THE INFLUENCE OF A CONTINUING PROFESSIONAL DEVELOPMENT PROGRAMME ON THE CLASSROOM PRACTICES AND PROFESSIONAL DEVELOPMENT OF TECHNOLOGY TEACHERS

by

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UNIVERSITY OF PRETORIA

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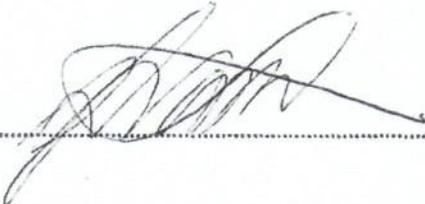
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Mittah, my wife

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"Destiny is not a matter of chance; it is a matter of choice. It is not a thing to be waited for; it is a thing to be achieved."

-    **William Jennings Bryan**

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ABSTRACT

The main purpose of this study was to explore the influence of a Continuing Professional Development (CPD) programme on the classroom practices and professional development of Technology Education teachers. Clarity was sought on how those Technology Education teachers who had participated in the CPD programme were influenced by the outcomes of the CPD programme in terms of their classroom practices and professional development. Although the school set-up and its management structure was not part of the outcomes of the CPD programme, the researcher felt that it was also important to highlight and describe from teachers' point of view the nature of support (if any) that the teachers received from their respective schools to enhance their professional development and growth. A qualitative approach to research, in the form of multiple case studies was used in this study. Purposeful sampling was applied to select the three teachers who participated in this study. Data was collected using multiple qualitative data collection strategies and instruments that included the use of once-off semi-structured interviews, classroom observations and documents analysis.

Findings from this study revealed that those Technology Education teachers who participated in the CPD programme under review in this study had their classroom practices and professional development, to some extent influenced by the outcomes of the CPD programme. Teachers confirmed that most of the teaching strategies they apply in their classes were adopted from the CPD programme under review. Teachers acknowledged that they had acquired new teacher Technology Education-specific teacher knowledge which in turn helped their learners to learn effectively in class. There is also evidence from the results of this study that suggest that teachers had been greatly motivated by the CPD programme to improve their Technology Education-specific teacher knowledge. However, teachers still lacked the 'drawing skills' that are critical to procedural knowledge. Further, the study revealed the need for the development of structured classroom activities that will assist novice Technology Education teachers to deal with the dynamics of the subject with much ease. Lack of effective curriculum management and support in schools were highlighted as inhibitors to the professional development and growth of Technology Education teachers.

Keywords: Continuing Professional Development; Technology-specific teacher knowledge; Teacher Education; Teaching, Learning and Assessment in Technology Education; Teacher Support.

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LIST OF ACRONYMS

ACE	Advanced Certificate in Education
ANC	African National Congress
B Ed	Bachelor of Education
CAPS	Curriculum and Assessment Policy Statement
CES	Chief Education Specialists
CPD	Continuing Professional Development
C2005	Curriculum 2005
DBE	Department of Basic Education
DMSTE	Department of Mathematics, Science and Technology Education
DoE	Department of Education (national)
FET	Further Education and Training
GET	General Education and Training
HEDCOM	Heads of Education Committee
HEIs	Higher Education Institutions
HOD	Head of Department
IQMS	Integrated Quality Management System
LDoE	Limpopo Department of Education
LO	Learning Outcome
LTSMs	Learner Teacher Support Materials
M/S/T	Mathematics, Science and Technology Education

NCS	National Curriculum Statement
NGO	Non Governmental Organisation
NPDE	National Professional Diploma in Education
NQF	National Qualification Framework
OBE	Outcomes-Based Education
PROTEC	Programmes for Technological Careers
RNCS	Revised National Curriculum
RDP	Reconstruction and Development Programme
SACTE	South African College of Teacher Education
SMTs	School Management Teams
SPTD	Senior Primary Teachers Diploma
STCS	Senior Technology Curriculum Studies
STPS	Senior Technology Policy Studies
STES	Senior Technology Education Studies
T2005	Technology 2005
UL	University of Limpopo

CHAPTER ONE

PROBLEM STATEMENT, AIMS AND OBJECTIVES OF THE STUDY

1.1   GENERAL INTRODUCTION AND OVERVIEW OF THE STUDY

Chapter 1 provides a general overview of the study, inclusive of the introduction and the rationale for this study. This chapter also contains the research problem, research questions, the purpose of the research, as well as the conceptualisation of the Continuing Professional Development (CPD) programme under review in this study.

Empirical research reveals that in South Africa, Outcome-based Education (OBE) was adopted and implemented without adjustments to suit the local context (Khulisa, cited in Engelbrecht, Ankiewics and De Swart, 2007:579). Inadequate training, mentoring and support for teachers in the dynamics of the new curriculum have negatively affected its implementation in schools (Engelbrecht et al., 2007:579).

Prior to its implementation in 1998 as one of the eight learning areas (subjects) in Curriculum 2005 (C2005), a National Task Team was appointed to facilitate the introduction of Technology Education in the General Education and Training (GET) Band of the curriculum. C2005, which was followed by the National Curriculum Statement (NCS), then the Revised National Curriculum (RNCS), defined Technology Education as a learning area. Presently the Curriculum and Assessment Policy Statement (CAPS) defines Technology Education as a school subject, hence in this study Technology Education is defined as a subject.

The project titled 'Technology 2005' (T2005) was launched and its purpose was to develop a national curriculum for this subject. Although the project was supposed to have been piloted in all nine provinces between March 1994 and March 1997, the project was completed in only three provinces, namely Gauteng, Kwa-Zulu Natal and Western Cape (Stevens, n.d). What compounded the situation further was that the cascade model adopted by the government to extend the training to the majority of schools was a failure (Mouton, Tapp, Luthuli and Rogan, 1999) cited in Stevens (n.d.).

