantaged and well-resourced to deeply disadvantaged and under resourced which possesses many problems in receiving and implementing the Technology Curriculum in schools. South African public schools' curricula are not yet decolonized and thus continue to perpetuate the preparation of learners for leading western lives in a continent that is not western by nature. According to Lebeloane (2017), the South African school curriculum does little to address decolonization for equity and social justice in the South African public schools (p. 1). Since the Technology Curriculum adopts the concept of a technocratic curriculum theory which means that curriculum is viewed as a document or plan for instruction in a particular subject (Cornbleth, 1990, p. 13) it does little to factor in the context of teaching and learning which is contrary to a critical curriculum, one that considers context and assumes that behaviour cannot always be predictable; it focuses on classroom interaction and produces opportunities for learning, rather than on predetermined outcomes (Frame, 2003). In a study by Nokwali, Mammen & Maphosa (2017) that sought to establish learners' views on the learning and teaching of the Technology Curriculum in junior secondary schools in one educational district in the Eastern Cape Province of South Africa, it was concluded that an important subject such as Technology may not be taught meaningfully and effectively under the current conditions such as numerous challenges that affected the learning and teaching of Technology in schools and these included lack of time stipulated in the design of the curriculum as well as inadequacy of resources. Froese-Germain *et al.* (2013) attest that a lack of time can restrict or impede a teacher's ability to provide effective instruction.

## Summary of Chapter Two

In this chapter, I introduced the reader to a landscape of curriculum and revealed that curriculum is more complex than just a written statement to describe what topics need to be covered in a period of time. In providing an overview of curriculum conceptions which place curriculum as either a narrow or broad concept, the reader could glean information around the multi-faceted potential of a curriculum. In this study, I work with curriculum as a complicated, broad idea. I provided three differing conceptions of curriculum theory. A technocratic curriculum on knowledge acquisition whilst a critical curriculum fosters individual growth. A hidden curriculum revealed that teaching and learning does not always align with the desired intended curriculum but could promote unintended learning, sometimes for the purposes of control by the teacher and more broadly the state.

From the literature, it is revealed that curriculum designs the guidelines presented in the form of a policy document that is controlled by the state. Curriculum design although subjected to scrutiny and reform creates a vision in which learners have to achieve a predetermined set of objectives within a time frame, irrespective of how and when it is achieved. Whether a teacher interprets it as it was desired or misinterprets the curriculum is solely dependent on the teacher as to how such a curriculum is practiced in the classroom. It is of crucial importance that the intended, implemented and attained curriculum is in alignment for effective curriculum implementation. It has also been gathered that such differences in interpretation by teachers when the intended curriculum is enacted results in a misalignment of the curriculum which defeats the desired vision of a curriculum design. Literature revealed that the unintended learning known as the hidden curriculum is what occurs when teachers ‘tweak’ the curriculum in order to adapt it to context. It is gathered that curriculum causes an imposition, but there’s also resistance and the resistance does not emerge because they don’t want to teach the curriculum, but because they cannot do so because of factors such as lack of resources as being one of them. In the following chapter, I introduced the reader to literature concerning technology, and Technology teachers and the curriculum.

# **CHAPTER THREE**

## **TECHNOLOGY EDUCATION, TECHNOLOGY TEACHERS AND THE CURRICULUM**

### **Introduction**

Technology is an essential part in the general education of all learners. It is important to acknowledge that as technological advancements are in constant evolution, the curriculum too is subject to revision in order to suit the demands of a highly technologically orientated world (Cascio & Montealegre, 2016). Globally, technology is changing how we work, interact and communicate. It has been predicted that as we proceed into the future, the majority of our tasks will eventually become technologically driven (Montresor & Vezzani, 2016). Technologies such as “cloud and mobile computing, machine learning, sensors and intelligent manufacturing, advanced robotics and drones and clean-energy technologies” are not just helping people do things better and faster, but they are enabling profound changes in the way that work is done in organisations (Cascio & Montealegre, 2016, p.350). As Murray (2005) contends, “together these innovations are hurtling us toward a new industrial revolution and savvy corporate leaders know they have to either figure out how these technologies will transform their businesses or face disruption by others who figure it out first” (p.6).

By 2020 it is estimated there will be 1, 5 million new digitised jobs across the globe. At the same time, 90% of organisations currently have an Information Technology (IT) skills shortage, while 75% of teachers and students feel there is a gap in their ability to meet the skills needs of the workforce (Murray, 2015). To prepare the talent needed for the digital economy, Technology education must as Frezzo (2017) contends, adapt as fast as the demand for IT skills is growing and evolving. Hence, it is massive changes that are driving the need towards curriculum revisions in Technology education. If such advancements as mentioned are ignored or not taken into consideration by the Technology curriculum and the teacher, then this will undoubtedly negatively affect the future generation as they will not be equipped with the relevant skills required to take on a highly technologically orientated world (Murray, 2005). While the process of curriculum revision is often a prolonged process by the relevant stakeholders before

its actual implementation in the classroom, it is Technology teachers in the interim, who are caught at the centre of this process. Technology teachers are expected to be kept abreast of technological advancements driving curricular revisions in their teaching due to the daily contact with their learners in class as opposed to the DoE. In comparison to other subjects, it is generally assumed that a History teacher does not necessarily have to be technologically inclined when teaching about the past and so does the Mathematics teacher who strictly follows fixed set rules. By contrast, a subject like Technology is different. Due to constant innovation of technology, a subject like Technology is constantly being modified to adapt to such changes and so it then becomes vital for a Technology teacher to be knowledgeable about these changes in order for such changes to be incorporated into the teaching and learning process. It is, therefore, and the researcher argues, highly important for Technology teachers to constantly revisit their teaching methodologies and practice when executing the curriculum in order to adapt to a subject like Technology. While teaching the Technology curriculum may be rewarding for some teachers, for many, it gives rise to challenges.

The said challenges include the availability of resources to teach the Technology curriculum; the employment of teachers who are uncomfortable in the use of technology and, since Technology is strongly associated with innovation, teachers who are under pressure to constantly keep track of the latest developments in technology feel under threat. Other challenges that emerge are teachers who have inadequate training, or none at all, to teach Technology (Sabieh, 2009). As described in Chapter One, South Africa introduced Technology as part of major curriculum reforms. Due to the absence of past experience of Technology education in South Africa, its introduction was an onerous task exacerbated by tight timeframes (Makgato, 2012).

It is Technology teachers who are at the juncture of the present and the future and have to really keep track of advancements. It therefore is necessary to understand the demands placed on Technology teachers specifically as curriculum revisionists and not solely for the purpose of school success. The role of Technology teachers demands a teacher who is technologically inclined and who is aware about curriculum matters concerning technology, as such teachers even though not trained as curriculum designers, are curriculum consumers (Bloch, 2009). In

order to gain greater insight into understanding of Technology teachers' perspectives on the Technology curriculum, a literature review was undertaken. According to Henning (2004), a literature review is used to contextualize one's study and to argue a case. In this chapter, the literature review concerning technology and Technology education is discussed. The chapter is divided into two sections, namely, technology and Technology education and Technology teachers' perspectives on this curriculum. Section A presents the historical significance of technology, a definition of the term 'technology', its development in education over the years, followed by a discussion on the dangers of Technology education. This section will facilitate an understanding of the demands of the technology, specifically in education. This section also offers clarity on the distinction between educational Technology and Technology education. Section B presents a review of existing literature on the type of knowledge required by a Twenty-First-Century Technology teacher, Technology teachers' knowledge and their espoused beliefs on the Technology curriculum, followed by perspectives of the teaching of the Technology curriculum, the approaches adopted as well the availability of resources. The chapter concludes with a summary.

## **Section A - Technology**

### **Historical Significance of Technology.**

The term technology is of Greek origin and is referred to as "teknologia" which comprises two word stems, namely "tekhne" which refers to an art or skill and "logos" which means an area of knowledge (Chapman, 1996, p.3). Hence, technology constitutes a combination of practical skills and information gathering. It is assumed that those living in the Twenty-First Century are exposed to some form of technology in their daily lives (Reeve, 2001; Chapman, 2002). However technology has always been part of human civilisation since the Stone Age, a broad prehistoric period during which stones were widely used to make implements with an edge or a percussion surface (Reeve, 2001). Some basic technologies, such as the firing of clay, weaving of textiles and smelting of metals, although practiced today, have existed for centuries (Custer, 1995). The first forms of technology related to survival needs during the period of ancient civilisation and were in the form of spears and knives that were carved from rocks and sticks that assisted people to hunt for food (Garrison, 2000). Cockburn (1991) argues that it is the 'mighty



five' devices which comprise the lever, wedge, screw, wheel and the inclined plane that made it possible to create the great Egyptian pyramids and have made a significant impact on architecture ever since (p.45). A rapid development in technology occurred particularly in the nineteenth, twentieth, and Twenty-First Centuries where the partnership between technology and science combined to create inventions such as the telephone, photography, water wheel, steam engine, and the aeroplane which were among the many innovations that changed the world (Garrison, 2000). Innovations such as the printing press and telephone made it easier for people to communicate and perform work-related tasks. As technological developments accelerated into the Twenty-First Century, an even larger progress was witnessed in the field of electronics, information technology, medical advancements, nanotechnology, space technology and cybernetics. Some of the breakthroughs in medical technology seen for the very first time were pregnancy by surrogacy and the first test tube baby being born in 1978 (Garrison, 2000). Technology has since opened up new knowledge to humankind and advancements in space technology have enabled the first person to land on the moon, the development of Mars rovers and a human mission to Mars being planned for the 2030s (Mosher 2017). From the literature, one can see that the evolution of technology since the Stone Age to the present day of the Twenty-First Century reflects that technology is in a state of constant change, striving to make life easier for humans. This is evident through its inventions to date. Indeed, exponential advances in technology have been dramatic and it has become an integrated part of life such that it now seems impossible for one to perform a simple task without the use of some technological gadget (Brown & Brown, 2010).

### **'Technology' as a Definition.**

The term 'technology' is difficult to define as supported by DiGironimo (2011) when he states that, "technology means different things to different people" (p. 1343). As an attempt to define, several individuals have their own perspective of what technology means to them. For instance, Barbour (1993) states that "technology may be defined as the application of organized knowledge to practical tasks by ordered systems of people and machines" (p. 3). Similar to this Friedel (2007) states that his understanding of technology refers to "the knowledge and instruments that humans use to accomplish the purposes of life" (p.1). Arthur (2009) and DiGironimo (2011) concur with the statements above as they both perceive technology as the

acquisition of knowledge and skills by humans used to address a problem, a need or to carry out a purpose. DiGironimo (2011) affirms this when he states that “technology is a creative process and a human practice (p. 1343). Apart from technology being associated with just human practice as revealed in the definitions above, Arthur (2009) claims that technology “may be material or non-material” (p. 28). According to Arthur (2009), the non-material aspect of technology refers to the skills and knowledge acquired by individuals as mentioned in the earlier definitions of technology, whilst the material aspects refer to “a device or instrument” to satisfy human needs (p.28). Similarly, Bain (1937) argues that “technology includes all tools, machines, utensils, weapons, instruments, housing, clothing, communicating and transporting devices and the skills by which we produce and use them” (p. 860). As a departure from technology constituting specialised knowledge and skill, technology is also associated with tangible devices such as computer hardware and tools. A detailed definition of technology is shared by Wepner, Ziomek and Tao (2003):

*... computer hardware that is used both academically and professionally with applications e.g., word processing, power point, spread sheets, educational software, the internet, and online instructional systems e.g., blackboard (p.53).*

This definition reflects that technology introduces multimedia applications and internet resources that assist learners to explore learning concepts and research topics; they are able to present their knowledge in a creative and innovative way (Zhenga, Aradab, Niiyac & Warschauer, 2014). Zhenga *et al.* (2014) emphasises that learners use laptops in schools and at home to communicate solve problems, and access, manage, integrate, evaluate and create information in all their subject areas. From this definition, it is clear that technology also plays a pivotal role in modern learning processes. However, this definition of technology is a limited one that is seen only as beneficial to learners and adults. In a national survey of new media technologies in the home, it was found that the use of technological devices is not only confined to professionals and academics, but is also introduced to and used even by infants at home as part of their everyday lives (Wartella, Rideout, Lauricella & Connell, 2014). Wartella *et al.* (2014) note that, when a child is upset, many parents allow them to play with mobile devices such as a tablet which is a wireless, portable personal computer with a touch screen interface, in

the hope that it will calm them (p. 4). To support the dynamic nature of technology, DiGironimo (2011) states that technology could mean “toys for kids” while seen as a “tool for learning by students” (p. 1343). Apart from the definition of technology associated with problem solving qualities and the satisfaction of human needs, it is thus being perceived as a toy with digital qualities that are used for amusement purposes for children. Postman (1992) avers that, “technology can be seen as a friend and enemy” (p.2). This dual definition of technology is contradicting and shared by the works of Hughes (2004) and Friedel (2007) when they associate technology with negative connotations. For instance, in the opening passage to his book, *Human-Built World: How to Think about Technology and Culture*, Thomas Hughes (2004) states that:

*Technology is messy and complex. It is difficult to define and to understand. In its variety, it is full of contradictions, laden with human folly, saved by occasional benign deeds, and rich with unintended consequences... (p. 2).*

This definition portrays the dual role of technology as rich in its inventions, yet simultaneously disastrous. Friedel (2007) shares similar sentiments to the definition above when he states that “technology can be defined as a pursuit of power over nature” (p. 543). This suggests the attempt of modern humans seeking to harness technology in the aim of controlling Mother Nature. For example, inventions such as the satellite enable a measure of control over weather patterns, whilst medical technology has proved to have some control over genetics and human life (Gareau, 2011, p. 108). Alongside faster production at factories due to modern machinery and the modification of motor vehicles amongst many other developments, technology has unintended consequences such as pollution and depletion of energy resources, with negative effects on people and the environment (Gareau, 2011). Hence, from the various definitions of technology as portrayed in the literature, it appears that the use of technology is problem-free. On the one hand, technology is perceived as knowledge, skills, tools, devices and toys used by humans to satisfy their needs, but on the other hand, it is a term associated with dangerous outcomes. The next sub-heading discusses the dangers of technology in education.

## **Technology and the Danger in Education.**

From a positive stance, technological advancement has simplified the way we do things by saving us time, increasing production, simplifying communication, and improving health care. However, it simultaneously evokes fear and trepidation when one looks at the rapid destruction of the earth's resources and the possibilities for self-destruction that technology has placed in our hands (Ramey, 2012). Ramey (2012) points out that very often the dangers of technology are marginalized due to its inventions being greater than its concerns. There is sufficient literature to address the concerns of technology being inserted into our lives through the Technology curriculum. Ironically, the introduction of the Technology curriculum promises to develop skills which will solve problems, yet through its intentions, stirs up even bigger problems which can destroy mankind, if one is not careful. Some of the dangers of technology encapsulated by several critiques of technology include humans' overdependence on technology, the relationship between capitalism and technology in our lives and the portrayal of negative qualities to children through games (Turkle, 2011; Heidegger, 1977; Germain, 2017; Feenberg, 1991). In the book, *Alone Together: Why we expect more from Technology*, Turkle (2011) argues how the introduction of technology has exposed not only children, but older people to technology when they need to care for digital toys and robots such as the "tamaguchi" that demands care or will literally die. In a study conducted by Turkle (2011), it was discovered that an elderly person in an old age home found comfort in the interaction with a social robot, due to the absence of visits by her family. The robot reciprocated feelings towards the elderly woman which made her feel loved (Turkle, 2011). It appears that when people are alienated from the social world, especially in people who are older, younger or have no friends, technology begins to fill that gap in their lives by fulfilling their social and emotional needs. In this case, technology creates a false sense of emotional attachment and technology is a substitute for human companionship (Garcia, 2012).

Apart from technology taking control of human emotions through digital robots, there is a concern that humans are valued for no other purpose other than for the benefit of production in the economy. According to Heidegger (1977), technology must be understood as a way of 'revealing' which is one of the terms Heidegger developed himself to make it possible to think what, according to him, is not thought of anymore (p. 12). Heidegger (1977) proposes that the horror of the technological age is that everything is revealed as a 'standing reserve' (p. 12). By

this, Heidegger means that everything is ready for ordering and use and human beings are reduced to the status of raw material. Heidegger (1977) claims that “we view nature and human beings too, only technologically; we see nature and people only as raw materials for technical operations” (p. 12). Similar to Heidegger, Germain (2017) claims that “the world we make reflects the way reality is perceived and today the world is perceived in technological terms” (p. 3). Adding to Heidegger’s perception of technology, Malpas (2006) suggests that the danger is that humans will also begin to interpret themselves as raw materials, available for production and manipulation and part of the endless process of production and consumption, with loss of dignity. In the technological era, no longer are individuals commanding presences for each other; they have become disposable experiences that can be turned on and off like water from a faucet (Malpas, 2006, p. 325). In other words, human beings are becoming enslaved by technology without realising it and technology is taking control over all aspects of life in the place of work as well as on a personal level.

Another danger of technology in education is the concern of technology taking over human labour (Khan, 2017). Under capitalism, which refers to an economic system in which industry is controlled by private owners for profit, technology is widely used against working people (Khan, 2017). Capitalism adopts new technologies which eventually have an impact on the economically vulnerable. Khan (2017) argues that digital robots and machinery are replacing jobs in many sectors of the economy and the state, causing an increased level of unemployment which leads to a polarisation of the work structure and a shrinking middle class. Ironically, the Technology curriculum seeks to develop technologically literate citizens who are skilled to perform these jobs, yet there may be no need for such skills in the future due to advances in technology (Hawksworth, Berriman & Goel, 2018). Instead of improving and developing human life and society’s living conditions, capitalism’s technological revolutions have ultimately ended up causing unprecedented disparity, exploitation and harrowing poverty. In a recent study PricewaterhouseCoopers (PwC), an accounting firm, to analyse the potential long term impact of automation, it was revealed that up to 38% of all current jobs in the United States will be replaced by technology in a decade (Hawksworth *et al.*, 2018). Khan (2017) asserts that although the unique nature of capitalism is all about the infinite expansion of capital and its transformation into personal wealth, the advanced instruments of production through technology

drive beyond private ownership. For example, the possibilities to use technological advancements to reverse global warming and to secure a prosperous future for mankind are limited through capitalist agendas that provide inadequate funding. There still remains an unprecedented level of inequality in the era of technological advances. Despite advance in technology, capitalism continues to thrive by increasing exploitation of labour, resulting in a secure financial position for business owners leaving the poor and middle working class stagnant (Khan, 2017). In other careers such as computers and graphics, gaming technology has also taken over the entertainment industry aimed at young people. The downside is that many youngsters are addicted to such games, many of which promote dubious values and contain vulgar language: “a game called Grand Theft Auto was developed and the game consisted of stealing cars, shooting and hurting random people plus more offensive material like the prostitute characters” (Parker, 2015, p. 7). While learners are equipped with skills to graphically design games, it seems that the nature of games developed promote negative behaviour and aggravate problems in society. As an attempt to minimise the danger of technology, Feenberg (1991) proposes a more critical outlook to the dangers of technology when he argues that technology is not an independent factor like science; rather it is part of a cultural system that shapes humanity. He proposes a critical theory to looking at technology which suggests using the same technology in many ways, that is, to create a new set of technology that embodies new values. The new technology would not be maximising profit; instead, values would be considered more important.

From the literature it is gathered that technology is deeply rooted in capitalism under the guise of the curriculum. The literature reveals the dangers of technology being inserted in our lives and provides examples by revealing the tendency of humans being ultimately controlled by technology, rather than they being in control. There is a fear of robots taking over peoples jobs. It is discovered that values and dignity of human beings are traded for material benefit. The question then that emerges from the literature is whether schools are schooling for profit or values in learners and as to whether the Technology curriculum is striving to create a learner who will eventually succumb to technology’s control or one who is aware of its dangers, is rooted in values and who approaches technology with a critical mind, as Feenberg (1991) proposed, that one who not only enjoys the glory of inventions, but recognises the dangers that could follow. Heidegger (1977) emphasised that people should not reject technology altogether, but perceive

its danger. The literature review also reflects the need for Technology teachers to understand the curriculum vision in order to achieve the curriculum goals. The vision is very important because it is at the centre of any curriculum and it controls all curriculum concepts (Khoza, 2016).

### **Development of Technology in Education.**

Technology has not only changed aspects of our daily lives, but has undoubtedly also been changing the dynamics in education. According to the International Technology Education Association (ITEA) (2007), education needs to adapt to the growing impact of technology and educational programmes should be aimed at making pupils more technologically literate. It is important to note that, while schools did not offer formal Technology education in the past, technology has indirectly always been a part of teaching and learning. Technology in education can be traced back to ancient civilisation around 30 000 BCE, (before Christ era) when early human beings used cave drawings as a means of communication which is considered a form of education as such drawings contained meaning and hence delivered important messages. The Pythagoras Academy was founded in 510 BCE (Oxford Interactive Encyclopedia, 1997). During the 1800s, students used slates and chalk. Many years later, educational devices such as the printing press and the typewriter came into being. However, there were limitations as the early typewriter could only type in capital letters. Blackboards were introduced in the early nineteenth century, to be replaced by interactive white boards in the 1990s. The 1970s saw the introduction of the calculator that helped learners solve maths problems faster. However, fears were expressed that the calculator would suppress or restrict thinking in learners (Oxford Interactive Encyclopedia, 1997). The computer age saw a breakthrough in technology, leading to the introduction of the first computer by the International Business Machines Corporation (IBM) which is an American multinational technology company. However, word processing was the sole application until the introduction of the World Wide Web (www.) which is a system of internet servers that support specially formatted documents in 1990. The World Wide Web enabled learners to access information on a computer rather than having to visit a library. Classroom equipment that empowers teaching and enhances student learning has opened up new possibilities. The Twenty-First Century witnessed the interactive age in technology that introduced modern gadgets such as smart phones, and social media. It is thus clear that much progress has been made in Technology in education, particularly in the past two decades.

As a learning area, Technology education's roots lie in the technical specialised subjects that were dominant in the past, including woodwork, needlework and metalwork amongst others appears on list (Christensen, Johnson & Horn, 2008). The current educational system dates back to the industrial revolution, when people required training for factory jobs (Zuga, 1989; Christensen *et al.*, 2008). As a result, the development of modern machinery led to changes in skills requirements. The industrial revolution has become a distant memory and skills that were previously prioritised are now insufficient to compete in the global economy. Employers now seek employees who can work and think differently (Christensen *et al.*, 2008). Thus, the primary reason for introducing Technology in education is to inculcate a better understanding of current technology among learners. According to Yeomans (1998), "the economic arguments for the inclusion of Technology within the curriculum focuses upon the preparation of young people for the world of work, where the subject is seen to have vocational value, for example, in its ability to produce a technologically trained workforce" (p. 9). As noted earlier, many of the topics that are part of the Technology curriculum, such as Woodwork and Art were once regarded as technical subjects. According to Wicklein (1997):

*Technical skills have unique and historical roots within the field of Technology Education and industrial arts; classroom activities related to tool use have been an important motivator for many students over the years (p. 74).*

It is therefore literally impossible to address the study of Technology in any practical terms without considering some application of tool skills. The shift in skills requirements resulted in the revision of the Technology curriculum (Sherman, Sanders, & Kwon, 2010), with more emphasis placed on technological literacy (Purcel, 1992; Wicklein, 2009; Brown & Brown, 2010; Jones, Bunting & De Vries, 2013). The development of the Technology curriculum from a purely craft-based and vocational approach to "thinking processes and technological content" is work in progress (Sherman *et al.*, 2010, p. 376). The aim is not only to provide quality education for all learners, but also to produce technologically-minded citizens who are good problem-solvers, and critical and innovative thinkers who are sensitive to the environment surrounding them (Sherman *et al.*, 2010).



## **Clarifying Educational Technology and Technology Education.**

In a study conducted by Dugger and Naik (2001), it was found that secondary school principals, teachers and curriculum development specialists did not know the differences between Technology Education and Educational Technology. It seems that educational specialists and stakeholders still confuse Educational Technology with Technology Education. Several writers argue that Educational Technology should not be confused with the Technology Education curriculum (Dugger & Naik, 2001; Brown & Brown, 2010; Hallstrom, Hulten, & Lovheim, 2013) as “this misconception and misunderstanding of concept could impair good decisions and bring about wrong application” (Patrick, Eje, Keziah, & Uchechukwu, 2016, p. 98). Muffoletto (1994) states, “Educational Technology is commonly thought of in terms of gadgets, instruments, machines and devices...” (p. 6), while Dugger and Naik (2001) claim that Educational Technology involves the “use of technology as a tool to enhance the teaching and learning process across all subject areas” (p. 32). Similarly, Al-Faki (2014) posit that Educational Technology is the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources and aids to improve the progress of human learning. Patrick *et al.* (2016) suggest that it is through Educational Technology that students develop a “wider range of knowledge and understanding of concepts” for higher productivity through effective delivery of lessons (p. 95). A report compiled for the Nellie Mae Education Foundation stated that, “technology can equip students to independently organize their learning process, instead of being passive recipients of information; students using technology become active users” (Moeller & Reitzes, 2011, p. 4). One such example includes the interactive whiteboard (IWB) which is a large interactive display in the form of a whiteboard that aims to transform classroom learning and teachers’ roles. It enables learners to write and draw by means of the touch of a finger (Al-Faki, 2014). Finally, teachers can also use the internet to bring the outside world into the classroom.

By contrast, Technology Education, being the focus of this study, has an official curriculum (Brown, & Brown, 2010, p. 49); this curriculum refers to “aspects of an educational system involving instruction in Mathematics, Science and technological concepts, directed towards the understanding of and ability to apply technology” (Wilson, 1993, p. 1). Technology Education teaches learners about technology as an educational area of content that is

underpinned by a curriculum which encompasses its aims, outcomes, goals, instructional methods and assessment and should be treated as a separate learning area (Brown & Brown, 2010, p. 53). Custer, Valsey and Burke (2001) similarly define Technology Education as the teaching and learning of technological processes and technology in a classroom setting or workshop within a school context. Furthermore, the introduction of Technology Education aims to assist learners to investigate, research and find possible solutions to a given technological problem. Technology Education develops interest and curiosity among the students and not only provides theoretical knowledge to students, but also makes them professionally skilled by providing practical knowledge. Through Technology Education, students become aware of their social status by keeping themselves up-to-date and can solve their problems by sitting together for group learning as well as promoting creativity, retention and entertainment to students (Patrick *et al*, 2016, p. 95). Chapman (2002) claims that the knowledge, values and skills that are required for the world of work can be taught through a Technology curriculum. The International Technology Association's Standards for Technology Literacy: Content for the Study of Technology (STL) state that "technology is the modification of the natural environment to satisfy perceived human wants and needs" (ITEA, 2007, p. 9). As a subject, Technology incorporates all areas of human innovation and is concerned with "design, making, problem solving, technological systems, resources and materials, criteria, constraints, processes, controls, optimization, and trade-offs, inventions" in order to find solutions to human needs and wants (Dugger & Naik, 2001, p. 31). Gibson (2008) emphasises that "design, skills and values" are all necessary components of Technology Education (p. 13).

## **Section B –Technology Teachers and the Curriculum**

### **Teacher Knowledge for the 21<sup>st</sup>Century Technology Teacher.**

Since the universal vision of the Technology curriculum demands that learners strive towards technological literacy, it then becomes paramount for learners to have a teacher who is able to transfer the necessary knowledge and skills to their learners as argued by Lawless and Pellegrino (2007) when they state that "technological literacy has fast become one of the basic skills of teaching and that teachers need to firstly build the knowledge of Technology itself before they can teach" (p. 580). It is therefore necessary to understand the kind of teacher

knowledge the Twenty-First Century Technology teacher should embody in order to teach the Technology curriculum. Conceptualising teacher knowledge is a complex issue that involves understanding key underlying phenomena such as the process of teaching and learning, the concept of knowledge, as well as the way teachers' knowledge is put into action in the classroom. Verloop, Van Driel and Meijer's (2001) concept of teacher knowledge refers to "the whole knowledge and insights that underlie teachers' actions in practice" (p. 446). This knowledge concept emphasises that beliefs and insights are closely interwoven and play an important role in constructing and organising teacher knowledge (Verloop *et al.*, 2001). A more detailed and comprehensive concept of teacher knowledge is given by Shulman (1986) when he proposed that teacher knowledge includes knowledge of the subject, known as content knowledge (CK), knowledge of teaching methods and classroom management strategies, known as pedagogical knowledge (PK), and knowledge of how to teach specific content to specific learners in specific contexts, which is referred to as pedagogical content knowledge (PCK). Building on Shulman's (1986) model for PCK, Mishra and Koehler (2006) proposed an extension in the dimension of technology knowledge (p. 1027) and showed how various kinds of teacher knowledge could be derived from the integration of technology, pedagogy, and content knowledge. These integrated forms of knowledge are, namely, pedagogical technological knowledge (PCK); technological content knowledge (TCK); technological pedagogical knowledge (TPK) and technological pedagogical content knowledge (TPCK) reference was listed (Mishra and Koehler, 2006, pp. 1027-1028). Together with technology knowledge (TK), pedagogical knowledge (PK) and content knowledge (CK), these seven kinds of knowledge make up the TPCK framework (TPCK was later termed "TPACK" for ease of pronunciation (Mishra & Koehler, 2006, pp. 1026-1027). According to Mishra and Koehler (2006), teaching is a highly complex activity drawing from many kinds of knowledge, the two main kinds of knowledge being knowledge of content and knowledge of pedagogy (p.1020). Shulman (1986) claims that knowledge of content and knowledge of pedagogy cannot be separated during teaching, but must be integrated, as teachers are confronted with both issues while teaching. However, despite TPACK providing a much needed framework for Technology teachers, the model has been criticised for being imprecisely formulated and in need of further theoretical development (Graham & Helen, 2011). Furthermore, it has been claimed that TPACK does not deal with evaluation consistently, has not been related to specific disciplinary areas, and has not

been sufficiently researched in higher educational contexts (Papanikolaou, Makri & Roussos, 2017).

Despite PCK's widespread use, Ball, Thames and Phelps (2008) claimed that it "has lacked definition and empirical foundation, limiting its usefulness" (p. 389) and thus extended Shulman's (1987) PCK to claim that there is common content knowledge (CCK), specialised content knowledge (SCK), the knowledge of context in students (KCS), the knowledge of context in teaching (KCT) and the knowledge of the curriculum. Ball *et al.* (2008) claim that the reason CCK is called "common" is because this knowledge is not specific to teaching and non-teachers are likely to have it and use it; on the contrary, SCK is specialised knowledge which teachers need to learn and know (p. 401). Not only do teachers need this knowledge to teach effectively, but it is probably not needed for any other purpose (Ball *et al.*, 2008). In other words, recognising a wrong answer is CCK, whereas sizing up the nature of an error, especially an unfamiliar error, typically requires flexible thinking about meaning in ways that are distinctive of SCK. In contrast, familiarity with common errors and deciding which of several errors students are most likely to make are examples of KCS (Ball *et al.*, 2008, p. 401). In order for a Technology teacher to be able to implement the Technology curriculum at school, he or she must be knowledgeable of the content of the Technology curriculum, which sets out the key issues to be taught, that is, problem solving using the design process, practical skills, knowledge and application of knowledge. Thus, a specialist kind of knowledge is required to implement the Technology curriculum. From Shulman's (1986), Mishra and Koehler's (2006) and Ball *et al.*'s (2008) constituents of teacher knowledge, it is gathered that in order for effective teaching and learning to occur in a classroom, every Technology teacher should embody the elements of PCK, TPACK, CCK, KCS and SCK.

Rohaani, Taconis and Jochems (2009) emphasise that teacher knowledge directly affects the teaching and learning process as well as learners' attitudes towards Technology; they stress the importance of Technology teachers having sufficient knowledge of this subject as such knowledge is vital in developing technological literacy amongst learners. When Technology teachers' display a positive attitude, more learners are expected to choose vocational careers and technical studies (Rohaani *et al.*, 2009, p. 327).

## **Technology Teachers' Espoused Beliefs in Implementing the Technology Curriculum.**

Beliefs can be inferred from what people say and do (Pajares, 1992) whilst a perspective is simply a person's viewpoint on a phenomenon (Baker, 2007). As beliefs help to guide an individual's interactions and interpretations of the world, the same can be said about the beliefs a teacher might have regarding the teaching and learning process and the instructional decisions that might result (Kagan, 1992). Teacher beliefs do not occur in a vacuum; instead, factors and conditions that lead to the creation of teacher beliefs are tied to personal and cultural experiences, cognitive insights as well as "critical images and episodes" (Pajares, 1992, p. 310). Evidence demonstrates that beliefs can and do influence the choices a teacher makes regarding the implementation of the Technology curriculum (Ertmer, 2005; Niederhauser & Stoddart, 2001). The literature reveals that Technology teachers have different beliefs on what they feel is correct or not, which is commonly referred to as their espoused beliefs (Pajares, 1992; Froese-Germain *et al.*, 2003, Reil & McGahey, 2013; Cviko, 2012). Espoused beliefs may stem from a lack of technological content, lack of training in the use of technological devices or a lack of equipment to deliver teaching and learning (Cviko, 2012; Froese-Germain *et al.*, 2013). On the contrary, Warwick, Watson, Hennessy and Nicholl (2016) note that factors such as teacher confidence, a lack of teacher competence and teacher resistance to change affect the implementation of the Technology curriculum. According to Habler, Hennessy, Cross, Chileshe & Machiko, (2015), "there may be resistance to change due to teachers' ingrained beliefs, the fear of losing authority or difficulty in letting go" (p. 807).

Some Technology teachers regard the curriculum as a 'sore spot' (Niederhauser & Stoddart, 2001, p. 27); this view is due to conflict between what it dictates and what they believe is important. For example, some teachers feel that it should include focus areas for interview skills, life skills, and résumé writing that would be useful to learners when applying for a job (Niederhauser & Stoddart, 2001). In South Africa, Technology does not go on to Grade 12, that is, it has no university entry option. For these reasons, it is not likely to be valued by some Technology teachers as they view Technology as unimportant and such beliefs may reveal the reluctance of Technology teachers to effectively implement the curriculum (Niederhauser & Stoddart, 2001). Cviko, McKenney & Voogt (2012) agree with Niederhauser and Stoddart (2001) by stating that: "teachers' interpretations of the meaning and intentions of the new

curriculum can be regarded as a factor affecting actual implementation” (p. 34). Another factor that can influence teachers’ belief is the perceived value for the instructional use of technology in whether or not it would positively impact the teacher’s instructional goals (Watson, 2006). In a study by Wozney, Venkatesh and Abrami (2006), expectancy-value theory was used to analyse teacher technology practices. Teachers who showed confidence in their ability to implement the identified technology, as well as valued the potential outcome for that technology, were identified as those “more likely to be at the high end of the ‘technology user’ spectrum” (p. 195).

Implementation of the Technology curriculum does not rely on theory and discussion in class, but calls for practical demonstration of concepts through the use of tools and equipment, yet teachers are hesitant to adopt curricular innovations (Ponticell, 2003). This resistance is because technology tools and resources are constantly changing, unlike curricular changes in Mathematics which occur only periodically (Straub, 2009). This change demands that Technology teachers be ready for constant changes in teaching and learning. Although some teachers might believe that technology helps them accomplish professional and personal tasks more efficiently, they are reluctant to incorporate the same tools into the classroom for a variety of reasons, including the lack of relevant knowledge (Lawless, & Pellegrino, 2007), low self-efficacy (Mueller, Wood, Willoughby, Ross & Specht, 2008), and existing belief systems (Ertmer, 2005; Subramaniam, 2007). In other words, despite the presence of resources at some schools, Technology teachers are contained in their beliefs and prefer not to utilise these resources in the implementation of the Technology curriculum.

Furthermore, the context in which teachers work often constrains or limits individual efforts (Roehrig, Kruse & Kern, 2007; Somekh, 2008). In a three year longitudinal case study, Levin and Wadmany (2005) studied the impact a technology-rich learning environment had on teachers’ beliefs. Teachers received professional development in the form of trainings and weekly workshops on the effective implementation of Technology in teaching and learning. By the end of the study, participants experienced a significant change in their practice, as well as their beliefs, demonstrating a “reciprocal rather than unidirectional link between teacher classroom practices, change in teachers’ educational beliefs, and between teachers’ knowledge restructuring process” (p.298). Despite the appearance that teacher beliefs are firmly entrenched, providing experiences that not only challenge a teacher’s underlying belief structure, but

demonstrate the benefits for teaching and learning, may facilitate a change in these beliefs (Kagan, 1992).