The researcher agrees with Stevens (n.d.) that the cascade model employed by the department to train teachers was not suitable for teachers who lack basic knowledge in a subject.

Furthermore, the researcher is of the view that the cascade model has been an inadequate model for delivering effective and meaningful training. In most instances where the information has been cascaded, the information has become more diluted and distorted resulting in the misinterpretation of crucial information.

It was therefore important that South African Technology Education teachers be exposed to a well thought-out CPD programme that would assist them to deal with the dynamics of the subject, thus, enhancing effective teaching and learning of the subject in schools. The researcher argues that the lack of well trained and/or qualified Technology Education teachers as well as inadequate facilities and resources in schools are problems that require serious attention from policy makers.

It was for these reasons that this study explored a CPD programme that was used as a vehicle to deliver a large-scale teacher development programme in Technology Education. The CPD programme was offered by the University of Limpopo in a form of an ACE in Technology Education. The programme catered for a wide range of Technology Education teachers coming from different schools (mostly rural), of which none of them had any formal qualifications in Technology Education.

Clarity was sought on how those Technology Education teachers who had participated in the CPD programme were influenced by the outcomes of the CPD programme in terms of their classroom practices and professional development. Although the school set-up and its management structure was not part of the outcomes of the CPD programme, the researcher felt that it was also important to highlight and describe (from teachers' own experiences) the nature of support (if any) that the teachers received from their respective schools to enhance their professional development and growth.

The research approach and method adopted for this study, which will be explained in detail in Chapter 3, is qualitative. The study followed a qualitative approach to research, which was conducted through multiple case studies which afforded the researcher the opportunity to interact closely with the participants in order to gain insight into how the outcomes of the CPD programme influenced Technology Education teachers in relation to their classroom practices and professional development.

For the study, the researcher used the purposeful sampling so that the selected participants had hands-on experience on the aspects that were explored. Since the researcher was one of the facilitators in the programme and has already built a rapport with the envisaged sample, it was easy to administer qualitative data collection procedures without compromising the ethical issues of collecting data face-to-face.

1.2   PROBLEM STATEMENT AND RATIONALE OF THE STUDY

1.2.1   Problem statement

The researcher did duty for Programmes for Technological Careers (PROTEC), a leading Mathematics, Science and Technology Education (M/S/T) service provider in South Africa. Presently, the researcher is employed by the Limpopo Department of Education as a Chief Education Specialist (CES) responsible for CPD in the province. His scope of work is on professional teacher development in the field of Technology Education. His scope of work includes conducting curriculum development workshops and offering classroom based support to Technology Education educators in the Intermediate and Senior phases of the GET band of the RNCS.

His experiences during his interaction with educators participating in most of the teacher development programmes, suggests that not much is being done in terms of effective teaching and learning of Technology Education in schools. Most teachers acknowledged that they have attended numerous teacher development programmes (conducted mainly through workshops) which were organised by the department. However, these teachers still felt incapacitated in the Technology Education- specific teacher knowledge required for the effective teaching of Technology Education in the classroom. Surely, the scenario painted above compromises learner performance in the subject.

The researcher was worried about whether any meaningful development has taken place within the adult learner (Technology Education teachers) owing to their participation in the CPD programme. Because most of these teachers had inadequate background and experience to implement the new subject, they found the subject's curriculum statements confusing and difficult to unpack for translation into teaching and learning activities in the classroom (Ankiewics & De

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Swart, 2002:76). The researcher supports Fox-Turnbull (2006:53) who raises an important point on teacher development in this regard, she asserts that:

> "*For teachers to be able to plan and implement a unit of work that is based on authentic technological practice, they (teachers) must have a good understanding of the conceptual, procedural, technical and societal knowledge relevant to the practice*"

1.2.2 The rationale of the study

The purpose of Technology Education as a school subject is to teach learners technological skills by offering them a problem-solving and creative method of work, thus enabling them (learners) to function more effectively in future. The National Curriculum Statement (2002:4) defines Technology Education as:

> "*The use of knowledge, skills and resources to meet people's needs and wants by developing practical solutions to the problems, taking social and environmental factors into consideration*"

Furthermore, the amended National Curriculum Statement Grade R-12: CAPS (2011) that replaces the National Curriculum Statement Grade R-9 (2002) and the National Curriculum Statement Grade 10-12 (2004) asserts that the intention of Technology Education is to introduce learners to the basics needed in Civil Technology, Mechanical Technology, Electrical Technology and Engineering Graphics & Design (CAPS: Technology Education Grade 7-9, 2011:6).

Jones and de Vries (2009:690) assert that when Technology Education was introduced as a school subject worldwide 10 to 15 years ago in schools, most of the teachers offering this 'new' subject had already been teaching other subjects for a number of years and continue to do so. Englebrecht et al., (2007:579) further assert that the scrapping out of traditional subjects like Home Economics and Woodwork resulted in competent and qualified teachers in those fields either leaving the profession or were assigned the responsibility of teaching and implementing Technology Education in schools (Englebrecht et al., 2007:579). Furthermore, it has been noted that in Technology Education, existing subject cultures influence the interpretation of the curriculum materials as well as classroom activities and student learning (Jones, cited in Jones & de Vries, 2009:690). Thus Jones and de Vries (2009:690) argue that "for teachers to teach Technology Education in a manner that it supports and extends student learning, they may need to develop new understanding and make changes to their current practices".

As a result, there was a need for the development and implementation of a well thought-out CPD model to serve as a platform to empower teachers with the necessary skills and knowledge to navigate the change from their old subjects' teaching to Technology Education (Ankiewics & De Swart, 2002:76; Potgieter, 2004:216). As earlier mentioned, the department did not provide Technology Education teachers with adequate training. Instead of offering teachers intensive training in the conceptual and procedural knowledge required to teach the subject, the government simply provided teachers with the subject policy and hoped that teachers would follow it with ease (Engelbrecht et al., 2007:580).