### **Approaches to Teaching the Technology Curriculum.**

The literature notes that the most striking characteristic of Technology that makes it unique is the prescribed method of teaching and learning in list (Barlex, 2011). In South Africa, the approach to teaching and learning of Technology is project-based, using group activities to drive the process and hands-on experience, with the end product being the Mini-PAT. The tool used to assess the Mini-PAT is an analytical rubric (DoE, 2011, p. 43). The curriculum proposes a learner-centred method of teaching and learning that encourages co-operative learning in the classroom (Brown & Brown, 2010). It is argued that the learner-centred approach is more effective than a teacher-centred environment as learners are able to actively participate in the construction of knowledge (Roblyer, Edwards & Havriluk, 2004). Learners in Technology classrooms work in groups to analyse the given information in order to create practical solutions. Learners co-operate and communicate with each other, often combining verbal and graphic modes of communication. Discussion and reporting techniques and use of appropriate terminology are encouraged during technological activities (DoE, 2002, p. 15). Trucano (2005) observes that “concerning the pedagogical rationale, the integration of Technology in education is claimed to facilitate a transformation of the teaching and learning process from being highly teacher-centred to student-centred” (p. 5). Keengwe, Onchwari and Onchwari (2009) concur by stating that this approach is:

*...desirable because it helps learners to become actively engaged in the learning process, take responsibility for their learning, and enhances their skills to learn how to learn (p.12).*

However, despite a stipulated approach to teaching Technology in the curriculum, several researchers have identified inconsistencies between teachers’ perspectives and their classroom practices (Ertmer, 2001; Cviko *et al.*, 2012; Safitry, 2015; Palak & Walls, 2009; Froese-Germain *et al.*, 2013). Earlier studies indicated that teachers enact belief, particularly in terms of classroom Technology practices, yet these did not always align with their espoused beliefs (Ertmer, 2001). Many teachers implement Technology drawing on their personal pedagogical

beliefs on approaches to teaching and learning with which they feel comfortable, and do not follow what is outlined in the curriculum (Froese-Germain *et al.*, 2013; Palak & Walls, 2009). These approaches included completion of tasks, practice skills and learning isolated facts (Palak & Walls, 2009). Many Technology teachers identify as teachers with learner-centred beliefs (Palak & Walls, 2009; Glassett, 2007). Such teachers subscribe to “cooperative learning”, a strategy that allows learners to grow and learn through classroom interaction that builds social skills (Braukmann & Pedras 1990, p. 30). Teachers in a supportive and resource rich context usually adopt a learner-centred approach to teach Technology (Glassett, 2007). Research has shown that teachers who take on a learner-centred approach to teaching and learning have been associated with the classroom use of technology (Ertmer, 2005; Wozney, Venkatesh & Abrami, 2006). While teachers use technology to access and manipulate data, gather resources, and enhance instruction, teachers who support learner-centred instruction fully understand that in the hands of their learners, Technology offers the potential to problem solve in a real world context and to construct knowledge through global interaction (Lajoie & Azevedo, 2006). Palak and Walls (2009) found that the role of the teacher in an ideal Technology classroom is that of a ‘facilitator’, who guides learners in their learning, and assists them to acquire knowledge and make things work (p. 429).

However, some Technology teachers continue to use traditional methods of teaching that adopt a more teacher-centred approach (Palak & Walls, 2009). Since one of the main aims of the Technology curriculum is to produce technologically literate learners, communication amongst learners is vital (Moeller & Reitzes, 2011); furthermore, it becomes a challenge (Palak & Walls, 2009). According to Palak and Walls (2009):

*Unless the focus of Technology integration is explicitly on student-centred pedagogy, Technology integration may continue to support teacher-centred practice with inadequate, highly controlled student use in the classroom (p. 437).*

Furthermore, while developing critical thinkers is central to the Technology curriculum, it was discovered that “most teachers do not regularly employ methods that encourage and develop thinking in their students” (Braukmann & Pedras, 1990). Literature reveals that, despite



the fact that group work, communicative activities and learner-centred approaches are stipulated in the Technology curriculum, some teachers resist adopting learner-centred methods. For instance, Palak and Walls (2009) study found that despite having large classrooms, some Technology teachers preferred to adopt a teacher-centred approach even though they were working in technology-rich schools, as they preferred an authoritarian method of instruction rather than a collaborative one. The findings in a study conducted by Mathumbu, Rauscher and Braun in 2014 revealed that some teachers in South Africa find it difficult to employ methods that satisfy the conditions stipulated in the Technology curriculum due to a lack of training in both content and methodological approaches and, as a result, continue traditional ways of teaching (Mathumbu *et al.*, 2014). This finding supported that of Palak and Walls.

### **Teaching the Technology Curriculum.**

Teachers are considered the driving force in the implementation of the curriculum. According to Kahn (1997), "...teachers teach as they have been taught" (p. 27) and Technology teachers' knowledge is therefore framed by their views on the nature of technology and their experiences with technology. The way they were taught contributes to their knowledge of Technology. Kahn (1997) adds that many teacher training colleges resisted the incorporation of Technology into their educational programmes. The reasons included insufficient equipment and expertise, an already overburdened curriculum, and suspicion that Technology is a passing fad rather than a subject worthy of study (Roberts & Ferris, 1994, p. 26). As a result, Palmer (2001) argues that in cases where Technology teachers' portray negative attitudes to teaching the Technology curriculum, this often stems from negative experiences they had through their own education which continue throughout their pre-service teacher training. Mellado, Bermejo, Blanco & Ruiz (2008) concur by stating that "prospective teachers have beliefs, attitudes, attitudes and emotions about themselves, towards their learners, and towards the teaching and learning of their subjects which are the result of the many years they themselves spent in school and which may influence their future teaching" (p. 41). It was discovered from the literature that teacher's content knowledge also affects their confidence levels which in turn affect their teaching. Technology teachers may lack confidence in their abilities to teach Technology because of incomplete content knowledge. Those lacking confidence tend to engage in avoidance behaviour, such as not teaching a section in Technology which they are not

comfortable with teaching due to their lack of knowledge (Potgieter, 2004). Hence, teachers reported that they acknowledge the success of their teaching only when they felt confident in it. Pool, Reitsma and Mentz (2013) argue that “teachers who teach with limited subject knowledge will only focus on areas of knowledge which are familiar to them and which will influence their level of teaching” (p. 372). A number of studies have found that Technology teachers do not have the necessary content knowledge to teach the themes associated with Technology (Ankiewicz, 2003, p. 17; Reddy, Ankiewicz, De Swart & Gross, 2003, p. 29; Potgieter, 2004, p. 210). The Bernstein Report (2011, p. 4) stated that many practicing teachers in Mathematics, Science and Technology were not teaching effectively and that one of the reasons given was poor training. A successful Technology teacher should have technological competencies which include subject knowledge, pedagogical subject knowledge, subject skills and pedagogical subject skills (Jones & Moreland, 2004). According to De Vries (2011, p.149), no other subject relates to Technology and it would thus be difficult for a Technology teacher without formal Technology training to base his or her teaching and learning strategies on approaches adopted in other subjects (Pool *et al.*, 2013).

Many Technology teachers confront challenges such as time constraints in successfully integrating technology into classroom activities that require learners to work collaboratively and think critically, which are among the goals of the Technology curriculum. A national survey conducted by the Canadian Teachers’ Federation (CTF) revealed that “a lack of time is the most significant factor restricting a teacher’s ability to provide instruction” (Froese-Germain *et al.*, 2013, p. 4; Ramorola, 2013).

Froese-Germain *et al.* (2013) argue that the teaching of the Technology curriculum has also expanded expectations of teachers as besides implementing it, teachers face the challenge of providing learners with “technical support” and counselling those with “complex social and emotional needs” (Froese-Germain *et al.*, p. 4). Such aspects of teaching as Morrow (2007) asserts would fall into the category of “material elements” of teachers’ work (pp. 10-11). According to Morrow (2007), “material elements refer to the ways in which an object or action may vary without ceasing to be an object or action of a particular kind”, whilst a formal element “is the reason we provide for saying that something is an object or action of a particular kind” (pp. 10-11). In other words, the “formal elements” in teachers’ work refer to the actual teaching

and learning process whilst the “material elements” refer to concrete objects and not to the actual cognitive process (Morrow, 2007). Drawing from the definition of material elements by Morrow, one can infer that Technology teachers do not simply engage in cognitive aspects of the teaching process which form the formal elements of teachers’ work. Instead, teachers are increasingly encumbered with extraneous child-oriented activities. In other words, Technology teachers have to perform tasks for which they are not trained (Amin & Ramrathan, 2009). These tasks seem to form part of their job description, despite them not being professionally equipped with the necessary knowledge and skills.

### **The Use of Technological Devices in Teaching the Technology Curriculum.**

It is argued that the competent Twenty-First Century Technology teacher no longer approaches teaching with technology using techno-centric strategies and techniques (teaching the tool) instead they incorporate more content-centric approaches (teaching with the tool) (Harris, Mishra, & Koehler, 2009; Jonassen, Howland, Marra & Crismond, 2008). Teaching with the tools rather than teaching the tools allows teachers to see more quickly how the tools can be used to support learning. When thinking about technology as an innovation, Fisher (2006) cautioned against viewing technology as an agent of change. Rather, he argued that teachers must assume this role. In recent years, literature on the Technology curriculum has emphasised that the use of technological devices by teachers can accelerate and enhance teaching and learning in the classroom (Alam, 2011; Puckett, 2013; Ehrlich, Spote, Sebring & Consortium on Chicago School 2013; Sanders, 2012; Al-bataineh, Anderson, Toledo & Wellinski, 2010). Yu (2013) believes that the use of technological equipment is essential in achieving the goals outlined in the Technology curriculum when he claims that “technology is not a piece of equipment; it is one of the many educational aids teachers and students use to make learning more effective” (p. 10). According to the University of Chicago Consortium on Chicago School Research (CCRS) report on teaching and learning in Chicago public schools, “students in schools with higher-achieving students use computers and the internet more...” (Ehrlich *et al.*, 2013, p. 3). Similarly it was found that the use of Information and Communication Technologies (ICT) which refer to technologies that provides access to information through telecommunications, problem solving, information management, collaboration, and communication skills in schools, boost learners’ interest in learning; they also enable a higher level of control in their thinking, thus enhancing

their performance (Alam, 2011, p. 96). As a result, Puckett (2013) claims that “more and more classes are gaining access to document cameras, interactive whiteboards, tablets, laptops, and various other methods of technology to enhance the learning process” in the United States (p. 6).

In contrast to the views above that favour the use of technological devices in learning, Brown and Brown (2010) argue that “technology is a tool that can enhance learning, but cannot solely be relied upon to increase students’ academic performance” (p. 5). To reinforce the statement by Steeves (2014), a project on *Young Canadians in a wired world-phase III* found that although many teachers believed that learners enjoyed working and playing with these devices, it has not made them better learners (Steeves, 2014, p. 3). In such cases, teachers often rely on technological devices to teach students rather than using technology as an educational tool (Steeves, 2014).

Apart from the use of technological devices to assist learners in learning, literature also revealed studies that focused on the use of technology to support and complement teachers’ pedagogical beliefs about the curriculum and practice (Sardegna & Dugartsyrenova, 2014; Niederhauster & Stoddart, 2001). To qualify this, Niederhauster and Stoddart (2001) state that:

*If technology is presented as a tool for fostering student-central curricula, then teachers with teacher-centred beliefs are likely to use it, if at all, to support the kinds of traditional activities with which they were comfortable (p. 28).*

The claim above is supported by Kozma’s (2003) international study on technology and classroom practices which found that:

*When teachers go beyond basic practices and use technology to also plan and prepare instruction, collaborate ....and when students also use technology to conduct research projects, analyse data, solve problems, design products, and assess their own work, students are more likely to develop new ICT skills (p.13).*

As a result, those teachers who integrate use of technological devices into their teaching are more likely to adopt constructivist teaching styles (Niederhauster & Stoddart, 2001). Niederhauster and Stoddart (2001) state that:

*This connection between the use of technology and constructivist pedagogy implies that constructivist-minded teachers maintain dynamic student-centred classrooms where technology is a powerful tool (p. 28).*

Collaboration amongst learners is essential in order for them to strengthen their communication skills, which is one of the goals of the Technology curriculum. Some teachers believe that using a computer is a privilege; it is therefore only used for reward and reinforcement purposes (Palak & Walls, 2009; Yu, 2013). Such teachers believe that their use of technological devices not only motivates, but sustains their students' interest in class (Niederhauser & Stoddart, 2001).

It was also discovered from the literature that although teachers were using some form of technology in the classroom to teach, this was not enough for effective teaching of the Technology curriculum. The following observation by McCabe and Van Wyk (2012) argues that teachers who teach an evolving subject like Technology are still using out-dated technological devices to teach. The chalkboard was invented in 1801. While many Twenty-First Century learners have digital devices in their pockets, teachers are using technology developed more than two centuries ago as teaching aids. It is no wonder that many learners are bored (McCabe & Van Wyk, 2012). Even though the use of technological devices is beneficial to both learners and teachers in implementing the Technology curriculum, many learners and teachers “lack access to quality technological devices” (Froese-Germain *et al.*, 2013, p. 5). A study conducted in a primary school in Turkey showed that a “lack of technological equipment prevented teachers from achieving the expected outcomes” (Gecer & Ozel, 2012, p. 2258). The shortage of technological devices remains problematic in South Africa due to the fact that many schools were under-resourced during the apartheid era. A study by Heymans (2007) revealed that seventy-nine per cent of teachers in South Africa indicated that their classes were not equipped for Technology (Heymans, 2007) while a study of South African semi-urban schools found that sixty-four per cent of teachers never use computer technologies with their students (Makgato, 2012). Years later, Stevens (2011) noted that “very few institutions have access to a resource rich environment for Technology” (p. 8). Hence, teachers battle to satisfy the demands of the curriculum when they lack equipment. Leigh (2003) adds that teachers who are committed to the use of instructional technology often struggle with barriers such as restricted budgets and large

classes. Alam (2011) suggests that in an era of limited availability of resources in educational fields, many teachers are under immense pressure to find different ways to enhance and support teaching and learning activities in the classroom. Interestingly, the CCSR also reportedly pointed to “unequal use of technology across schools in Chicago” despite the fact that these are all technologically-rich schools (Ehrlich *et al.*, 2013, p. 2). It was found that usually when resources are available at school, teachers are resistant to utilising them due to a lack of technological skills and knowledge (Yu, 2013; Froese-Germain *et al.*, 2013; Reel, 2011). Previous research has shown that teachers who are not equipped with technological skills have a tendency to ignore the use of technology in the classroom (Reel, 2011; Froese-Germain *et al.*, 2013; Yu, 2013; Safitry, 2015). Yu (2013) observes that such teachers experience “anxiety and an actual distaste for technology” (p. 9) and as a result tend to be emotionally affected when they are expected to include technological devices in teaching and learning. Selvi and Thangarajathi (2011) argue that teachers who are emotionally affected could experience problems such as “changes in blood pressure” and “heart problems” due to stress (p. 48). Teachers in the Twenty-First Century therefore become terrified when they lack such skills (Yu, 2013). South African teachers experience challenges in integrating ICT into teaching and learning due to factors such as technophobia, which is the fear or dislike of advanced technology or complex devices. In addition, technological devices tend to cause much disruption in class (Ramorola, 2013). Many teachers also attribute their inability to integrate technology into teaching in the classroom to a lack of professional learning opportunities (Couture & Murgatroyd, 2012, p. 152). Lack of familiarity with computers “may prevent teachers from designing activities that are more meaningful...” (Chamorro & Rey, 2013, p. 83). It is embarrassing for teachers when learners are more familiar with technology than they are (Al-Faki, 2014).

### **Summary of Chapter Three**

This chapter presented a review of the literature on technology, Technology teachers and the curriculum which is relevant to this study. Section A introduced technology by providing the historical significance of technology. Literature has revealed that over the years, technology has been in constant evolution into making tasks much easier. This is evident through its incredible innovations. Technology as a definition was explored and it was gathered that although it has positively influences on the lives of individuals, it is simultaneously creating a negative impact

on the environment as well as on humans. Teachers are tasked with the challenging responsibility of ensuring that learners are receiving the knowledge that will enable them to be disciplined when using technology. The section clarifies the misconceptions that are associated with Technology Education and Educational Technology and looks at the development of technology in education. It is revealed from the literature review that Technology teachers of the Twenty-First Century and the curriculum need to incorporate subject knowledge, pedagogical knowledge as well as resources for successful teaching of the Technology curriculum. It has been found that teachers' espoused beliefs can impact their interpretation of the Technology curriculum and result in varied interpretations of the curriculum; it would seem that not all Technology teachers' adopt a student-centred approach to teaching Technology as stipulated in the curriculum. Further to this, many schools do not have basic resources and technological equipment to support their teaching. In addition, technological devices are not being utilised by teachers because of their fear for technology and their lack of skills required in using them. The following chapter presents the conceptual and theoretical framework adopted for this study.

## **CHAPTER FOUR**

### **CONCEPTUAL AND THEORETICAL FRAMEWORK**

#### **Introduction**

The previous chapter presented a literature review on technology in education, Technology teachers and the curriculum. This chapter discusses the conceptual and theoretical framework employed. Since the study explored Technology teachers' perspectives on the Technology curriculum, a perspectival theory was appropriate. Nietzsche's (1882) theory of Perspectivism was thus adopted as the theoretical framework. It is also important to provide a conceptual analysis of the term "perspective" and the concepts associated within it. This constitutes the conceptual framework for this study. This chapter is divided into two sections. Section A presents the conceptual framework on the notion of perspective and what knowledge is possible from a perspective. It explores how perspective in art is connected to the perspectives of individuals and discusses the emergence of perspectives within society. Finally, it examines how worldviews influence peoples' perspectives. Section B introduces Nietzsche's (1882) theory of perspectivism. It begins by sketching Nietzsche's' philosophy of perspectivism and the concepts associated with it. These include Nietzsche's conception of truth and perspective; morality and perspectivism; his multi-perspectivism theory as well as the importance of the affects in Nietzsche's theory of perspectivism. Nietzsche's theory of perspectivism served as a lens to guide the researcher in understanding Technology teachers' perspectives.

#### **Section A: Conceptual Framework**

##### **A Philosophical Perspective of Perspective.**

The assertion that "all conscious beings, dogs, as well as human beings have a perspective" (Baker, 2007, p. 2) captures the notion that perspectives are connected to consciousness, and therefore, to thought or action. There has been on-going debate on what knowledge is possible from a perspective. Philosophers such as Plato, John Locke, Socrates and Aristotle differed in their conceptions of the sources of knowledge (Fleming, 2008). While some regard a perspective as an opinion of the world, others see it as truthful and equivalent to knowledge. According to



Baker (2007), perspectives held by individuals can be defined “as points of view, from which they perceive and act in the world” (p. 1). Similarly, Mooney, Knox and Schacht (2007) define a perspective as “simply a way of looking at the world” (p. 1). It is important to note that people live in different parts of the world and will therefore have different perspectives on how they see or relate to situations. This leads to the notion that perspectives may be contextual.

Philosophical perspectives are “world views that define the nature of the world, the individual’s place in it, and the possible relationships to that world and its parts” (Schuh & Barab, 2008, p. 68). The philosophical view is that all perception takes place from a specific perspective. The terms epistemology and ontology are commonly associated with philosophical perspectives. Thus, in order to understand philosophical perspectives, it is important to understand epistemology and ontology. Schuh and Barab (2008) define epistemology as knowledge that emanates from sensory experience. Fleming (2008) portrays epistemology as a theory of knowledge in which individuals come to know how knowledge is acquired (p. 3). In other words, epistemology is a theory of knowledge that deals with what knowledge is; how we deal with it, and how we learn, while ontology refers to what exists in the world (Schuh & Barab, 2008). Various philosophical perspectives, including empiricism, rationalism, and relativism, to name but a few, provide an indication of what knowledge is possible. Empiricism “emphasises consistency of knowledge with experience” (Greeno, Collins & Resnick, 1996, p. 16). In other words, it is the accumulation of knowledge that relies on sense perception to understand the world. One of the early empiricists, John Locke’s epistemological view of knowledge denies the existence of pre-existing ideas and claims that children are devoid of innate ideas (Meslar, 2011). In his essay “Concerning Human Understanding”, Locke proposed that a person begins life with a “tabula rasa” or “blank slate”. He believed that when a child is born, their mind is a blank slate. The child has the potential to know things through his or her senses during interaction with the world around him or her (Meslar, 2011, p. 14). Aristotle also supported empiricism as he believed that knowledge can be derived from sensory experience (Fleming, 2008, p. 3).

In contrast, rationalism is built on the notion that “reason is the principle source of knowledge” (Schuh & Barab, 2008, p. 23). Plato believed that knowledge is derived from reasoning and that thought and ideas exist independent of human experience (Fleming, 2008, p.3). In one of his greatest epistemological works *The Theaetetus*, Socrates

and Plato argue about the nature of knowledge. While Socrates claims that knowledge is derived from perception, Plato rejects this notion (Meslar, 2011) and notes that this generates many logical and empirical errors (Lee, 2008). Plato also makes a sharp distinction between knowledge and opinion. He believed that knowledge is certain and factual while opinions emanate from the changing world of sensation. According to Lee (2008), Plato's doctrine of recollection states that:

*Ultimately, the burden of recalling our knowledge of the forms falls on our sensory experience under such a doctrine. Because the soul is unable to escape the body while it is still alive, the only way to reach a greater degree of recollection is through experience of imitations in the physical world* (Translated by Lee, 2008, p. 253).

Hence, Plato believed that knowledge of ideas is innate, and that learning is therefore the development of ideas buried deep in the soul. For Plato, the only source of knowledge is in the form itself and all things and events experienced in the physical world constitute opinion (Meslar, 2011). Hence, rationalism rejects the notion that knowledge may be acquired through individual experiences in the world. The term relativism is simply a “general principal that places the meaning of experiential and physical events in the relationships that exist among them” (Reber, 1995). This theory advocates that all points of view are equally valid and that there are no universal values. In other words, truth is relative to the individual. In lay terms, this means that you have your truth and I have mine (Wood, 1928).

### **Perspective in the World of Art.**

The origins of perspective lie in painting and it was given great prominence during the Italian Renaissance (Panofsky, 1991; Conant, 2006). Perspective is a technique used by artists to represent a three-dimensional object on a two-dimensional surface, such as an artist's canvas (Solso, 1997). The artist deliberately uses three-dimensional techniques to create perspective that makes some objects seem further away than others. According to Panofsky (1991), the term perspective is derived from the word “perspectiva” which is of Latin origin and simply means “seeing through”. Panofsky (1991) states:

*What we were originally meant to “see through” was the two-dimensional plane of a picture. The artist sought to offer a depiction of a vista of a three-dimensional space and the objects in it that was so convincing that someone looking at the resulting image would seem to be able to see through the plane of the picture and into that space. The plane surface of the picture was to be like the transparent glass plane of a window, framing and disclosing a view of a scene that lay beyond it (p. 55).*

The concept of perspective therefore involves an internal relationship between the objective and subjective moments, “between a perceiving subject and the object(s) of his perception” (Conant, 2006, p. 12). In other words, perspective enables the viewer to see in much greater depth as opposed to a flat drawing. According to Panofsky (1927):

*For us, perspective is quite precisely the capacity to represent a number of objects together with a part of the space around them in such a way that the conception of the material picture support is completely supplanted by the conception of a transparent plane through which we believe we are looking into an imaginary space (p. 77).*

Goldberg (1965) states that for a cartoonist, “there are three musts of a perspective, that is, the station point, horizon point and vanishing point” (p. 4). It is important to note that such artistic techniques on a canvas cause illusions for people who view them, as near objects appear larger than those that are far away. The reason is that nearby objects occupy “more space on the retina” (Solso, 1997, p.166). In visual perception, the appearance of an object changes according to a viewer’s relative position to the object. In addition, “distant objects appear to be less precise, small details are lost, and colours become paler” (Solso, 1997, p. 172). Perspective is crucial in art and can likewise be crucial in interpreting whether individuals perceive the Technology curriculum as distant or close.

Without perspective, the artist may fail to depict what he or she wishes to portray. According to Storey (1910) “the outline of a ball is a mere flat circle, but with proper shading we make it appear round, and this is the perspective of light and shade” (p. 1). In other words, perspective enables the object to appear more realistic. Art is perceived differently by different people. Millions of interpretations may exist of one piece of art and none are more or less

correct than the others as everyone has their own perspective (Panofsky, 1991). In relation to this study, this concept of perspective in art is important as the teachers in the study each have their own way of perceiving the Technology curriculum. Since there are four participants, there will be four interpretations of the same issue, in this case the Technology curriculum. These interpretations may not necessarily yield similar perspectives to each other, but at the same time their perspectives cannot be ignored or deemed as more correct or less correct than the other, as each individual is entitled to have his/her own perspective. In art, perspective thus has to do with the way the artist captures and represents reality (ontology) as he or she sees it. Technology teachers' perspectives of the curriculum could similarly influence how and what they teach. Conant (2006) claims that one of the most important features of a perspective in art is "the line of sight" (p. 8). This is the vantage point (a position or standpoint from which something is viewed or considered) from which a viewer looks at a painting; as the viewer changes his or her position, so too does his or her perception of the colour and shape of an object change, creating a different perspective (Conant, 2006). In other words, an interpretation can only be created from a particular point. It is never fixed as it is subject to change as the viewer's position changes. According to Conant (2006):

*Objects look different depending upon the perspective from which they are viewed. Something that is round can appear elliptical. If I look at something in one light it will appear green, in another it will appear blue. And so on. This gives rise to distortions that are due to the circumstances under which objects are perceived. We must correct for these distortions, if we wish to judge correctly (p. 8).*

It is important to note that, for human beings, the line of sight has limitations. We can only perceive what is exposed to us and it is impossible to have a rotational view. Conant believes that lines of sight could create a naïve perspective; this is discussed later in this chapter. Conant (2006) thus argues that "perspectivism would turn out not to be a philosophical position at all, but merely a set of reminders about some of the potentially deceptive circumstances under which objects can be perceptually encountered" (p. 9). In Conant's opinion, a naïve perspective reflects the "same answer to the questions about shape and color because, for him, there is only one kind of perspective, a kind that allows for corrections in distortion" (*ibid.* p. 23). Such appearances can be deceiving, leading to a variety of perspectives. The nature of perception can be

misleading depending on the philosophical position of the viewer (Conant, 2006). Just as an artist uses optical illusions to create distortion of objects under certain conditions, human beings create their own perspectives when viewing objects in their own context. In some cases, these perspectives may be distorted depending on their “line of sight” or “vantage point”. The four Technology teachers selected for this study work in four different school contexts; hence, their line of sight or position from which their view of the Technology curriculum will influence their perspectives of this curriculum. As a result, they may have different perspectives. The perspectives of a teacher who teaches Technology in a rural school may differ from those who teach Technology in an urban school.

### **Sociological Perspective.**

People are influenced by society when it comes to their thinking and perceptions of things. According to Rubin, Nelson, Hastings and Asendorpf (1999), a society refers to a “group of people who share a culture and territory” (p. 18). This leads to the sociological perspective which seeks to understand “human behaviour by placing it within its broader social context in society” (*ibid.* p. 20). An excellent example in the work of Rubin *et al.* is that of a new born baby who is taken from the city to be raised by a tribe in the jungle. It is likely that the child would grow up learning the habits of the tribe as opposed to what he or she would learn in the city, where the most important goal may be to make money or to wear designer clothing. For the child in the jungle, other factors such as striving to be the best hunter or warrior would be important. In other words, what is regarded as important to those who live in the city is completely different from those who live other lifestyles. Rubin and co-authors add that, in contrast to those that live in a city, people who grow up in the jungle would assume that it is natural to want more children (Rubin *et al.*, 1999). The point is that everyone has different perceptions of the world around them and this is partially due to where they come from, where they grow up and where they live; in other words, socio-cultural backgrounds influence perspectives. Perspectives are thus also contextual.

The sociological perspective includes three theoretical perspectives that offer various explanations of the social world and human behaviour. These are the functionalist perspective, conflict perspective and symbolic interactionist perspective (Mooney *et al.*, 2007). According to

Mooney *et al.* (2007), the functionalist perspective “views society as composed of different parts working together” (p. 1). An example is a single parent’s involvement in their children’s school work. It is sometimes difficult for single parents to be supportive of their child’s education and this could result in poor results. However, if the parent shows interest by communicating with the school, this could benefit the child’s marks. Hence, a functionalist perspective is dependent on all components working together (Mooney *et al.*, 2007). In relation to this study, a functionalist perspective would relate to the equal involvement of all relevant stakeholders (principal, school management team, teachers, subject advisors, parents and learners) to ensure the successful implementation of the Technology curriculum.

The conflict perspective “views society as composed of different groups and interests competing for power and resources” (Mooney *et al.*, 2007, p. 2). Proposed by theorists such as Karl Marx in the mid-1800s, the conflict perspective provides a radical alternative to functionalist perspective. According to Karl Marx (1818–1883), in any societies there are two major social groups: a ruling class and a subject class (Rummel, 1977). The ruling class derives its power from its ownership and control of the forces of production. The ruling class exploits and oppresses the subject class (lower class). As a result there is a basic conflict of interest between these two classes. Marx believed that western societies had developed through a capitalist society, in which labour power required for production was supplied by the subject class (*ibid.*). The relationship between the major social classes is one of mutual dependence and conflict. However, the mutual dependency of the two classes is not a relationship of equal reciprocity. Instead it is relationship of exploiter and exploited, oppressor and oppressed (Rummel, 1977). Capital confers political power, which the bourgeois class uses to legitimatise and protect their property and consequent social relations. Class relations are political, and in the mature capitalist society, the state's business is that of the bourgeoisie. Moreover, the intellectual basis of state rule, the ideas justifying the use of state power and its distribution, are those of the ruling class (Bates, 2015, p. 3). Because the individuals and groups of society compete for advantage, there is constantly conflict for change. One major teaching of the conflict perspective is that conflict arises from the dissimilar goals and interests of different social groups - the oppressed, the dominant, the powerful, or the powerless (Wieviorka, 2010). The conflict can arise in different areas such as law, religion, education, or media, and can be found in the

powerful protecting their monopoly on these holdings, or the powerless attempting to change the status quo. His conflict perspective believed that the basic form of interaction in society is not cooperation, but competition, which leads to conflict. This conflict would then determine the major events and outcomes of history (Wieviorka, 2010). This produces the view that those who are wealthy usually hold power and the poor are perceived as inferior. A sense of greed and inequality are involved in this type of perspective. It gives explanations for happenings in history and in society.

The symbolic-interactionist perspective emphasises that “our identity or sense of self is shaped by how others interact with us and label us” (Mooney *et al.*, 2007, p. 2). Similarly, Carter and Fuller (2016) attest that symbolic interactionism is a perspective in sociology that addresses how society is created and maintained through repeated interactions among individuals (p. 1). According to Blumer (1969), the basic tenets of symbolic interactionism state that individuals act based on the meanings objects have for them; interaction occurs within a particular social and cultural context in which physical and social objects (persons), as well as situations, must be defined or categorised based on individual meanings; meanings emerge from interactions with other individuals and with society; and lastly, meanings are continuously created and recreated through interpreting processes during interaction with others. Blumer (1969) believed that the study of human behaviour must begin with human association (Meltzer & Petras, 1970). In this view, social institutions exist only as individuals interact; society is not a structure, but rather a continuing process where agency and indeterminateness of action is emphasised (Collins, 1994). Treating society as structured, patterned, or stable is a reification because society, like individual actors’ interactions and experiences with one another, is constantly in flux (Meltzer & Petras, 1970). For the purposes of this study, it was useful to identify whether the curriculum is viewed from a functionalist, conflict or a symbolic-interactionist perspective.

### **World View and Perspective.**

According to Vidal (2008), “the term ‘worldview’ is often used to emphasise a personal and historical point of view” (p. 3). Dhanesh and Dhanesh (2002) indicates a more detailed description of the term when he states that the term worldview refers “to a mental framework

within which individuals and groups interpret the nature of reality, the nature and purpose of human life and the laws governing human relationships, the overall perspective from which one sees and interprets the world” (p. 55-78). Worldviews are shaped by our life experiences and, at the same time, they reshape our approach to life (Dhanesh, 2002). Furthermore, worldviews are “a dynamic, reflective lens through which human beings construct, interpret, and interact with all aspects of their reality” (Dhanesh & Dhanesh, 2002, p. 59-76). Our worldviews shape how we perceive, interpret, understand, and respond to the realities around us. They determine all that we think, do, or consider to be normal or abnormal and acceptable or unacceptable. According to Vidal (2008), “we all need a worldview, even if it is not made fully explicit, to interact with our world” (p. 7). Vidal adds that there is an evolutionary, psychological and sociological necessity to have a worldview. In this study, a world view is essential to all four participants in the enactment of the Technology curriculum and in understanding their perspectives about how they perceive the realities that exist around them when implementing the curriculum.

## **Section B: Theoretical Framework**

### **Nietzsche’s Philosophy of Perspectivism.**

The term ‘perspectivism’ was coined by nineteenth century philosopher, Friedrich Nietzsche (1882) who is the best known perspectivist to date. The term has its origins in the German word ‘perspektivisms’ and refers to the philosophical view that all ideations take place from particular perspectives and that there are many possible perspectives in which truth and value can be made (Nietzsche, 1882). From Nietzsche’s (1882) viewpoint, the world is knowable, but individual interpretations of this world differ and therefore the meanings behind such interpretations are innumerable. Hence, in Nietzsche’s Perspectivism, there is no perspective-independent world at all (Nietzsche, 1967). Nietzsche’s perspectivist theory dismisses the ideas of rationalist thinkers such as Plato regarding an objective reality. Nietzsche argues that past philosophers lacked perspective when theorising and therefore rejects Plato’s ideation that knowledge essentially involves a form of objectivity that is independent of any point of view. According to Nietzsche (1886):

*We are asked to think an eye which cannot be thought at all, an eye turned in no direction at all, an eye where the active and interpretative powers are to be*



*suppressed, absent, but through which seeing still becomes a seeing - something, so it is an absurdity and a non-concept of an eye that is demanded* (Translated by Conant, 2005, p. 12).

This reflects a belief of what the world ought to be and the notion of unproductive beings who do not desire to create a world as it ought to be. It suggests that individuals are indirectly forced or pressurised to follow the theories or knowledge of past philosophers that claim to be absolute. Hence, interpretation is eliminated when one speaks of truth. Nietzsche's primary reason for rejecting absolutism is that no idea is independent of interpretation and no interpretation is independent from an interpreter. Furthermore, each interpreter is influenced by cultural norms and language. Nietzsche's epistemology of interpretation came to be known as perspectivism. Hence, Nietzsche (1882) believed that "the world is a mere fiction, constructed of fictitious entities" (p. 568). Bonevac (2008) compares Nietzsche's Perspectivism with the work of Hegel. Hegel believed that individuals progress through stages, to come to self-consciousness and ultimately realise absolute knowledge (Bonevac, 2008) and that the state of absolute knowledge is unity with the mind of God. In contrast, Nietzsche rejects the existence of God, as he claims God is dead. More importantly, he rejects the idea of absolute knowledge in any sense. Nietzsche (1882) contends that,

*The progression of human thought is not reducible to principles of logic or rationality...instead, it is to a large extent irrational and driven by a will to power...there is no reason to expect that it will reach some ideal fixed point of complete knowledge* (Translated by Bonevac, 2008, p. 2).

While Nietzsche sometimes seemed to regard his own thought as scientific, he urges us to think of science not as an earnest inquiry into the truth or even a process of self-criticism, but rather as a cheerful, playful enterprise of developing new ways of seeing, interpreting, and understanding the world. Science is not a tool for deciding between rival perspectives; there is no way to do that but to live them (Nietzsche, 1882). Nietzsche's (1882) constant refrain is that our judgements arise out of and express our human condition, and that we have no access to a source of justification that transcends that human condition.

Unlike relativism, which assumes that all views are equally valid, the Perspectivism of Nietzsche (1882) does not claim that all perspectives have equal value. He emphasises that a philosopher should adopt and test various and different perspectives in order to gain a deeper understanding of truth. Hence, Nietzsche stresses that in order for one to acquire some value in judgement or truth, one has to obtain as many perspectives as possible from different “vantage points” and should take into consideration culture as well as context (Nietzsche, 1979). In this study, Nietzsche’s (1882) theory enables the researcher to explore Technology teachers’ perspectives within various school contexts which serve as “vantage points” that promote better understanding of these perspectives. Nietzsche (1882) does not agree that various perspectives will lead to one truth, as bias needs to be taken into account. However, he is of the view that various perspectives can come very close to the truth as for Nietzsche (1882) there are no facts, only interpretations. Nietzsche notes that morality, truth claims and ethical dictates are influenced by other people. Hence, individuals accept certain norms and ideas because they are compelled to do so or are pressurised by society (Nietzsche, 1882). Nietzsche argues that our truths are irretrievably entwined with our interests. Perspectivism aims to induce, contrary to the metaphysical realist, a form of epistemological modesty by claiming that we cannot acquire extra-perspectival knowledge. Extra-perspectival knowledge is conceivable, according to Nietzsche, only if we permit both the objectionable concept of the ‘thing-in-itself’ (refers to the distinction between appearance and reality). The thing as it appears to the knower (notion of reality) and the possibility of going beyond knowledge of mere appearances and getting to know it in relation to other things in each of its varied contexts ( Kant, 1787), or “Platonic eternal verities and the necessary rationalist cognitive tools” (Doyle, 2005, p. 279). According to Nietzsche (1882):

*Perspectivism expresses a naturalistic understanding of the human, and especially a naturalistic understanding of those aspects of human activity that have been thought of as supernatural or transcendental: pre-eminently, the assignment of value. Perspectivism is the thesis that all our evaluations are conditioned by the biological, psychological, cultural and linguistic background in which we are embedded and which constitutes our perspective. It is therefore a rebuttal of the idea, the idea that ultimately defines the ascetic*

*ideal, that our evaluations can, at least in principle, be given an ultimate justification* (Translated by Simpson, 2012, p. 9).

According to Hales and Welson (1994), “Nietzsche holds that subjects, objects, and attributes are all fabricated distinctions that we invent to suit our ends” (p. 105). Thus, our needs interpret the world. Nietzsche (1882) emphasises that the world is always understood within the perspective of some point of view and that all knowledge is thus an interpretation of reality in accordance with the set of assumptions that makes one perspective different from another and “as a result, there is an interface between worldview and perspectivism” (p.99). This is often taken to imply that no way of seeing the world can be taken as definitively ‘true’, but at the same time it does not necessarily mean that all perspectives are equally valid.

Nietzsche (1967) emphasises that one should be flexible and avoid being trapped by one set of values. One assembles one’s own picture of the world from these many points of view. For Nietzsche, there are no objective personalities and therefore no objective points of view, only subjective points of view, and all human knowledge is considered perspectival. In other words, the many interpretations of various individuals will create a better understanding of knowledge (Conant, 2006). According to Hales and Welson (1994), “Even if truth consists in correspondence, that correspondence cannot be to a thing-in-itself, or the ‘real’ world” (p. 1). Nietzsche (1974) thus argues that philosophical beliefs about truth and goodness are part of a particular perspective on the world, a short-sighted, distorting one. This distorted perspective’s most important distortions are that it denies that it is a perspective, that its truths are unconditional, and that it represents the world as it truly is. Philosophers are thus wrong to think that it is possible to represent or hold beliefs about the world that are value-free, ‘objective’, or ‘disinterested’ (Nietzsche, 1974).