Studies on teacher development that elicited mostly teachers' perceptions on in-service training that include both the long-term and short-term programmes for educators had been conducted in many countries, including the United States (Jurasait-Harbison, 2005), South Africa (Nkopodi, 2006; Reitsma & Mentz, 2009) and Lebanon (Nabhani & Bahous, 2010). What is common in both the long and short-term teacher development programmes is that these are delivered through workshops which have been widely criticized for their ineffectiveness. In comparison to the traditional 'one-hit' workshop, long-term in-service training is seen as a suitable teacher development strategy. Boyle, Lamprianou and Boyle (2005:5) argue that longer duration of the training allow teachers to practice and reflect upon their own teaching practices. Hence, Guskey and Yoon (2009:496) regard short-term workshops as a waste of time and money because most short-term workshops do not provide adequate follow-up or sustained support.

The researcher has noted some of the challenges experienced with any training and development programmes for teachers that the study might address. The challenges are summarised as follows:

- There is uncertainty whether any development and change has taken place within the Technology Education teachers owing to their participation in CPD programmes;

- It is not known as to whether teachers apply what they have learned from their participation in CPD programmes in their classroom practices;

- It is not known what the teachers are doing with the learning materials that they acquired from the CPD programmes; and

- It is not known how the school set-up and the School Management Teams (SMTs) support teachers to nurture and sustain their professional development and growth in the teaching of Technology Education in schools.

Clarity was sought on how those Technology Education teachers who had participated in the CPD programme were influenced by the outcomes of the CPD programme in terms of their classroom practices and professional development. Tinoca and Valente (n.d.) argue that 'change' in teachers' beliefs and attitude is evaluated through improved learner performance, hence the need for the study to look at the manner in which Technology Education teachers' classroom practices and professional development were influenced by the outcomes of the CPD programme.

The researcher argues that the school acts as a premise for teachers to implement their acquired knowledge from their participation in CPD programmes. As earlier mentioned, it is not known how the school set-up (as a practicing site) and the SMTs support teachers to nurture and sustain their professional development and growth in the teaching of Technology Education in schools. To correct this, according to Nabhani and Bahous (2010:211), school management needs to incorporate CPD activities in their management roster. This concurs with Holloway (2000:82), who asserts that site-based management can only be effective in bringing changes in teaching and learning in schools if SMTs and teachers can be given adequate time and training to internalise and implement the process effectively. Since professional identity is a determining factor in how teachers respond to CPD programmes (Kelly, 2006, Day, Sammons, Stobart, Kington & Gu, 2007 and Ronfeldt & Grossman, 2008), this study explains and describes teachers' own experiences on how SMTs support teachers to nurture and sustain their professional development and growth in the teaching of Technology Education in schools. The researcher argues that SMTs support at school level will impact positively on Technology Education teachers' job satisfaction and retention in the system.

The rationale of the study is that there appears to be a direct relationship between the quality of training that staff receives and the consecutive quality of teaching. The better we can train teachers, the better they can perform.

Engelbrecht et al., (2007:85) asserts that:

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"... in an attempt to meet the challenges faced by CPD programmes in South Africa, policy framework on teacher development and training stipulates that CPD must be subject-specific, especially in scare skills, but not excluding pedagogical knowledge as they manifest themselves in different contexts"

1.3 FACTORS CONSTRAINING THE DEVELOPMENT OF TECHNOLOGY EDUCATION IN SCHOOLS AND IN TEACHER EDUCATION

In summary, according to Stevens (n.d.) and Engelbrecht et al., (2007:85-88), supported by the researcher's own personal experience, the following can be listed as among the many factors that constrain the development of Technology Education as a school subject, and teacher education in particular which the study might address:

- *"Teachers have not been given sufficient CPD training through the cascade model of the Department of Basic Education (DBE) to effectively teach Technology Education as a school subject;*

- *Technology Education is a new subject, with unique content that is unfamiliar to most teachers who are supposed to teach it in schools;*

- *Most teachers offering the subject at schools do not have content knowledge of most of the themes in their frame of reference hence most topics are not being taught as envisaged;*

- *Most schools do not offer Technology Education related subjects like Mechanical Technology, and Drawing in their Further Education and Training (FET) Band subject groupings. This result in the subject being allocated the low status ratings in schools;*

- *The subject is always allocated to teachers who used to teach technical subjects such metalwork and needlework hence the teaching of selected themes of the subject in different schools and more worse in the same school;*

- *Some teachers experience challenges in how to assess, manage and record assessment in the classroom. They have limited skills in the development and application of a variety of assessment instruments, techniques and strategies in teaching and learning situations; and*

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- *Most teachers lack understanding on how to use the Design Process (procedural knowledge) to deliver content. Procedural knowledge cannot be taught but can only be acquired through application".*

1.4 CONTINUING PROFESSIONAL DEVELOPMENT (CPD) PROGRAMMES IN COMMON PRACTICE

In the wake of the call made by the African National Congress (ANC) to review Outcome–based Education (OBE) and intensify teacher development, especially in Mathematics, Science and Technology Education in South Africa, the National Policy Framework for Teacher Education and Development (2006) was developed. DBE formulated a policy framework aimed at providing an overall strategy for successful recruitment, retention, and professional development of teachers to meet the social and economic needs of the country. "The objective of the policy is to achieve a community of competent educators dedicated to providing education of high quality, with high levels of performance as well as ethical and professional standards of conduct" (DBE, 2011:5).

The National Policy Framework for Teacher Education and Development (2006) states that the ACE programme is aimed at addressing the needs of three groups of teachers as outlined in Minimum Requirements for Teacher Education Qualifications (DBE, 2011:29):

- *"Teachers who want to specialise in a new teaching subject not studied in a prior professional teaching qualifications (re-training);*

- *Foundation Phase and Intermediate Phase teachers, who have prior professional teaching qualifications but did not specialise in the phase; and*

- *Teachers who want to strengthen their field of specialisation subject and/or phase, studied in an initial three-year diploma in education, offered by a former college of education, or a National Professional Diploma in Education (NPDE) in NQF Level 5 (upgrading)".*

The development of the National Policy Framework for Teacher Education and Development was conceptualised in terms of the seven roles of educators, as enshrined in the Norms and Standards for Educators (2000) which are discussed in detail in chapter 2. It stipulates that a teacher should be:

1. "A specialist in a particular learning area, subject or phase;

2. A specialist in teaching and learning;

3. A specialist in assessment;

4. A curriculum developer;

5. A leader, administrator and manager

6. A scholar and lifelong learner; and

7. A professional who plays a community, citizenship, and pastoral role".

In the South African context, the DBE is responsible for the formulation of CPD policy and the nine provinces are charged with the responsibility to adapt it to suit their own contexts (Engelbrecht et al., 2007:580). Different CPD models ranging from centralized to school-based models were implemented and each has its own shortcomings and limitations. Lack of capacity in the DBE to offer such programmes has resulted in the outsourcing of large scale CPD programmes to other service providers like Higher Education Institutions (HEIs) and Non-Governmental Organisations (NGOs), whilst they continue to offer small scale teacher development programme in various provincial departments (Engelbrecht et al., 2007:580).

It is for these reasons that the DBE in conjunction with the University of Limpopo (UL), has offered a more formalised CPD programme that will be discussed in the next section (section1.5) in the form of an ACE programme targeting practicing GET Band of the RNCS educators, part time, in the following subject combinations:

- Mathematics and Science Education

- Mathematics and Technology Education; and

- Science and Technology Education.

1.5 ADVANCED CERTIFICATE IN EDUCATION (ACE) PROGRAMME IN CONTEXT

1.5.1 Conceptualization of the ACE programme

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Between 2002 and 2009 the Department of Mathematics, Science and Technology Education (DMSTE) within the School of Education in the Faculty of Humanities of the University of Limpopo has being offering the ACE programme to practising teachers in the Limpopo province. It was a two year qualification course that provides teachers with an access to NQF level seven qualifications.

1.5.2 Advanced Certificate in Education (ACE) Senior Phase Technology Programme Outline

The information presented in sections 1.5.2.1 to 1.5.2.3 regarding the programme outline and its delivery strategy was extracted from the Mathematics, Science and Technology Education (M/S/T) Teacher Development Funding Proposal to the National Department of Education: University of Limpopo (2007). The programme catered for Senior Phase Technology Education teachers as part of NQF level six qualifications at the University of Limpopo. The programme was presented by PROTEC on behalf of the University of Limpopo.

1.5.2.1 Overview of the content covered

The curriculum of the CPD programme was clustered into three modules with eight major units, i.e. Senior Technology Education Studies (STES), Senior Technology Policy Studies (STPS) and Senior Technology Curriculum Studies (STCS). Each module was presented over a five-day period, one Saturday session (five Saturdays per year) and each day was eight hours long, i.e. approximately forty contact hours per unit. There was an in-school support component which was meant to support the teachers in the class during implementation.

The modules were all self-contained and dealt directly with relevant content and methodologies for use in Technology Education classrooms. The technological process (procedural knowledge) was used as the vehicle to deliver the content (conceptual knowledge) whilst reinforcing OBE principles.

The exploration of the seven roles of educators, as discussed in section 2.25 as well as the outcomes of the CPD programme (see section 2.26) served as a platform for the planning and delivery of learning experiences falling under the Policy Studies and Curriculum Studies components. Furthermore, teachers were expected to develop a reflective teacher' portfolio that provided

detailed feedback on how they plan, prepare, present, assess and evaluate classroom based teaching. The teacher portfolio and classroom-based assignments formed part of their final mark.

1.5.2.2 Modules Outline

Unit 1: Introduction to OBE and Technology Education

Unit Outcomes: Teachers were expected to:

- Demonstrate confidence and familiarity with typical learning support materials and OBE methodologies for Technology Education in the Senior Phase of RNCS.

- Identify OBE principles and features and relate them to a specific learning experience.

- Identify features in a learning experience that relate to the SAQA Critical Outcomes and support the development of a learner educated for the 21st century.

- Demonstrate confidence and familiarity in using the curriculum policy document for Technology Education.

- Demonstrate awareness of the new roles of the educator in the classroom environment.

- Demonstrate understanding of technology as a school subject and how it is related to curriculum learning outcomes and assessment standards.

- Show understanding of performance based assessment in OBE.

- Produce an Outline plan of a Technology Education learning programme for use in the school environment.

- Produce detailed lesson plans for Technology Education modules or projects for use in the classroom.

Unit 2: Technology Education and Structures

Unit Outcomes: Teachers were expected to:

- Demonstrate confidence and familiarity with design and make projects involving structures.

- Demonstrate understanding of the basic principles of structures and a range of techniques for strengthening and stiffening materials.

- Use and develop performance-based assessment instruments to measure on-going learner performance.

Unit 3: Technology Education and Processing (Textiles)

Unit Outcomes: Teachers were expected to:

- Demonstrate confidence and familiarity with investigative activities in Technology Education.

- Demonstrate confidence and familiarity with design and make projects involving textiles.

- Write learning outcome statements that relate to specific competences covered during a learning activity.

- Transform learning outcome statements into assessment instruments that can be used to measure the competence of individual and groups of learners.

- Demonstrate awareness of the different assessment strategies that could be used in a classroom situation.

Unit 4: Technology Education and Pneumatics

Unit Outcomes: Teachers were expected to:

- Demonstrate confidence and familiarity with design and make projects involving Pneumatics and Mechanisms.

- Demonstrate awareness of different ways of recording and reporting learner progress.