Nietzsche’s view is that perspective cannot be eliminated, that its values cannot cease to guide our knowledge, and that any attempt to eliminate it completely is misguided. However, some perspectives are less distorting than others. Firstly, a perspective may be aware that it is a perspective. Becoming aware of the perspectival nature of knowledge is itself an improvement in knowledge. Secondly, one can find a less perspectival perspective by assembling many different perspectives. According to Nietzsche (1882), perspectival ‘knowing’ is the only kind

of knowing; and therefore the more feelings about a matter that one allows to find expression, the more different eyes through which one is able to view this same matter, and the more complete will one's conception of it be.

At best the correspondence would be to sets of fictitious entities whose elements vary from perspective to perspective. In terms of this ontology, "there seems to be no room for any kind of absolute truth that insists on privileged statements whose truth values are constant across perspectives" (Nietzsche, 1882 p. 105). Conant (2005) maintains that, "By abolishing any kind of 'absolute' truth that even the new philosophers must attack, Nietzsche prepares the ground for different persons to develop diverse moralities without fear of running afoul of 'the truth'" (p. 944). The absence of cosmic moral truths allows Nietzsche to advocate for the experimental life, one of sampling new perspectives and ways of living, without permanent allegiance to any particular area (Nietzsche, 1882).

Nietzsche's (1882) theory of Perspectivism was appropriate for this study as it acknowledges all the viewpoints of teachers who teach in different schooling contexts as well as their different viewpoints which provide a deeper understanding of perspectives. The researcher specifically chose Nietzsche's Perspectivism as it was believed that such a framework would provide the researcher with the ability to reflect on the data gathered and to interpret what affects these four teachers could bring to their expressed views, and how these affects influenced their discourse. Nietzsche argues that some perspectives are foregrounded ones, while others are better or less distorting perspectives. He adds that philosophical or moral views are false. Nietzsche also states that our sense organs can be fine, loyal, cautious organs of cognition while he rejects the possibility of synthetic priori judgements (Nietzsche, 1974).

### **Nietzsche's Theory of Multi-Perspectivism.**

Nietzsche's theory of multi-perspectivism posits that, "any judgment or belief is an interpretation of the world from a particular and limited point of view" (Nietzsche, 1974). The theory of multi-perspectivism enables the philosopher to see any given thing or issue from ever new and different points of view. In the *Genealogy of Morals*, Nietzsche (1887) states that:

*There is only a seeing from a perspective, only a knowing from a perspective, and the more emotions we express over a thing, the more eyes, different eyes, we train on the same thing, the more complete will be our idea of that thing, our objectivity* (Translated by Kaufmann, 1974, p. 153).

Since all knowledge is perspectival, the more points of view we are able to adopt to understand any given thing or issue, “the more complete will our ‘concept’ of this thing, our ‘objectivity’ be” (Nietzsche, 1974, p. 153). According to Zelic (2007), “the philosopher, as Nietzsche envisions him, needs to be inquisitive to the point of ‘cruelty’ and he has a ‘duty to suspicion’ first and foremost regarding his own prejudices and thought process” (p. 28). In fact, he “will look for error precisely where the instinct of life most unconditionally posits truth... he should be ready for any revaluation of values or change of perspective, which might be called for in any given situation” (Zelic, 2007, p. 29). For Nietzsche, seeing a given thing or issue from new and different points of view represents “the discipline and preparation of the intellect for its future ‘objectivity’ ” (Nietzsche, 1974, p. 155). Nietzsche was influenced by the works of Leibniz (1840) who recognises that perspectives are the character of human perception. Leibniz (1840) referred to each individual as a ‘monad’ (In Leibniz’s philosophy, a monad refers to an invisible and hence ultimately simple entity, such as an atom or a person) and believed that monads argue, reflect or perceive the world from their own perspective. Since every monad would reveal his or her own perspectives, Leibniz believed that the world is filled with multiple perspectives (Leibniz, 1840). Nietzsche (1979) offers an account of various philosophical perspectives within his theory of Perspectivism. He claims that perspectives can sometimes be interpreted with a narrow mind to which he refers as the naïve perspective. Other perspectives include a non-naïve perspective which views an object in a way that transcends or surpasses what it views. Nietzsche (1979) claims that in a naïve perspective,

*Objects look different depending upon the perspective from which they are viewed. Something that is round can appear elliptical. If I look at something in one light it will appear green, in another it will appear blue. And so on. This gives rise to distortions that are due to the circumstances under which objects are perceived. We must correct for these distortions, if we wish to judge correctly* (p.8).

Thus, in a naïve perspective, the individual is confined to a single perspective that is not freely altered by the viewer or subject. The subject cannot see beyond such a perspective and therefore becomes epistemologically isolated (Conant, 2005, p. 17). Nietzsche (1979) notes that, in terms of non-naïve perspectivism,

*The world, as we experience it, appears to have contradictory qualities. A coin appears round when viewed from here, elliptical when viewed from there; the mountain appears green in this light, blue in that light; and so on. But these are not necessarily properties of the world, but may rather be perspective-dependent properties of it - that is, they may not necessarily be properties of the objects we perceive as those objects are in themselves. Rather they may just be relative to some point of view or set of standing conditions under which the objects of experience are encountered* (Translated by Conant, 2005, p. 20).

In terms of this study, Technology teachers may have different perspectives depending on the vantage point in which they position themselves. For instance, if a teacher from a poor school sees the lack of resources as a limitation to teaching and learning, this implies that his/her vantage point drives his/her perspective and therefore causes him/her to make that statement. Nietzsche (1979) advocates that since values change over time with experience, so too will perspectives. Thus, Nietzsche's perspectives can be freely altered (Conant, 2006). This gives rise to the notion that Technology teachers' perspectives are prone to change and not something that is accepted as a norm. Furthermore, Nietzsche (1979) claims that since multiple perspectives are brought about when trying to understand a phenomenon, there are instances when individuals may privilege one perspective over another in order to "secure an idea, image or experience" (Magnus, Mileur & Stewart, 1993, p. 227). Nietzsche (1967) argues that one's individual needs compel or drive one to interpret the world. As a result, each perspective seeks to compete with others to overcome all other perspectives for one's own perspective to be accepted as the norm (Nietzsche, 1967). Therefore, Nietzsche emphasises that in order for one to acquire truth about judgments made, one would have to obtain manifold perspectives from various vantage points while taking culture and context into consideration (Nietzsche, 1974). In relation to this study, Nietzsche's Perspectivism enabled the researcher to obtain various perspectives and understand them from the context in which Technology teachers practice their

teaching. Technology teachers' perspectives are illuminated through their experiences in the context and culture of working at their respective schools.

### **Morality and Perspectivism.**

Nietzsche (1882) argues that morality is perspectival. People should choose a perspective that works for them. Some perspectives are imposed on us and different conception schemas in different parts of the world evolve over time (Kain, 1996). For liberal, utilitarian and classical thinkers, values are simply given and are factual beyond all doubt. Thus, people mistakenly believe that there is intrinsic value in social institutions. Therefore, one has no trouble assuming that the good person is of greater value than the bad one. While this view makes common sense, it doesn't mean that it is true. Firstly, Nietzsche (1882) argues that one cannot understand the history of moral or political systems until one appreciates that different individuals, groups and cultures have very different modes of valuation. These are always in conflict and have been transformed over time (Nietzsche, 1882). Secondly, Nietzsche points out that valuing exists everywhere. By simply being alive, an individual is valuing. Values are embedded in feelings, emotions, and instincts. One can therefore also value the moment when they perceive something. Perception comes with meaning and regards value judgements as true for all sensory experiences (Nietzsche, 1974).

All experiences are moral ones, even in the realm of sense perception. Nietzsche adds that we value even in the most unconscious bodily processes; these are not just judgements of the eye or mind, but judgement of the muscles. What makes a perspective believable is not that it corresponds to reality, but rather that it empowers us to cope with reality and it fulfils our "will to power", that is, to control ourselves. Instincts drive a person; Nietzsche (1967) refers to this as "will to power" (p.522). All of nature, not only humans, has varied wills to power that seek to dominate the environment. Nietzsche (1967) states that the world is knowable, but people's interpretations of it differ; therefore, there are endless meanings behind these interpretations. There is a lust to rule and people will therefore push for their perspectives to be accepted as the norm.

## **Perspectivism and the Concept of Truth.**

In a note in *The Will to Power*, Nietzsche (1967) states that “truth is not something there that might be found or discovered but something that must be created and that gives a name to a process, or rather to a will to overcome that has in itself no end...” (p. 522). This not only rejects metaphysical realism, but also adopts a view of the epistemic subject as actively establishing its own truth from experience in the world. According to Simpson (2012), “the subject is grounded in biology, psychology, culture and language, and this constitutes the naturalistic basis for the will to power, the will to survive by overcoming and dominating the world” (p. 23). It is important to note that Nietzsche does not deny the value of truth and the will to truth. Instead, he contends that, “truth involves the arising of a new self-consciousness, in which the will to truth becomes conscious of itself as a problem” (Nietzsche, 1967, p. 530). Nietzsche’s (1882) Perspectivism argues that the ‘truth’ must always be represented from a particular perspective and that there is no single way to represent it. According to Nietzsche (1967) “the cardinal intuition of truth absolutism is that statements, if true, are true for everyone and, if untrue, then untrue for everyone” (p. 406). In other words, people have no choice but to follow a perspective that is privileged over others and considered to be true. However, the intuition behind truth perspectivism is that statements, if true, are true from, or in, some perspective, but are untrue from another, or in another, perspective (Nietzsche, 1967). In *The Will to Power*, Nietzsche (1967) states that, “there are many kinds of eyes. Even the Sphinx has eyes and consequently there are many kinds of ‘truths,’ and consequently there is no truth” (p. 540). Unlike past philosophers, Nietzsche does not insist that the truth must be true for everyone else. Instead, he claims that there is no universal definition of truth and that an individual creates truth. Therefore truth will only exist in an individual perspective that depends on their subjective experiences (Nietzsche, 1967).

For the purpose of this study, Nietzsche’s truth perspectivism means that all the Technology teachers’ interpretations may be true or untrue according to their experiences; this assisted the researcher in gaining a better understanding of their perspectives. Hence Nietzsche’s concept of essential truth in perspectivism was vital to this study. Nietzsche (1967) asserts that an individual’s will to power generates a perspective and claims that “interpretation is itself a means of becoming master over something” (p. 643). Adopting a perspective is thus a way of



mastering one's experiences, of coming to grips with them. Nietzsche (1974) maintain that, "we can comprehend only a world that we ourselves have made" (p.495). Nietzsche (1882) believes that the world is chaotic and individuals can categorize it and turn it into something intelligible. (p. 508). According to Nietzsche, (1967) "all evaluation is made from a definite perspective... that of the preservation of the individual, a community, a race, a state, a church, a faith, a culture" (p. 259). Hales and Welson (1994) are of the view that "all of these will be loci of power for Nietzsche, and so all will be entities which adopt or create perspectives" (p. 107). One must acknowledge that Nietzsche does not ignore the possibility of bias when interpretations are created. Hence, his concept of 'truth' is not based on a theory, but rather acceptance of an interpretation (Nietzsche, 1882). Simpson (2012) contends that Nietzsche does not deny that there could be some big Truth out there, but if there were, one would never be in a position to confirm its veracity because an individual's observations are biased and conceived within a language, a culture, a perspective, and within the constraints and expectations of a theory. Hence, Nietzsche also does not claim that an accumulation of perspectives will provide a clearer picture, because as a human being, one is unable to escape personal insight that limits one's perspectives (Nietzsche, 1967). It is for this reason that Nietzsche argues that one cannot rely on the truth, as perspectives can be contradictory. Nietzsche states that in light of perspectivism, the very idea of an absolute truth is unintelligible. In *The Will to Power*, Nietzsche (1967) writes that, "truth is the kind of error without which a certain being could not live" (p. 493). To confirm that this 'certain kind of being' is humanity, one need only look to *Beyond Good and Evil*, where he emphasises that for the purpose of preserving beings such as ourselves, such judgements must be believed to be true although they might still be false judgments (Nietzsche, 1967)). Nietzsche strongly claims that what people believe is true depends on their perspective, as does how they understand the concept and value of truth (Nietzsche, 1967). In other words, Nietzsche does not attack the idea of truth, but instead claims that there may be truth in our perspectives. Hence, Perspectivism claims that there is no one way to represent truth and that it must always be represented from someone else's perspective. Appearance is also essential to Nietzsche's truth in Perspectivism and necessary for a true world (Nietzsche, 1967). Nietzsche asserts that instead of simply understanding truth, one must understand appearances as what comes first, logically speaking. We then interpret "appearances" to be the appearance of something. However, appearance and perspective are not equivalent. Perspectives can distort appearances and those

that are not distorting or less distorting of appearance have a better grasp of what we may call ‘truth’ (Nietzsche, 1882)). For Nietzsche, the idea of perspectivism has a rich metaphorical life (Lacewing, 2009). Nietzsche (1967) claims that:

*We literally see things from and within a particular perspective. Our eyes are located at a particular point in space, from which some things are visible and others are not, for example, the top of the table, but not it’s underneath. A scene looks different from different perspectives - from high up, we can see further and things look smaller, from below things ‘loom’ over us and we cannot see very far (p.493).*

Nietzsche talks of “foreground evaluations” and emphasises that one usually takes what is near to us (in the foreground) as the standard by which we interpret the world. He also talks of a perspective from below - the literal translation is a “frog’s perspective” (refers to artists’ terminology that means sitting at the level of a frog, that is, very low and looking slightly up, (Conant, 2005), which was also slang for ‘narrow-minded’ because one cannot see far or wide. Apart from appearance, Nietzsche argues that in order for interpretations to be considered as truthful, they must be coherent, legitimate and practical. This is further discussed below.

### **Nietzsche’s Theory of Affects in Perspectivism.**

Nietzsche’s (1882) ‘perspective theory of the affects’ sharpens the epistemic inquiry in relation to an individual as the source of all perspectives. Inquiry in Perspectivism allows for the engagement of various affects and interpretations which enhance various perspectives and prevent a single or naïve one. It is important to note that teachers are firstly human beings and that they are exposed to various experiences when teaching the Technology curriculum to learners at school, which will directly affect them either positively or negatively. Such interpretation of teachers’ experiences is acquired through affects. Nietzsche’s theory of affects claims that in order for judgments to be considered truthful, they must satisfy three conditions to acquire meaning, namely, coherence, legitimacy and practicality (Nietzsche, 1882). According to Warren (1991), truths that do not satisfy these conditions will be regarded as “Errors of Deception” (p. 98). Warren adds that such truths would possess content, but such content would be irrelevant because it lacks meaning (Warren, 1991). Nietzsche (1882) emphasises that

perspectives are always rooted in affects and their associated patterns of valuation. In relation to this study, affects must be taken into consideration when exploring Technology teachers' perspectives as such affects would shape their perspectives of the Technology curriculum. According to Anderson (1994):

*Theoretical claims not only need to be analysed from the point of view of truth, but can also be diagnosed as symptoms and thereby traced back to the complex configurations of drive and affect from the point of view of which they make sense. Nietzsche's perspectivism thus connects to his 'genealogical' program of criticizing philosophical theories by exposing the psychological needs they satisfy; perspectivism serves both to motivate the program and to provide it with methodological guidance (p. 10).*

Nietzsche entwines the notion of perspective with the notion of affective interpretation. In *The Will to Power* (Nietzsche, 1882), he claims that “virtually every sphere of human activity - from ‘morality’ to ‘physics’ and ‘natural science’, to ‘rational thought’ in general - is called, in one passage or another, an ‘interpretation’...” (p. 590). For Nietzsche, interpretation is present wherever there is meaning and value at all. Nietzsche adds that a perspective “is constituted and directed by a matrix of ‘active and interpreting forces’ that allow something to appear as a particular something. A ‘perspective’, then, would seem to be an ontological and evaluative horizon opened up by the operation of a particular ‘affective interpretation’” (Nietzsche, 1882, p. 592).

### **The Affect of Coherence.**

The affect of coherence avers that the language and expression of a judgment must be clear and understandable in order to acquire meaning from a perspective. Nietzsche (1882) believed that a perspective cannot be formed without the element of language. He stresses that even in the field of art, language is evident in terms of visual interpretation. A work of art literally speaks to the viewer through its painting (Nietzsche, 1882). For Nietzsche “speaking more and more precisely, demanding greater and greater precision...this alone is fitting for a philosopher” (Nietzsche, 1882, p. 3). In this study, semi-structured individual interviews as well as stimulated interviews were conducted with the teachers to acquire their interpretations through

language and understand their perspectives of the Technology curriculum. Nietzsche (1979) advocates "...coherence as a means for judging between epistemologies in his critique of the thing-in-itself; we can also use this intuition to judge between perspectives" (p.60). Not only is the language of 'perspective' subsumed under the broader language of 'interpretation', but both are generalized far beyond their ordinary sense. For Nietzsche, 'perspective' comes to characterise a particular form of life's directedness towards the conditions that preserve and enhance it, conditions that are codified in the 'interpretation' that directs the perspective (Nietzsche, 1979).

### **The Affect of Legitimacy.**

Legitimacy is another prerequisite for 'truth'. History plays a pivotal role in the 'truth' that is acquired and legitimacy avers that context has to acknowledge historical experiences, irrespective of whether or not such experiences were pleasant (Nietzsche, 1979). As such, experiences serve as a basis for 'truth' to be authentic. Nietzsche's views on historical experiences are presented in *The Eternal Return*, where he stresses that an individual cannot escape past events and will thus live in the present moment (Nietzsche, 1979). Nietzsche's affect of legitimacy emphasises that the past teaches one to rectify one's own mistakes and possibly transform their thinking by embracing new ideas for the future (Nietzsche, 1979). In other words, interpretations from past experiences will provide opportunities for growth and new meanings. Warren (1991) supports the notion that reconstruction of ideas and thinking would provide opportunities for new 'truth' to emerge. Nietzsche (1979) argues that "thinghood," "eventhood," "history," "development" and "evolution" are at the bottom, and are only manifestations of "will to power," the incessant drive for interpretation and reinterpretation, forming and reforming; and that the very origin, history and growth of "a 'thing'" (whether it be an object, practice or institution) should be seen as the consequence of its role in a struggle among interpretations, each of which is "aggressive" and "expansive," seeking to increase power and control over its environment (Nietzsche, p. 545). Historicity is important in the South African schooling context, as the previous ideologies shape the current and future dimensions of teacher perspectives. As Simpson (2012) notes, "our thought is indeed relative to the particular historical epoch in which we find ourselves" (p.9).

In favour of Nietzsche's affect of legitimacy, Hursthouse and Pettigrove (2018), highlight three features that are crucial in understanding the interpretation of perspectives. Firstly, "that the past *recurs*, so that what has happened in the past will be re-experienced in the future; secondly, that what recurs is the *same* in every detail; and thirdly, that the recurrence happens not just once more, or even many times more, but *eternally*" (p. 16). Hence, since one cannot undo the past, but is able to create one's future, events of the past serve as a guide to shape the future and hence create new values (Hursthouse & Pettigrove, 2018). In relation to this study, Technology teachers' perspectives must acknowledge legitimacy in order for their statements to be authentic and regarded as truthful. Their historical experiences would be vital in the perspectives they share and would therefore not be able to be ignored.

### **The Affect of Practicality.**

In the affect of practicality, Nietzsche claims that the quest for truth is also a practical one and emphasises that an individual's experiences are not only linked to their value but to their practice (Nietzsche, 1967). The affect of practicality advocates that in order for an interpretation to be considered trustworthy, it should be applied by agents in practice within a context (Nietzsche, 1967). It is therefore important for an individual to prove the truth of existence relating to how he or she thinks in practice (Strong, 1975). Hence, Nietzsche's concept of 'truth' deals with how experiences are connected to practice (Strong, 1975). For Nietzsche, perspectives must be experienced in practice in order to serve as a contextual 'truth' (Conant, 2005). At the beginning of this section in the study, it was noted that Nietzsche's Perspectivism asserts that there are no facts, only interpretations and therefore the value of truth is gained by the depth of our pursuit to acquire that truth. Nietzsche (1967) claims that:

*There is only a perspective seeing, only a perspective knowing; and the more affects we allow to speak about one thing, the more eyes, different eyes, we can use to observe one thing, the more complete will our 'concept' of this thing, our 'objectivity' be* (Translated by Kaufman, 1967, pp. 98-99).

In relation to this study, four cases of Technology teachers were explored taking into consideration their experiences of teaching the Technology curriculum in context.

## **Summary of Chapter Four**

This chapter presented the conceptual and theoretical framework employed for this study. It discussed the artistic interpretation of perspective in order to understand a perspective as well as the philosophical background of a perspective. Nietzsche's (1882) theory of Perspectivism provided the theoretical lens through which the researcher made sense of Technology teachers' perspectives. The theory showed that context and culture are necessary in order for one to evaluate and arrive at a truth. Finally, the chapter examined Nietzsche's theory of affects which was necessary in the interpretation of teachers' perspectives. The following chapter discusses the research design and methodology employed for this study.

# **CHAPTER FIVE**

## **RESEARCH DESIGN AND METHODOLOGY**

### **Introduction**

The previous chapter presented the conceptual and theoretical framework that underpinned this study. This chapter discusses the research design and methodology employed to understand Technology teachers' perspectives on the Technology curriculum. The research design and methodology employed in a research study are important as they form the foundation for the research and thus influence the reliability of the results (Vosloo, 2014). The study sought to answer the following key research questions:

1. What are the selected Technology teachers' perspectives on the Technology curriculum?
2. What is the nature of Technology teachers' perspectives?
3. What are the implications of teachers' perspectives on the Technology curriculum?

This chapter presents a detailed description of the research design and methodology adopted to answer these questions. The qualitative paradigm is outlined and there is a discussion on recruitment of participants and the sampling technique. The contexts within which this study was conducted are described, as well as the tools used for data collection. The proposed data collection plan is presented and the challenges confronted during this process are discussed. The chapter highlights how each case study was written; how ethical matters were considered and it outlines the approaches adopted to promote validity, reliability, trustworthiness and authenticity. The chapter concludes with a discussion on the study's limitations and data analysis.

### **Research Design**

The selection of a research design and methodology depends on the nature of the research problem (Creswell, 2009). Parahoo (1997) describes a research design as "a plan that describes how, when and where data are to be collected and analysed" (p. 142). Similarly, Creswell (2009) states that "research designs are plans and procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis" (p. 3). This was

important, as the research design served as a guide to determine how the data was gathered to answer the critical research questions. While there are many types of research designs, quantitative and qualitative research designs are the most commonly used (Nicholls, 2011). These approaches are discussed separately and the reasons for the selected approach are justified. According to Yilmaz (2013), “quantitative research is informed by objectivist epistemology and thus seeks to develop explanatory universal laws in social behaviours by statistically measuring what it assumes to be a static reality” (p.312). This type of research design implies that the researcher has control over the study and predictions are made in advance about its results. In other words, the researcher knows what is being sought and a structured inquiry is employed. This means that systematic, ordered steps are in place which do not accommodate flexibility. Yilmaz (2013) argues that a quantitative research design emphasises the measurement and analysis of causal relationships between isolated variables within a framework which is value-free, logical, reductionistic, and deterministic, based on a priori theories (p.312). Due to its methods being confined to a set of rules, a quantitative research study is usually conducted under strict conditions, usually in a confined space such as a laboratory setting (Hammarberg, Kirkman & Lacey, 2016). A quantitative research design seeks to establish truth and a single reality thus exists. This means that only one answer is objective and it can be discovered using appropriate tools and methods (McMillan & Schumacher, 2010). For example, quantitative researcher Fred Kerlinger in (Miles & Huberman, 1994) states that, “there’s no such thing as qualitative data. Everything is either 1 or 0” (p.40). Bogden and Biklen (1998) state that “qualitative research is conducted in the natural world, and uses multiple techniques that are interactive and holistic. It allows for the collection of data that is rich in description of people, the investigation of topics in context, and an understanding of behaviour from the participants “own frame of reference” (p. 10). Holliday (2002) adds that there is an assumption that qualitative research is “going to be open-ended, to look deeply into the participants’ behaviour within the specific social settings” (p. 5), while Denzin and Lincoln (2000) state that qualitative research involves an “interpretive and naturalistic approach. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them” (p. 3). The aim of qualitative research is thus to seek understanding and interpretation. A qualitative researcher studies behaviour or gathers information in a natural setting as opposed to the arranged settings used in quantitative research. Flick (2007) adds that



“qualitative research is intended to approach the world ‘out there’ (not in specialised research settings such as laboratories) and to understand, describe and sometimes explain social phenomena ‘from the inside’ in a number of different ways” (p. 5). Unlike specialised laboratories, a natural setting is one that the researcher does not manipulate or control to yield the desired data. Similarly, Burns and Grove (2003) describe a qualitative design as a “systematic subjective approach used to describe life experiences and situations to give them meaning” (p. 19). Researchers who use this approach adopt a person-centred holistic and humanistic perspective to understand human lived experiences without focusing on specific concepts (Morse, & Field, 1996, p.8). Furthermore, the qualitative approach considers the uniqueness of the individual, as well as their individual experiences as people (Parahoo, 1997, p. 59). This approach to research implies that every individual is different and therefore their responses are likely to differ or in some cases, be similar. Thus a qualitative research design gives rise to multiple realities as each study participant could understand and do things differently from other participants. The aim is not to seek the truth, but to interpret and understand each individual’s experiences and events (Flick, 2007). According to Merriam (2002, p. 3), “meaning is socially constructed by individuals in interaction with their world”. Therefore there is no single reality.

This study sought to obtain various interpretations of the Technology curriculum; hence a qualitative research design was thus appropriate to explore Technology teachers’ perspectives. This research topic and the participants have shaped the design of this study as the researcher’s inquiry was based on intimate conversations with teachers through interviews about their perspectives on aspects of Technology curriculum which required deep discussions around these issues. Hence, it was speculated that a qualitative approach would develop a deeper understanding of the language that teachers spoke about their enactment of the Technology curriculum. To unveil the description of qualitative research, one has to dissect the etymology of the characteristics in this methodology as provided in a definition by Creswell (2007):

*Qualitative research begins with assumptions, a worldview, the possible use of a theoretical lens, and the study of research problems inquiring into the meaning individuals or groups ascribe to a social or human problem. To study this problem, the qualitative researchers use an emerging qualitative approach*

*to inquiry, the collection of data in a nature setting sensitive to the people and places under study, and data analysis that is inductive and establishes patterns or themes. The final written report or presentation includes the voices of participants, the reflectivity of the researcher, a complex description and interpretation of the problem (Creswell, 2007, p. 37).*

In the design of this study, the characteristics as embedded in the definition above would have an influence on the data produced. The characteristics as presented in the definition above can be linked to the participants in an interpretive study, and the need to learn more through exploration yielded significant data about the central phenomenon in this study. These data are usually not amenable to counting or measuring which is commonly found in quantitative research (Hammarberg *et al.*, 2016). In order to comprehend, infer and understand Technology teachers' perspectives on the Technology curriculum, the researcher had to engage with the participants to obtain the desired data. The researcher had to literally walk in their shoes in order to understand their perspectives. Descriptive information such as thoughts, feelings and information relating to teachers' perspectives is best represented in the form of words in transcripts and observed as opposed to numerical data (Cohen, Manion, & Morrison, 2011). Hence, a qualitative design was appropriate to capture the opinions and experiences of Technology teachers and this enabled the researcher to be immersed and involved in the study. A further rationale for employing a qualitative research design was that it allowed a variety of methods to be used to capture the participants' perspectives. These included semi-structured interviews, video recordings and stimulated interviews (Creswell, 2009). Such methods "serve to provide a bigger picture of a situation or issue" (Nicholls, 2011, p. 2). The interviews ensured detailed responses which created rich data that enabled better understanding. The video recording of a Technology lesson served as a stimulus for a further interview that provided additional data.

### **Paradigmatic Location.**

The research philosophy that underpins a study is represented by the research paradigm. Researchers view and understand the world through different lenses (Anderson, & Arsenault, 1998). Therefore, prior to the commencement of the study, it was necessary for the researcher to

reveal her position of being a lens to understand the world of the participants (Cohen *et al.*, 2011). Bogdan and Biklen (1998) define a paradigm as “a loose collection of logically related assumptions, concepts or prepositions that orient thinking and research” (p. 22). A paradigm may also be described as a whole system of thinking (Neuman, 2011, p.94). There are several paradigms that a researcher may use to understand the world. Cohen *et al.* (2011) and Bertram (2003) note that positivism, interpretivism and the critical theory are common paradigms in educational research (Cohen *et al.*, 2011; Bertram, 2003). Each of these is briefly discussed before presenting the rationale for the selected paradigm. The positivist paradigm is generally regarded as a scientific approach and therefore provides scientific methods of inquiry (Denscombe, 1998). Positivism is rooted in the belief that the world is in a fixed state and that the universe is governed by natural laws. According to Cohen *et al.* (2011), “positivism claims that science provides us with the clearest possible ideal of knowledge” (p. 7). Objectivity is thus a given in this paradigm. This implies that a single reality and one truth exist. A positivist researcher’s task is thus to explain the patterns and regularities in the social world through the application of appropriate scientific methods (Bryman, 2008). He or she searches for the truth as opposed to seeking understanding.

The critical theory seeks to emancipate society (Scotland, 2012). According to Cohen, *et al.* (2011), its aim is “not merely to give an account of society and behaviour, but to realise a society that is based on equality and democracy for all its members” (p. 31). This implies that understanding human behaviour is not of particular concern. Instead, critical theorists seek to critique and change society to ensure that the rights of individuals are recognised as well as to empower the marginalized amongst them (Cohen, Manion & Morrison, 2007). Hammersley (2009) adds that in a critical theory paradigm “the goal of research is to actively challenge interpretations and values in order to bring about change” (p. 102).

The interpretivist paradigm is quite different from the positivist and critical theory paradigms as it aims to understand people (Babbie & Mouton, 2008). According to Cohen, *et al.* (2011), “the central endeavour in the context of the interpretive paradigm is to understand the subjective world of human experience...to retain the integrity of the phenomenon being investigated, efforts are made to get inside the person and to understand from within” (p. 17). In contrast to the positivist paradigm, interpretivists believe that the world is not stable and that

“there is no single reality”; instead, it claims that there are “multiple realities”, as each individual is unique and would have different experiences (Bertram, 2003, p. 40). In an interpretive paradigm, “knowledge is not only constructed by observable phenomena, but also by descriptions of people’s intentions, beliefs, values, reasons, meaning-making and self-understanding” (Henning, Van Rensburg & Smit, 2004, p. 20). The researcher gets into the skin of the participants in order to understand and interpret meaning. Since the interpretivist paradigm is not concerned with objectivity and such studies are usually centred on a small number of participants, questions have been raised as to their authenticity. According to Hammersley (2009), “one of the criticisms of interpretivism is that it does not allow for generalisations because it encourages the study of a small number of cases that do not apply to the whole population” (p. 104). However, the depth and detail of understanding that is gathered from an interpretive inquiry is only possible using a small number of participants. In a positivist study, the variables can be manipulated by the researcher. In contrast, the interpretivist researcher does not in any way influence or interfere with the participant in their natural setting (McMillan & Schumacher, 2010). Goldkuhl (2012) states that “the core idea of interpretivism is to work with these subjective meanings already there in the social world; that is, to acknowledge their existence, to reconstruct them, to understand them, to avoid distorting them, to use them as building blocks in theorising” (p. 6).

This research study was conducted within an interpretivist paradigm. The rationale for using an interpretive approach was based on the assumptions of an interpretivist paradigm which were valid and appropriate for the study. Interpretivists “set out to understand their interpretations of the world around them” (Cohen *et al.*, 2011, p. 18). The aim of this study was to explore Technology teachers’ perspectives on the Technology curriculum. The researcher thus sought to place herself in the participants’ situation in order to understand their perspectives on the Technology curriculum. According to Creswell (2009, p.8), “interpretive methodology is directed at understanding a phenomenon from an individual’s perspective, investigating interaction among individuals as well as the historical and cultural contexts which people inhabit”. The primary purpose of this study was to understand teachers’ perspectives and be non-judgemental. Furthermore, the interpretivist paradigm allowed the researcher to utilise

different qualitative data collection methods, such as interviews and video-recordings, which assisted in gathering rich data.

### **Research Methodology: Case Study**

It was also essential to consider the methodology that would be most suited to the study, as well as the instruments that would be used to generate data (Bell, 2010). Rajasekar, Philominathan and Chinnathambi (2013) define a methodology as “the procedures by which researchers go about their work of describing, explaining and predicting phenomena” (p. 5). Babbie and Mouton (2008) state that research methodology refers to “the researcher’s general approach in carrying out a research project” (p. 74). The procedures include the methods and tools used to generate data (Wisker, 2009).

Given the interpretive stance adopted and the nature of the research questions, a case study was considered the most appropriate method for this study. A case study is one of several methodologies which can be used to conduct research. According to Yin (2011), a case study is “an empirical inquiry that investigates a contemporary phenomenon in-depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (p. 18). The case study methodology allowed the researcher to explore each Technology teacher’s perspectives in their individual contexts. It thus enabled the researcher to understand a phenomenon that was bounded by contextual influences. Thus, the rationale for adopting a case study approach was to give in-depth meaning to the phenomenon under study. Since the emphasis was on Technology teachers’ perspectives, the case study methodology provided a platform to search for understanding and meaning. Case studies focus on real people in real situations and are therefore a more appropriate approach than abstract theories. Yilmaz (2013) note that traditional qualitative research often employs case studies in which selected cases are studied in-depth. While there are different definitions of a case study, there are some commonalities. According to Cohen, Manion and Morrison (2007), a case study “provides a unique example of real people in real situations, enabling readers to understand ideas more clearly than simply by presenting them with abstract theories or principles” (p. 289). This implies that a case study is a unique approach as the context is not controlled as in other experimental research designs (Yin, 2009). A case study presents reality as it is experienced by

the participants in their natural setting. In relation to this study, the participants were Technology teachers who taught in different schools, which was the natural setting for the study. Bromley (1990) defines case study research as a “systematic inquiry into an event or a set of related events which aim to describe and explain the phenomenon of interest” (p. 302). McMillan and Schumacher (2010) explain that a case study “examines a bounded system, or a case, over time in depth, employing multiple sources of data found in the setting. The case may be a program, an event, an activity, or a set of individuals bounded in time and place” (p. 24). For the purpose of this study, the case comprised of four Technology teachers. A case study also allows for a range of data collection methods including observation, interviews, document analysis and questionnaires (Kumar, 2003; Wood, 2006; Nieuwenhuis, 2007). The use of a variety of data production methods enabled the researcher to gain greater insight into the phenomenon under study. One advantage of a case study method is that it is more manageable than quantitative methods. According to Rule and John (2011), “the singularity of focus of a case study can make it more manageable than a large-scale survey” (p. 8). The study of a phenomenon such as Technology teachers’ perspectives was quite personal and therefore required patience and understanding as well as deep conversational interaction with the participants so as to obtain rich data. This would not have been possible using methods such as a survey that produces numerical data. Case studies are able to catch unique data that would otherwise be lost if a large scale study were to be conducted. This approach revealed participants’ perspectives through experiences within the context. Furthermore, a case study enabled every participant to express their feelings, experiences and perspectives of the phenomenon at hand without any restrictions. Maree (2007) states that a case study “opens the possibility of giving a voice to the powerless and voiceless” (p. 75). This provided an opportunity for Technology teachers to speak freely about their experiences and thoughts on the Technology curriculum, without being judged. Although case studies have many advantages, they also suffers a few disadvantages. Yin (2009) observes that case studies can be lengthy. Neale, Thapa and Boyce (2006) state that “because they provide detailed information about the case in narrative form, it may be difficult to hold a reader’s interest if too lengthy. In writing the case study, special care should be taken to provide rich information in a digestible manner” (p. 6). Another disadvantage of using a case study method was that it produced an alarming amount of data that can be difficult and challenging to organise (Babbie, & Mouton, 2003).

## **Research Site.**

The context is extremely important in qualitative research. According to Holloway and Wheeler (2002), it includes the “environment and conditions in which the study takes place as well as the culture of the participants and location” (p. 34). This study sought to explore Technology teachers’ perspectives on the Technology curriculum. It therefore lent itself to a school context. Due to the fact that each participant teaches at a different school, four schools served as locations for the study. The participants were selected from four different schools from the small town of Galaxy situated in the province of KwaZulu-Natal. All these schools are co-educational, with male and female learners. Three of the schools are situated in an urban area and one is in a rural area. All four are located at an area that was accessible to the researcher in terms of travel. Being a full time teacher, the researcher could not get a full day off to conduct the video recording. Schools that were close by had to be chosen so that some teaching could be done before the principal would allow the researcher to go and gather data and thereafter return back to school. The observations could not be done during holidays as learners would then not be at school. The observations were absolutely necessary and in order to get a short period of time away from school responsibilities to travel between schools for observations, schools that were closest to the researcher’s school were selected.