Unit 5: Elective Module STTE 201

Unit Outcomes: Teachers were expected to:

- Demonstrate understanding of the basic principles of structures and a range of techniques for strengthening and stiffening materials.

- Demonstrate confidence and familiarity with investigative activities in processing textiles.

- Demonstrate confidence and familiarity with Mechanical Systems, how we use technology to help us move things more easily, and design and make projects involving Electrical Systems.

Unit 6: Technology Education and Processing

Unit Outcomes: Teachers were expected to:

- Demonstrate confidence and familiarity with design and make projects involving processing and the enhancement of the properties of materials.

- Demonstrate understanding of how 'learning styles' affect the way learners learn and how certain types of learners are being disadvantaged because of the way traditional teachers teach.

- Be able to develop, deliver and assess learning experiences in Processing.

Unit 7: Technology Education, Movement and Mechanisms

Unit Outcomes: Teachers were expected to:

- Demonstrate confidence and familiarity with design and make projects involving Mechanical Systems, and how people use technology to move things more easily.

- Demonstrate awareness of what it means to be a Learning Mediator in the context of Technology Education.

- Demonstrate understanding of different learning strategies and how these can be used appropriately during a Technology Education project.

- Be able to write a reflective report that analyses the appropriateness of the different learning strategies used during a Technology Education project.

Unit 8: Technology Education, Electricity, Motors and Drives

Unit Outcomes: Teachers were expected to:

- Demonstrate confidence and familiarity with design and make projects involving electrical systems and the integration of electrical and mechanical systems.

- Demonstrate understanding of how language can be a barrier to learning and awareness of simple strategies to overcome these barriers.

- Be able to develop and implement a case study project in the classroom.

- Identifying language problems that arise in the Technology Education classroom and make suggestions as to how to overcome them.

Unit 9: Technology Education and Electronics

Unit Outcomes: Teachers were expected to:

- Demonstrate confidence and familiarity with design and make projects involving electronics.

- Demonstrate awareness that learners have different needs and educators need to deliberately include diverse needs into Technology Education projects, i.e. to promote inclusivity.

- Be able to develop and implement an electronics project for use in a classroom.

- Suggest ways (strategies) for promoting inclusivity based on gender, different abilities and learners with disabilities in the context of an electronics project.

Unit 10: Integrated Technology Education Projects and CTA Assessment

Unit Outcomes: Teachers were expected to:

- Demonstrate confidence and familiarity with integrated design and make projects.

- Demonstrate the ability to mediate a typical Common Task Assessment.

- Demonstrate knowledge and understanding of Technology Education content areas.

- Plan a project for Senior Phase learners.

1.5.2.3 Delivery strategy for the CPD programme

The ACE programme was delivered through a combination of block sessions (three blocks of five days each per year), one Saturday session (five Saturdays per year) and four in-school support sessions. In each year of the two year programme, three blocks were five days and each day was eight hours long. The week-long sessions were scheduled for school holidays to minimize disruptions at schools. To ensure that participating teachers had access to library facilities, workshops and internet, all block sessions were held at the Turfloop campus of the University of Limpopo.

In-school support sessions were organised in three blocks of one month each year focusing on assisting teachers to implement some of the ideas acquired during contact sessions. In-school support sessions encompass classroom observation and lesson evaluation. Furthermore, a module on computers was incorporated into the programme to introduce the teachers to the world of computers. Since the programme did not have a formal examination as part of the accreditation process, teachers were assessed through extended writings based on topics covered during contact. Additionally, teachers were expected to keep a teacher portfolio to capture and reflect on their experiences during the programme.

1.6   STATEMENT OF THE PROBLEM

Technology Education teachers in South Africa still need grounding in the subject. This is due to the fact that this subject is relatively a newcomer in the curriculum. Many teachers still battle with its philosophy, content, application and pedagogy. At the same time implementation of the subject

needs monitoring through research. It is in light of this that this study is deemed important. The study inquires into the influence of CPD on the classroom practices and professional development of Technology Education teachers.

The following research question addressed the needs of the investigation:

How do Senior Phase Technology Education teachers enact with the outcomes of a CPD programme in terms of their classroom practices and professional development?

In support of the main research question, a number of research sub-questions or secondary questions have been designed.

Research sub-questions:

- How do Technology Education teachers develop as professionals in terms of the expected outcomes of the CPD programme?

- How do Technology Education teachers presently manage, plan, facilitate, resource and assess Technology Education lessons in the classroom as against the expected outcomes of the CPD programme?

- What are Technology Education teachers' perceptions of the support offered by their SMTs in relation to their professional development and growth?

1.7   THE OBJECTIVES OF THE STUDY

The purpose (aim) of this study was to explore the influence of a CPD programme on the classroom practices and professional development of Technology Education teachers. Clarity was sought on how those Technology Education teachers who had participated in the CPD programme were influenced by the outcomes of the CPD programme in terms of their classroom practices and professional development.

The CPD model that was designed and implemented by the University of Limpopo through the ACE programme met most of the requirements as suggested by researchers like Clarke and Hollingsworth (2002), Reitsma and Mentz (2009) and Tinoca and Valente (n.d.). The programme had the capability of acting as a platform to empower teachers to offer quality teaching in

Technology Education in schools. However, the researcher was mindful of the fact that without on-going support, the teachers are likely to revert back to their old classroom practices. This is in line with the suggestion made by Bubb and Earley (2006:6) who assert that it is imperative for policymakers to avoid what they term 'educational vandalism' where CPD funds and time are wasted as a result of providing teachers with inadequate training that has no effect on improving teachers' classroom practices.

The researcher's assumption is that a well thought-out CPD programme and effective support by the school as a practicing site for teachers will go a long way in enhancing teachers' professional development and growth in the teaching of Technology Education in schools. This will in turn develop and enhance technological knowledge in learners.