It also is important to clarify the reason for having three primary schools and one secondary school as the research sites for this study. Given the nature of this study, the type of school chosen was irrelevant as the study specifically focused on Technology teachers and therefore it was important for the participant to be a Technology teacher. It was discovered that there was just one Technology teacher per school that taught in the senior phase which consists of Grades 7 to 9. In South Africa, some high schools begin at a lower grade such as Grade 7, whilst some primary schools end at a higher grade such as Grade 9. What is common to the four selected schools is that there are Grades 7 to 9 classes in operation at these schools, to which Technology is taught. It is again important to note that Technology is one of the nine subjects taken by learners only in the senior phase (Grades 7-9) as part of their school curriculum. Hence, it was not intentional to have three primary schools and one secondary school, however this mix constituted the case. The learners attending the schools under study came from diverse cultural, ethnic and religious backgrounds. In terms of social-economic status, some came from quite

well established homes and hence were not deprived of basic needs and educational resources. However, others did not have access to basic needs such as food, clothing or educational resources. While some learners resided close to school, others travelled long distances to get to school. This is both risky and challenging. The urban schools were equipped with good infrastructure and in some schools, with technological devices also, while others had minimal to no resources. The table below provides a summary of the schools that were selected as contexts for the study. A detailed description of each school was introduced in Chapter One. Each school was assigned a pseudonym to protect their identity.

**Table 2**

***Participating Schools***

<b>No.</b>	<b>Name of school</b>	<b>Learner population</b>	<b>School fees per annum</b>	<b>Type of school (Quintile ranking)</b>
1.	Nasa Primary	416	No Fee	2
2.	Saturn Secondary	1200	R1400	4
3.	Jupiter Primary	740	R550	3
4.	Earth Primary	1100	R600	3

**Participant Recruitment.**

Four Technology teachers were asked to volunteer to participate in this study. The researcher opted for four participants as the study sought to obtain in-depth data that was relevant to the study. Focusing on four teachers enabled the researcher to gain in-depth understanding rather than statistical information. Furthermore, each participant was willing to share their perspectives in detail. Creswell (1998, p.11) states that there is a need for participants



“who are accessible and willing to provide information as well as those who can shed light on issues being explored”. Apart from the fact that participants taught in schools that were accessible to the researcher, selection criteria included that they had to be teaching Technology; and that they were willing to share their experiences and perspectives of the Technology curriculum. The purpose was to generate data to answer the research questions which concerned the perspectives teachers held about the Technology curriculum. These participants teach the Technology curriculum and are, therefore, important sources of a perspectival account. Each prospective participant was personally informed about the nature and purpose of the research study and was individually asked if they wanted to take part. The researcher explained to each that the purpose of engaging them in the study was to satisfy her research interest in exploring and understanding their perspectives of the Technology curriculum. She informed them that confidentiality would be maintained throughout the study and that they were at liberty to withdraw at any point. All the participants that were recruited had a minimum of three years’ experience teaching Technology. While two male and two female teachers were participants in the study selected, it was not intentional as this was not an analysis of the perspectives of Technology teachers of different genders. The guiding criteria of the participant chosen had to be that he or she was teaching Technology; it did not matter whether the school was a primary or a secondary one, or what the gender of the participant was. Since there was just one teacher teaching Technology, only a single teacher from each school was recruited. It was not possible to recruit teachers from Grades 4 to 6 because in these grades, Technology is integrated with Natural Sciences and that would mean integrating another area of knowledge, and this study is solely about teachers’ perspectives of the Technology curriculum in its entirety which is only offered to Grades 7 to 9. This explains the researcher’s rationale for having one teacher per school in the study. The table below presents a profile of the participants. A detailed description of each participant was discussed in Chapter One. The participants were also assigned pseudonyms to protect their identity.

**Table 3**

**Participants' Details**

<b>No</b>	<b>Pseudonym</b>	<b>Gender</b>	<b>Years of teaching</b>
1	Taimur	Male	21
2	Aryan	Male	30
3	Zarah	Female	6
4	Emma	Female	30

**Purposive Selection of Participants.**

Since most educational phenomena involve large population groups, it is impractical to collect data from everyone. Therefore, a sample of the population is selected (Koul, 1984). Polit, Beck and Hungler (2001) define a sample as “a proportion of a population” (p. 31). Burns and Grove (2003) refer to sampling as “the process of selecting a group of people, events or behaviour with which to conduct a study” (p. 31). Purposive selection is a technique in which participants are purposefully selected by the researcher (Creswell, 2009) and is a very common method among qualitative researchers (Marshall, 1996). According to Parahoo (1997), purposive sampling is a “method of sampling where the researcher deliberately chooses who to include in the study based on their ability to provide necessary data” (p. 232). Irrespective of the kind of unit of analysis, the main aim of purposeful sampling in qualitative research is to select and study a small number of people or unique cases whose study produces a wealth of detailed information and an in-depth understanding of the people, programmes, cases, and situations studied (Denzin & Lincoln, 1998). The participants selected had to be able to offer sufficient insight into their perspectives of the Technology curriculum by virtue of their experience (Creswell, 2009). Onwuegbuzie and Leech (2007) state that:

*If the goal is not to generalize to a population but to obtain insights into a phenomenon, individuals or events, as is most often the case in interpretivist studies, then the qualitative researcher purposefully selects individuals, groups, and settings for this phase that increases understandings of the phenomenon* (p. 242).

Purposeful sampling was more suitable for this study as the four teachers selected for this research are from an eleven kilometre spatial location in one district. The four selected schools are located in one education district within an eleven kilometre radius to test the fixed limits of geographical location, infrastructure, resources, work spaces, school culture and times, support services, race, language, located within a particular region. Johnson and Christensen (2012) claim that these district-specific school demographics will test the working conditions and possibly account for the differences in teachers' perspectives within these limits, magnify their experiences and deepen our understanding of Technology teachers' perspectives of the Technology curriculum in the context of where they work.

The rationale for employing purposive sampling was so the researcher could select "information-rich" cases for studying in depth (Nicholls, 2011). Pre-selected participants who showed resistance to participating and were hesitant to share their views were not selected. In a qualitative research design, a sample usually comprises of a small group of participants (Cohen *et al.*, 2007; Nicholls, 2011). In case study research, the size of the sample is influenced by the purpose of the study and the resources available (Nieuwenhuis, 2007; Rule & John, 2011). Four participants were selected to explore Technology teachers' perspectives on the Technology curriculum. This enabled the researcher to investigate the teachers' perspectives in greater detail and spend more time interpreting them to obtain deep understanding (Nicholls, 2011). Given the researcher's time constraints, another reason for purposefully selecting four participants was to ensure that the study was manageable. The limitation of such purposive sampling is that the possibility of generalising research findings to other settings or situations is not likely to be possible (Denzin & Lincoln, 1998).

### **Challenges Encountered in Obtaining Participants.**

Recruiting participants was not a smooth process. In one case, a teacher who was approached at an informal meeting agreed to be part of the study. However, the principal of the school would not grant permission for a video recording of the Technology lesson, despite assurances that the learners would not be filmed, but only the teacher. The researcher also stated that permission had been received from the DoE as well as UKZN. However, the researcher respected the principal's right to refuse permission. The researcher thus had to respectfully ask that particular teacher to withdraw from the study due to circumstances beyond her control. She understood and was not offended. While the researcher had initially planned to include five participants, this meant that only four were successfully recruited.

### **Writing the Case Study.**

Since there were four participants from four different schools, there were four case studies. As mentioned earlier, it was discovered that there was just one Technology teacher per school who taught Technology in the senior phase (Grades 7-9) so therefore that constituted a case on its own. It needs to be clarified and reiterated that this case study may not appear to be a case because readers would expect more teachers from a school, but again the peculiar instance here is that there is one specialist Technology teacher per school. Each case offers brief insight into the participant and his or her professional background. The participants' qualifications in Technology assisted the researcher in understanding their perspectives based on their experiences. In Chapter One, a detailed description of the context in which each case was studied was provided. In other words, the reader was able to literally walk in the shoes of the participant to gain greater insight. The data obtained from fieldwork will be presented in subsequent chapters and analysed within themes relating to the Technology curriculum.

### **The Role of the Researcher.**

The researcher was the main data collection instrument (Xu & Storr, 2012). This placed a great amount of responsibility and pressure on her. During the interviews, she created a comfortable environment. During the video recording, she sat in a corner in the classroom to minimise the chances of the teacher acknowledging her presence. As the researcher, it was her

duty to ensure that the participants were not ethically compromised. She ensured that before the study commenced, they were informed about the nature of the study and what would be expected of them. She also arranged meeting times at their convenience, rather than hers. As a Technology teacher herself, she could not let her bias prevail. As the researcher, it was important for her to not only remain neutral, but also not to share her views on any aspects of the Technology curriculum that would encourage, influence or lead the participants to change their thinking. As an attempt to prevent being biased, she allowed each participant to review what they had contributed to the study and to make adjustments if necessary. This gave them the opportunity to confirm or correct their responses on the transcripts to ensure that the correct data was reflected.

### **Data Production.**

According to Merriam (1998), “the researcher is the primary instrument for data collection and analysis” (p. 7). The process of data production began in 2016. The range of approaches that researchers use to gather data are referred to as methods (Kumar, 2003). Different methods are employed to obtain the information required to answer the critical questions. According to Kumar (2003), the “choice of methods depends on the purpose of the study, the resources available as well as the skill of the researcher” (p. 119). The purpose of data collection was to collect rich data that would answer the study’s critical questions. Given the interpretive nature of the study, multiple data collection techniques were employed to gain rich, detailed data. Furthermore a case study methodology encourages the use of multiple data collection methods (Nieuwenhuis, 2007; Gibbert & Ruigrok, 2010). The use of different data collection methods enabled the researcher to gain greater insight into- and understand the phenomenon under study. Qualitative research techniques include ‘small-group discussions’ for investigating beliefs, attitudes and concepts of normative behaviour; ‘semi-structured interviews’, to seek views on a focused topic or, with key informants, for background information or an institutional perspective; ‘in-depth interviews’ to understand a condition, experience, or event from a personal perspective; and ‘analysis of texts and documents’, such as government reports, media articles, websites or diaries, to learn about distributed or private knowledge okay I agree (Hammarberg *et al.*, 2016, p. 1). Individual semi-structured interviews and a video recording of a Technology lesson were

considered to be the most appropriate for this study. Data production was done in three phases. The data collection plan below summarises this process.

**Data Production Plan.**

*Table 4*

*Data Production Plan*

<p><b>Q.1 What are the selected Technology teachers’ perspectives on the Technology curriculum? Why do teachers hold such views?</b></p>	
<p><b>Questions for developing a data production plan</b></p>	<p><b>Researcher’s data production plan</b></p>
<p>Why is the data being produced?</p>	<p>To explore and understand the selected teachers’ perspectives on the Technology curriculum.</p>
<p>Who (what) will be the sources of data?</p>	<p>Interviews (Semi-structured and stimulated interview) and video recording of a Technology lesson</p>
<p>Where is the data to be collected?</p>	<p>Video recording - Inside the classroom during a Technology lesson.  Interview - Outside school hours, at a venue chosen by each participant.</p>
<p>How many of the data sources will be accessed?</p>	<p>Four Technology teachers</p>
<p>How often will data be produced?</p>	<p>One semi-structured interview per participant.</p>

	<p>One video recorded Technology lesson per participant.</p> <p>One stimulated interview per participant.</p>
How will the data be produced?	<p>All interviews will be audio-recorded.</p> <p>Technology lesson will be video-taped.</p>
Justify the plan for data production. (Why is this the best way of collecting data for this critical question?)	<p>The semi-structured interview method ensures that in-depth information is produced from each of the participants for better understanding of individual teacher’s perspectives on the curriculum. Open-ended responses let the researcher understand and present the world as it is seen and experienced by the participants, without predetermining those standpoints. Direct quotations document the participants’ depth of feelings, experiences, thoughts about what is happening, and meaning at a personal level.</p> <p>Video recording of a Technology lesson will ensure that richer data is generated.</p>
Validity and Reliability issues	<p>The transcript of each interview will be sent to each participant who will read it through for the purposes of verification, revision and excision.</p> <p>For reliability and validity, participants’ responses were carefully preserved in the</p>

	<p>very form they were given, without interference in the form of correcting, restructuring or rejecting any response.</p>
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(Adapted from Vithal & Jansen, 2010)

**Phase One - Semi-Structured Individual Interviews.** Kvale (1983) defines a qualitative research interview as "an interview, whose purpose is to gather descriptions of the life-world of the interviewee with respect to interpretation of the meaning of the described phenomena" (p. 174). Similarly, Turner (2010) states that "interviews provide in-depth information pertaining to participants' experiences and viewpoints of a particular topic" (p. 1). According to Denzin and Lincoln (2008), interviewing is "one of the most common and powerful ways in which we try to understand fellow humans" (p. 118). Given that this research study was qualitative and interpretive in nature, rich in-depth data was required and interviews were a suitable means to fulfil this objective. Any person to person interaction between two or more people (in this case a researcher and a respondent) is classified as an interview. Interviews are different from daily day-to-day conversations; an agenda is set, and a researcher asks the respondent questions so that the researcher is able to understand the phenomenon that is being explored through the eyes of the participant (Kumar, 2005). If the participant that the researcher has sampled trusts the researcher and is of the opinion that the topic is important, they will be able to provide rich data that a researcher would not be able to collect with any other method (Kumar, 2005; Nieuwenhuis, 2007). Therefore it was essential for the researcher to establish a comfortable environment through "small talk" that served as an ice breaker which was carried out in order to establish a relationship with the participants prior the interview (McMillan and Schumacher, 2006, p. 205). Cohen, Manion and Morrison (2000) explain that, "the interview is not simply concerned with collecting data about life: it is part of life itself, its human embeddedness is inescapable" (p. 267). Perspective is a concept that cannot be captured through other methods such as written questionnaires that produce statistical or numerical data (Cohen *et al.*, 2011). In addition, "an interview is adaptable and flexible" (Verma & Mallick, 1999, p. 128). Technology teachers' perspectives require understanding and interpretation and the interview process fits that purpose. McMillan and Schumacher (2010) identify three types of interviews, namely, an informal conversation, and a structured or semi-structured interview. In informal interviews,



questions are not predetermined by the researcher and the interview is conducted without an interview schedule. The researcher spontaneously formulates questions on issues of interest as the interview proceeds. Structured interviews use a set of predetermined questions and the researcher focuses strictly on those questions. This type of interview does not accommodate probing or clarification of questions. While a semi-structured interview also uses a set of predetermined questions, the researcher is able to probe and clarify questions which is more flexible as “it allows depth to be achieved by providing the opportunity on the part of the interviewer to probe and expand the interviewee's responses” (Rubin & Rubin, 2005, p. 88). Phellas, Bloch and Seale (2011) define a semi-structured interview as:

*...non-scheduled, though still partially standardised, the interviewer works from a list of topics that needs to be covered with each respondent, but the order and exact wording of questions is not important...generally such interviews gather qualitative data... (p. 183).*

Semi-structured interviews fit with qualitative research and were thus appropriate for this study as they enabled flexibility for both the researcher and the participant (Bradley, Curry & Devers, 2007). The researcher was able to explore Technology teachers' perspectives in depth by probing and clarify questions when the need arose. According to Harrell and Bradley, (2009), a semi-structured interview “collects detailed information in a style that is somewhat conversational” (p.35). This was advantageous as it ensured that the participants were relaxed and comfortable and were not restricted when answering or expressing their opinions. Phellas *et al.* (2012) highlight the strengths of interviews in qualitative research. Firstly, interviews when compared to questionnaires are more powerful in eliciting narrative data that allows researchers to investigate people's views in greater depth (Kvale, 1996). In a similar vein, Cohen *et al.* (2007) add that interviewing is “a valuable method for exploring the construction and negotiation of meanings in a natural setting” (p. 29). That is, the value of interviewing is not only because it builds a holistic snapshot, analyses words, reports detailed views of informants; but also because it enables interviewees to “speak in their own voice and express their own thoughts and feelings” (Berg, 2007, p. 96). Furthermore, interviews result in a higher response rate as the interviewee can expand on aspects about which he or she feels strongly. This leads to the production of more data. Furthermore, an interview allows for clarification of questions through probing, should the

need arise (Alshenqeeti, 2014). Phellas *et al.* (2012) identify two ways of conducting an interview, namely, “Face-to-face interviews” and “Telephonic interviews” (p. 197). Face-to-face interviews are conducted when both the interviewer and interviewee are physically present and engaged directly in conversation. Telephonic interviews are conducted over the telephone (Opdenakker, 2006). Telephonic interviews were not considered for this study as “the interviewer has no view on the situation in which the interviewee is situated” and, as a result, “the interviewer has lesser possibilities to create a good interview ambience” (Opdenakker, 2006, p. 14). For the purpose of this study, face-to-face interviews were employed. This allowed the researcher to capture the “respondents’ feelings from their facial expressions as well as their answered questions” (Phellas *et al.*, 2012, p. 197). It also creates a more relaxed setting for the respondent and the researcher. This would not have been possible in a telephonic interview (Phellas *et al.*, 2012). The interviews were audio-recorded to ensure that all the data was captured and thereafter transcribed. One of the advantages of audio-recording face-to-face interviews with the permission of the interviewee was that the interviewer was relaxed and focused on the interviewee, rather than having to record large amounts of data. Furthermore the use of an audio- recorder is advantageous as the transcription is more accurate than written notes (Opdenakker, 2006). Audio recordings also enable the researcher to identify direct quotations for data presentation (Walsham, 2006). It would not have been possible for the researcher to capture all the data had she relied on memory. A copy of the semi-structured interview schedule is attached as Appendix 6.

***Phase Two - Video-Recorded Technology Lesson and Stimulated Interview.*** A Technology lesson was video recorded to promote the collection of rich data and capture non-verbal communication. The lesson was not recorded for the researcher’s interpretation, but was used as a stimulus for further discussion in an interview between the researcher and the participant. In other words, it was additional data. The discussion with the participant was then transcribed and used as data. The video recording captured aspects of teaching that were not possible to acquire through interviews alone and provided clues to the participants’ unstated perspectives of curriculum. Cohen *et al.* (2011) observe that “video recording makes for richer data and catches non-verbal communication...” (p. 426). Interpretation of the video recorded lesson was generated by viewing the footage with each participant and this was explored in a

conversation style discussion that privileged their viewpoints. The selection of topics by the candidate for the recording was done through scheduling. The researcher firstly asked the teacher which lesson she could observe and arranged her timetable accordingly for that day. She wanted the teacher to be at liberty to continue teaching what was outlined in the Technology curriculum for that particular day and with no extra special preparation in the topics because of her presence. The choice of topic that the teacher taught would not affect her study in any way as it would be teaching the Technology curriculum, irrespective of the topic. She also did not want to infringe on the lesson by telling the teacher to prepare or teach a particular topic as it would not be ethical to do so.

### **Interview Schedule.**

“An interview guide is also an essential component for conducting interviews” on reference list (Kajornboon, 2004, p.23). It consists of a list of questions that the interviewer wishes to ask the interviewee (Kajornboon, 2004). A semi-structured interview serves as a guide to the researcher and enables relevant information to be obtained from the participants as well as information about subsidiary experiences that may be relevant to the study (Kelly, 2006). However, the type of questions is extremely important. Alshenqeeti (2014) identify three types of questions, namely, “structured questions”, “semi-structured questions” and “unstructured questions” (p.40). According to Berg (2007), the key feature of a structured interview is that it is mostly organised around a set of predetermined direct questions that require immediate, mostly ‘yes’ or ‘no’ type, responses. Thus, in such an interview, the interviewer and interviewees would have very little freedom (p. 40). With semi-structured questions, “the question is phrased to allow for individual responses. It is an open-ended question, but is fairly specific in its intent” (McMillan & Schumacher, 2010, p. 206). Finally, Gubrium and Holstein (2002) point out that, unlike the structured interview, the unstructured interview is an open situation through which a greater flexibility and freedom is offered to both sides (that is, interviewers and interviewees), in terms of planning, implementing and organising the interview content and questions. Semi-structured questions were considered most appropriate for this study. The researcher requested her supervisor to check the order and nature of the questions she had set in order to ensure that none could lead to predetermined answers. The interview schedule consisted of Section A,

which focused on aspects of the Technology curriculum and Section B that focused on the perspectives of Technology teachers (See Appendix 4).

***Managing the Interviews and Video Recording.*** Permission was sought from UKZN's Research Ethics Committee and the schools as well as the participants (See Appendix 4 and 5). The researcher met with the principal of each research site (school) to obtain written permission to conduct research on the school premises. Once permission was granted, video recordings of Technology lessons were done during school hours. Interviews were conducted after hours. The researcher created a weekly plan for video recordings and interviews. This obviously had to be flexible and she had to reorganise her diary on many occasions to accommodate the participants. She began with the individual interviews, followed by video recordings. The video recordings were challenging and had to be carefully organised. She had to be there on time, to record and to ensure that there were no faults with the camera.

The selection of topics by the candidate was done through scheduling. She firstly asked the teacher which lesson she could observe and arranged her timetable accordingly for that day. She wanted the teacher to be at liberty to continue teaching what was outlined in the Technology curriculum for that particular day and wanted the lesson to be very much as normal as possible, with no extra special preparation in the topics because of her presence. The topic that the teacher chose would not affect her research in any way as the teacher would be engaged in teaching the Technology curriculum, irrespective of the topic. The researcher also did not want to infringe on the lesson by telling the teacher to prepare or teach a particular topic as it would not be ethical to do so. Once the lessons were recorded, the researcher had to centre a stimulated discussion on the video with the participant. The purpose was to solicit perspectives of what the teacher was doing when teaching the Technology curriculum and why they did it. Once the discussions were complete, the researcher had to transcribe them. The table on the next page details each participant's age, the number of times they were interviewed and for how long.

*Table 5*

*Duration of Interviews*

<b>Pseudonym</b>	<b>Age</b>	<b>No. of times interviewed</b>	<b>Approximate duration of interview one</b>	<b>Approximate duration of interview two</b>
Taimur	45	2	45 minutes	30 minutes
Zarah	26	2	45 minutes	30 minutes
Emma	51	2	45 minutes	30 minutes
Aryan	54	2	35 minutes	30 minutes

**Challenges in Data Production.**

“Data collection has its complexities and demands” (Kajornboon, 2004). As noted previously, a tape recorded Technology education lesson and two individual interviews were used to gather data for this study. One of the most challenging tasks was arrangements for the video recording of a Technology lesson. Although permission was granted by all the necessary stakeholders, it was also important to ensure that teaching and learning was not disrupted. The researcher had to take into consideration special events or sporting activities at the school and adjust the schedule to accommodate the teacher. Dates were re-visited many times due to such factors. As a teacher herself, she had to seek permission from her principal to conduct video-recording during school hours. The video-recordings could not be conducted after school hours in the absence of learners. As a result, the researcher’s time table and free periods were re-scheduled to accommodate data collection; simultaneously ensuring that there was no loss of teaching time with her own learners. This was a challenging task. Furthermore, this was her

first experience of video-recording a lesson for the purpose of data collection. She constantly checked that the camera was recording the lesson and this was a nerve-wrecking process. Prior to the video-recording, a brief explanation was given to each class on the researcher's purpose and presence in the classroom. Learners were informed that the camera would not focus on them, but the teacher. They were also advised to ignore the presence of the researcher and focus on the lesson. The researcher had to ensure that no learner was visible on screen as this would be unethical. Arranging appointments for the individual interviews was also a challenge. Face-to-face interviews called for participants to set aside time. A maximum of forty-five minutes was allocated for each interview and two interviews had to be conducted. The first interview was a semi-structured interview, while the second was stimulated by the video recording of the Technology lesson. School teachers face time constraints as they are either occupied with extra-curricular activities after school or have personal matters to take care of. Some of the participants postponed or cancelled their appointments due to unforeseen circumstances. This delayed data collection, with interviews being conducted at a later stage. Each teacher was individually interviewed at different places, depending on their preference. Some were interviewed in the comfort of their homes, while others opted for a more private space.

### **Ethical Considerations**

Ethical issues are of paramount importance when conducting research. Every individual has the right to be respected and their rights should never be violated as reflected in the Constitution of South Africa (Act 108 of 1996). Ethical considerations were essential in conducting a study dealing with teachers and their perspectives. According to Terre Blanche and Durrheim (2002), "the essential purpose of ethical research planning is to protect the welfare and the rights of research participants" (p.65). Ethical considerations were stressed from the proposal stage of the study and were maintained throughout. Prior to collecting data, permission to conduct the research study was obtained from the relevant bodies and institutions, including the UKZN Research Ethics Committee (Refer to Appendix 4) and the DoE (Refer to Appendix 5). Furthermore, permission had to be obtained from each of the gatekeepers (Refer to Appendix 3), that is, the principal of each of the schools selected as well as from the selected Technology teachers (Refer to Appendix 2). A letter of informed consent containing details about the study with the option of participating or not, as well as the option of withdrawing at any given time

was handed to each participant after having being approached by the researcher (Refer to Appendix 2). A separate document containing important information on the purpose of the research study, as well as guaranteeing protection of the participants in terms of their identity, was given to participants before they completed the letter of consent (Refer to Appendix 1). Pseudonyms were used for each school and participant. Participants were also assured that the data gathered would be used solely for the purpose of research. Finally, they were informed that the data would be kept in a safe cabinet at the University and would be destroyed after five years.

### **Validity, Reliability, Trustworthiness and Authenticity.**

Validity and reliability are terms which are usually associated with ethical principles adhered to by those conducting quantitative research. According to on reference list (Golofshani, 2003), “reliability is a concept to evaluate quality in a quantitative study with a ‘purpose of explaining’ while the qualitative study has the purpose of ‘generating understanding’” (p.601). In this study, the sole purpose was to generate an understanding of Technology teachers’ perspectives. Validity indicates how sound a research study is and if its findings truly represent the phenomenon that the researcher claims to measure (Cohen *et al.*, 2011). In qualitative research, validity refers to the degree of congruence between the explanations of the phenomena and the realities of the world (Kothari, 2004). This study centred on Technology teachers’ perspectives on the Technology curriculum. Such personal experiences and perspectives could not be measured simply by means of an instrument, as with quantitative studies. It is important to note that this study was specifically to interpret and understand their perspectives on the Technology curriculum. Birt, Scott, Cavers, Campbell and Walter (2016) indicate that member checking is a technique for exploring the credibility of results which enhances validity. Creswell (2009) defines member checking as a process where “the final report or specific description or themes are taken back to the participants” (p. 191). During member checking, researchers can “check informally with participants for accuracy during data collection” (McMillan & Schumacher, 2010, p. 330). Member Checking was used to ensure trustworthiness of the findings which is a strategy that allows for improving the quality of qualitative data. This meant that the data and interpretations were continuously tested as they are derived from the participants from which data is solicited (Guba, 1981, p. 85).

As a researcher, i was required to include the voices of respondents in the analysis and interpretation of data. In addition to enhancing validity, the researcher allowed each participant to review what they had contributed to the study and to make adjustments if necessary. This gave them the opportunity to confirm or correct their responses on the transcripts to ensure that the correct data was reflected. Data was returned to participants to also check for resonance with their experiences. Member checking allowed for the elimination of researcher bias when analysing and interpreting the data. This meant that the analysed and interpreted data was sent back to the participants for them to evaluate the interpretation made by the inquirer and to suggest changes if they were unhappy with it or because they had been misreported. Informants were at liberty to reject an interpretation made by the researcher, either because it was socially undesirable or because of the way in which it was presented by the researcher (Schwandt et al., 2007). The member checking strategy involved establishing structural corroboration or coherence, which is, testing all the data to ensure that there was no internal conflict or inconsistencies, and establishing referential adequacy, which is, testing the analysis and interpretation against the documents that were used during data collection before producing the final document (Guba, 1981). This strengthens the data, especially because researcher and respondents look at the data with different eyes

Furthermore, the use of devices such as an audio- and video-recorder ensured that a more accurate transcript was created (Cohen *et al.*, 2007). In order for a research study to be trustworthy it has to abide by the principle of verisimilitude (Loh, 2013). This simply means that the data generated, in this case the perspectives of teachers, needed to be believable to the extent that others could relate to it. In an attempt to implement verisimilitude, the researcher gave the participants an opportunity to read and review their responses in the transcripts thereby ensuring accuracy and proper quotations. Another approach used to ensure trustworthiness was to establish a level of comfort between herself and each participant before conducting an interview and video-recording in order to build trust and encourage the participants to share their experiences.

Since the researcher was the data capturing instrument during interviews, there was a chance of bias (Cohen *et al.*, 2007). In seeking to minimise bias, she sought assistance from the supervisor for verification of the types of questions in the interview schedule. She also asked the



participants who provided the data to review the analysis of the data in order to check whether her interpretations seemed to be representative of their beliefs. Participants' responses were carefully preserved in the very form they were given, without interference in the form of correcting, restructuring or rejecting any response. Since this was a qualitative study, the results retrieved were based on participants' experiences; hence, authenticity was crucial. McMillan and Schumacher (2010) define authenticity as "the faithful reconstruction of participants' perceptions (p. 335). In other words, readers would be able to relate to or connect with informants and the situation. The participants chosen for the study were Technology teachers who articulated their perspectives and feelings about the Technology curriculum. As noted above, both the transcript and analysis were offered to the participants for comments and feedback which were written into the analysis. The findings do not represent the perspectives and interpretations of all Technology teachers, but illuminate how a group of teachers perceived the Technology curriculum.

### **Limitations and Strengths of the Study**

All researchers encounter barriers. While the study encountered a few limitations, attempts were made to overcome them. Firstly, teachers could not be interviewed during the school day. One limitation was the selection of a suitable yet convenient venue for the interviews. The researcher approached the participants for suggestions on a suitable venue in order to include them in the decision making process. A second limitation that was of great concern was the possibility of teachers wishing to withdraw from the study. This would mean that the researcher would have to go through the process of recruiting another participant and that would have been very time consuming. The third limitation was time. The interviews could only be conducted after school hours or on weekends. Since all the participants were teachers, they led very busy lives preparing lessons for the next day. Furthermore, three were parents and were busy with their families. Weekends were not an option as they had their own plans. Time constraints and the rescheduling of interviews were very challenging. While the researcher had planned to conduct the interviews over a period of two weeks, this extended to almost two months.

Fourthly, the researcher would have liked to have had more than one participant from a school in this study as it would have been interesting to find out if their perspectives were similar

or different in teaching the Technology curriculum within the same school. However the fact that there was just one Technology teacher for Grades 7 to 9 at each of these schools was a limitation. The study was conducted using a small sample of four teachers and it is therefore limited to the perspectives of four Technology teachers in their schools. Due to the small sample size, the results do not reflect the views of all Technology teachers. Finally, the possibility of bias was a limitation. In attempting to address this issue, the researcher employed different data collection methods. In addition, the data was checked and confirmed by each participant. Strengths included the fact that the semi-structured and stimulated interviews enabled the participants to speak freely and provide rich descriptive details of their perspectives. This yielded in-depth information to answer the research questions. It also allowed some of the participants to reflect on their previous perspectives and critique their own judgment.

### **Data Analysis**

Data analysis is the process of systematically organising and integrating data. According to (Boeije, 2009), it is “the process of breaking up or segmenting the data into parts and reassembling the parts again into a coherent whole” (p. 76). Wahyuni (2012) states that data analysis “involves the drawings of inferences from raw data” (p. 7). The amount of data gathered in a qualitative study can be overwhelming. Anderson and Anderson (1998) observe that, “Analysing data is like walking through a maze” (p.157) as many routes can be embarked on, but not all yield the data to answer the critical research questions. The raw data from the interviews was transcribed from the audio-tape into hard copy printed text format (Maykut & Morehouse, 1994). In order to make meaning of the data, it was organised into themes. Each participant’s data was analysed individually. This process is called coding which simply refers to ‘labelling’ (Wahyuni, 2012, p. 8). The topics that emerged from the data collected during semi-structured interviews were allocated codes. The coding process involved organizing the data into categories to create themes. The critical research questions served as a guide to ensure that the themes that were created addressed the questions. The role of the researcher is not to measure the data that is obtained, but rather interpret it for understanding (Cohen *et al.*, 2007). The video-recording was only used as a stimulus for discussion which was also transcribed. Once data was organised into categories, the researcher compared the findings with the feedback from the participant to determine whether or not patterns existed in the data. The hardcopies of

collected data were collected by the researcher's supervisor for storage in a locked cabinet at the University. It was also stored on the researcher's personal computer which is password protected.

### **Summary of Chapter Five**

This chapter presented an in-depth discussion on the research design and methodology used in this study. It outlined the paradigm that underpinned the study and the case study methodology employed. The sampling technique used to select the participants was highlighted and the data collection methods were discussed in detail as well as the challenges encountered in gathering data. Ethical considerations, trustworthiness, and validity, as well as the study's limitations were highlighted. The chapter concluded with a discussion on the approach adopted to analyse the data. The following four chapters present an analysis of the data on Technology teachers' perspectives on the Technology curriculum.

## **INTRODUCTION TO THE ANALYSIS CHAPTERS: ANALYSIS OF RESEARCH FINDINGS**

### **Introduction**

The previous chapter presented the research design and methodology employed for this study. The following four chapters present an analysis of Technology teachers' perspectives on the Technology curriculum. They provide a detailed analysis of the data gathered through the semi-structured interviews and stimulated interviews which were based on the video recording of a Technology lesson. The digitally recorded interviews were transcribed into textual data. The data was then analysed and interpreted using thematic analysis. An inductive process was used to analyse the data. This was useful as it focused on the categorisation and identification of possible themes from the data (Snape & Spencer, 2003). In answering the research questions, I identified nine perspectives of Technology teachers, namely, Technology teachers' perspectives on the goals of the Technology curriculum; resources used in teaching the Technology curriculum; the use of devices in teaching the Technology curriculum; teaching the Technology curriculum; assessment in the Technology curriculum; methods used in the Technology curriculum; time allocated to teaching the Technology curriculum; factors that influence the teaching of the Technology curriculum; and, finally, preparation of lesson plans for the Technology curriculum. The data is presented in the form of a descriptive analysis that provides the participants' actual responses from both the individual interview (I) which refers to a semi-structured individual interview between the researcher and the participant as well as the stimulated interview which refers to an informal interview between the participant and the researcher based on the video recording of the participant's Technology lesson arising from the video-recorded lesson (SI). Quotations of each teacher's response are indented and shown in italics. The Technology teachers' perspectives are firstly analysed by being represented directly as expressed by the teachers. Secondly, perspectives are inferred on the basis of their description and in making sense or understanding what has been captured from the teacher.

## CHAPTER SIX

### Case one - Taimur

This chapter presents Taimur's perspectives on the Technology curriculum.

#### **Taimur's perspective of the Goals of the Technology Curriculum**

According to Taimur:

*“Some of these goals include equipping learners with design skills and this may assist learners in the future should they intend on pursuing a career in the artistic field...it also aims to develop learners in becoming responsible citizens in society so that they are able to take care of their environment...and to help learners in strengthening their communication skills through group work activities...despite these goals being relevant to our learners it can take a long time to achieve them in the classroom” (I).*

Taimur suggests that the Technology curriculum aims to prepare learners for the future in three main areas, namely, design skills, tools that will enable them to become responsible citizens and communication skills. Acquiring these skills will enable learners to become self-directed in preparing for their future. The goals he identifies are thus long-term ones. Communication skills are important in preparing learners for the world of work and Taimur feels that it is vital to develop and strengthen these skills in learners. However, Taimur is conscious that such skills take time to develop. The limited time devoted to the Technology curriculum thus suggests that that Taimur experiences time management challenges because the curriculum imposes demands that are difficult to meet within the time available. Furthermore, teachers are under pressure to complete the syllabus on time. In summary, Taimur's perspective on the goals of the Technology curriculum suggests that these are not limited to the present, but about preparing for the future. Taimur added that:

*“I think that the Technology curriculum should include interview skills and computer literacy skills which are extremely important and useful for learners in their daily lives, especially once they finish school” (I).*

Once again, he defines the goals of the curriculum in relation to their application in the future. In suggesting that “*interview skills*” and “*computer literacy skills*” should be incorporated in the curriculum, he steps outside the curriculum and identifies knowledge that he feels would be appropriate. Interview skills are important when applying for a job and, given the evolution of technology, people living in the Twenty-First Century need to be computer literate. Hence, Taimur’s perspective points to the need to re-evaluate the Technology curriculum in terms of the skills that learners require in their daily lives. Taimur’s perception is that the Technology curriculum is constrained. Teachers are not included in curriculum design. While the designers of the Technology curriculum probably took it for granted that learners would be computer literate, this is often not the case. Taimur’s experience of the learners in his classroom enables him to identify gaps in the curriculum. Thus, what appears in the curriculum does not necessarily represent classroom realities. Taimur also described how he achieves his goals in relation to the Technology curriculum:

*“During the lesson I’ve engaged the learners with various questions and I’ve received numerous responses from various learners and I found that they were right on track, they gave very good, reasonable answers... also during the case study, they did self-evaluation, they corrected their work, I had a look at it and found they gave me answers which I’ve put on the board after they have answered and I found that most were correct. Furthermore, I gave the homework activities to reinforce whatever they have learnt during the lesson, but judging from the overall lesson I know that it was successful as I mentioned from all these activities from the responses, to the answering of the case study, and from the homework as well, it was a successful lesson indeed and the children thanked me for that lesson” (S.I).*

The data from the stimulated interview based on the video recording of Taimur’s Technology lesson reveals that the goals of the lesson were achieved. From Taimur’s perspective, it seems that his pedagogy is successful but one may wonder to what extent, as learners may have cheated during self-evaluation or could have asked their parents or older siblings to complete their homework and presented it as their own work. In a sense, it appears that Taimur takes credit for successful outcomes without establishing whether this is due to the

learners' own learning or his teaching. Therefore, one may infer that Taimur's perspective is driven by self-praise. During my observation of Taimur's lesson, it seemed that it was difficult for him to keep an eye on every learner during correction, as the classroom was overcrowded. This raises the risk of learners copying answers from one another or the chalkboard.

Furthermore, there seems to be a contradiction between Taimur's earlier statement regarding time constraints and his assertion that his lesson was a success as most of the learners understood it. This implies that Taimur's perspective varies depending on how successful a lesson is. It can thus be argued that he holds a naïve perspective of achievement of goals. His perspective is also not fixed but changes according to the situation in the classroom. Thus, if the lesson is successful, it would represent attainment of goals and if not, achieving the goals would take longer than usual. He attributes the achievement of his goals to learner self-evaluation and class discussions. Taimur noted that his learners answered questions correctly, indicating they understood concepts. The learners also showed gratitude to him.