1.8   CONCLUSION

Chapter 1 provided a general overview of the study, including an introduction and rationale for the study. This chapter also contains the research problem, research questions, and purpose of the research and the conceptualisation of the CPD programme under review. The next chapter provides a detailed outline of the conceptual framework for the study as well as the literature exposition with regard to information on professional development; Technology Education- teacher specific knowledge; the nature of technological knowledge; issues regarding teaching, learning and assessment in Technology Education; and school-based support for practicing Technology Education teachers.

CHAPTER TWO

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1   INTRODUCTION

This chapter provides a literature review of the CPD programme as a teacher development strategy, Technology Education teachers' classroom practices as well as the school as a practising site for teachers. The literature review process assisted the researcher in exploring existing teacher development models on teacher development and subsequently assisted the researcher to adopt a conceptual framework to explore the influence of a CPD programme on the classroom practices and professional development of Technology Education teachers.

Vithal and Jansen (1997:17) describe a theoretical framework as a "well developed, coherent explanation for an event". A literature review of teacher development models delivered through CPD programmes was used to inform the study, especially where the literature focused on in-service training for practising teachers. The approach employed in this review of literature was to extract what the literature informs us about the aspects under consideration and how it relate to the CPD programme under review in this study.

The effectiveness of most teacher professional development programmes are evaluated through the performance of learners (Boyle et al., 2005:3). However, research reveals that using learner achievement alone to evaluate the effectiveness of such programmes is inadequate as it does not completely reveal the change in teachers' classroom practices as a result of their participation in teacher development programmes (Shymansky, Yore, Anderson, & Hand, 2001; Fletcher & Barufaldi, 2002).

It is for these reasons that the researcher adapted the interconnected model of professional growth, as suggested by Clarke and Hollingsworth (2002:951) and fused it with the components of programme evaluation as suggested by Stronge (2012). The interconnected model of professional growth is depicted in figure 2.1 and explores how those Technology Education teachers who had participated in the CPD programme might have been influenced by the outcomes of the CPD programme in terms of their classroom practices and professional development.

Without effective evaluation of teacher professional development programmes, it is impossible to ascertain whether there has been any meaningful learning in the adult learner (Technology Education teachers), whether teachers apply what they have learned in their classroom teaching or how best teacher professional development programmes can be designed and delivered to meet teachers' needs.

The interconnected model of professional growth advocates for teacher development programmes that changes teachers to active learners who shape their professional growth through reflective participation in professional development programmes, and in practice. The model represents four types of domains, i.e. external domain, the domain of practice, personal domain, and the domain of consequence (Clarke & Hollingsworth, 2002:951). The combination of all the domains "constituted the individual teacher's professional world of practice, encompassing the teacher's professional actions, the inferred consequences of those actions, and the knowledge and beliefs that prompted and responded to those actions" (Clarke & Hollingsworth, 2002:951). Clarke and Hollingsworth (2002:951) further assert that through the mediation process that entails 'enaction' and 'reflection', "change in one domain is translated into change in another". Clarke and Hollingsworth (2002:953) describe 'enaction' as a process of putting into action a new idea or a new belief, thus representing "the enactment of something a teacher knows, believes and has experienced" (Clarke & Hollingsworth, 2002:951). The process of 'reflection' is aimed at "teachers drawing conclusions about how their newly acquired knowledge influenced change in other domains" (Clarke & Hollingsworth, 2002:954).

According to Stronge (2012:2-5), the evaluation programme employs a two-tiered approach to validate what is viewed as the expectations for teacher performance. The process of evaluation can be done through a variety of data collection like observations, document analysis and structured interviews (Stronge, 2012:6). Hence in this study, multiple data collection methods were used to capture the influence of CPD programme on classroom practices and professional development of Technology Education teachers.

The evaluation process entails the use of seven performance standards and multiple key elements which are assessed against the performance appraisal matrices (Stronge, 2012:2-5). Performance standards that are aligned to the Norms and Standards of educators, which are discussed in detail in section 2.2.5 of this dissertation, were used to generate a theoretical framework to anchor this study and also to inform the contents of the data collection instrument used in this study.

Performance standards describe the general responsibilities of teachers' work and key elements defines the expected teacher's classroom practices for each performance standard and are measured through the performance appraisal matrices which provide a holistic description of the performance of a teacher at each level thus enhancing their teaching practice. Table 2.1 and 2.2

below illustrate the seven performance standards, as well as the relationship between the performance standards, key elements and performance appraisal matrices respectively:

Table 2.1: Performance Standards

1. Professional Knowledge
The teacher demonstrates knowledge of the curriculum needs, subject-specific content knowledge and how to mediate student learning by providing relevant learning experiences.
2. Instructional Planning
The teacher plans effectively using the curriculum, work schedule, relevant and appropriate strategies to mediate learning in the classroom.
3. Instructional Delivery
The teacher effectively uses a variety of appropriate and relevant teaching strategies to enhance learner attainment in the classroom.
4. Assessment of and for Student Learning
The teacher uses appropriate and relevant assessment strategies to assess learners' performance and provides reliable feedback to both the parent and the learner.
5. Learning Environment
The teacher creates a conducive and safe environment for learners to realise their full potential.
6. Professionalism
The teacher takes control and responsibility of his/her own professional growth and development thus resulting in improved teaching and learning in the classroom.
7. Student Academic Progress
The work of the teacher should result in the realisation of competent and well informed learners who will contribute meaningfully to the economy of the country.

Table2.2: Relationship between Performance Standards, Key Elements and Performance Matrix

Standard1:Professional Knowledge

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The teacher demonstrates knowledge of the curriculum needs, subject-specific content knowledge and how to mediate student learning by providing relevant learning experience.			
Key Element			
The teacher demonstrates knowledge and understanding of best practices.			
Performance Matrix			
Highly Effective	Effective	Developing or Needs Improvement	Ineffective
Develops relevant and appropriate lesson plans that will challenge, motivate and highly engage learners with different abilities.	Develops relevant and appropriate lesson plans that are likely to motivate and engage learners with different abilities.	Develops lesson plans that cater only for high achievers.	Develops lessons that are inappropriate and are teacher-centred.