### **Taimur's Perspectives on Lesson Planning for the Technology Curriculum**

Taimur's was of the view that experienced teachers may not require lesson plans when teaching the Technology curriculum:

*“It serves as a guideline during teaching... The irony is that on paper there is quite a lot we want to achieve, however in reality when I am in the classroom teaching this is not the case. At the end of a lesson only a small portion of what was intended may be achieved” (I).*

Taimur acknowledges that although lesson plans provides teachers with some direction, such plans do not always guarantee a successful lesson. He highlights that the policy document stipulates various goals, but in reality these are not always easy to achieve. In some cases only a small fraction of the goal may be achieved. One can therefore infer that what is intended by the curriculum and the teacher is not always achieved due to the reality in the classroom. From Taimur's perspective, it seems that the DoE has many expectations of Technology teachers. However, large, overcrowded classes, discipline problems and a lack of resources render such expectations unattainable or difficult to achieve.

## **Taimur’s Perspectives on Resources for Teaching Technology**

Since Nasa Primary is a no fee school, it is difficult to purchase resources. Taimur stated that:

*“Since Nasa Primary is a no fee school, we receive funding from the Department of Education. However it is a minimum amount that does not accommodate for resources entirely. We are therefore restricted in our budget. It was a real struggle to get a Technology kit for our school. It cost about five thousand rand.....the kit is the main resource I have to teach Technology” (I).*

This statement reveals that technology is expensive. It also suggests that the DoE does not prioritise Technology in making funding allocations. While no fee schools prioritise payment for basic necessities such as water and electricity, Nasa Primary has clearly made an effort to support the teaching of Technology by setting aside funds to purchase a Technology kit. However, from Taimur’s response, it seems that this is the only resource he has to teach Technology. Taimur added that the lack of resources to teach the Technology curriculum could be the reason for poor results:

*“I feel that one of the reasons as to why we have such bad results in our district is because of the lack of resources available to our children. I feel that the teaching of the Technology curriculum will only become successful if the department intervenes, play a more active role and provide the necessary resources to our children” (I).*

As stated previously by Taimur, one of the goals of the Technology curriculum is to prepare learners to be able to design and computers are necessary for designing. When resources are lacking, this goal cannot be achieved. From Taimur’s perspective, it seems that responsibility for learner success that is placed on schools and teachers should be shifted to the department. Taimur’s response implies that since he is an employee of the department, he should be provided with the basic resources required to succeed in his work. He clearly feels that poor results are mainly due to the DoE’s failure to provide basic resources. At a macro level, this suggests that



the DoE is negligent while from a micro level, it appears that the school is. Taimur identified some the resources that he utilizes within his classroom:

*“Apart from teacher talking, I think it’s important also to use the traditional form of teaching which is the use of the chalkboard and from past experience as I said I’ve been teaching for numerous years and I find that children remember better when they look at words on the board so I had various words written there, dumping of sewage and other important concepts. When children visualise certain concepts, they are able to remember better and that makes the lesson successful” (S.I).*

From Taimur’s worldview, the chalkboard is not seen as educational technology; rather, he regards it as a traditional form of teaching. Since one of the goals of Technology, as Taimur mentioned earlier, includes imparting design skills, the use of the chalkboard enables Taimur to draw diagrams that stimulate design skills in his learners and enable a good understanding of the concepts discussed. In earlier times, the chalkboard was a relevant teaching tool. However, Taimur regards it as traditional but useful. If he had computers in the class, the learners could see the words on a screen. This indirectly reinforces the idea that visual learning is important, whether from a chalkboard or screen. From my personal observation, it was apparent that, within the constraints of his working environment, Taimur was trying to impart knowledge about Technology through visual aids so that his learners find the lessons interesting and useful for the future. His response suggests that if learners are not visually stimulated in a subject like Technology, they are not likely to be interested in learning. Taimur started teaching before Technology was introduced as a subject and hence uses the approach which he feels is important to learners rather than sticking to the Technology curriculum *per se*. This implies that he is comfortable with traditional resources such as the chalkboard to teach Technology.

### **Perspectives on the Use of Devices to Teach Technology**

Taimur stated that:

*“There are a few computers, however these are restricted to the use of teachers only and not learners. We do not have a computer teacher nor do we have a period allocated for the teaching of computer skills to our learners” (I).*

Although Taimur is a Technology teacher, he would not be able to teach learners technical skills to use a computer because it is not in the syllabus. However, there seems to be co-dependency between a computer and Technology as a subject because a computer is a technological device. Learners that have never seen a computer may never get an opportunity to use one in school unless they choose Information Technology (IT) as a subject. The use of technological devices in teaching the Technology curriculum also raises contradictions. According to Taimur:

*“On one hand, the use of a cell phone in the classroom can help learners find educational information instantly. On the other hand the use of a cell phone by learners at Nasa Primary and many other schools is banned” (I).*

While many schools, including Nasa Primary, impose restrictions on the use of mobile devices. Taimur feels that such devices could help learners. According to Baron (2010) “...for young people, the mobile phone is not simply an instrument for conveying information but a lifeline for managing social interaction” (p. 4). Restrictions on the use of cell phones suggest that schools regard them as a tool for social interaction rather than communication. Cell phones generally offer fast access to the internet and thus information about the world. However, they are also associated with bad habits amongst learners, including playing games or using Facebook during class. Taimur adds:

*“It would be nice if learners had smart tablets instead of carrying books...I personally use my cell phone and laptop to plan creative Technology lessons and to find additional information that may not be in textbook...teachers need to come out of their shell and become more innovative” ...many teachers also have technophobia” (I).*

Interestingly, Taimur observed that many Technology teachers suffer from “*technophobia*”. Bauer (1997) defines technophobia as a fear or dislike of advanced technology

or complex devices, especially computers. It is thus of great concern that some teachers are afraid to use computers or technological gadgets in teaching the Technology curriculum. This is likely to result in learners being unable to utilize such devices. In pointing to the advantages of using a *smart tablet* instead of carrying books, Taimur reflects on the value of such devices that he himself uses to plan his teaching. However, the fact that some teachers fear technology limits the use of technological devices in the classroom. Taimur is clearly not a victim of this malady. Taimur stressed that teachers “*need to come out of their shell and become more innovative*”, suggesting that they should make an effort to create fun lessons using technological devices. The stimulated interview based on the video-recording of Taimur’s Technology lesson showed that Taimur goes out of his way to prepare creative and innovative lessons by obtaining additional information and not relying solely on the textbook.

### **Taimur’s Perspectives on Teaching the Technology Curriculum**

According to Taimur:

*“Generally, a learner that comes from an urban area would be able to relate to what I am teaching, for example the teaching of technological gadgets, bridges, towers and so on. However, a learner that comes from a rural community where our school is based at may not be able to relate to such concepts and this can become quite challenging and also unfair to these learners as well” (I).*

This illustrates that Taimur is bounded by the context in which he teaches. He assumes that if a learner comes from a rural area, he or she may not know anything about technology. Taimur creates a reductionist argument that, depending on where one stays, one will either know technology or not. He thus reduces knowledge of technology to a geographical location. Taimur’s statement also reveals that the area learners come from determines their ability to understand concepts. Since the learners who attend Nasa Primary have not been exposed to architecture that is commonly found in towns and cities, this impacts on Taimur’s teaching of the Technology curriculum. Learners from poor economic backgrounds seem to be further disadvantaged. It seems that the curriculum does not take the diverse nature of learners’ backgrounds into consideration. According to Taimur, a learner who comes from a town or city would be able to relate to structures such as a bridge as they would have been exposed to them on

a daily basis. However, those who reside on farms are not familiar with such architecture and would be at a disadvantage. Thus, for Taimur, the context in which he teaches impacts his teaching of the Technology curriculum as he is the medium that brings Technology into the classroom. Taimur added that:

*“Previously, our school had specialised rooms for specialist subjects like needlework and woodwork. Presently, I don’t even have a Technology room to teach Technology; instead I have to teach in a normal classroom which becomes very challenging” (I).*

This also appears to contradict an earlier statement. While Taimur previously spoke of how he prefers traditional ways of teaching, here he states that not having a Technology room is challenging. During the video recording of Taimur’s lesson, I observed that he did not walk around the classroom. In a way, he is invoking the idea that it is abnormal to teach Technology in a non-specialist environment. He seems to be overwhelmed or paralysed. It seems that Taimur’s teaching of the Technology curriculum is compromised by the lack of an appropriate room. This suggests that many schools don’t recognise Technology as a crucial subject. With an estimated fifty learners per class at Nasa Primary, one can understand Taimur’s difficulties. As I observed, the “normal classroom” he refers to is small with desks and chairs in rows that are very close together. Once again, the classroom as a context has an impact on Taimur’s’ ability to teach the Technology curriculum. He points out that, in the past subjects such as needlework and woodwork were taught in specialised rooms. Such subjects would have required space for movement as sharp objects and needles were likely to be used. While these subjects are now submerged into Technology, the Technology curriculum still requires practical work. The small classrooms at Nasa Primary make it impossible to conduct safe practicals. Taimur added that:

*“It’s important for an educator, especially teaching Technology to move around the classroom and to talk. I tried to make use of various resources, charts, the textbooks; I got learners involved in terms of examples” (S.I).*

While he has clearly made an effort to make his classroom conducive to the teaching and learning of Technology by using various resources such as charts, textbooks and learner activities, he remains hamstrung as he cannot walk around the class due to the restricted space.

This was evident in the video recording of his lesson. In other words, one's beliefs are often difficult to fulfil due to contextual constraints. It seems that the curriculum designers designed a curriculum with an ideal school in mind without considering the complexities of the South African education landscape. Taimur also observed that:

*“My specialisation is Mathematics, not Technology. Although I go for maybe one workshop in a year, it doesn't help much, because those workshops are short. I mainly have to use my own ways of teaching Technology” (I).*

Although Taimur is not a specialist in Technology, he tries his best. His response indicates that he is not given an opportunity to teach the subject he is qualified to teach. It also seems that the DoE has not provided Taimur with adequate support as he is left to make decisions about pedagogy on his own.

### **Taimur's Perspective on Teaching Methods**

Taimur shared the teaching methodologies that he uses in teaching the Technology curriculum:

*“There are certain loop-holes in the Technology curriculum; in this case it does not specify which teaching method to be used when teaching a particular topic. As a Technology teacher I indulge in both learner centred as well as the teacher centred approach” (I).*

It is clear that Taimur is dissatisfied with the Technology curriculum in terms of the methods to be used. It seems that the curriculum does not explicitly state which approach to adopt when teaching. Taimur is flexible in his approaches, sometimes using a learner-centred and at other times a teacher-centred approach, yet at the same time he is unsure about which approach to use. The fact that standardized methods are not set is problematic. According to Taimur:

*“A learner centred approach would be appropriate for when learners conduct their mini pat assessments. When learners are placed into groups they can share ideas and learn from each other...I use the teacher centred approach*

*mostly because of the large class size and also when I want to derive individual responses” (I).*

This statement implies that Taimur regards group work as the ideal method. He organises learners into groups during mini-pat assessments so that they are able to collaborate and communicate, creating a better understanding of concepts. However, due to the large classes at Nasa Primary, Taimur is forced to resort to the teacher-centred approach. He expressed the desire to use online approaches:

*“In an ideal situation a computer and online approach would be excellent, however this option might only be doable in private schools where facilities are in abundance” (I).*

Private schools generally have many different types of equipment ranging from smart boards, to whiteboards, laptops, and computers.

*“I also use real life experiences and examples when teaching Technology so that my learners can relate and understand better. I encourage a lot of learner participation in my discussions, so that I can gauge feedback” (I).*

This indicates that Taimur stimulates critical thinking amongst his learners by asking questions during discussions. He uses real life examples to help learners understand concepts in Technology. This is a creative way of making lessons exciting. Taimur added that:

*“The case study is a good example because when learners answer questions they will do so from their own critical perspective and solve problems as well... children must be able to relate to what is being taught and need to know their responsibilities as well...we did not have many props, so I was able to use the learners themselves and objects that they were wearing to enhance my lesson. Children normally learn well through visual effects so when I started the lesson with a chart, they were able to compare and contrast”(S.I).*

It was evident in the Technology lesson taught by Taimur that he incorporates creative teaching methods such as case studies with the intention of implementing what the curriculum

seeks to achieve. Such methods enable learners to expand their knowledge by becoming objective. They are given a chance to provide their own solutions to problems. Taimur strongly believes that learners learn best through visual objects; he therefore uses available examples such as their shoes as well as charts to illustrate concepts associated with processing.

### **The Distribution of Time to Content**

The downfall of the curriculum is that there are many topics and very little time to complete them. Taimur observed:

*“Technology is given only two hours a week and this time is not enough compared to subjects like Mathematics and Science. The curriculum does not accommodate for days on when I am ill and away from school because of a union strike. I have to therefore use my lunch breaks and time after school to catch up on the time lost” (I).*

The amount of time allocated to teaching and learning the Technology curriculum is a hundred and twenty minutes per week. There is a sense of frustration in Taimur’s statement that he has to give up his lunch breaks and after school time to teach. Union strikes are part of the education system and are therefore unavoidable. Such circumstances are beyond Taimur’s control; however, he feels it is his duty to make up for lost time.

### **Taimur’s Perspective on Assessment in the Technology Curriculum**

In terms of assessment, Taimur identified many challenges in the Technology curriculum:

*“The mini-pat assessments depicted in the Technology curriculum are of an unrealistic nature. My learners sometimes cannot relate to concepts such as a watchtower and this becomes problematic. I often find myself in situations where I have to supply these resources to my learners just so that they can do their own work....” (I).*

Taimur feels that mini-pat assessments do not do justice to the learners that he teaches. The word “unrealistic” conveys that his learners are not familiar with the concepts in the curriculum. Generally, structures such as watchtowers are found in towns, parks, beaches and the city. Very

rarely would one find a watchtower on a farm. Mini-pats require materials in order to be completed and form an essential component of the Technology curriculum. The majority of the marks (70 per cent) are from the mini-pat itself and form part of continuous assessment (CASS) for Technology (CAPS). Yet learners at Nasa Primary do not have access to such resources. Taimur further stated that:

*“Through self-evaluation learners are able to learn from their mistakes...The curriculum does not provide guidelines for questioning when accommodating learners with barriers to learning...I am not trained to educate learners specifically with special needs...curriculum should become streamlined” (I).*

Taimur indicates that the curriculum offers no assistance in supporting learners with special needs. He is not equipped with appropriate skills to assess learners who experience challenges or barriers to learning. According to Khan (1997), learning barriers include language and communication, disability and socio-economic factors. Learners with disabilities generally attend schools where teachers are trained to cater for their needs and class sizes are reduced so that they receive more attention. However, the DoE’s White Paper Six highlights the importance of inclusive education and recommends that all learners should be able to access education and training regardless of their individual needs. This would allow all children, including those with disabilities, to develop and extend their potential and participate as equal members of society (White Paper 6, 2001). Taimur’s statement that *“I am not trained to educate learners specifically with special needs”* infers that the training of Technology teachers at higher education institutions focuses on the content and teaching of the Technology curriculum and that no formal training is given on learners with special needs. Taimur uses self-evaluation to test if his learners understood their work as he believes that this will enable them to identify their own mistakes and therefore learn from them.

### **Factors that Influence Taimur’s Perspectives on Teaching the Technology Curriculum**

Taimur stated that:

*“I am influenced by my students’ interest. I find that when there are practicals, such as the mini pat, some of my learners become disinterested because of the lack*



*of materials and this influences my teaching as it becomes very difficult...I think the department needs to intervene by providing basic resources to schools so that the teaching of Technology can become more effective” (I).*

From Taimur’s response it seems that the availability of resources determines the spirit of learning in the classroom. A lack of resources negatively affects his teaching. Without adequate resources to teach the Technology curriculum and do the mini-pats, many learners do not show interest in the subject. In contrast, when Taimur receives positive responses from his learners he feels elated:

*“The positive responses that I get in my lesson make me feel good and happy that learners are able to relate to what I talk about” (I).*

Taimur feels a sense of jubilation when learners participate in discussions and answer questions correctly. This motivates him to continue to make an effort.

## CHAPTER SEVEN

### Case Two – Zarah

This chapter presents Zarah’s perspectives on the Technology curriculum.

#### **Zarah’s Perspective on the Goals of the Technology Curriculum**

Zarah stated that:

*“It’s important to remember that not all our learners are academically inclined and Technology being a practical subject brings out the hidden talents of some learners, for example building and constructing which would not be possible with a subject that is numerically or theory orientated. This brings out their self-confidence. They may fail a test in another subject but at the same time they will feel worthy because there have skills in making things in Technology... learners are exposed to learning how to construct three dimensional sketches which can allow them to take up careers as “artists” or plan drawers” (I).*

Zarah’s perspective highlights the uniqueness of the Technology curriculum in being practically orientated as opposed to other learning areas that primarily focus on theory. She notes that succeeding in Technology improves some learners’ self-esteem. Zarah points to the distinction between practical, theoretical and numerical subjects and adds that, since all learners are different, they may not be good at a particular subject. From Zarah’s perspective, if learners are not happy, this will negatively affect their self-esteem. She feels that the Technology curriculum creates opportunities for more practically inclined learners to excel in school work as well as increasing their self-confidence. Zarah shares a similar perspective to Taimur when she states that the Technology curriculum’s goals are beneficial to learners’ career path. She indicates that there is hope for learners who are more practically inclined as Technology provides opportunities to improve their drawing skills that would be valuable in careers relating to architecture. Like Taimur, Zarah feels that the Technology curriculum will prepare learners for future careers in the vocational field. She added that:

*“Technology aims to develop learners into responsible beings who are aware of global problems like pollution and ways how to protect the environment so it is very beneficial” (I).*

Thus, Zarah feels that Technology not only aims to create good design skills in learners but also assists them in becoming responsible citizens. It exposes learners to real life problems such as pollution that can be detrimental to one’s health as well as the environment. Hence, Zarah implies that Technology education strives to develop learners who would find ways to protect the environment and come up with solutions that would help maintain a clean environment. Once again, Zarah shares a similar perspective to Taimur in that they both feel that Technology strives to develop socially responsible learners. One can infer that it encourages critical thinking and problem solving, skills that expand a learners’ thinking ability and offer opportunities to be creative.

### **Zarah’s Perspectives on Lesson Planning for the Technology Curriculum**

The DoE policy document for Technology requires that lessons be planned. According to Zarah:

*“Lesson planning is time consuming and honestly I don’t see the point of it. I write out my lesson plans just for formality, because after it’s done I don’t even go back to refer to it when I’m teaching. It’s the last thing on my mind, because you are faced with a different reality in the classroom. To put it down on paper is very easy but to practice it is the hardest part....” (I).*

Zarah regards Technology lesson plans as a mere formality and does not feel that they make a difference. She thus infers that lesson plans are imposed on her and she would do away with them if she could. Zarah adds that preparing something on paper does not necessarily guarantee a fruitful and successful lesson. This implies that her lessons are not always presented as intended. From the above response, it seems that Zarah is faced with bigger challenges which require her attention. One can infer that the “reality” she confronts refers to ill-discipline, an inappropriate context that hinders delivery of a successful lesson.

## Zarah's Perspectives on the Use of Resources when Teaching the Technology Curriculum

The lack of resources at Earth Primary impacts on Zarah's teaching of the Technology curriculum:

*"We have a kit however it was a real mission to acquire it...most of the time I have to dig in my own pocket for money to buy resources...at times myself and other teachers are engaged in fundraising to help raise money for the school"* (I).

The words "real mission" conveys a sense of the struggle the school had to purchase the kit. The fact that teachers have to get involved in fundraising, points to the financial difficulties many schools face. It can also be inferred that purchasing the Technology kit was low on the list of the school's priorities. Zarah mentions that she often uses her own money to purchase materials and ensure that her learners have access to some resources. This indicates the extent of her sacrifice for her learners. One can assume that she prioritises her teaching over her personal needs. The lack of resources poses great difficulties in teaching Technology lessons:

*"We so used to sharing and it is very rare that each child will have a textbook for themselves and this really disrupts the lesson because we have to make sure each child has a textbook between them....it's not the learners fault. Sometimes if you want to borrow from the other class and that class didn't have Technology for the day or they left their textbooks at home it does become frustrating for you as a teacher and sometimes there are fights, they don't want to share. It has an impact on my lesson because teaching time is lost between sharing these textbooks and so on"* (SI).

Zarah's perspective on teaching the Technology curriculum gives rise to extreme challenges due to the lack of text book availability. I personally observed up to three learners sharing a textbook. In one instance her learners asked Zarah if they could borrow from their friends in other classes. Zarah noted that this can create problems of discipline, as learners refuse to share with their peers. Such situations require Zarah to step out of her teaching and resolve the problems. Teaching time is infringed upon by factors such as

discipline as learners fight over textbooks. This reveals that Zarah is perhaps unhappy in her teaching merely because her teaching time is being compromised due to factors beyond her control. Zarah further added that:

*“I feel that if the department wants to give textbooks, they need to ensure that a textbook is given to every learner because it’s very difficult when we have to make them share, and now with this new policy that schools have, we must issue the textbooks to the learner... I feel it was much better when we as teachers kept the textbooks. So the issuing of textbooks is good on paper but realistically if they cannot provide for every child, giving half and leaving half out creates a lot of problems” (S. I).*

This implies that the policy on textbooks was designed without taking the reality at schools into consideration. The new rule for issuing textbooks to learners is imposed on Zarah and she has no choice but to come up with ways to deal with the problems it creates. From Zarah’s perspective, her autonomy is restrained in the implementation of the curriculum, in that she was previously in charge of issuing textbooks but the new rule that learners should keep the textbooks undermines her authority. Zarah also shared the strategies she adopts to address this problem:

*“Sometimes I make worksheets to make up for them not having a textbook. I know as a teacher in a public school I am going to be faced with these challenges daily and I’m often faced with them so when I just thought of telling those children who didn’t have a textbook to just draw from the board, it was from my previous experience because if I don’t give them something to do they are going to be disruptive... and so you have to think on your feet and be able to accommodate those children and where I can accommodate them I do try my best” (S.I).*

Zarah acknowledges that teaching in a public school means confronting numerous challenges. One can infer that teaching in a private school would be different. Zarah stated that she had to come up with ways to accommodate learners that lack textbooks. From my personal observation of Zarah’s Technology lesson, she utilizes worksheets as well as the chalkboard to illustrate concepts. She knows from past experience that if learners are not

busy with tasks; this results in disruptive behaviour. To prevent or minimise this risk, Zarah finds solutions to keep her learners occupied. In other words, according to Zarah, one has to be proactive as a Technology teacher even if it means finding your own solutions to problems in the classroom.

### **Zarah's Perspectives on the Use of Technological Devices in the Technology Curriculum**

The use of technological devices has implications for teaching and learning in the classroom. Zarah stated that:

*"I personally use my cell phone now and then to quickly Google something I'm teaching to show the class so that they have an idea. They end up understanding in that way... it would be excellent if her school had smart boards, laptops and tablets but we cannot afford these" (I).*

Zarah's response suggests that when learners are exposed to technological devices such as a cell phone they are likely to understand better. This highlights the importance of technological devices in the classroom. A small device enabled Zarah and her learners to have immediate access to the world. This points to the power of technology in the classroom. Using her cell phone also shows that Zarah is a teacher who is not afraid to use technological devices in the classroom and encourages their use. She adds that it would be excellent if other devices such as smart boards, laptops and tablets were introduced. However, this is not possible due to Earth Primary's financial constraints. Zarah added that:

*"Even if such devices are introduced by some miracle at my school, it would be very challenging and difficult to monitor and facilitate...children these days can really get up to a lot of mischief...we don't know what children can be searching for on the internet, so it needs to be supervised closely...maybe they could put a safety device on it so learners could have limited access"(I).*

Although Zarah enjoys the use of such devices when teaching the curriculum, she highlights the problems the school might encounter should such devices be introduced to teaching and learning. Learners could abuse such facilities by searching for information that is not school related or could use the devices for their own amusement. She also acknowledged that learners can be

disruptive when using such devices in the classroom. Zarah adds that technological devices would need close supervision. The primary task of a teacher is to impart knowledge to his or her learners and the additional responsibility of having to supervise them would be onerous.

### **Zarah's Perspectives on Teaching the Technology Curriculum**

According to Zarah:

*“It would be nice if my school had a Technology centre with big tables which learners can use when working with their mini pats...classrooms are not sufficient when teaching Technology...it's not safe to work in a small classroom with many learners especially when you are making things and using equipment like the glue gun, cutting things using sharp tools and so on...learners can get injured if they are crowded together” (I).*

Zarah's primary concern is her learners' safety. It appears that the classroom in which she teaches Technology is not appropriate and presents safety problems. She mentions that her classroom is small and hence cannot accommodate a large number of learners. It is unsafe because there isn't enough space to move around. Equipment such as glue guns and sharp tools are dangerous if not used properly. Zarah shares her desire for her learners to have good working conditions such as large tables and space to move around. This could be addressed by a dedicated Technology room. Zarah added that:

*“Context affects performance...if learners are squashed and in a confined place they will start to push each other and fight for space to keep their things because there's no space to work”(I).*

One can infer that if learners are not in a conducive environment, they will be unable to work, with detrimental effects on their results. It seems that fights are most likely to occur when learners are seated too close to one another. Zarah shared the challenges she confronts when teaching a Technology lesson in a classroom that is not conducive to teaching and learning:

*“It is quite difficult because in Technology we need graphs to show these children and these graphs have to be drawn accurately. Like here I'm using the*

*chalkboard, but obviously I'm not drawing the graph accurately as it would have been if I had a smart board, so it is not conducive but as a teacher you have to think of alternate methods and you have to make it conducive to learning...you have to do what you can...there's lot of learners in the class and obviously you cannot go to them individually and show them how draw, you have to show them" (S. I).*

It seems that although Zarah is not happy in the context in which she teaches, she has no choice but to find alternate ways to make her classroom conducive to learning. When she indicates that “*you have to make it conducive*”, this suggests that she receives no support in creating a conducive learning environment for a large number of learners. It also seems that the environment in which she teaches prevents Zarah from moving around her class because of the lack of space. This creates a distance between the teacher and learners in the Technology classroom, with negative impacts on knowledge acquisition. Zarah observed:

*“When I was trained at university to specialise in Technology, I was trained with the idea that these facilities would be available in schools. I didn't know that I would be teaching in a school with hardly any resources. I was not prepared for this. I was not trained to deal with text book shortages and discipline problems. I wish more emphasis was placed on those things. It would make teaching better” (I).*

From Zarah's perspective, her training at university did not prepare her for the harsh realities at schools. She took it for granted that the school that she would teach at would have relevant resources and facilities. It appears that, apart from teaching subject content knowledge; higher education institutions are not equipping their students with ways to handle discipline and a lack of resources. This suggests that, although Zarah is qualified to teach Technology, she confronts challenges.

### **Zarah's Perspective on Methods Used in the Teaching of the Technology Curriculum**

Zarah noted that it is up to her to decide which methods to use when teaching the curriculum:



*“It is up to me to use my discretion as to which method I wish to use when teaching the Technology curriculum...it can be scary because sometimes I don’t know if I am using the correct method to teach a particular topic. There is no direction given in the curriculum as to what method I must adopt. For example if you want to use a textbook and teach your learners that is fine. If you want to do group work for the whole year, that too is fine. If you just only want to write notes for the whole year that too is fine” (I).*

While this narrative communicates a sense of autonomy in that Zarah is free to use the strategy that she prefers when teaching the Technology curriculum, there is also a sense of fear as she is unsure if her methods are correct. It is thus apparent that the Technology curriculum does not guide Zarah in her curriculum delivery in the classroom. This once more reveals a lack of support for Technology teachers. Zarah shared some of the methods she uses:

*“I do a bit of group work but it is difficult because of class numbers and when I do put them in groups they can become very chaotic...I feel that sometimes it’s humanly impossible for a teacher to be doing group work with a class of forty eight” (I).*

Group work is a learner-centred approach, but Zarah finds it difficult to use in a small classroom with forty eight learners. It is difficult to maintain discipline when groups are seated close together. While Zarah believes that it is important for Technology teachers to use a variety of teaching methods to avoid learners becoming bored, she is frustrated because it is practically impossible to use more learner-centred approaches.

### **Zarah’s Perspectives on Time Allocated to Teach the Technology Curriculum**

Zarah stated that insufficient time is allocated to the Technology curriculum:

*“We have only two hours a week to teach Technology. I don’t have double periods to teach Technology...the time is insufficient especially with the group work and practicals. Many times learners end up not finishing a task in groups because of single periods and this actually sets us back” (I).*

Zarah is allocated single periods in which she has to conduct practicals and group work tasks that learners do not complete. She added that:

*“the curriculum expects me to be teaching right till the end of the term, not taking into consideration take into consideration the extra tasks that go along with teaching such as projects to mark, exams that usually starts weeks before the end of term which and reports to be issued all before the end of the term, so the curriculum is not being realistic” (I).*

Apart from teaching the Technology curriculum, various other tasks have to be completed that are very time-consuming. However, the Technology curriculum does not make provision for tasks such as marking assessments which are just as important as teaching the curriculum. Zarah’s comments also highlight that the Technology curriculum outlines the syllabus from the first to the last day of the school term. Thus, one can infer that she has no time to complete additional tasks. Zarah feels that the curriculum does not consider the reality of the work that has to be done as a teacher. She indicated that:

*“I just have to rush through the syllabus because of the huge amounts of content. If I have lost time due to reasons beyond my control, I will usually swap classes with an educator of another subject who has finished the syllabus for the term earlier than me, and use some of that time to cover up the sections that I wished to teach...The curriculum needs to reconsider its content... The Technology curriculum does not take into consideration the extra tasks that go along with teaching such as the assessment, marking, moderation and reporting aspects. Most of the times during my lesson I am completing administrative documentation that the office demands as being urgent and I lose out on my teaching time” (I).*

Zarah feels that it is not fair to her learners that she has to rush through the syllabus. However, it seems that she is caught in a dilemma and has no choice but to do so. However, Zarah indicates that she makes up for lost time by making arrangements with other teachers who have completed their syllabus to share their teaching time. Zarah is of the view that the curriculum should be reevaluated to streamline its content so as to make teaching more

manageable. It appears from Zarah's perspective her teaching time has become eroded by non-teaching tasks such as administrative work which is time consuming. Her response above indicates that the Technology curriculum is ignorant of the additional work that comes with the teaching of the curriculum such as the marking of tests as these tasks require time to be completed as well.

### **Zarah's Perspective on Assessment in the Technology Curriculum**

Zarah felt strongly that the Technology curriculum is not practical when it comes to assessment:

*"I feel that some of the assessments, min-pats as we call them in Technology are quite impractical, for example, this year the Grade sevens had to make a model of the "Jaws-of-life" structure...many of them have not even heard of a Jaws-of-life before, it's the first time for them and so making a model of it at Grade seven level was no doubt challenging" (I).*

Zarah shares the same sentiments as Taimur when it comes to assessment in the Technology curriculum being unrealistic. She notes that many of her Grade Seven learners were not familiar with the "Jaws-of-life" (a hydraulic apparatus used to pry apart the wreckage of crashed vehicles in order to free people trapped inside) and expecting them to make a model of something they could not relate to is unrealistic. She added that:

*"I think these learners should make things which they can use, something that can serve a purpose thereafter, so that they see the value of it, rather than making something they are not going to end up using" (I).*

Zarah suggests that the curriculum should incorporate assessment that would be meaningful to learners' lives where they make something that they appreciate and could be used in the future. She identified additional assessment challenges as follows:

*"Due to a large number of learners experiencing barriers to learning during assessment, it is virtually impossible to attend to every learner individually because of the lack of time...what I don't quite like about*

*the curriculum is that they don't tell you what to do if a child is struggling and very often these are the learners that get left behind because there's no support" (I).*

It is apparent that time constraints prevent Zarah from assisting learners that experience problems, with negative impacts on their performance. She points to lack of support from the Technology curriculum that does not identify ways to accommodate learners with difficulties. Furthermore, the Technology curriculum does not consider the ratio of learners to the teacher.

### **Factors that Influence Zarah in the Teaching of the Technology Curriculum**

Zarah identified the factors that influence her teaching of the Technology curriculum:

*"I find that students respond better to me when I show them something visually rather than just talk continuously. When I talk, some of them start to yawn and eventually fall asleep, but when I show them a picture and talk then they become alert...I've learnt to integrate my teaching with their favourite sport or sometimes a programme or singer because I feel that they can relate to them and at the same time learn the concepts I'm teaching" (I).*

Zarah feels that visual stimulation makes learners more attentive. Other factors that influence her teaching of the Technology curriculum include school announcements and learners that bunk. According to Zarah:

*"The announcements are really disturbing especially when you are trying to get a concept across to the learners and... the announcements are made on a regular basis. As a teacher you want to overlook the noise that is coming from outside and the disruptive learners walking past, but the learners in my class, they sometimes can't be bothered...they still want to look outside" (S.I).*

Zarah shared her experience of being disturbed while teaching Technology. School announcements distract her thoughts and she often forgets what she wanted to say. She also has to chase after learners from other classes who walk past her door and disturb her lessons. Teaching time is thus directed to discipline problems rather than the curriculum. Zarah also

explains that when learners outside her class are noisy, her learners look out of the classroom window or want to know what is going on.

## CHAPTER EIGHT

### Case Three – Emma

This chapter presents Emma’s perspectives on the Technology curriculum.

#### **Emma’s Perspective on the Goals of the Technology Curriculum**

In terms of the goals of the Technology curriculum, Emma stated that:

*“Technology helps them in choosing technical subjects that may be useful for their career. The goals help us in developing skills so as to produce future civil engineers and builders from our own country instead of getting people from abroad to do our jobs...Technology curriculum aims at developing the learner holistically” (I).*

Emma explained that the goals of the Technology curriculum prepare learners for their future careers. Her narrative indicates that she regards these goals as relevant. Emma seems to see beyond the ‘line-of-sight’ and therefore gives the impression that she holds a non-naïve perspective as she does not only view the goals as being advantageous in the present. From Emma’s perspective, Technology provides a foundation for learners by exposing them to various skills which will be helpful when choosing their specialised subjects when they enter the FET band. Emma believes that the goals of Technology prepare a learner to be physically, mentally and emotionally prepared for life after school. Furthermore, she notes that, if South African learners are equipped with the skills stipulated in the Technology curriculum, there will be no need for the country to import skilled professionals, artisans, or engineers from abroad. Emma’s perspective of the goals in the Technology curriculum is therefore shaped by future application by learners.

#### **Emma’s Perspectives on Lesson Planning for the Technology Curriculum**

One of the requirements of the Technology curriculum is that lesson plans should be prepared for every lesson. According to Emma:

*“Lesson planning is relevant especially since we have different classes and we have to take into ... the contextual factors into account when designing my*

*lesson plans so as to accommodate my learners. So it is important that I plan in advance” (I).*

Emma’s seems to hold a positive perspective of the preparation of lesson plans for the Technology curriculum. Given that learners do not have the same abilities, planning ahead enables her to devise strategies to accommodate all learners. Emma’s perspective of lesson planning is driven by the context in which she teaches. She acknowledges that her learners differ in terms of learning abilities and that some may come from poor socio-economic backgrounds. Emma indicates that she takes different classes and therefore each lesson plan is designed to suit the needs of a particular class. She added that:

*“With Technology, planning in advance is essential because of creating or bringing in objects or models to show learners, as it is a mostly practical subject not just theory and learners learn well when they see things” (I).*

She also mentioned that learners learn and understand concepts better through the use of visual aids. Planning in advance ensures that teachers have time to obtain or make resources. Finally, she was of the view that:

*“It may not be possible to achieve all goals at the end of the lesson however it’s good to at least achieve some of the goals. ... Factors that hinder the achievement of objectives include discipline and not having enough of resources” (I).*

Emma is thus conscious that despite planning ahead, she might not be able to achieve all her goals. Factors such as discipline problems and lack of resources hinder the achievement of goals. However, her response suggests that although she might not achieve her goals for every lesson, she feels satisfied if some of them are realised despite the circumstances that prevail in the classroom.

### **Emma’s Perspectives on the Use of Resources when Teaching the Technology Curriculum**

According to Emma:

*“Our school has purchased a Technology kit, but we just have one kit, which is not enough to work with so many classes, so if you need them you will have to like look for some of the stuff because they so few... our school has only sixty seven Technology textbooks and we have almost two hundred Grade eight learners so it becomes difficult to share these books. As a result I end up carrying these textbooks from class to class which is very exhausting” (I).*

While Emma’s school has resources such as the Technology kit and Technology textbooks, there are not enough for every learner. Given the absence of a base room, she has the tiring daily task of carrying the textbooks from class to class. One can infer that by the time Emma reaches her classroom, she is already tired. She stated that she tries other ways to introduce her learners to creative and exciting resources:

*“I also make use of the internet to download videos for learners to watch. I also teach hospitality studies so I bring some of my own resources from home to my Technology classes. I think that the department should provide Technology kits to every school rather than schools having to purchase these” (I).*

Emma’s use of the internet to gather videos for her learners indicates that she encourages the use of technological devices as resources to teach Technology. Since Emma also teaches a class in Hospitality, she occasionally uses her Hospitality utensils to explain certain concepts to her Technology learners. This suggests that she is a problem solver as she finds ways of obtaining resources rather than accepting the lack of resources as a barrier to her teaching. In other words, she seems to be a teacher that thinks out of the box. According to Emma:

*“In my lesson on gears, I used resources such as an eggbeater to explain the movement of gears. Learners were quite fascinated because generally one thinks of a motor vehicle when talking about gears. So the eggbeater got them thinking about gears being used in everyday equipment like in our kitchen. Learners are now aware of it and will go home now and look for other objects that use gears. When they have like concrete things to see what a gear is they have a better understanding because they are using more senses rather than me*



*talking and them listening, now they can see and they can touch, they can look at the product, I mean when you use more senses, then you learn more” (S.I).*

Emma uses objects that learners can relate to, to explain the concept of gear systems. It seems that learners enjoyed the lesson because the resources used create further learning opportunities. They could go home and independently research gears and their uses. Emma also mentions that her learners were excited when she brought resources to teach gear systems. She notes that when learners are encouraged to use their senses such as seeing and touching, they understand concepts better than when they simply listen to the teacher. It is evident from the video recording of her Technology lesson that Emma creates opportunities for her learners to use almost all their senses during Technology. She stated that:

*“Some of them were really amazed to see because if you look at gears and things, you think about technology, things outside like motor vehicles and buildings and so on, they don’t think about the little day to day things that we use in the kitchen and almost every day we using something with gears but these kids are not aware of it so we making them aware now, with the things that they use so that when they go back home now and work with things they will look for these things like gears and cranks and so on” (S.I).*

The video recording showed that Emma’s learners enjoyed the lesson. They were fascinated and were eager to go home and look for objects with gears. The only issue was that there were insufficient resources:

*“If each row, each desk at least maybe amongst two people had a wheel. It’s more like feasible because they’ll be able to look at it and feel it but now by the time it goes to the back row, the people in the front have already forgotten what they have seen so it’s nice if they had one while I was questioning them so if each person had one it would be a better lesson you know where kids can see it feel it while the questions are been asked; they can look at it, you know find things on it, because once it’s gone now, they may not have noticed something that I’m going to ask like the questions I’m going to ask. They may not have noticed it and then they’ll want to look at it again so if they had it on their desk*

*that would have been an ideal situation where each group like each set of learners had one for themselves” (S.I).*

Emma would have preferred all her learners to have had a resource as this would enable better understanding of the concept. From my personal observation of Emma’s lesson it was evident that the large number of learners prevented her from personally showing each one how a gear works. Therefore, she illustrated the working gear standing in front of the class. From my vantage point right at the back of the classroom along with some of the learners, it was very difficult to see Emma illustrating her working model. The distance between the learners and the teacher prevented Emma from ensuring that all concepts were understood. During her lesson, just one resource (a gear wheel) was passed around the classroom for learners to look at for a few seconds and thereafter pass it on and participate in the discussion. As Emma noted, by the time the resource was passed to the entire class, learners would have forgotten what she had discussed. Emma added:

*“The CAPS document insists that we have tools like glue guns and drills, but we don’t have enough of these. Apart from having these I think that drills are dangerous for learners in Grades 8 and 9 to be using. I unfortunately can’t keep an eye on everyone because I have a large number in my class” (I).*

Thus, for Emma, not only are insufficient resources a challenge, but supervision of resources is problematic. She felt that glue-guns and drills are too dangerous for learners in the GET band. The point where she is stationed in her classroom limits her view of learners and this could be fatal if they are using equipment such as drills.

### **Emma’s Perspectives on the Use of Technological Devices in the Technology Curriculum**

Emma stated that the use of technological devices in teaching the Technology curriculum is an excellent idea:

*“The world is becoming more techno-savvy and so should all schools. We do have some computers in our school; however there isn’t enough as we have large class sizes in the GET band. The computers are used by IT learners who are in Grades ten, eleven and twelve” (I).*

There are insufficient computers to accommodate all learners in the GET band and the FET band is given first preference due to higher grades and specialist subjects such as IT. This suggests that if learners in the GET band do not choose IT as a specialist subject, some who have never seen a computer before may never be exposed to one. Emma stated that her school cannot afford technological devices for every learner. She added:

*“I personally use the internet and You Tube to download interesting information relating to Technology, however to project this onto a screen for learners to view becomes challenging as we require other equipment to do so...Not all teachers know how to handle these devices but like fortunately enough I do... This then again becomes a cost factor. Carrying the equipment would eventually become quite daunting as we do not have a specialised Technology room to work from” (I).*

Emma speaks confidently about her knowledge and skills in using technological devices; however, she notes not all teachers have such skills. This suggests that many teachers are not using technological devices in their teaching. While Emma downloads videos from the internet, she does not have the equipment required for learners to view them due to the school’s financial constraints.

### **Emma’s Perspectives on Teaching the Technology Curriculum**

In the following extract Emma shares her perspectives of how the context of her learners’ backgrounds and the classroom affect her teaching of the Technology curriculum:

*“Our learners that attend Saturn Secondary come from very indigent backgrounds where some of them cannot afford food to eat and so the making of Technology projects are not considered as important in their lives. They don’t have the resources to make projects. Some of these learners are not even alert or attentive in the classroom because they haven’t eaten and this affects my teaching “(I).*

For learners that come to school without having eaten, Technology is not a priority, as they have bigger problems to worry about. Gathering resources for a project is simply an additional

burden. Emma's perspective is thus influenced by learners' socio-economic backgrounds, pointing to a sociological perspective. Thus, the context that learners come from affects their ability to learn. This also causes physical tiredness. One can assume that by the time she enters the classroom, she may have lost her spark to teach. Emma adds:

*“In the lesson on gears for example, the classroom I was teaching in was not conducive. The gears were really small and so learners could not really see the linking of the gears to show movement. If I had a screen to project this it would have been so much more amazing” (S.I.)*

It seems clear that the classroom setting in which Emma teaches is not conducive to teaching the Technology curriculum. If learners are unable to see resources, their understanding of concepts is constrained, leading to poor results. Furthermore, the narrative suggests that Emma isn't afraid to use technological devices such as projectors in the classroom, but that this equipment is not available at her school. Moreover:

*“My Technology classes usually comprise of an estimate of about forty six to forty seven learners in each class. The classroom itself is quite small and so there's not enough space for movement. This becomes problematic for me during teaching. If there were fewer learners in my class there would have been so much I could do with them and I could give them individual attention; however with a big class it is virtually impossible” (S.I.)*

The classroom context thus poses challenges. Small classrooms are bursting at the seams, making it difficult for Emma to give learners individual attention. Emma would like to do more for her learners, but the context disallows her from doing so. During the stimulated interview with Emma, it was evident in the video recording that she could not walk around while teaching due to limited space and the fact that learners are seated so close to one another. Furthermore, because of this arrangement, learners at the far end of the classroom could not see the resources which Emma used. She explained that the distance between the teacher and learners creates further contextual problems for teaching and learning:

*“ I’m sure many of them would have not seen what I was showing because firstly the gears were small and if you looking at the class, there are many learners in my class and the focus group would be just the few of them who were looking at it...Because of the large classes they may be answering the question and saying yes they do but they would not be able to see how they link with each other ...it’s better if you had a bigger classroom where you could project this onto a screen and children can see it on the screen itself instead of looking at a small object” (S.I).*

In a classroom context where movement is restricted, learners would experience difficulty in focusing on an object in the teacher’s hand. A projector screen would have enabled them to view the enlarged object on a screen and simultaneously listen to the teacher during discussion. Emma added:

*“When Technology was introduced I was given to start teaching it because I was teaching currently teaching a practical subject Hospitality. The workshops were not detailed... Although the teaching of Technology can sometimes beenjoyable, it can also become very frustrating because I find that we have bigger challenges such as smoking, learners coming from broken homes and bullying at school which we have to handle before we begin our lesson” (I).*

It seems that Emma is faced with aspects of work that are not related to her teaching. These form part of informal teaching (Morrow, 2007). Emma felt that these informal aspects are more demanding than the actual teaching of Technology. It also seems that Technology was imposed on her rather than her being willing to teach the subject. This implies that she was not trained to teach Technology but has no choice but to do so. Apart from her informal work, she said that Technology could be enjoyable if she had the appropriate resources at her disposal.

### **Emma’s Perspective on Methods Used in the Teaching of the Technology Curriculum**

Emma stated that it is up to her to decide which methods to adopt in teaching Technology:

*“It is up to me to my own discretion for which method to be used. I would say that the best way to teach Technology is through using technology itself. It would be nice to use videos from the internet and smart boards to show our learners how machines work. However my school does not have the facilities to do so. I think learners learn Technology better in groups as they are able to share ideas with each other, luckily I do have a base room for Technology. I always recap at the beginning of my lessons to ensure that learners are on track” (I).*

For Emma, it is also a choice as to what method she wishes to adopt in her teaching of Technology. Ideally, Emma indicates that using Technological devices to teach Technology would be the best method to do so. Emma also uses the group work method in her classroom where learners are able to communicate to each other and build up ideas. She is also fortunate to have a Technology base room to teach her learners. Due to having a base room, Emma does not need to walk to her classes; instead the learners come to her for Technology. In the video recording of Emma’s Technology lesson, it was evident that she recaps on the previous lesson before commencing the current lesson.

### **Emma’s Perspectives on Time allocated to Teach the Technology Curriculum**

Emma felt that insufficient time is allocated to teach the Technology curriculum:

*“The curriculum also does not have measures in place to help teachers for days when they may be ill. I personally have to use up my breaks and turn out worksheets to catch-up on the syllabus. It would also be nice if we had double periods for teaching Technology because of the practicals that we have. Single periods are not enough....the classes that I go to are usually ill disciplined and by the time I settle them down, almost half of my period is lost” (I).*

One of the shortfalls of the curriculum is its failure to take into consideration days when teachers may be sick or away from school for school-related matters. The curriculum also does not have a strategy for teachers to catch up on work because it is so tight. As a result, Emma has to give up her breaks and work extra hours. The school only provides for single periods for Technology which Emma

feels is insufficient. It appears that most of her time is spent trying to establish a conducive learning environment, robbing her of teaching time. One can thus infer that the curriculum is not realistic as practicals also require time to clean up afterwards.

### **Emma's Perspective on Assessment in the Technology Curriculum**

Emma indicated dissatisfaction with the type of assessment set out in the Technology curriculum:

*“When I look at the Grade 8 and 9 CAPS syllabus for Technology, I notice that the assessment tasks and the topics seem to be irrelevant. For example, I’ve noticed that there are certain topics which are featured in the Grade 9 syllabus that should be covered in the Grade 8 syllabus... If learners are doing a section on gears, let the mini-pat be on gears specifically and not something that is farfetched. Even the Grade 7 mini pat on the Jaws-of-Life is farfetched. The child must be able to understand what he or she has learnt and apply it to the pat appropriately. You must be able to see the relevance in practical and theory” (I).*

Emma indicates that the mini-pats for the respective grades are not properly organised. She feels that sections in the Grade nine syllabus are used as assessment for Grade eight learners. This seems to be unrealistic and she believes that learners should be assessed on what they have learned in theory and in practical work in order to ensure meaningful learning.

### **Factors that Influence Emma in the Teaching of the Technology Curriculum**

Emma identified various factors that influence her teaching of the Technology curriculum:

*“Discipline is one of the main factors that affect every teacher’s teaching. If my class is disruptive it automatically puts me off and I lose track of what I was supposed to have covered in that lesson. When I bring gadgets to my Technology class and if the learners are rowdy, they generally lose interest in the gadgets and the presence of having these gadgets loses its affect. But when*

*learners engage positively in a class discussion then it motivates me to do better” (I).*

Emma indicates that an ill disciplined class is like to demotivate her. Using gadgets is meaningless if learners do not want to learn. She added that:

*“In my lesson on gear systems, there were a lot of learners peeping into my learners and this can be quite disturbing... it disturbs my line of thought and I have to start all over again. This is time consuming. Sometimes I find myself having to leave my class to go outside and shout at the learners to go to their class because they are making a huge noise” (S.I).*

It also appears that bunking is a huge problem in Emma’s school and this directly affects the teaching of the Technology curriculum. When Emma leaves her own class to discipline other learners, her teaching time is disrupted. She indicated that this happens in every lesson. She is also interrupted by learners that are sent to her class to fetch something.



## CHAPTER NINE

### Case Four – Aryan

This chapter presents Aryan’s perspectives on the Technology curriculum.

#### **Aryan’s Perspective on the Goals of the Technology Curriculum**

According to Aryan:

*“A lot of thought was done into putting this together and it wasn’t just one person’s idea to put this whole CAPS thing together, it was a task team that was set and they, some of the people who sat on this panel I know them, and they’ve got vast experience in the field of Technology, so they were heading in the right direction I would say. The skills that learners will acquire are very fitting for everyday lives and learners will find these skills very useful. In Technology you are mostly using your hands, you’re being creative and this will lead to job opportunities” (I).*

From Aryan’s perspective, it is apparent that he has confidence in the team that was responsible for the development of the Technology curriculum. He emphasises that the practical aspects of Technology are advantageous to learners as they could lead to career opportunities and that the goals reflect skills that individuals can use in their daily lives. Like Taimur, Zarah and Emma, he stresses that these goals prepare learners for the future. However, Aryan indirectly critiqued the curriculum by adding that it could be slightly adjusted to include more aspects of design:

*“For example some aspects on food can be covered in another field or subject. That can be reconsidered. I think that one goal the CAPS document could probably add to the Technology curriculum is to get learners involved on a deeper level in designing skills. For example, steps on how to make a cabinet” (I).*

From Aryan’s point of view, topics relating to food are not necessary in the Technology curriculum and could rather be incorporated in a subject that specialises in food. He also believes

that learners should get more involved in the practical process of building structures that could be useful in their daily lives. He raises the need for more hands-on activities, suggesting that he is a more practically inclined teacher. As noted in chapter one, Aryan was previously a woodwork and metalwork teacher. This seems to have influenced his perspective of the goals of the Technology curriculum and his opinions on what learners should learn.

### **Perspectives on Lesson Planning for the Technology Curriculum**

Aryan claimed that lesson planning for the Technology curriculum is irrelevant:

*“Most of the time I’m so busy trying to teach an alarming amount of work that I have to cover as projected in the syllabus that I sometimes forget to check if the objectives were achieved or not. I do so much of preparation and yet still don’t meet my objectives. It is time consuming as well because a fully-fledged teacher is not just teaching Technology at school, but sometimes other subjects as well, so it’s a lot of work” (I).*

Aryan states that he is so consumed by the amount of work that he loses track of time and forgets to check whether the objectives of a particular lesson were achieved. This points to the level of pressure he experiences in the classroom. It also suggests that the work schedule for Technology is a lengthy one. Furthermore, Aryan observes that in some cases a Technology teacher also teaches other subjects. He/she thus has to prepare for other learning areas. Hence, from Aryan’s perspective, the length of the curriculum, the extensive preparation required and work in other learning areas prevent him from checking if his goals were met. He added that:

*“The only way I find out if the objectives were achieved is through a test or exam or through my learners’ responses. Though, not all learners will respond ... because they are shy” (I).*

This suggests that if learners do not answer questions, this does not necessarily mean that they do not understand a concept. Aryan makes us aware that not all learners actively participate in discussions. Thus, class discussions do not truly reflect the goals achieved. It appears that Aryan often relies on tests to reveal learners’ performance. Noise is another factor that prevents learners from achieving the objectives of the Technology curriculum:

*“During teaching there’s a lot of noise emanating from outside and this is quite disturbing, but there’s not much I can do because other learners have to go for physical education and the grounds are just outside my classroom window” (I).*

It seems that it is almost impossible for Aryan to teach effectively with disturbances occurring during lesson time. This indicates that, while such noise is disruptive, the school design means that Aryan has no choice but to continue teaching.

### **Aryan’s Perspectives on the Use of Resources when Teaching the Technology Curriculum**

Aryan’s school is fortunate to possess some resources:

*“It was a struggle to get that kit. We literally cried and bought it. ...there is a limited supply which isn’t sufficient for the entire class. So I use an example to show the class what it looks like. And this doesn’t make me happy; it’s quite tiring also because I have about forty plus learners looking at me with just one example” (I).*

However, the resources in the kit are not sufficient for all the learners in Aryan’s class. His perspective reveals that with a large number of learners, it becomes virtually impossible for effective teaching and learning to occur. Aryan is faced with the challenge of using one resource as an example with many learners which is not realistic. He’s response indicates that he feels bad about this, but it seems he has no choice. The process is also exhausting. Aryan added that:

*“The topic that I was doing was on rural areas and so I couldn’t really bring a model to the classroom, the only way to explain what I have taught to the class was to put it in a form of a worksheet so that they could recap the information from the questions that I presented on the worksheet but using the text book as a guideline. Furthermore we are a poor school, we are quintile four, our funding is low, and we don’t have the resources to bring in the classroom. In fact we have basically nothing to really show the kids, it makes life quite difficult in that way” (S.I).*

In Aryan's lesson on Energy, he could not expose learners to concepts related to the topic in creative ways because his school lacks funding to purchase resources. It appears that Aryan is bounded in his teaching as he is unable to show his learners what a rural area would look like. Quintile four schools generally have very basic infrastructure and resources. Aryan resorted to creating worksheets with pictures, indicating that he is a pro-active problem solver. His perspective of teaching Technology is thus shaped by the availability of resources and the lack of resources renders him unable to teach effectively.

### **Aryan's Perspectives on the Use of Technological Devices in the Technology Curriculum**

Aryan stated that, while technological devices are required to teach the Technology curriculum, funding is a major issue:

*"In addition to having computers, I need access to the internet, therefore... Wi-Fi is essential and this becomes more costly. I would love to have it in our schools but it can only work with a reduction in class sizes, and we cannot afford to have that as this will affect our school PPN... My cell phone screen is small to show a class of about forty four to forty five the screen. If I had access to Wi-Fi I would love to download You Tube videos to show my learners" (I).*

Aryan experiences a similar problem to Emma. Like her, he seems keen to use technological devices in his classroom but the cost prevents him from doing so. While Aryan's school has a few computers, the lack of a Wi-Fi connection means that learners cannot access information from the outside world. From the above response one can infer that Aryan deeply is a teacher who is not afraid to use these devices. In fact, one may assume that he would be constantly using technological devices in his teaching of the curriculum had they been available to him at his school. He added that:

*"These days with Technology everything is going online but we are not ready as a school to go online. We don't have the facilities. At the moment as a province we are a bit behind. You find that other provinces are ahead of us in terms of facilities. It would make lessons much more interesting if we had laptops and smart boards for learners to use" (I).*

Aryan strongly advocates that good results in Technology depend on the availability of resources and technological devices. He claims that KwaZulu-Natal lags behind other provinces in terms of resources. This could be due to apartheid legacies.

### **Aryan's Perspectives on Teaching the Technology Curriculum**

In terms of context, Aryan compared his previous school with the one where he currently teaches:

*“The school I was teaching Technology prior to where I’m teaching currently was a real pleasure to teach. I had smaller class numbers and this made teaching pleasurable. We had abundant resources and children didn’t have to share resources...In my current school the children are poor. We don’t have enough funding as a school. We are living from hand-to-mouth basically, meaning that we are in a situation of having to choose either to pay our water account for the school or buy a Technology kit” (I).*

It seems that Aryan’s perspective is narrowed to resource availability. In a context of resource and economic constraints, Aryan is required to be more creative in his use of resources (for example, rotating them or using simulated forms). His response suggests that a teacher with smaller classes and more resources would find it easier to teach the Technology curriculum. Teachers would enjoy their teaching and learners would gain a better understanding of concepts as they would not have to share resources. However, this is not possible at his current school as basic needs such as water and electricity take priority. His use of the term “hand-to-mouth” points to the struggle the school endures on a daily basis. Purchasing a Technology kit therefore seems like a luxury. The use of resources is thus shaped by the availability of such. While the school might believe that one kit is sufficient, Aryan noted that this is not the case:

*“From the classroom point of view I think that the concept behind the whole thing is that these kids are particularly from disadvantaged areas, the classroom set up is not really conducive for that...we are restricted in terms of what we have and what we have to actually do” (S.I).*

Aryan's perspective is shaped by his view of the classroom, where he is confronted with children from poor backgrounds that have not been exposed to any form of technology. The context in which Aryan teaches seems to pose as a challenge. Although the curriculum requires certain tasks to be done in the classroom, the classroom in which he teaches does not enable him to do so. Aryan added:

*"I'm an ex-metalwork and EGD teacher, so I had no formal training of Technology. I enjoy teaching the practical aspects more than the theory parts because I'm an expert at that. I don't go for all the workshops as most often our schools do not receive the notice on time" (I)*

Aryan's perspective reveals that he is not equipped with the appropriate skills and knowledge to teach Technology. He tends to focus on aspects of the curriculum with which he is familiar, suggesting that he might neglect other aspects. This is of great concern. In addition, Aryan's response implies that he does not often attend workshops as he is not informed timely about Technology workshops. It becomes apparent that the distributions of important notices such as workshop circulars are not given priority or importance by the DoE. This raises the question of how he manages to teach the curriculum without acquiring the skills required to do so.

### **Aryan's Perspective on Methods Used in the Teaching of the Technology Curriculum**

According to Aryan:

*"I think depending on the type of environment you're teaching in, the school you are in will probably; you will have to use teaching methods to adapt to that environment. So the methods you use will differ slightly to suit the types of learners. I use group work in my lessons but sometimes if that does not work out I use teacher centred learning" (I).*

Aryan's statement that the school environment will determine the types of teaching methods adopted suggests that there are no prescribed methods to teach the topics in the Technology curriculum. He seems to adopt a flexible approach. However, he added that group work has disadvantages:

*“I find that with group work, there is generally just one learner who eventually ends up doing all the work, while the other learners are like passengers and yet expects similar marks. So this is a bit unfair” (I).*

From Aryan’s perspective, group work is unfair because the group benefits from the input or hard work of some members. While this issue is not unique to Technology he seems to find it frustrating. Furthermore, he noted that:

*“I don’t have classroom space for group work because I don’t have a Technology room. This restricts me from what I want to show and express to my learners in class. I find learners are shouting at one another because of the tight space. I have to constantly re-arrange desks for group work which is cumbersome at times...In an ideal Technology room you would have the basic desk arrangement and tools ready for you” (I).*

The lack of space makes group work daunting. He also has the responsibility to arrange furniture and place learners into groups for the lesson. One can just begin to imagine when he starts the actual lesson. As a result, learners become problematic. The fact that the classroom is too small causes behavioural problems. Aryan mentions that: *“In an ideal Technology room you would have the basic desk arrangement and tools ready for you”*. One can infer that without a specialist Technology room, it becomes very difficult to work with learners in a crowded classroom. Where else in a Technology room, tools and equipment are displayed and readily available. Aryan does not seem to approve of this type of approach for those very reasons. At the same time Aryan also suggests that he uses a lot of class discussions during his lessons to stimulate learners thinking. Aryan indicated that he uses class discussions lessons to stimulate learners’ thinking:

*“In my lesson on energy I began by asking learners questions so I like to encourage discussion and ask thought provoking questions” (SI).*

This implies that he aims to develop critical thinkers, which is one of the goals of the Technology curriculum. He also uses whole class discussions. Aryan stated that he feels that it is important to draw on daily life experiences when teaching Technology:

*“I think children need to learn from the known to the unknown, it’s best to use examples from daily life and practical situations, to further enhance and reinforce what you trying to say to kids. I talk about daily experience in life of which they’re experiencing, sometimes when you talk about something which is abstract, then the child will say oh I don’t know what you talking about. I always prompt them to you know try and answer, help them maybe, even if it’s not in the best of English but they know the concept maybe but cannot express themselves, but you do push them for an answer” (S.I).*

This helps learners to identify with and better understand concepts. While Aryan acknowledges that his learners have a language barrier, he does not expect all answers to be in perfect English, as the objective is for them to understand concepts. He also encourages learner participation.

### **Aryan’s Perspectives on Time Allocated to Teach the Technology Curriculum**

Aryan stated that:

*“I think the curriculum should at least give a little bit of a breathing space for the learners to digest each section before immediately moving on to the next. There’s basically a lot of topics and the curriculum should be streamlined a bit to accommodate our learners. This will improve their results as well” (I).*

Besides smooth transition from one topic to another, Aryan feels that the curriculum is too long. The excerpt above suggests that he has to move through the curriculum very quickly in order to cover all the topics. This does not enable his learners to process what they have learnt, as they have to immediately move on to the next topic. He believes that the curriculum should allow some time for them to reflect on what they have learnt. Aryan’s teaching seems to be driven by the need to cover the curriculum rather than to pause and think about what his learners are learning. This reveals the ways in which the CAPS policy is structured. Teachers like Aryan can become overwhelmed and become trapped in undesirable teaching practices. He added:

*“I am always battling for time when teaching the Technology curriculum...the syllabus is extremely long and this puts a lot of pressure on me...I have*



*disruptive days at times when there is a taxi violence strike, water problems or a union strike and time is lost. Our curriculum is so tightly structured that week one the work is outlined week two and so on, so there is no time to breathe”(I).*

Situations such as strikes and ill-health are beyond Aryan’s control. However, it is difficult to catch up as the curriculum leaves no room for recovery. Aryan thus resorts to using his “*lunch breaks*” and “*time after school*” to catch up on lost time. He stated that, “...*the curriculum doesn’t guide or make provision for teachers like myself in situations like these*”. One can infer that it is up to Aryan to find solutions.

### **Aryan’s Perspective on Assessment in the Technology Curriculum**

Aryan does not seem to favour the assessment tasks in the Technology curriculum. He believes that it is inflexible and this is problematic for him and his learners:

*“The curriculum is just a straight syllabus for all learners, it does not accommodate for everyone and we have learners with different learning abilities in our classes. But from the brightest child to the weakest child, all follow the same structure. It’s a challenge because we have weaker learners that are really struggling because of problems at home...most children do not come to school, so catch-up becomes a major problem at our school. The standards of the mini pat in the Technology curriculum are very high compared to what our learners are able to do at our school” (I).*

Aryan narrows the notion of a curriculum to a syllabus (an academic document that communicates course information and defines expectations and responsibilities). He feels that the syllabus is too generalized and does not accommodate individual learning styles or backgrounds. This reveals his own perspective of a curriculum in that he has some freedom and autonomy to interpret it and suggests that he might lack insight that he needs to prepare learners for these standards. Aryan feels that the curriculum is too rigid, as every learner, weak or bright, has to follow it. He also makes us aware of the problems that learners face at home that directly affect their school work and indicates that the curriculum does not provide ways to deal with

learners with barriers to learning. He also implies that the standard of assessment is very high. Aryan has knowledge of what his learners are, and are not able to do and from his perspective, mini-pats are a challenge. It appears that the Technology curriculum does not accommodate different ways of thinking amongst learners and is very demanding. All learners are given the same tasks. It is up to the teacher to create tasks that accommodate learners with barriers to learning. Given the lack of resources at the school and the learners' poor backgrounds, it is challenging for learners to cope with the demands of the Technology curriculum.

### **Factors that Influence Aryan's Teaching of the Technology Curriculum**

Aryan believes that the teaching of the Technology curriculum ultimately depends on him as a teacher and can be influenced by a number of factors:

*“If I'm a boring teacher and unprepared then this will reflect in my lesson and then my learners who will show disinterest and cause discipline problems. On the contrary if I am well prepared with teaching aids then I won't have discipline problems” (I).*

It seems that preparation is one of the factors that influence Aryan's teaching of the Technology curriculum. He acknowledges that problematic behaviour amongst learners can be attributed to the teacher's unpreparedness. Learners tend to lack focus and show disinterest in the lesson is not thoroughly prepared. The availability of resources also seems to influence Aryan's teaching of the Technology curriculum. He seems to feel that if he has resources, this reduces discipline problems. Other factors that interfere with Aryan's ability to teach in the classroom include noise from outside:

*“My learners are easily distracted when other learners go for physical education (P.E.)... the ground is quite clearly visible so they begin to look outside and it shifts the focus from actually what I'm saying, but by being quite strict and setting the ground rules earlier in the year you try to enforce your discipline” (S.I).*

Aryan notes that teaching is disturbed by the everyday school culture. Reinforcing classroom rules seems to be his method of preventing disruptive behaviour in his Technology

classroom. He highlights that if learners are given strict instructions at the beginning of the school year, they know what is expected of them and have less tendency to be disruptive.

### **Summary of Chapters Six, Seven, Eight and Nine**

Chapters' six to nine presented a detailed analysis of the four selected Technology teachers' perspectives on the Technology curriculum in the form of descriptive textual data. Each case was analysed separately, expressing each teacher's unique experiences. The data analysis showed that each of the cases is quite different in some aspects and similar in others. It can be concluded that many teachers shared common perspectives. Some of these teachers had very similar experiences while others did not. While some teachers believe that the use of technological devices enhances the teaching process, others fear using such devices. Teaching methodologies differed depending what teachers were teaching. Some used methods that they felt comfortable with while others felt that the curriculum does not support them in choosing an appropriate method. Teachers' perspectives of the planning of Technology lessons also differed, with some believing that the lesson plan is a guide, while others felt that it is not relevant and is merely an additional burden. The perspectives of some teachers were shaped by the availability of resources and the context in which they teach. Some believed that a lack of resources creates challenges in teaching and a few took the initiative to create their own resources to teach Technology. All four teachers agreed that insufficient time is allocated to teach Technology. While some believed that this subject is marginalized in terms of time allocation, others feel that the curriculum does not provide teachers with support or solutions to catch up on lost time in the event of an emergency.

Viewed against the theoretical framework adopted for this study, the multiplicity of perspectives that emerged from the data is in keeping with Nietzsche's (1882) theory of 'perspectivism', in that teachers have various perspectives of the Technology curriculum. This reflects that their perspectives of the curriculum are similar regardless of whether they teach in a disadvantaged or advantaged context. The following chapter provides a detailed discussion on the key findings arising from the data analysis.

# **CHAPTER TEN**

## **DISCUSSION OF FINDINGS**

### **Introduction**

This chapter presents a discussion on the findings of the study arising from the analysis of teachers' perspectives of the Technology curriculum in South African schools. While all four participants in the study are Technology teachers, they taught at different schools and shared different perspectives of the Technology curriculum. Although all four shared some commonalities, they differed in other respects, depending on the affects (Nietzsche, 1882) they experienced within their practice. The differences point to a multi-perspectival phenomenon which reflects Nietzsche's (1882) notion of 'perspectivism'. In summary, the participants' perspectives were influenced by various factors. The study's findings are that constant curriculum change disrupts university preparation of Technology teachers; such a rigid curriculum is very constraining; the disapproval of learners' use of technological devices is ironic; a universal Technology curriculum for diverse school contexts, teacher beliefs and Technology curriculum pedagogy does not allow for individual differences; the Technology curriculum is seen to be an unfair curriculum, unrealistic, impractical and uses irrelevant assessment; and lastly, the building of cultural capital is impeded, Technology education is not being maximised and social inequalities are being perpetuated.

### **Findings**

#### **Constant Curriculum Change Disrupts University Preparation of Technology Teachers.**

As indicated earlier in the literature review, the education system in South Africa has experienced four major curriculum changes within a period of fifteen years. Such radical changes have never occurred within a short period of time in any other country (Jansen, 2007). These curriculum changes were namely, C2005 introduced in 1997 followed by the NCS in 2002, which later reformed to the RNCS in 2007, leading to CAPS in 2012, which is the policy currently in use at all schools (Adu & Ngibe, 2014). In the midst of such changes in policy by the DoE, universities which prepare students for the workplace were also affected (Afeti, 2018).

As programmes are approved by the Council on Higher Education (CHE), changes to a programme at university cannot be made overnight because that would result in some cohorts complicating a degree based on an out-dated policy, while a new cohort is introduced to the new policy. Legalities that need to be satisfied mean that there is a short time lapse for introducing new innovations and current practice to students (Afeti, 2018). It appears that the challenge that higher institutions are grappling with is constant disruption of curriculum with changes in teacher preparation – this is reflected in the participant responses collected in this study. Since all four teachers in the study have different years of teaching experience, Emma (32), Taimur (21), Aryan (22) and Zarah (6), each of them received teacher preparation that was different from one another at university. For instance, teachers like Aryan and Taimur who began university in 1993 and 1995 respectively would not have encountered an OBE based curriculum. However, by the time OBE was introduced in 1997, Taimur and Aryan were already in their third and fourth year of study and these curricular changes by the DoE were not immediately adjusted into the Bachelor of Education (B.Ed.) programme. As a result of this, both Taimur and Aryan graduated with a degree based on an obsolete curriculum with no specialist knowledge of OBE as compared to those students who began in 1997 who would have received an OBE curriculum at the universities. In Zarah’s case, she started university in 2007 and therefore would have encountered an NCS curriculum during her study. However, six years later the introduction of CAPS meant that Zarah would now require knowledge of the new curriculum. Nietzsche (1882) posits that for ‘crystallisation’ to occur, a ‘constellation’ of perspectives around knowledge are required to develop our understanding of concepts. The findings from the perspectives of teachers from four different schools in the study reflected that when students of an old curriculum graduate and enter schools, they are already inadequately prepared in terms of the school curriculum and thus possess out-dated knowledge.

One of the difficulties in curriculum changes by the DoE is that it involves the introduction of a new discourse about education, which impacts on teachers because they are not sure how to implement the new curriculum. It takes time for teachers to understand and come to accept new ways of thinking about education and it will probably take even longer for those charged with implementing the new curriculum, the teachers who have to move out of their ‘comfort zone’ of habit and tradition (Hoadley & Jansen, 2002, p. 2). Taimur, who specialised in

Mathematics, Aryan in technical subjects such as Woodwork and Technical Drawing and Emma, a specialist in Hospitality, shared similar perspectives on their lack of training to teach the Technology curriculum: they were caught between the periods of old and new curricula for which they had to make fairly great adjustments. The uncertainty of implementing the Technology curriculum is captured in the perspectives of teachers in this study when they all emphasised the curriculum to being “*challenging*”. As noted in the literature, the types of knowledge that a Technology teacher requires to teach are namely PCK, TPACK, CCK, KCS and SCK in order for effective teaching and learning to occur in a classroom. From Shulman (1987), Mishra and Koehler’s (2006) and Ball *et al.*’s (2008) constituents of teacher knowledge, it is gathered that in order for effective teaching and learning to occur in a classroom, every Technology teacher should embody these very elements. However from the frameworks of Shulman (1987), Mishra and Koehler (2006) and Ball *et al.* (2008), the teachers in the study lack knowledge of curriculum by the DoE, as well as knowledge of context due to being inadequate prepared at university and that is where these teachers become antiquated (Afeti, 2018).

Because of several curriculum changes by the DoE infringing on teacher preparation at university, young teachers like Zarah as well as the other teachers in the study have to acquire new knowledge of curricula through the Continuing Professional Teacher Development (CPTD) route in order to implement the Technology curriculum at their school. In South Africa, CPTD is an integral part of teacher education because it ensures that teachers keep up-to-date with new research on how children learn, emerging technologies for the classroom and new curriculum resources (Bernadine, 2019). However, within the South African context, CPTD is deemed to be quite problematic as there is no time allocated for CPTD activities such as workshops and conferences and “school principals, as the driving forces in schools, do not see to it that teachers participate or have the ability to participate in CPTD programmes” (Bernadine, 2019, p. 4). The scarcity of CPTD programmes is poignantly captured in the perspectives of Taimur “*I go for maybe one workshop in a year, it doesn’t help much because those workshops are short...I mainly have to use my own ways of teaching*”, and by Aryan who bemoaned the late notification of scheduled workshops, “*I don’t go for all the workshops as most often our schools do not receive the notice on time*”. As noted in the literature, “...teachers teach as they have been taught” (Kahn, 1997, p. 27), and as a result, it is not surprising that teachers like Taimur and

Aryan devise their own methods in teaching due to a lack of training. Although this finding is similar to those of previous studies which concluded that teachers use their past knowledge of teaching technical subjects to teach Technology because they felt comfortable in it (Stevens, 2011; Pool, Reitsma & Mentz, 2013), the reasons as to why the teachers in this study use their past knowledge in teaching the Technology curriculum are peculiar to South Africa: many of these teachers are constantly being exposed to new curricula reforms and do not have adequate training in Technology. Therefore, the teachers in the study find themselves in a situation where they rely on their past knowledge to deliver the curriculum. Examined from Nietzsche's (1882) 'perspectivism', one of the affects that influences the authenticity of a judgement is legitimacy. Historical experiences, good or bad, shape or influence a person's current perspective. Thus, it can be argued that teachers like Aryan, Taimur and Emma's teaching of Technology is to some extent deeply rooted in the technical subjects they taught in the past.

The findings in the study provide an indication that the teacher preparation which students receive at university level is not congruent with the types of schools at which they eventually teach due to constant curriculum changes made by the DoE. Despite being a specialist in Technology, Zarah's perspective indicated that: "*I was trained with the idea that these facilities would be available in schools....I was not prepared for this*". If one considers the Technology curriculum taught at university, a teacher like Zarah was exposed to the technological advancements and the resources to teach Technology in an ideal environment and thereafter encountered a different reality at an underprivileged school environment. Similarly, the teachers in this study are those who teach in a particular context of deprivation of resources and therefore the teacher preparation received at university is not suited to this context as they were prepared to teach in a technology rich environment, but instead are exposed to a technology deprived environment. Drawing from the literature, Amin and Ramathan (2009) argue that contexts are important for preparing new teachers to teach in the complicated contextual landscape of South African schools (, however it also argued that teaching institutions work with ideal school situations and even when context is considered, the full complexity of the realities schools face is virtually impossible to factor in. As a result, "universities have continued to produce teachers who believe that they will teach in first world conditions" (Amin, & Ramathan, 2009, p. 70). Hence, the teachers in the study not only experience an obsolete policy

because the curriculum has changed, but they also now encounter a school that has ancient resources. It provides an indication that teacher preparation at university is done from a naive perspective or what Nietzsche (1882) terms a “frog’s perspective”. A “frog’s perspective, in artists’ terminology means sitting at the level of a frog, that is, very low and looking slightly up (Conant, 2005). Nietzsche (1882) emphasises that one usually takes what is near to us as the standard by which we interpret the world. He talks of a perspective from below - the literal translation is a “frog’s perspective”, which was also slang for ‘narrow-minded’ because one cannot see far or wide. In this case, the focus of schools from university is narrowed and does not take cognisance of the fact that a country like South Africa has schools that range from privileged to underprivileged due to its history of apartheid. It becomes apparent that the DoE has its political agendas for change. Jansen (2007) advocates that the DoE has its political agendas for change which are symbolic. According to Jansen (2007), “transition is the movement from one kind of political regime to another kind of political order” (p. 2). In the South African context, it would mean moving away from an apartheid system to a more democratic system. Such symbolic changes as Jansen emphasises are made to make the population aware that we are moving away from apartheid and that the DoE is changing the curriculum to a more democratic one. However, what is actually occurring is that while teachers are theoretically savvy, they enter into a curriculum mine field at schools which are constantly experiencing curricular changes.