In this study, the focus of the literature search was located and reflected in each specific domain as outlined below:

(i) The CPD programme as a teacher development strategy was captured under the Professional and Personal domain.

(ii) The enactment of teachers with the outcomes of the CPD in relation to teacher knowledge and classroom practices (teaching, learning and assessment in Technology Education) is captured under the Teacher domain.

(iii) Technology Education teachers' views on the support offered by their SMTs to enhance teachers' professional development and growth is captured under the School domain.

In summary, the focus of the literature review was on the relationship between the various domains, as depicted by Figure 2.1 below:

Professional and personal domain   **Teacher domain**   **School domain**

CPD programme as a teacher development strategy

Technology Education teachers' enactment with the outcomes of a

Technology Education teachers' perceptions of the support offered by SMTs to enhance
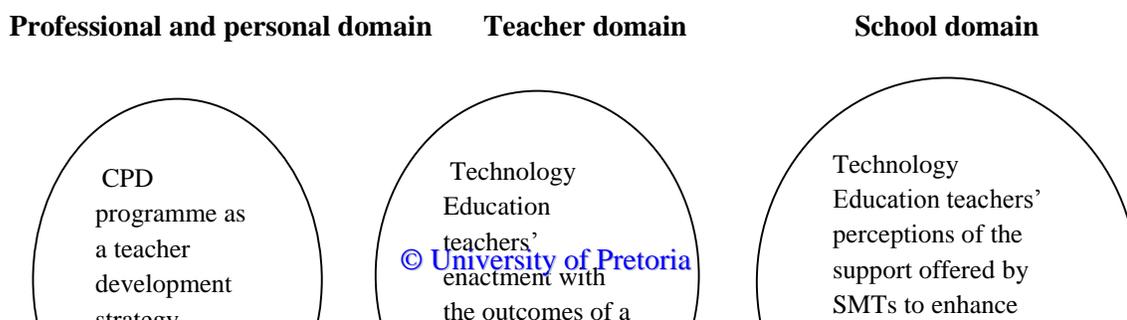
Figure 2.1   Conceptual Framework applicable to the study

2.2   PROFESSIONAL AND PERSONAL DEVELOPMENT DOMAIN

2.2.1 Continuing Professional Development (CPD) as a teacher development strategy

Engelbrecht et al., (2007:581) asserts that in literature the terms "Continuing Professional Development (CPD) and in-service education and training (INSET) are often used interchangeably". Craft (1996:6) asserts that the two terms encompass a broad range of activities aimed at enhancing the teaching abilities of teachers who have completed their pre-service training. For this study, the term 'Continuing Professional Development' is used. In literature, CPD is defined as a Continuing Professional Development programme for practising teachers focussed on helping teachers to keep abreast with the requirements of the changing curriculum thus enhancing the quality of teaching and learning in the classroom (Collins, 1991; Leclerq, cited in Engelbrecht et al., 2007:581).

Steyl (1998:117) asserts that CPD programmes are a key platform that can be utilised to response to a continuously changing education environment thus upgrading the status of unqualified teachers in a particular subject as well as providing refresher courses for qualified teachers within a specific content area (Steyl, 1998:114). Furthermore, Steyl (1998:125) indentifies the following key aspects that are usually addressed in CPD programmes:

- "Equalisation of teachers through upgrading academic and professional qualifications, as well as classroom skills and teaching strategies;

- Efficiency of classrooms and schools as microcosms through proper management training;

- Classroom competence through effective input on subject knowledge, theory, subject methodology and educational philosophy;

- Change brought on through curriculum development, social awareness programmes and CPD for new roles such as multicultural teaching or religious and sex education; and

- Empowerment through action research and teacher-led initiatives" (Steyl, 1998:125).

2.2.2   The need for CPD programme for Technology Education teachers

Englebrecht et al., (2007:579) argue that the scrapping of traditional subjects like Home Economics and Woodwork resulted in competent and qualified teachers in those fields either leaving the profession or being charged with the responsibility of teaching and implementing Technology Education in schools. The challenge was that these teachers did not have the necessary background and qualifications in the subject. Owing to the experience they gained over the years of implementing traditional instructional methodology related to their technical subjects, they continued to teach Technology Education in a manner that disregarded the procedural knowledge (technological process) required for the effective delivery of the conceptual knowledge (content) in the classroom (Ankiewicz, cited in Engelbrecht et al., 2007:579).

Since the teachers who participated in the CPD programme did not possess the necessary qualifications, background, knowledge and skills to teach Technology Education, there was a need for a CPD programme to facilitate the paradigm shift from their old subjects to Technology Education (Ankiewicz & De Swardt, 2002:76; Potgieter, 2004:216). Steyn and Van Niekerk (2007:22) explain that "professional development should encompass a broad range of activities, all of which are focussed at enhancing teachers' professional growth and competence". Jones and de Vries (2009:670) had this to say in relation to teacher development in Technology Education:

> *"When broader notion of technology were introduced 10-15 years ago in schools, most of teachers teaching this 'new' subject had already been teaching for a number of years and would continue to do so. Therefore, teacher development and strategies to enhance in-service professional learning are key to enhancing the development of technology education in schools. For teachers to teach Technology Education in a manner that support and extends student learning, they may need to develop new understanding and make changes to their current practices. Teachers' belief about the subject area, teaching, their students, and the curriculum influence how they interact with curriculum materials. In Technology Education, the influence of existing subject subcultures on the interpretation of a new curriculum has been noted"*

2.2.3   The various viewpoints of CPD models

It should be noted that this was not an impact study focussed on 'teacher change' but an exploratory study on the influence of the CPD programme on the classroom practices and professional development of Technology Education teachers. However, most of the alternative perspectives on 'teacher change' listed below, as suggested by Clarke and Hollingsworth (2002), which are interrelated, were applicable to the CPD programme under review.