This research study is beginning to show that the greater the time lapse between graduation and the teaching of a new subject that never existed before that is moving into the new domains of IT systems and technology, the greater the requirement will be for professional development, in-service training and an attitude to develop oneself in a very deep way. Hence this study presumes that during teacher preparation, universities have to influence students to activate one of the seven norms and standards of teachers and that is to become lifelong learners, as what is emerging from the findings are teachers who are in a way ignoring the aspect of learning which can be understood. If one is in a teaching mode, one can forget that simultaneously, one is in a learning mode. And if teachers forget this, then the idea that they need to equip themselves and find the skills and knowledge to be successful will bypass them;



however, if they do acknowledge that they are lifelong learners, then this could mean successful teaching and learning of the Technology curriculum.

### **The Constraints of a Rigid Curriculum.**

As indicated in the literature, a curriculum is usually considered as rigid in nature, one that is quite specific and made as a universal idea of a “one-size-fits-all” policy (Maniates, 2010). In that sense, it is rigid until the next change occurs. However, in South Africa, each curriculum reform creates a new rigid curriculum to which teachers are exposed. The findings of this study reveal that rigidity is prevalent in the structuring of the Technology curriculum. From the perspectives of all teachers in this study, the Technology curriculum made no time for consolidation of learning and does not accommodate remediation or re-teaching, should the need arise due to time lost or because some learners require more time to learn. The findings in this study point out that the curriculum does not factor in circumstances beyond the control of teachers, such as teacher absenteeism due to illnesses or instances when protests occur. Aryan’s perspective confirms the above when he states that *“I am always battling for time when teaching the Technology curriculum...I have disruptive days when there is a taxi violence strike, water problems or a union strike and time is lost”*. In South Africa, a union strike is an organised refusal to work by employees as a means of protest. It is a tactic that may be used during contract negotiations if employers and employees cannot agree on terms of employment and is usually conducted for pay rises, better working conditions and more respect for their profession (Wills, 2014). In South Africa, teacher union protests conducted by the South African Democratic Union (SADTU), the most powerful teachers’ union that is aligned with the African National Congress (ANC), the ruling political party, are quite common and are certainly not desired by teachers, but they do occur when the need arises (Pattillo, 2012). During a strike, teachers do not engage in any form of teaching in the classroom or may stay away from school (Wills, 2014). Literature reveals that teacher strike participation negatively affects learning for learners in the poorest of schools in South Africa and that more marginalised learners, both in terms of socio-economic status and academic performance, are affected most negatively by strike action (Wills, 2014). In the event of a taxi strike, taxis are not in operation, resulting in many learners not having transport to school. Unforeseen circumstances, such as water problems due to a burst pipe or a maintenance shutdown, affect the usual routine at school. In South Africa,

the law permits the closure of schools in the event of no water (Weaver, Keeffe, Hamer & Palmer, 2017). As a result, all four teachers in the study admitted to using their personal time after school hours in order to catch-up on lost teaching time just so that they are aligned with the curriculum pace setter once more.

In South Africa, CAPS policy organises the Technology curriculum into units and the times allocated to these units are strictly defined. The stipulated time for teaching the Technology curriculum in all schools is “two hours per week” (DoE, 2011, p. 5). This usually amounts to three single periods per week, each of forty minutes duration. A commonality in the findings was that all four teachers were “*dissatisfied*” with the time allocated to teaching the Technology curriculum. For instance, Taimur noted that subjects such as Mathematics, Sciences and Languages are given priority at his school in terms of allocating double periods. In an interview, Emma indicated that, “*One double period would be preferable for Technology as project work can be time consuming*”; however, this was not the case at her school. As mentioned in the literature (Wright *et al.*, 2018), Technology is part of the STEM group, yet Technology seems to be marginalised by being given the least amount of teaching time as stipulated in the Technology curriculum, whilst other subjects in its group gain maximum time on the time table. This finding indicates that the rigidity of the Technology curriculum is expressed through its inflexibility. Such inflexibility of the curriculum does not provide the teachers in the study with any extra support because the completion of the curriculum is considered as paramount. Feelings of dissatisfaction indicate that Technology teachers in this study are unhappy in teaching Technology because of the curriculum’s rigidity nature. Such rigidity limits these teachers’ control of how to plan and pace their lessons according to their learner’s needs. In previous curriculum policies, teachers were provided with the freedom and flexibility to teach using methods they desired. Teachers were ultimately responsible for creating their own work schedules and selecting resources to facilitate their teaching as well as creating their own assessments (De Vries, 2011). However, with CAPS, teachers are provided with clear and concise guidelines and as a result are aware of what needs to be covered within a specific time frame. The rigidity of the curriculum is captured in the perspectives of Zarah and Aryan when they refer to the Technology curriculum as “*too prescriptive*”. Hence, such a structured, precise and concise curriculum makes no room for teacher autonomy. The

prescriptive nature of the Technology curriculum presents a lack of teacher agency as they are restricted in terms of decision making in the process of teaching and learning in the classroom. The findings of this study reveal the lack of teacher autonomy when Zarah points out that:

*The curriculum expects me to be teaching right till the end of the term, not taking into consideration the extra tasks that go along with teaching such as projects to mark, exams that usually starts weeks before the end of term and reports to be issued all before the end of the term.*

Aryan also claims that, “There’s basically a lot of topics and the curriculum should be streamlined a bit to accommodate our learners”. The prescriptive nature of the Technology curriculum is seen in the content that is stipulated, and the time in which all outcomes must be achieved. Teachers (Aryan and Zarah) have claimed that the content is too heavy and vast to cover in such a limited time. Aryan’s perspective revealed that:

*I think the curriculum should at least give a little bit of breathing space for the learners to digest each section before immediately moving on to the next...there are basically a lot of topics...Our curriculum is so tightly structured that there is no time to breathe.*

Zarah stated that:

*Most of the times during my lesson I am completing administrative documentation that the office demands as being urgent and I lose out on my teaching time and I have to rush through the syllabus because of the huge amounts of content.*

According to Harrop-Allin and Kros (2014), agency is the extent of a person’s ability to act freely, independently and autonomously. This involves being able to make decisions and have the capability and capacity to act. Teacher agency provides teachers with the freedom and flexibility to skilfully use their expertise to make decisions and informed judgements regarding teaching and learning. The Technology curriculum, however, as cited by various authors (Ramatlapana & Makonye, 2012; Msibi & Mchunu, 2013; Harrop-Allin & Kros, 2014), severely impedes teacher agency and hinders Technology teachers’ opportunities to act freely and

independently in the best interest of their learners. Similarly, participants in this study explained their dissatisfaction with the lack of agency that is provided to them within the Technology curriculum. Paralyzing teachers and reducing their decision-making powers have resulted in all four teachers becoming “*demotivated*” and “*frustrated*”. It appears that the prescriptive nature of the Technology curriculum has taken them away from being the architect of their own preparations and plans. All four teachers in the study admit to doing lesson plans as a mere “*formality*” and do not see the value of planning. It becomes apparent that such a rigid curriculum is primarily concerned with the completion of its content, rather than what learners have actually learnt. Due to the large amounts of work to be covered, the DoE appears to be ignorant about the attention span of learners. The rigidity of the Technology curriculum exposes the inequalities that teachers in South Africa have to endure when teaching the Technology curriculum. Teachers’ workloads reveal inequalities in the curriculum for those teachers who are not just teaching, but have to attend to various other aspects which the curriculum does not consider. Due to the fact that all four teachers teach at a school with learners from diverse social economic backgrounds, time is of the essence as much of it is spent on non-teaching tasks. As Emma’s perspective contends, “*It can become frustrating because I find that we have bigger challenges such as smoking, learners coming from broken homes and bullying at school, which I have to handle before we begin our lesson*”. ‘Perspectivism’ deals with the concept of perspectives altering according to the proximity at which one is positioned in relation to an object. As teachers like Emma are in close proximity to children with challenges, it becomes difficult for her to look the other way when the problem is in a perspectival sense ‘staring her in the face’. While in the case of the DoE, that is located far away from the problem, they may not be aware of the realities that teachers like Emma confront.

The literature also notes that a lack of time can restrict or impede a teacher’s ability to provide effective instruction (Froese-Germain *et al.*, 2013). In relation to the study, academic work seems to have taken a back seat to discipline and non-teaching tasks such as counselling. However, teachers like Emma realise that her ‘vantage point’ places her in such close proximity to her learners that she cannot ignore such realities. To ignore these realities would, as Nietzsche stated, foist a “harmonious view of the world” (Nietzsche, 1967, p. 540). These are truths as they exist for these teachers which have to be acknowledged and cannot be ignored even at the

expense of teaching time. Perhaps, in an ideal school, teaching the Technology curriculum would be more of a less challenging task, but certainly in schools that are underprivileged, it is an onerous task.

### **The Irony of Disapproval of Learners' Use of Technological Devices.**

Learners are now part of a world that is highly connected. Globally children have more access to technological devices such as smart phones currently than before (Odgers, 2018). For instance, learners in American classrooms are allowed smart phones in schools on a daily basis as the use of smart phones is encouraged and is seen as a tool to enhance teaching and learning in the classroom (Thomas & Muñoz, 2016). In light of smart phones being used for various academic purposes, learners can sometimes misuse them for non-academic or anti-academic purposes. Therefore, the South African context, schools have taken a very particular position that the use of smart phones should be banned in schools. (Muyambi, 2018). From the literature, the banning of cell phones in South African schools has been attributed to two major issues: the likelihood that they will be disruptive in classrooms and misused by learners (Friedel, 2007). Some learners use smart phones for criminal activities such as stealing, bullying, cyber bullying, disruption of teaching and learning and cheating in examinations. Despite its potential to aid the teaching and learning process, smart phones are still disliked and outlawed in South Africa schools and such phones are often confiscated if found in a learner's possession (Mavhunga, Kibirige, Chigonga & Ramaboka, 2016). Schools in South Africa operate in a very high surveillance mode in which learners are constantly being policed for their behaviour and the use of a cell phone in particular seems to raise the ire of teachers. Instances of misuse have been reported in some schools in South Africa (Ford & Batchelor, 2007; Bosch, 2008). Cell phones are viewed by the DoE as more of a socialisation tool rather than a learning one and it believes that such devices will impact negatively on teaching and learning. In this study, all teachers (Taimur, Zarah, Emma and Aryan) mentioned that the use of cell phones is banned at their schools. Despite the rule that cell phones are banned from schools, the findings of my study indicate that there seems to be mixed feelings amongst the teachers in this study regarding the use of technological devices such as cell phones for teaching the Technology curriculum. Taimur and Zara believe that these devices could "*assist learners in their school work*". Their perspective is supported by literature that indicates that the use of technological devices can

enhance learning (Puckett, 2013). In one of the latest studies on the relationship between social media and academic performance, Ngelale (2019) found that learners were using technological devices such as smart phones to improve their academic performance and success in schools. In other words, such devices are now not only beneficial for social interactions, but for academic purposes as well. Although teachers like Aryan and Taimur share a desire to use technological devices in class, the lack of provisioning of technological devices at their schools prevent them from doing so. According to Aryan, other schools in South Africa have access to these devices, *“We don’t have the facilities and as a province we are a bit behind. You find that other provinces are ahead of us in terms of facilities, as they have access to technological devices”* and according to Taimur, *“It would be nice if learners had smart tablets instead of carrying books... I personally use my cell phone and laptop to plan creative Technology lessons”*. It should be noted though that the DoE provides some schools with technological devices. The uneven distribution of technological devices, by ignoring schools like those mentioned in this study, points to inequality in the South African education system.

Despite the lack of technological devices at their schools, all the teachers in the study used their personal cell phones to bring technology into their classrooms so that their learners are exposed to some form of technology in their lives, especially since the majority of their learners come from homes where technology is absent. From Aryan’s perspective, *“My cell phone screen is too small to show a class of about forty-five the screen...if I had access to Wi-Fi, I would love to download You Tube videos to show my learners”*. Taimur also shared perspectives of willingness to be creative despite such barriers to learning when he stated that, *“Teachers need to come out of their shell and become more innovative ...many teachers also have technophobia”*. It was interesting to find that Taimur admits to teachers having a fear of technology which is probably disadvantageous to their learners. What is worrying is the fact that some Technology teachers are not personally inclined towards technology, yet are teaching Technology which requires them to be technologically savvy and be creative in their teaching. Although Zarah supports the use of cell phones in the class, she mentioned that this could pose other challenges as well. From Zarah’s perspective, *“Even if such devices are introduced by some miracle at my school, it would be very challenging and difficult to monitor and facilitate...children these days can really get up to a lot of mischief”*.

Emma's perspective of the use of technological devices reflects a teacher who is not afraid of using these devices, but who is limited by financial constraints at her school. She uses the internet to access information, but finds it difficult to share with her learners because she does not have a projector. Emma is a proactive teacher who uses technology to search for information so that she can teach Technology and not rely on her school for resources she knows she will never get. Nietzsche (1882) posited that our needs drive us to interpret the world and there are hence infinite interpretations. However, each person seeks to privilege their perspective over those of others. To obtain value from judgements, one has to obtain manifold perspectives from various vantage points and take into account their context and culture (Nietzsche, 1967). This is the case with Zarah and Taimur who want to embrace the use of technological devices, but fear the challenges that come with it, whilst, in Emma and Aryan's case, financial constraints seem to be the sole deterrent. In addition, it also means a change of perspective is required from all Technology teachers to change their view of technological devices towards a more positive one.

### **A Universal Technology Curriculum for Diverse School Contexts.**

The post-apartheid landscape in South Africa is characterised by multiculturalism and homogeneity, multiracialism and mono-racialism, co-education and gender-specificity, class distinctions, class elitism and a range of disparities and inequalities (Amin & Ramrathan, 2009). In the South African context, schools are not homogeneous. According to Amin (2008), schools in South Africa "vary in terms of poverty and wealth distribution, geographic locations, demography, language, culture, social morals, and religious beliefs" (p. 70). And as a result, it is not surprising that the education system is complex and disadvantaged in many parts of South Africa. Schools range from private to public; rural to urban; underprivileged and under-resourced to privileged and highly technological; unqualified and under-qualified to highly qualified teachers. Unlike countries like Canada, for instance, that has a different curriculum for a different state or province (Ontario Ministry of Education and Training, 1998), this is not the case in South Africa. In South Africa, it is a national imperative that each province does not derive its own curriculum; rather it is derived nationally by the DoE. Similarly, the Technology curriculum in South Africa was not designed for a particular school context or province, but rather it was designed for the nation. In connection with the literature, it appears that the

Technology Curriculum was designed on the concept of a Technocratic curriculum theory which means that curriculum is viewed as a document or plan for instruction in a particular subject (Cornbleth, 1990, p. 13) without factoring in the context of teaching and learning as opposed to a critical curriculum which considers context and assumes that behaviour cannot always be predictable; it focuses on classroom interaction and produces opportunities for learning, rather than on predetermined outcomes (Frame, 2003). In operating within the principles of fairness and equality as emphasised in the constitution, the DoE has no alternative but to offer a universal curriculum to the nation. Ironically, this curriculum as experienced by the participants (Aryan, Taimur, Emma and Zarah) in the study shows that it is illogical. All Technology teachers in this study are teaching in a context that is underprivileged, with some schools worse than others. From the perspectives of the four teachers, teaching in a poor school impacted the learners' results at their schools. For instance, Taimur indicated that, "*Since Nasa Primary is a no fee school, we receive funding from the DoE, however it is a minimum amount that does not accommodate for resources entirely and one of the reasons as to why we have such bad results in our district is because of the lack of resources available to our children*". Similarly, Zarah's perspective revealed that, "*Context affects performance...if learners are squashed and in a confined place, they will start to fight for space to keep their things because there's no space to work*". The findings of these teachers reveal the inequality that is prevalent at the context level in each of their schools. Aryan, who taught at both a privileged school and now at an underprivileged school, states that "*The school, at which I was teaching Technology prior to where I'm teaching currently, was a real pleasure ... I had smaller class numbers and this made teaching pleasurable...we had abundant resources and children didn't have to share resources....in my current school, the children are poor...we don't have enough funding as a school and we are in a situation of having to choose either to pay our water account for the school or buy a Technology kit*". Evidently, the type of context one teaches in alters the perspectives of teachers, as in this case with Aryan, as his perspective changed when he came to teach at an underprivileged school. According to Nietzsche's (1882) theory of 'perspectivism', in order for one to acquire some value in judgement or truth, one has to obtain as many perspectives as possible from different "vantage points" and should take into consideration culture as well as context (Nietzsche, 1882). In this case, Aryan's perspective of his ex-school as well as his present school helps us to understand his world view from both vantage points. For Nietzsche



(1967), culture and context are vital ingredients that have to be factored in as there are no ‘absolute truths’ because the prevailing culture and context shape truth, making it multiple in nature.

The perspectives of teachers like Zarah and Emma on the use of textbooks in the classroom reveal that though the (DoE, 2011) mandates that all learners must be given a textbook, insufficient numbers of books are received at schools. Despite the anomaly, the DoE expects learning to be optimal at each school. Emma’s perspective reveals that, “*Our school has only sixty-seven Technology textbooks and we have almost two hundred Grade Eight learners*”. Teachers like Zarah mentioned that she “*was not trained to deal with text book shortages...the issuing of textbooks is good on paper, but realistically if they cannot provide for every child, then this creates a lot of problems*”. The findings reveal that the DoE seems to think that by providing textbooks, contextual differences will be taken care of. Furthermore, such unequal distribution of textbooks creates even further disadvantages amongst learners at these schools. The uneven distribution of textbooks to schools is a severe problem created by the government in its inability to improve the situation for the teachers. Despite the DoE providing a universal curriculum for all learners, the DoE does not see its obligation to provide equal resources at all schools to optimise learning.

The current national average teacher to learner ratio in South African schools is 1:30 (DBE, 2015). However, this is not the case in my study as Emma stated that, “*My Technology classes usually comprise of an estimate of about forty-six to forty-seven learners in each class*”. In schools like those used in this study, one can see that context is closely related to curriculum implementation and curriculum design, which are not factored in. When observing the participants teaching the Technology curriculum, it was clear that they were teaching under difficult conditions with the ratios they have mentioned. When teaching the Technology curriculum, all four teachers’ perspectives are shaped and driven by contextual challenges which originated during apartheid. Examined from Nietzsche’s (1882) theory of perspectivism, it seems that apartheid inequities persist, influencing the conditions of teaching. According to Nietzsche’s theory, historical experiences, good or bad, are important in understanding a perspective. He claimed that individuals are strongly connected to their past and unable to break away in the present. Nietzsche (1882) was keenly aware that there is causality between the past

and the present, even if you cannot avoid returning to apartheid, for example, people who experienced it will always feel its influence in their lives, particularly when they fight against its effects. In the same way a child is shaped by his or her childhood, negatively or positively, not being able to escape its influence, so too it is in the education system. Similarly, the teachers that find themselves incarcerated by historical circumstances, may find that the past contours the way they can operate in the present. In this study, teachers find themselves influenced by history in their present experiences at school. For Nietzsche (1882), historical experiences have to be acknowledged for a judgement to be considered legitimate (Warren, 1991). While Aryan stated that teachers are only as good as their context allows them to be, Taimur was of the view that context should not prevent effective teaching and learning. Emma's perspective revealed that, *"Our learners come from very indigent backgrounds where some of them cannot afford food and Technology projects are not considered as important in their lives"*. As explained by Jansen (2001), a serious problem facing educational change is the disconnection between policy visions and practical realities in schools and classroom contexts in South Africa. The reality is that this is what we are going to have to live with and that the curriculum will not be diversified for every school but certainly, it is the schools that need to be equalised. However, we do not see that happening for a very long time, because the financial costs are prohibitive. The curriculum will not become diverse, but whether support will be shown through political will or through economic provisioning in its implementation is uncertain. But, if we take a cue from the history of the past twenty-five years after apartheid, then it is likely that nothing much will happen (World Bank Report, 2016).

### **Teacher Beliefs and Technology Curriculum Pedagogy.**

In South Africa, the Technology curriculum prescribes a group work approach for all learners. As pointed out earlier, the literature supports the DoE prescription as group work is presumed to have many advantages. Learners who are engaged in group work show increased individual achievement compared to those learners working alone (Taylor, 2011). In addition, Taylor (2011) argues that group work also enhances communication and other professional development skills amongst learners. However, the findings in this study indicate that the implementation of group work is not successful at all schools. Most of the teachers in the study implemented the Technology curriculum using their own pedagogical beliefs. The realities that

teachers are faced with are “*small classroom sizes*” (Taimur, Zarah and Aryan) that make it impossible for group work to be implemented in undersized geographical spaces. The Technology curriculum requires more experiential approaches to learning, something that is not possible with large numbers of students in small classrooms. In the cases of Aryan, Zarah and Taimur, the absence of a technology base room hinders their ability to implement group work effectively, irrespective of their desire to adopt such a method, and this directs them into using more teacher-centred approaches. Aryan’s perspective was that:

*I don’t have classroom space for group work because I don’t have a Technology room and when I do try to implement group work in my class, I find learners are shouting at one another because of the tight space.*

Zarah mentioned “*I do a bit of group work, but it is difficult because of class numbers and when I do put them in groups, they can become very chaotic*”. Taimur shared similar sentiments, “*I use the teacher-centred approach mostly because of the large class size and also when I want to derive individual responses*”. I observed teachers’ implementation of the Technology curriculum first-hand during the video recording of their Technology lessons and saw that teachers do not have enough space in the classroom since desks are tightly packed and learners are crammed. The movement is very restricted and teachers were unable to walk around the classroom. The lack of space posed a huge risk that would present health and safety issues if tools were wielded in those confined spaces. What is peculiarly ironic is the stipulation of the Technology policy document that it is compulsory for every Technology teacher to have a base room when teaching the Technology curriculum, yet only a small percentage of teachers have access to a base room, leaving the majority implementing a curriculum without proper working conditions (Marais, 2016). It is very challenging for the teacher to interact with learners as these conditions restricted interaction. As a result of the minimal learner-teacher interaction, learners seemed to feel insignificant which caused them to engage in disruptive behaviour. Only one of the four (Emma) in this study preferred using group work when teaching Technology. In the case of Emma, she is fortunate to have a large Technology base room at her school. Emma seemed to embrace the idea of group work when she stated that “*Learners learn Technology better in groups as they are able to share ideas with each other*”. ‘Perspectivism’ alludes to the concept of a ‘distinctive context’ which makes people adopt perspectives according to the

circumstances they find themselves in (Nietzsche, 1882). Thus in Emma's case, we can see how the context she teaches in favours group work and this appears to shape her perspective. Studies reveal that teachers with strong beliefs about what to teach and where to teach have a very strong influence on the way the curriculum is enacted or implemented or delivered in the classroom (Palak & Walls, 2009; Froese-Germain *et al.*, 2013).

It was discovered that the reasons for these teachers holding such beliefs about Technology pedagogy is informed by the circumstances in which they find themselves. The realities that teachers like Aryan, Taimur and Zarah are faced with on a daily basis, as derived from their perspectives, is not that they do not wish to implement group work, but that the lack of classroom space in which they teach prevents them from doing so. It is important to acknowledge that in South Africa, classrooms are small for the vast majority of schools and the number of learners per class is large. In South Africa, ideal conditions for teaching as stipulated by the DoE, are a ratio of 1:30 (Otte, 2016). However, in South Africa there are realities of classrooms that have a ratio of almost 1:50, as in the cases used in my study. Zarah noted that group work can become chaotic as learners in a class of forty-eight, struggle to form groups in a small classroom. Furthermore, as indicated in the introduction, the learners of the schools are learners of different gender, race, culture, ethnicity and learning ability and due to these differences, teachers in the study are faced with a challenge of how to make group work effective. Hence, Aryan, Zarah and Taimur stated that they used their "*own discretion*" in selecting methods to teach the curriculum as the Technology curriculum. It was evident in the video of Aryan's Technology lesson that he uses whole class discussions as one approach. The effect of apartheid education was far greater than we have ever imagined and the hold of traditional practices on teachers has been very strong, particularly in ideas of what a "real" school is. To a larger extent the participating teachers have adopted the Technology curriculum's pedagogy through the patterns of the past. The perspectives of Aryan, Taimur and Zarah make their beliefs less open to change. Whilst the literature notes that teachers adopt practices that they feel comfortable with and that they might not follow what is outlined in the Technology curriculum (Palak & Walls, 2009; Froese-Germain *et al.*, 2013), the cases in the study revealed that the participating teachers were not just using methods that they were

comfortable with, but rather methods that they were able to work with in order to implement the Technology curriculum. In other words, it is not as if these teachers had choices.

Through the perspectives of the participating teachers, the study found that there is a desire to use pedagogy that would enhance teaching and learning in Technology, however within the South African context, this is very difficult to implement. Apart from the group work approach, Taimur and Emma were of the view that the best approach in teaching the Technology curriculum is to use technology itself. Aryan mentioned using a “*computer to go online*”, whilst Emma singled out “*smart boards*”. However, financial constraints at their schools prohibited both of these methods. Zarah indicated that: “*In Technology we need graphs to show these children and I’m using the chalkboard, but I’m not drawing the graph accurately as it would have been if I had a smart board*”. The perspectives of teachers in relation to their beliefs about pedagogy can be related to their “line of sight” (Conant, 2006). Conant (2006) claims that one of the most important features of a perspective in art is “the line of sight” (p. 8). This is the vantage point from which a viewer looks at a painting; as the viewer changes his or her position, so too does his or her perception of the colour and shape of an object change, creating a different perspective (Conant, 2006). In other words, an interpretation can only be created from a particular vantage point. It is never fixed as it is subject to change as the viewer’s position changes. Just as an artist uses optical illusions to create distortion of objects under certain conditions, teachers in this study create their own perspectives when viewing the type of pedagogy to be adopted in their own context. In some cases, these perspectives may be distorted depending on their “line of sight” or “vantage point”. One may presume that, if these technological devices were readily available at these schools, the beliefs of these teachers may change as Nietzsche (1882) advocates that perspectives are never in a fixed state and are prone to change.

### **Technology Curriculum as an Unfair Curriculum.**

The Technology curriculum is one that is standardised to all schools in South Africa and it is expected by the DoE that Technology teachers implement the curriculum at school. However, do to so, Technology teachers require support from the DoE, yet the findings of this study indicate that the participant teachers are not receiving adequate and, in some cases, no support at

all. Hence, one can conclude that the Technology curriculum is unfair in terms of its universal nature, of ignoring school contexts, of ignoring support that teachers require, of ignoring the lack of training amongst many teachers, and in not considering the learners' social economic backgrounds and where they come from. This is poignantly captured in Emma's perspective when she noted that, *"The CAPS document insists that we have tools like glue guns and drills, but we don't have enough of these and it's not fair"*. The curriculum expects teachers to use resources, yet fails to provide such resources. A teacher like Zarah has to use her own money to purchase such resources which is not fair. According to Zarah: *"I have to dig into my own pocket for money to buy resources...at times, I myself and other teachers are engaged in fundraising to help raise money for the school"*. The DoE neglects its responsibility in the provision of resources and this leaves teachers in a difficult situation. According to Rembe (2005), important types of resources that are relevant to educational policy are human resources; equipment and facilities; space and monetary resources, which are vital and are the major factors that add to successful implementation. Should any of these resources not be available, this would undoubtedly affect implementation negatively (Van der Nest, 2012). What is unfair about the Technology curriculum is that teachers like Aryan are in a way protecting the DoE by taking the responsibility to purchase resources for their school. Taimur admits to making resources after school for teaching Technology, due to the lack of resources at his school. Once more, the inequality of the curriculum prevails, where else in an ideal school setting, the resources are present and finance is available. In doing so, Aryan and Taimur, as Nietzsche (1882) would claim, are falsifying experiences in order to opt for a harmonious view of the world. The findings indicate that there is a harsh reality of no resources and that there is a need for the DoE to provide the necessary resources to the schools, should they expect teachers to utilise them for teaching purposes. The Technology curriculum is unfair as it ignores the contextual constraints that exist in a South African context. Taimur's perspective indicated that:

*My learners cannot relate to concepts such as a watchtower. Generally a learner that comes from an urban area would be able to relate to what I am teaching, for example, bridges, towers and so on...however, a learner that comes from a rural community where our school is based may not be able to*

*relate to such concepts and this can become quite challenging and also unfair to these learners as well.*

This statement above suggests that the Technology curriculum does not take into account the context in which learners in South Africa abide. It is important for the DoE to take cognisance of the fact that some learners may not have ever left their hometown to understand what a bridge ought to look like and yet the DoE expects equal implementation throughout South Africa when in reality such expectations create further inequalities within the education system. When learners cannot relate to structures that exist out of their context and to which they have never been exposed, it creates a gap between those that live in urban areas and are knowledgeable about these structures to those that do not. Although this study yielded similar findings about the lack of support and training received by Technology teachers globally, as depicted in the literature review, the situation in South Africa is peculiar and intensified due to the several curriculum changes that have occurred within a short period of time. The support, therefore, that Technology teachers require for implementation is more extensive than ever before. The teachers in this study have complained about the increased classroom administration that each curriculum change has brought upon them. Consequently, the demands on teachers' time, energies and attention had shifted and there was not enough focus on new instructional practices. The shortage of classrooms, resources and teaching materials had also affected the implementation of the Technology curriculum as the curriculum required more experiential approaches to learning, something that is not possible with large classes. It is also unfair in stipulating that base rooms should be implemented when in reality this is not the case as seen from this study. Some schools have the privilege while to a large extent many do not, like the teachers in this study. Such demands are unrealistic and again do not take into consideration the types of schools in South Africa.

The curriculum is largely unfair to teachers who are in similar situations to Emma, Taimur, Aryan and Zarah in this study, who are forced into non-teaching tasks such as administration and counselling of learners who come from problematic homes. Such teachers are not qualified to do so and this not only infringes on teaching time, but also can be dangerous to the learner if counselling is administered incorrectly (Amin & Vithal, 2015). Qualified educational psychologists are required at such schools to assist teachers. It is unfair as the DoE does not take

cognisance of the type of problems present at schools. The Technology curriculum offers a false sense of being prepared for the Twenty-First Century and is largely unfair to learners as an inadequate amount of time is spent on content, due to the fast pace required as per work schedules of the CAPS approach to curriculum design. Aryan's perspectives reveals that "*most of the time I'm so busy trying to teach an alarming amount of work that I have to cover as projected in the curriculum that I sometimes forget to check if the objectives were achieved or not*". The question then arises as to whether the DoE wishes for teachers to teach for knowledge and ensure that learners understand concepts or just for the sake of completing a curriculum, given that the Technology curriculum is time bound. Along with this, are the overwhelming workloads that teachers are confronted with, which according to Jacobson (2016) can cause burnout in teachers. In addition, feelings of anxiety and frustration arise when teachers are trying to complete the syllabus in time and held accountable for many areas outside their control (Jacobson, 2016). The curriculum is unfair as the pedagogy of group work is not seen as realistic in maximising a learner's potential. As Emma indicated "*I find that with group work, there is generally just one learner who eventually ends up doing all the work, while the other learners are like passengers and yet expect similar marks. So this is a bit unfair*". The Technology curriculum stipulates assessment through group work, yet fails to consider how this would impact on learners who do not contribute to the group.

Designers of curriculum continue to design policy that naturally assumes that all schools have access to resources when in reality this is not the case. In order to enrich our understanding of a phenomenon, multiple perspectives are required to 'crystallise' our views. One needs to develop a constellation of perspectives around knowledge for it to develop integrity. According to Nietzsche (1974), this can only be done in practice. The world is understandable, but individual interpretations differ and people have an innate need to promote their perspectives to be accepted as the norm, which is reflected in the curriculum.

### **Unrealistic, Impractical and Irrelevant Assessment in the Technology Curriculum.**

In the study it emerged that none of the participants were satisfied with the assessment requirements as stipulated in the Technology curriculum. The teachers in this study described assessment in the Technology curriculum as "*unrealistic*" (Taimur and Aryan), "*impractical*"



(Zarah) and “irrelevant” (Emma). Taimur’s perspective was that “my learners sometimes cannot relate to concepts such as a Watch Tower and this becomes problematic.” Zarah felt that some of the assessments are quite impractical, when she stated that : “*the Grade Sevens had to make a model of the “Jaws-of-life” structure (The jaws-of-life is a hydraulic apparatus used to pry apart the wreckage of crashed vehicles in order to free people trapped inside)...many of them have not even heard of a Jaws-of-life before*”. From Zarah’s perspective, she feels that: “*I think these learners should make things which they can use and that serve a purpose, so that they see the value of it, rather than making something they are not going to end up using*”. Emma indicated that: “*when I look at the Grade 8 and 9 curriculum for Technology, I notice that the assessment tasks seem to be irrelevant. For example, I’ve noticed that there are certain topics which are featured in the Grade 9 syllabus that should be covered in the Grade 8 syllabus... If learners are doing a section on gears, let the mini-pat be on gears specifically and not something that is farfetched. The child must be able to understand what he or she has learnt and apply it to the pat appropriately. You must be able to see the relevance in practical and theory*”. From Aryan’s perspective, “*The standards of the mini pat in the Technology curriculum are very high compared to what our learners are able to do at our school*”.

From the literature, it is noted that that for a test to be reliable, it must first of all be practical, it should not require learners to do unreasonable things or to do them under unreasonable circumstances (Vandeyar & Killen, 2003). For example, it would be unfair to ask learners questions in a language they did not understand or to expect learners to answer an extremely large number of questions in a short time. The first step in achieving fairness in testing is for teachers to ensure that all learners have had a reasonable opportunity to learn the things that are being tested. Furthermore, the assessment strategies must be designed to ensure equal opportunity for success, regardless of the individual learner’s age, gender, physical or other disability, culture, language, socio-economic status or geographic location (Vandeyar & Killen, 2003, p. 121). However, it is quite evident from the teachers’ perspectives in this study that none of the above has been present in assessments for the Technology curriculum. Zarah’s perception of assessment in the technology curriculum being “*unrealistic*” was mainly because of her concern that the majority of her learners cannot understand concepts because they have never been exposed to them. She stated that, “*Many of them have not even heard of a ‘Jaws-of-life’*

*before*”, yet the DoE requires learners to be able to create a model of the structure. Emma indicated that the Technology curriculum did not thoroughly consider assessment for Grades 8 and 9 as aspects outlined for Grade 8 are being tested in Grade 9 instead of Grade 8 and vice versa. She argued that the curriculum does not organise the mini-paths according to learners’ capabilities.

Another finding of concern revealed by Zarah’s perspective was that, “*What I don’t like about the curriculum is that they don’t tell you what to do if a child is struggling*” and that of Aryan who shared similar sentiments when he stated that, “*We have weaker learners that are really struggling*”. Such findings reveal an unequal curriculum that expects learners with barriers to learning to adhere to the standardised assessment that was designed for all learners. On one hand, the DoE wishes to create equality in education and on the other hand, the Technology curriculum does the opposite as learners are faced with an assessment that is not only unequal, but also unfair to them. Teachers cannot be expected to apply assessment principles that they do not understand. Therefore, those who propose curriculum change have an obligation to ensure that the principles driving those reforms are explicit and that they are explained clearly. Unfortunately, the Technology curriculum falls short of providing information and explicit guidelines that would help teachers to focus specifically on the fundamental principles of high-quality assessment practices. This shortcoming reduces parts of the Technology curriculum to a ‘recipe’ for assessment, a set of administrative requirements that must be followed without understanding the principles on which those procedures are based. Such an approach in the Technology curriculum perpetuates the perception held by many teachers that assessment is a matter of “technical procedure” (something that must be done to satisfy the bureaucrats), rather than a matter of “professional judgement” (something that should be done to help students learn) (Vandeyar & Killen, 2003, p. 133). The pace setter forces the participants to teach and assess learners regardless of whether the concepts were understood or not. Teachers do not have the autonomy to choose what they want to assess and they are forced to abide by the stipulated assessment, even for learners with barriers to learning. For instance, Taimur’s perspective was that, “*The curriculum does not provide guidelines for questioning when accommodating learners with barriers to learning and I am not trained to educate learners specifically with special needs - the curriculum thus has high expectations*”. Taimur’s

perspective reflects the harsh realities that teachers like him are exposed to when teaching the Technology curriculum. This could cause psychological harm to the learner.

Assessment in this regard is viewed as subject matter, rather than being personalised for each student, and potential is based solely on assessments stipulated in the curriculum. It appears that much emphasis in assessment is placed on societal needs as compared to individual needs. In this light, the Technology curriculum is not producing thinkers because a curriculum that strictly emphasises assessment of content has no space for developing creativity. The contexts, in which all four participants work, affect teaching and assessment as the majority of learners came from rural or poor backgrounds. Context affects perspective. According to Nietzsche's (1882) theory of perspectivism, the concept of truth is connected to practice, personal experience and value. Teachers like Taimur engage with the task of teaching learners with special needs despite the fact that the curriculum offers no support as they feel the need to include all learners in learning, irrespective of whether or not the method they use to teach is correct. Nietzsche's (1882) theory of perspectivism suggests that it is only in practice that teachers' perspectives can be judged as contextual truths and agency are established.

### **Cultural Capital, Technology Education and Social Inequalities.**

Cultural capital can be described as a person's education (knowledge and intellectual skills) that provides advantage in achieving a higher social-status in society (Bourdieu, 1986). According to Bourdieu (1986, p. 47), cultural capital can exist in three forms: the first is the "embodied state" that incorporates the knowledge we acquire over time through socialisation, the "objectified state" which refers to the material objects we own that might relate to our educational pursuits (books, computers, tools, and equipment) and the "institutionalised state" that pertains to the ways in which cultural capital is measured, certified, and ranked and examples of these include academic qualifications and job titles. The introduction of Technology in South Africa, through its goals, aims to promote mobility in a stratified society. However, the educational landscape in South Africa impedes this vision, as many learners, according to the participants, lack cultural capital which makes their ability to succeed less likely. Taimur indicated that, "*My learners cannot relate to concepts such as a Watchtower*", suggesting that the Technology curriculum does not take into account the context at different

schools. When learners cannot relate to structures that exist outside of their context and to which they have never been exposed, a gap between those that live in urban areas and are knowledgeable about these structures and those that do not is created. Zarah mentioned that, *“It is quite difficult because in Technology we need graphs to show these children and these graphs have to be drawn accurately... I’m using the chalkboard, but obviously I’m not drawing the graph accurately as it would have been if I had a smart board”*. The DoE insists on the use of technological devices as mentioned in the literature, yet fails to provide such resources. Again, children become deprived of gaining cultural capital, as they grow to lack familiarity with devices such as smart boards which they may encounter much later in their lives. As Aryan states: *“We don’t have the facilities. At the moment as a province we are a bit behind...you find that other provinces are ahead of us in terms of facilities”*. This clearly shows the lack in uniformity that exists in the country’s education system, where some learners excel, leaving others behind. As during apartheid and very much still today, it appears that different groups of individuals have access to different resources and forms of knowledge, depending on variables which according to Bourdieu (1986) may include race, gender, ethnicity, nationality and even religion. Given the racial segregation prior to 1994, it is not surprising that many schools in South Africa are still functioning under poor conditions with no signs of transformation. Apart from a small minority, most learners continue to receive an education which condemns them to the underclass of South African society, where poverty and unemployment are the norm, not the exception. This substandard education does not develop their talents and abilities or expand their economic opportunities, but instead denies them dignified employment and undermines their own sense of self-worth. In short, poor school performance in South Africa reinforces social inequality and leads to a situation where learners inherit the social station of their parents, irrespective of their motivation or ability. That is how income inequality increases.

In an era where education is an important driver of social mobility, inequality is perpetuated in how skills and knowledge are accumulated or not. Inequality has a profound impact on people’s ability to accumulate skills and knowledge. The poor quality of the majority of public education in South Africa is in itself a major injustice. At the individual level, it blocks the formation of skills and capabilities, preventing the South African youth from realising anything approaching their full potential. Poor education condemns them to lives with fewer

opportunities, lower incomes, and a more limited capacity for self-determination. Low quality education is also an injustice to the broader society, causing the loss of an enormous amount of human potential. This slows development, making the eradication of poverty more challenging, and probably more distant. Over the long term, a population with high proportions of people having limited skills and opportunities, economic and otherwise, is also likely to be more susceptible to a range of other social ills such as violence and crime. (DeKadt, 2015).

Nietzsche (1882) speaks about “cause and effect”, and “truth and consequences” that help shape our interpretation of the world (p. 592). Hence, statements by participating teachers must be relevant to their actual experiences. As indicated in Nietzsche’s (1882) theory of ‘perspectivism’, people could ‘falsify’ experiences in order to create a ‘harmonious view of the world’. The participants did so by trying to make up for the lack of resources and the unfairness of the curriculum by purchasing tool out of their own pockets, and for creating the impression that the curriculum worked in their school contexts. In other words, they created the impression that the Technology curriculum is universal and applies to all school contexts. For Nietzsche, “truth” must acknowledge the harsh realities of the world because these “truths” exist and should not be cast aside as though they do not exist. The “truth” in this instance is that teachers’ perspectives from all four schools in the study reveal that their learners lack cultural capital which will eventually impede them from competing globally.

### **Summary of Chapter Ten**

The findings reveal that South Africa is a very unequal country with two different education systems, namely the historically privileged highly resourced one and an impoverished, underprivileged one with a singular universal Technology curriculum. Although the findings in my study confirm what is found in other studies: that there are not enough resources, that teachers are not properly trained and that there is a lack of support, the reasons for such findings in this study are different and peculiar to a South African context. I will provide, in the next chapter, different reasons for the same findings and show that Technology is implicated in the reproduction of social and political inequalities in South Africa and that it is contributing to the inequalities that are historically based.

# **CHAPTER ELEVEN**

## **THE TECHNOLOGY CURRICULUM AND THE REPRODUCTION OF INEQUALITIES: IMPLICATIONS, RECOMMENDATIONS, FUTURE DIRECTIONS**

### **Introduction**

In the previous chapter, I discussed the findings of the study in relation to the conceptual and theoretical framework of Nietzsche's (1882) theory of 'perspectivism'. In this chapter, I offer a thesis and consider the implications of the findings. The major implication of the study is the reproduction of inequalities which will be followed by the recommendations and future directions.

### **Thesis: Curriculum and the Reproduction of Inequalities**

Despite more than two decades of democracy, South Africa remains the most unequal country in the world (World Bank Report, 2018). During the apartheid era, race-based inequalities were sanctioned, legitimised and practised. Almost twenty-five years later new forms of apartheid are emerging as a result of a confluence of a number of factors. These factors include the inability of the government in financing the upgrade of schools that were under resourced during apartheid as a vast majority of schools continue to remain poorly resourced. Schools that were well resourced with excellent infrastructure continue to thrive and are expensive to attend which prohibits the poor from attending those schools due to the inability to afford such schools (Spaull, 2016). Furthermore, the geographical locations of most privileged schools are situated in middle class and elite areas which are costly for the poor to travel to (Mosala, Venter & Bain, 2017). Hence, from these factors, the new form of apartheid appears to be class-based. South Africa appears as two different countries chafing up against each other, that is, one for the rich and one for the poor. While this separation was legislated under the apartheid era, post-apartheid South Africa has struggled to bridge the divide. At present, the disparity in education, skill and income continues. Challenges within the Basic Education System continue to hamper the transition of many learners to post-school education (World Bank Report, 2018).

Through implementing its 2012 National Development Plan (NDP), South Africa aims to eliminate poverty and reduce inequality by the year 2030. According to Kanbur (1998) it is education that enhances the earnings potential of the poor, both in competing for jobs and earnings and as a source of growth and employment in itself (p. 20). However, a recently released report shows that despite more than two decades of democracy, South Africa remains the most unequal country in the world and that the gap between the poor and rich in South Africa is not only widening but also intergenerational. (World Bank Report, 2018). The circumstances that exacerbate South Africa's inequality are both historical and a result of years of policy uncertainty, making it harder for ordinary South Africans to claw their way out of poverty. More than two decades after South Africa ousted a racist apartheid system that trapped the vast majority of South Africans in poverty, more than half the country still lives below the national poverty line and most of the nation's wealth remains in the hands of a small elite. Despite the positive trend on poverty reduction, poverty rates increased between 2011 and 2015. At least 2.5 million more South Africans slipped into poverty between 2011 and 2015. A significant determinant of this inequality is inequality of opportunity especially in education (World Bank Report, 2018). Although the World Bank Reports highlight the importance of job creation and skills improvement to reducing poverty and inequality in South Africa, the findings in my study indicate that South Africa is far from eliminating poverty and reducing inequality because a subject like Technology Education merely expands the gap of inequality that already exists instead of solving problems as it was intended. Initially, Technology as a subject was introduced in the South African curriculum in recognition of the need to produce engineers, technicians and artisans needed in modern society and the need to develop a technologically literate population for the modern world (DoE, 2011, p. 8). However, my study shows the impact of the Technology curriculum as interpreted by Technology Teachers at schools rich in resources as well as others with little or no resources and the affect that this has on the teaching of the Technology curriculum to the learners at these schools (Jones, Bunting & De Vries, 2013). Inequality of opportunity among children in South Africa is shaped by various circumstances such as location, whether a child lives in a township or rural area as opposed to an urban area, and education of the household head contributes the most to inequality of opportunity in most cases. Location is particularly important for opportunities related to infrastructure (access to electricity, telecommunications, water). Such factors such as location of learners undoubtedly impacts on

the interpretation of the Technology curriculum by learners in the identification of technological concepts as mentioned in the findings of my study. The lack of exposure to technological creations and infrastructure as well as resource availability at school thus eventually leads to the lack of competitiveness amongst learners from low productivity which will ultimately undermine job growth, thus excluding many from labor markets. Hence, South Africa's polarised economy, coupled with its skills constraint, hurts the poor and keeps inequality high.

The dawning of democracy in 1994 had brought in an opportunity to create an equal society. One would assume that twenty five years later every individual would have access to land, education, health care, and not have children dying because they fall into pit latrines, as in the case of a school in the Limpopo province (Van Zyl, 2019) due to a failure to provide ablution facilities. At the time of press there were 3 909 public schools in the province of Limpopo which 3 023 had pit toilets (Van Zyl, 2019). This is not to say the government has not made significant strides in equalising the country. Access to basic services such as water, electricity, health care and education has improved considerably since the ANC came into power (World Bank Report, 2018). The most striking feature of equality that is prevalent in South Africa is seen in the ability of every South African citizen to be able to exercise their democratic right to vote. But while democracy has delivered equal freedom to vote, not enough has changed for those living in the country's vast townships where a large degree of inequality still persists and the legacy of apartheid endures. Previously disadvantaged South Africans hold fewer assets, have fewer skills, earn lower wages, and are still more likely to be unemployed or receive equal access to water, nutrition, social welfare, psychological services and education.

The provision of education in South Africa is characterised by at least two schooling systems, namely, a public one and a private one. On one end of the spectrum is an underprivileged public educational system and at the other end is a private educational system attended by those considered to be elite which gives those who attend there to prosper and have a competitive edge, creating a gap between the rich and poor that is wider in South Africa than in any other country where comparable data exists (World Bank Report, 2018). The public system is also bifurcated with well-resourced schools and poorly resourced schools. This gap between the two schooling systems have increased in the democratic phase and my study shows how the Technology curriculum is implicated in the reproduction and the entrenchment of inequalities.



The findings in the study have shown that university preparation of Technology teachers is disrupted by constant curriculum changes and the constraints of a rigid curriculum leave little room for flexibility. Furthermore learner's use of technological devices is disapproved, a universal Technology curriculum for a diversity of school contexts is set and that teacher beliefs and Technology curriculum pedagogy are not synchronised. The Technology curriculum is unfair in terms of its expectations in poorly resourced schools. Assessment was found to be unrealistic, impractical and irrelevant in the Technology curriculum. The Technology curriculum reveals how learners from underprivileged schools lack cultural capital which hinders them from competing at a global level, creating even further inequalities. The outcome is dire for learners who go into the senior phase education system as exemplified by the four schools that are represented in this study. The learners who attend those schools will probably not be able to compete on an equal level for entrance into university to study technology or for attaining employment which requires high competency and skills regarding technology, as these learners do not have the cultural capital to compete because they have never seen technology devices or structures related to technology. The aspirations of these learners in becoming an Engineer, Doctor or gaining entry into high status professions that rely on technology are reduced because of the poverty of the educational experience in Technology education. If anything, the rainbow nation is even more divided and more unfair now than it was in 1994.

## **Recommendations**

### **Keeping Technology Teachers Up-To-Date.**

This study has shown that three out of the four Technology teachers were not trained to teach Technology and in addition were not attending regular workshops or in some cases not informed about such workshops at all due to miscommunication. Given rapid technological advances, Technology teachers, especially those who are not trained in the subject, require constant training. This would provide them with the necessary skills, teaching methods content and curricular knowledge required for effective teaching. The ideal way to keep all Technology teachers abreast of the latest updates would be through regular workshops, retraining and sending teachers back to university to complete short courses. However, in a vast country like South Africa, such a recommendation would not be practical, considering the large number of

Technology teachers and the issue of finance in a third world country. Therefore, alternate forms of doing so are required. In ensuring my recommendations are realistic, I have carefully considered suggestions that would not require enormous amounts of financing or human resources to implement. An ideal way in ensuring that Technology teachers are kept up-to-date would be for the DoE to perhaps have two newsletters a year for Technology teachers. These newsletters could provide new developments and trends in technology, the current and most useful news and information to help district and school leaders make smart decisions about how technology should be used for teaching and learning at schools. Other platforms that can be created to keep Technology teachers updated are through websites and teacher educational blogs that are functioned by the DoE. The use of blogging not only is a convenient way for all Technology teachers to be updated but can also assist them in becoming digitally literate. Through blogging, many skills such as research skills and multimedia can be discussed and practiced. When publishing online, teachers have the chance to have their thoughts read and can write about their concerns about Technology. Another way to keep Technology teachers up-to-date is to through the use of technology itself. This could be achieved in the creation of WhatsApp groups for Technology teachers. WhatsApp is a free messenger application that works across multiple platforms like smart phones and this application is being used widely to send multimedia messages like photos, videos, audios along with simple text messages (Gon & Rawekar, 2017). The use of WhatsApp groups could serve as a platform where teachers could communicate their grievances, share ideas and perhaps gain assistance from other Technology teachers in possible challenges they may be experiencing in teaching the Technology curriculum.

### **Support Teachers During Implementation.**

In providing support to Technology teachers, one has to consider the contextual reality that exists in South Africa. In a province such as KwaZulu-Natal, there are an estimated number of around 6264 high schools (Hall, Richter, Mokomane and Lake, 2018) which indicates that there may be 6264 Technology teachers if one considers that there may be one Technology teacher per school. Within KwaZulu-Natal there may be three or two superintendents of education for Technology teachers and as a result it is impossible for them to provide support to all Technology teachers as this would not practical because we live in a developing country that comprises elements or situations of third world conditions that cannot provide first world

support. This means that support has to be created at school level or at district level; where teachers need to recognise themselves as lifelong learners and devise own self-support. There is a need for the implementation of a mentorship programme for all Technology teachers irrespective of the number of years in teaching to come to grips with the present teaching situation especially as technology is a dynamic field. This is crucial as mentorship should be seen as part of a teacher's life-long learning. It is the responsibility of the school to set up, support and monitor the establishment of School Based Professional Learning Communities. These communities provide the first level of intervention and support to the teachers by providing orientation to newly appointed teachers, and hosting regular meetings, workshops and talks, where teachers are informed about current policies such as the National Development Plan (NDP) (National Planning Commission, 2010), the role of education in transforming the education landscape, and the requirements of the norms and standard document which stipulates the seven roles the teacher must adopt (DoE, 2011).

### **Sharing Resources.**

The provision of resources by the DoE would be ideal but it might not be financially viable in South Africa. Although it does not absolve the DoE from the provisioning of resources but perhaps to suggest that maybe one school in a district or a circuit can share resources once a week. Another suggestion is that the DoE could provide technology resources on wheels that visit schools regularly so that teachers can use it for a period of time until it travels to the next school. This will give learners an opportunity to see models used in the teaching of Technology so that they are able to identify structures such as a watch tower or understand how a gear system works by looking at one. A method such as technology resources on wheels seems practical and effective. The idea of promoting sharing over providing is because of financial constraints and to keep it practical. The provision of resources on wheels has been an effective practice in the past and is encouraged to be operational, especially to underprivileged schools in South Africa (Mojapelo, 2014).

### **The Inclusion of Technology Teachers in Curriculum Design.**

Ideally, the literature review mentioned that teachers should be involved in curriculum design (Maniates, 2010), but what is unusual in my study is that Technology teachers do not

declare a desire to be a curriculum designer. In fact, they are largely pre-occupied by the context, constraints and the problems that they face on a daily basis to deliver the curriculum effectively. The South African government should actively involve Technology teachers in formulating or drafting any policy that will affect curriculum since they are the custodians and implementers of the curriculum. Perhaps the DoE could create a platform that will allow for conversations between representatives from the DoE and Technology teachers around curriculum so that even if teachers do not wish to engage in the design of it, their grievances will be heard and they are thus in a way involved in curriculum design. The creation of dialogues of meaning between policy, politics, practice and stakeholders, can be used as a means for transforming education (Jansen, 2001). As explained by Jansen (2001) almost twenty years ago and which still holds true for the present times, a serious problem facing educational change is the disconnection between policy visions and practical realities in schools and classrooms in South Africa. Teachers can be used to reduce this gap and to fill this void if given the opportunity to be part of policy development and revision.

### **Parental Involvement.**

This suggestion is made apprehensively because there are large numbers of learners in South Africa who come from child-headed households. These children do not have parents and are the sole providers of basic needs such as food (Hall *et al.*, 2018). In some cases, there are learners living with elderly parents and grandparents who are illiterate and have no exposure to technology. While on one hand it is possible that some parents can be involved with the Technology curriculum but to a very large extent on the other hand they are not. A suggestion is that perhaps schools can be used as centres to keep parents of the community up-to-date with technological developments. For instance, technology days could be hosted by the school in which parents come to view learners work. This will not only assist in getting parents involved in the work of their child and help with teaching but also a suggestion in which the school is seen as a service to parents to know what is happening in technology and in a way be updated by advancements. This is perhaps another way of reducing inequalities in a social sense. Schools could offer services to the community by encouraging National Government Organisations (NGO) to run workshops for technology literacy for adult learners.

## **Suggestions for Future Research**

Given the paucity of research on Technology teachers' perspectives of the Technology curriculum, further research is recommended on this phenomenon. There are lessons that can be learnt from this study, extrapolated from the research findings to foster and generate possible future endeavours. There are gaps that require further research. For instance, while conducting interviews with teachers it emerged that the provision of Learning and Teaching Support Material (LTSM) needs to be strengthened, and augmented in order to improve the implementation of the Technology curriculum. The issue of LTSM needs to be examined further in order to determine its efficiency in the implementation of the Technology curriculum. Other future research could include school leavers' experiences of applying what they learnt in Technology at school as an attempt to discover if the subject is useful or relevant and whether or not it has made a difference in their lives. Another possible area of research could be centred on the school and community partnerships and Technology. Research could examine how schools can be used centres for the community to interact and learn more about Technology and its influence in our lives. A future study is also recommended with a focus on assessment in the Technology curriculum to establish ways on how to accommodate learners with barriers to learning during group work assessment as many of the teachers' perspectives in the study found the structure and requirements of assessment to be problematic. Other research could also focus on how to make group work in Technology more effective in South African schools.

## CONCLUSION

The study started out with the idea of exploring Technology teachers' perspectives on the Technology curriculum. As portrayed in the literature review, the concept 'curriculum' is neither limited to a single definition nor is it in a fixed state and due to this the curriculum will always be subjected to scrutiny by stakeholders involved, as that is the nature of curriculum. This was the case with curriculum in South Africa, where reform became crucial after the abolishment of apartheid in 1994 and the introduction of the Technology curriculum was part of this major reform. Apart from preparing learners for a Twenty-First Century world, there is an assumption that the Technology curriculum would also be a way to eradicate or reduce inequalities in South Africa (Dugger & Naik, 2001, p. 31). Since the Technology curriculum was relatively a new subject in South Africa, it mirrored much of its design internationally (Stevens, 2006). However, when a curriculum is not designed to deal with the complexity of the diversity of a South African school context, it can lead to further dissatisfaction, inequalities and misalignment. The major finding in this study reveals that the Technology curriculum is in fact reproducing inequalities in South Africa. A curriculum like Technology is in fact deepening and widening the gap between the privileged and underprivileged learners. This study's unique contribution is providing different reasons for similar findings in the literature and show that Technology is implicated in the reproduction of social and political inequalities in South Africa and it is really contributing to the inequalities that are historically based. The inequities ranging from uneven resource allocation to lack of uniformity in the quality of education have hindered progress. The introduction of the Technology curriculum imposed changes in the style of teaching as teachers had to shift from traditional methods, adapt to group work and create a culture of teaching and learning that is conducive to teaching Technology (Van Niekerk *et al.*, 2005). The participants' perspectives revealed that the Technology curriculum is not having as positive an impact as was intended due to textbook shortages, overcrowded classrooms, a lack of basic resources and barriers to learning. There are schools who are either very well equipped to those in dire poverty and a subject like Technology continues to widen the gap between these two types of schools. Those schools that have specialists to teach Technology and resources put learners in a competitive space globally where else the learners in an impoverished system are given a false sense of competency that they have entered a digital age and that they can compete.

In other words, they are entering into the digital age with the idea that they have knowledge in Technology but it is insufficient to compete. It is within that context of a very problematic background that we have the Technology curriculum emerging and such a subject is not going to solve its problems, but rather it is reproducing inequalities and providing individuals with a false sense that we are in the Twenty First Century, whilst there are teachers who are not technologically literate and properly equipped who are now trying to prepare children for the future.

Hence, the study is beginning to show through the example of Technology teachers' perspectives' of the Technology curriculum that curriculum is contested, it is open to multiple interpretations, it is context dependent, complicated and complex, shaped by teacher beliefs and attitudes, and it is complicated by the way the official curriculum is designed. These are the implications from the study that are coming through and that Technology teachers are where they are positioned because of their perspective. As a researcher, all I had to work with was the opinions and experiences of the teachers which are perspectives that I had to make sense of through the means which was recommended by Nietzsche's (1882) theory of affects, that is coherence of perspectives, legitimacy of perspectives and practicality of perspectives. In taking into consideration South Africa's history of apartheid as discussed in the introduction of this study, it was pointed out that historical influences play a role in what a teacher can or cannot achieve in a context. The findings of the study found that the ravages of apartheid are still very much evident at schools and as a result plays a role in the shaping of teachers' perspectives. The choice of Nietzsche's (1882) theory of 'perspectivism' was a deliberate one as the data was generated from the perspectives of Technology teachers about the Technology curriculum. All I had to work with as a researcher were statements which were perspectives of my participants which I had to make sense of through the means that Nietzsche (1882) recommended which was a coherence of perspectives, legitimacy of perspectives, and practicality of perspectives. Nietzsche's (1882) theory of 'perspectivism' posits that affects play an important role in driving a perspective. It was pointed out that historical influences play a huge part in what a teacher's perspective can become in context. The study found that the history and the damages of apartheid still play a big part in shaping the school as well most importantly the perspective of a teacher. While the four teachers had some similar perspectives of the Technology curriculum,

they differed in other respects, depending on the affects they experienced within their practice. This points to a multi-perspectival phenomenon which reflects Nietzsche's (1882) notion of perspectivism.

At this juncture, the question that arises is what would an ideal Technology curriculum look like? Perhaps it would start by considering a broad based consultative process, in which it's not just the Technology education experts, but also individuals who are non-experts and are expected to teach Technology and perhaps engage them in a dialogue to discuss the challenges and requirements so that a redesign can be considered. A curriculum design that may not be ideal, but certainly one that will try to in some way lessen the toxic effects that Technology education has promised for an advanced citizenry, that can contribute to nation building and a better life. This could be strengthened if curriculum designers can see the necessity of providing learners with these kinds of tools. It also means that all stakeholders in schools are made aware of the importance, not only of the subject, but in the way the time table is constructed, so that the limited time allocated can be maximized in Technology. At this juncture it is known that some things cannot be changed, but one has to know that the nature of curriculum is such that there is always much more content than the time that is allocated to a topic. Hence, an increased time allocation would increase the maximum potential that one can gain out of the limitations of this and that in some way, positions South Africans in a very global competitive space, in terms of globalisation and new liberalism. It is a reality that currently if one does not possess the necessary skills required in Technology that one could be displaced in your own country and replaced by a foreigner who has the skills. However, the Technology curriculum has the potential to change this through its aims and goals and is aware of the environment besides the skills that are necessary to be good citizens. To conclude this thesis, cognisance should be taken of the various challenges that Technology teachers face irrespective of the context in which they have to execute the Technology curriculum. Perhaps, it would be a good idea for the DoE to consider or look into teacher agency which can be related to Nietzsche's (1882) affect of practicality to provide the teacher with a sense of ownership in their teacher and learning, so that teachers can experience some sense of fulfilment and not feel like curriculum implementers but rather as important contributors who add value to the curriculum. Lastly, addressing the weaknesses pertaining to the Technology curriculum that were identified by the study



participants would hopefully result in teachers adopting more positive perspectives and enable the vision for Technology as set out in C2005, to be achieved.

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## APPENDIX 1

### APPENDIX 1: INFORMATION SHEET

Dear Colleague

I am a PhD student at the University of KwaZulu-Natal and I am currently conducting a research study which is entitled: *Technology teachers' perspectives on the Technology curriculum*. The study intends to analyse Technology teachers' perspectives about the Technology curriculum. The study requires participating Technology teachers to be video-recorded for one Technology lesson, followed by two personal interviews and later a focus group interview. The purpose of video recording the Technology lesson is to provide an opportunity to discuss your perspective and your interpretation of the curriculum based on what you do in the classroom. The duration of the interviews and the video-recorded lesson will be approximately 45 minutes each. With your permission, the observed lesson will be video-taped and the interviews will be audio-taped. Every effort will be made to ensure that no one will know that you took part in this study. If I use any information that you share with me, I will be careful to use it in a way that will prevent people from being able to identify you or the school you work in. After the interviews, the video-recorded discussion will be transcribed and you will be given an opportunity to revise, remove or to add details. To protect your identity I will ask you to provide a different name during the interviews, for use in reports. You are free to withdraw from the research at any stage without negative or undesirable consequences. All information is only intended for research purposes. All data recordings and transcripts will be stored in a locked cabinet in my supervisor's office and no-one else will have access to the raw data. Please note that your participation is voluntary, without payment. A copy of the completed thesis will be made available should you so desire. Permission to conduct this research study has been obtained from University of KwaZulu-Natal.

Should you require further clarification or details you can contact the supervisor of this study, Prof Nyna Amin, from the University of KwaZulu-Natal, School of Education and she can be

contacted at 031-2607255 or by email: amin@ukzn.ac.za. You are also welcome to contact me for further information at 0325515055. For issues regarding ethics, you may contact Ms Phume Ximba from the Humanities and Social Sciences Research Ethics division by telephone, during office hours or by email,

Thank you for your co-operation.

---

Raksha Janak



## APPENDIX 2

### APPENDIX 2: CONSENT DOCUMENT FOR PARTICIPANTS

Dear Ms Janak,

I, \_\_\_\_\_ (Full name of participant), hereby voluntarily consent to participate in the study entitled: *Technology teachers' perspectives on the Technology curriculum*. I understand that confidentiality will be maintained and that I have the right to withdraw from the study at any stage. I agree to be video-recorded during one Technology lesson, as well as to be interviewed individually which will be audio-recorded.

*I hereby consent / do not consent to having a Technology lesson video recorded, and to having an individual interview audio recorded.*

I consent to the following data collection activities (please tick)

	YES	NO
Video recorded Technology lesson		
Audio recorded individual interviews		

-----  
SIGNATURE OF PARTICIPANT

DATE: -----

## APPENDIX 3

### APPENDIX 3: GATEKEEPER PERMISSION

Dear Sir/Madam,

I am a PhD student at the University of KwaZulu-Natal and am currently conducting a research study which is entitled: **“Technology teachers’ perspectives on the Technology curriculum”**. The study intends to analyse Technology teachers’ perspectives about the Technology curriculum. The study neither seeks information about the school nor does it seek information about specific individuals (colleagues, students, or parents). The focus is on Technology teachers’ perspectives. I am seeking your permission to conduct the study with the Technology teacher employed at your school. The study requires the participating Technology teacher to be video recorded and interviewed. Participating Technology teachers will be video recorded during a Technology lesson in school and interviewed after school hours at a venue that is convenient for them. The interview will be audio-taped. Thus the school will not be affected in any way and the Technology teachers will not be detracted from their duties in school. The duration of these interviews will be approximately 45 minutes. The interviews as well as the video recording will be conducted with the permission of participants. Every effort will be made to ensure that no one will be able to identify participants or the schools they work in. To protect their identities I will ask them to provide a different name during the interview. They will be free to withdraw from the research at any stage without negative or undesirable consequences. All information is only intended for the research purposes. All data recordings and transcripts will be stored in a locked cabinet.

Further clarification can be obtained from my supervisor Prof Nyna Amin, Tel: 031- 2607255 and by email [amin@ukzn.ac.za](mailto:amin@ukzn.ac.za). Permission to conduct this research study has been obtained from University of KwaZulu-Natal. For queries concerning ethics, please contact Ms Phume Ximba at 031-2603587 or email her at [ximbap@ukzn.ac.za](mailto:ximbap@ukzn.ac.za)

Yours faithfully,

\_\_\_\_\_

Miss R. Janak

**Study: “Technology teachers’ perspectives on the Technology curriculum”.**

I hereby give permission to the researcher to conduct the above-mentioned study at this school

..... (Name of school).

Principal: \_\_\_\_\_ (Name)

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

# APPENDIX 4

## APPENDIX 4: ETHICAL CLEARANCE UNIVERSITY OF KWA-ZULU NATAL



13 September 2016

Ms Raksha Janak 206504918  
School of Education  
Edgewood Campus

Dear Ms Janak

Protocol reference number: HSS/1316/016D  
Project title: Technology teachers' perspectives of the Technology curriculum.

### Expedited Approval

In response to your application dated 22 August 2016, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL**.

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

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

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

Yours Faithfully

  
Dr Shamila Naidoo (Deputy Chair)

/s/

cc Supervisor: Prof Nynia Amin  
cc Academic Leader Research: Dr SB Khosa  
cc School Administrator: Mrs B Bhengu-Mngun, Mbalenhle Ngcobo, Ph'lis'we Ncayiyana, Tyzer Khumalo

Humanities & Social Sciences Research Ethics Committee  
Dr Shenuka Singh (Chair)

Westville Campus, Govan Mbeki Building  
Postal Address: Private Bag X5129, Durban 4000

Telephone: +27 (0) 31 263 3587/83504557 Facsimile: +27 (0) 31 263 4018 Email: [ethics@ukzn.ac.za](mailto:ethics@ukzn.ac.za) / [humanities@ukzn.ac.za](mailto:humanities@ukzn.ac.za) / [ethics@ukzn.ac.za](mailto:ethics@ukzn.ac.za)  
Website: [www.ukzn.ac.za](http://www.ukzn.ac.za)

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## APPENDIX 5

### APPENDIX 5: PERMISSION FROM DEPARTMENT OF EDUCATION (KZN)



education

Department:  
Education  
PROVINCE OF KWAZULU-NATAL

Enquiries: Phindile Duma

Tel: 033 392 1004

Ref.:2/4/8/886

Miss R Janak  
PO Box 2905  
Stanger  
4450

Dear Miss Janak

#### PERMISSION TO CONDUCT RESEARCH IN THE KZN DoE INSTITUTIONS

Your application to conduct research entitled: "TECHNOLOGY TEACHERS' PERSPECTIVES ON THE TECHNOLOGY CURRICULUM", 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 August 2016 to 01 December 2017.
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.

(See List of Schools Attached)

  
Adv. MB Masuku  
Acting Head of Department: Education  
Date: 23 August 2016

#### KWAZULU-NATAL DEPARTMENT OF EDUCATION

POSTAL: Private Bag X 9137, Pietermaritzburg, 3200, KwaZulu-Natal, Republic of South Africa ...dedicated to service and performance  
PHYSICAL: 247 Burger Street, Anton Lembede House, Pietermaritzburg, 3201. Tel. 033 392 1004 beyond the call of duty  
EMAIL ADDRESS: [kehologile.connie@kzndoe.gov.za](mailto:kehologile.connie@kzndoe.gov.za) / [Phindile.Duma@kzndoe.gov.za](mailto:Phindile.Duma@kzndoe.gov.za)  
CALL CENTRE: 0860 596 363; Fax: 033 392 1203 WEBSITE: [WWW.kzneducation.gov.za](http://WWW.kzneducation.gov.za)

## APPENDIX 6

### APPENDIX 6: INTERVIEW SCHEDULE

This interview schedule includes two sections, namely, the warm up questions and teachers' perspectives about the Technology curriculum.

Introductions

#### **Section A- Warming up questions**

- \* When did you begin your teaching career?
- \*What subject did you specialise in?
- \*When were you appointed at this school?
- \* How long have you been teaching Technology?
- \* Which grades do you teach?
- \* Do you enjoy teaching Technology?

#### **Section B – Teachers' perspectives on the Technology curriculum**

1. In your opinion, are the goals of the Technology curriculum relevant (for school, society, the future, for a career pathway)?
2. Do you think there are some irrelevant goals in the Technology curriculum? (Why? Why are they not relevant?)
3. If you could, are there any goals you would remove from the Technology curriculum? (Which goals?)
4. If you could, would you add goals to the Technology curriculum? (What would those be? Why?)
5. How should the Technology curriculum be taught? (Individually? Group work? On-line? Why?)
6. Is the allocated time for teaching the Technology curriculum sufficient? Explain (sufficient/insufficient)
7. Do you have relevant resources to teach the Technology curriculum? (Explain.)
8. At what time of the day should the Technology curriculum be taught? (Why?)

9. What influences the way you teach the Technology curriculum? (Does student response/interest influence the way you teach?)
10. Do you think the context in which you are teaching is appropriate for teaching Technology? (Explain.)
11. Do you think that the context has an influence on teaching Technology? (Why?)
12. What approaches do you think are necessary for teaching Technology and why?
13. Do you think that the projects or assessments depicted in the Technology curriculum are realistic and of a practicable nature?
14. How do you feel about the accommodation of learners with barriers to learning in the Technology curriculum? Should different assessments be set? (This relates to: Learners with different learning abilities, in terms of language and the weaker learners).
15. What is your opinion on Technology integration into the curriculum? (Do you view it as a challenge?)
16. Is lesson planning in Technology effective in achieving the objectives of the Technology curriculum?
17. What do you think are some of the factors that hinder the achievement of objectives in teaching Technology?
18. What are your feelings about the demands of the Technology curriculum?
19. What is your perspective on group work in Technology? (Do you embrace group work in Technology?)

### **Interview 2 – (Video-recorded Technology lesson)**

This is an informal interview between the researcher and the participant. The researcher will use the video-recorded Technology lesson to stimulate a discussion with the participant on teachers' perspectives. The participant will explain to the researcher what he or she is doing in the video and give reasons for doing so. This will help to deepen the interrogation of teachers' perspectives about the Technology curriculum. The video-recording will not be transcribed. Only the discussion will be transcribed.

### **INFORMAL STIMULATED INTERVIEW (PLAY VIDEO)**

## APPENDIX 7

### TURNITIN ORIGINALITY REPORT

#### TURNITIN ORIGINALITY REPORT

#### TECHNOLOGY TEACHERS' PERSPECTIVES OF THE TECHNOLOGY CURRICULUM

##### ORIGINALITY REPORT

<b>14%</b>	<b>12%</b>	<b>2%</b>	<b>6%</b>
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

##### PRIMARY SOURCES

<b>1</b>	<b>Submitted to University of KwaZulu-Natal</b> Student Paper	<b>1%</b>
<b>2</b>	<b>uir.unisa.ac.za</b> Internet Source	<b>1%</b>
<b>3</b>	<b>cw.routledge.com</b> Internet Source	<b>&lt;1%</b>
<b>4</b>	<b>my.unisa.ac.za</b> Internet Source	<b>&lt;1%</b>
<b>5</b>	<b>asee.org</b> Internet Source	<b>&lt;1%</b>
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<b>9</b>	<b>hrcak.srce.hr</b>	



## APPENDIX 8

### PROOFREADING AND EDITOR'S CERTIFICATE

#### TO WHOM IT MAY CONCERN

I have 42 years' experience in the teaching profession, both at high school and tertiary level. In my last position before retiring in December 2016, I was a Teaching and Learning Consultant and had acted as Manager of the Teaching and Learning Centre (TLC) of the University of Fort Hare on three different occasions. As a consultant, I facilitated modules on the Post Graduate Diploma in Higher Education and Training (PGDHET) and also evaluated lecturers' teaching and their courses. My skills set allowed me to focus on management, language, research and student development. Activities which speak to this include being the Co-ordinator of the Language and Writing Advancement Programme (LWAP) and the Supplemental Instruction Programme (SI) for two years plus being the Editor of the TLC's bi-annual newsletter for approximately eight years.

I hereby certify that I have proofread a PhD thesis submitted to me by the author, **Raksha Janak (Student Number – 206504918)**, enrolled in the College of Humanities: School of Education, University of KwaZulu-Natal. The candidate's research topic is:

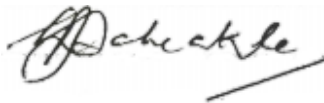
**'TECHNOLOGY TEACHERS' PERSPECTIVES ON THE TECHNOLOGY CURRICULUM'**

I have corrected superficial errors in spelling, grammar, syntax and punctuation in the Abstract, individual units and reference list of the manuscript. I have checked the balance required between APA referencing style (6<sup>th</sup> version) for in-text referencing and end-referencing, where

the one needs to be a mirror image of the other. The APA formatting and layout of the body's headers and sub-headers has also been adopted. The APA format offers spaces between sentences plus the alternative of no numbering, using boldface, centering or left alignment, indentation, italics and full stops in various combinations for different levels. This differs slightly from the UKZN Guidelines 2016 supplied by the UKZN Student Services. I trust that the aforementioned will meet with the examiners'- and publishers' approval and that the language used accurately reflects the author's intended meaning. The principles of anonymity, confidentiality, accountability and reliability have been respected by all researching parties.

DISCLAIMER: The proofreader cannot be held responsible for any errors introduced after the proofreading has been completed, due to changes being made during the corrections' process.

Should there be any questions that arise from this exercise, kindly contact me on [lscheckle@gmail.com](mailto:lscheckle@gmail.com).



Linda Scheckle (Private Editing Service)

20 July 2019

	<p>Address: Flat 2 Riverview Heights 6 Riverview Terrace Beacon Bay East London 5241</p>
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