Empirical research on teachers' professional development models shows contrasting viewpoints about its effectiveness and its ability to promote and enhance 'teacher change'. Clarke and Hollingsworth (2002:948) posit that in literature, the term 'teacher change' has multiple interpretations of which "each interpretation could be linked with a particular perspective on teacher professional development". The different perspectives on 'teacher change' according to Clarke and Hollingsworth (2002:948) are listed as follows:

- *"Change as training - change is something that is done to teachers; that is, teachers are 'changed';*

- *Change as adaptation - teachers 'change' in response to something; they adapt their practices to changed conditions;*

- *Change as a professional development - teachers 'seek to change' in an attempt to improve their performance or develop additional skills or strategies;*

- *Change as a local reform - teachers 'change something' for reasons of personal growth;*

- *Change as systematic restructuring - teachers enact with the 'changed policies' of the system; and*

- *Change as growth or learning - teachers 'change inevitably through professional activity'; teachers are themselves learners who work in a learning environment".*

Nabhani and Bahous (2010:221) state that one of the key intentions of CPD is to contribute to teachers' professional identity formation. Day et al., (2007:102) found that teachers' identity is more inclined towards self-introspection by teachers on themselves and how they are viewed by others. As a result it has an effect on how teachers respond to CPD programmes and has a bearing

on their effectiveness and emotional well-being, inclusive of their motivation and commitment to the teaching profession. Nabhani and Bahous (2010:221) further argue that it is important for CPD programmes to support and assist teachers to build professional identities whilst taking into cognisance teachers' experiences related to the expectations of different exposition to management structures as well as the roles they need to fulfil as teachers. Since factors such as teachers' roles and responsibilities has been identified as key to the formation of teachers' professional identity it is important for any CPD programme aimed at the development of teachers to be contextualised to suit the teacher as an individual with prior knowledge and experience working in an environment (school) that has its own politics that can either enhance or inhibit development and growth (Day et al., 2007:102). This will in turn result in teachers' being content and satisfied with the teaching profession thus retaining them in the system.

2.2.4   Effective professional development models

Duncombe and Armour (2004:141) suggest that "effective professional development for teachers should be school-based, active, and collaborative, focused closely on pupil's learning and tailored according to the needs of teachers". Bybee (2001:27) states that an effective CPD programme for Technology Education teachers should take into cognisance the needs and experiences of teachers, the curriculum requirements, Technology Education-specific teacher knowledge required to promote effective learning in the classroom as well as the support for standards-based reform and associated changes of curriculum, teaching strategies and assessment.

Clarke (2007:95) emphasises the training of teachers in classroom management as an important component that must be incorporated in all CPD programmes. Furthermore, literature emphasises that the creation of a positive learning climate is key to the realisation of effective teaching and learning in the classroom. To achieve this, teachers should use relevant and appropriate teaching and assessment strategies that can enhance learner achievement (Meyer, 2002; Mestry & Grobbler, 2004; Popham, 2005; Moloi, 2009).

This concurs with Combrinck (2003:60) and Monteith and Nieuwoudt (2002:22) who assert that for effective development and delivery of a CPD programme to be realised, attention should be given to the professional development of staff with regard to classroom management and

facilitation. Hence, Clarke (2007:75) suggests that there is a need to empower and support teachers on how to effectively manage the class throughout all the stages of the lesson.

Reitsma and Mentz, (2009:16) advocate for a CPD model that focuses on four interconnected variables (context, content, process, structure and strategy) that will inform the planning, implementation, evaluation and closure of a CPD programme. Additionally, Reitsma and Mentz (2009:16) argue that the content of the training should be delivered according to different themes and should incorporate content and methodology, as well as practical skill work.

All the teachers who were admitted into the CPD programme under review in this study did not have formal qualifications in Technology Education. The content of the programme was delivered according to different themes and covered all the variables, i.e. content and methodology, as well as practical skill work. The focus was on quality training which assisted teachers to understand how to mediate learning in a Technology Education classroom, the nature of teaching and assessment strategies required to facilitate learning, and the type of resources and support required in school to promote authentic learning and teaching in the classroom as suggested by Bybee and Loucks-Horsely (2000:33). Reitsma and Mentz (2009:17) suggest that the format of the training, training approach, time and duration, the capacity of facilitators (trainers), as well as Learner Teacher Support Materials (LTSMs) are the key components that must inform the structure and strategy to be used in the delivery of a CPD programme.

Lavonen, Meisalo and Juuti in Reitsma and Mentz, 2009:25 advocate for the combination of the theoretical content and practical teaching examples as a means to enable teachers to implement their acquired knowledge and skills in their own teaching. Guskey and Sparks (2002:1) expound that the process of teacher training provides a detailed explanation on how the activities should be designed, delivered and followed-up to suit the level and qualifications of the teachers attending the programme. In the CPD programme under study, the learning activities were assessment centred, focussing on conceptual, content, procedural and pedagogical knowledge and reinforced through sustainable follow-up activities in their different schools to help implement new knowledge and skills (Desimone, Porter, Garet, Yoon & Birman, 2002; Nkopodi, 2006; Lessing & de Witt, 2007). This provided teachers with continuous support and training that was assessed in schools as well as during centre-based workshops, thus resulting in reliable evidence of success as suggested by Reitsma and Mentz (2009: 25). During centralised training sessions, educators

were encouraged to give input and suggestions on how future training sessions should be designed and delivered. This, in a way, gave teachers some sense of ownership of the programme.

Further, assessment, with on-going reflection, formed part of the training process and the programme was accredited thus impacting positively on teacher retention and identity formation. This concurs with the viewpoint of Reitsma and Mentz (2009:25) who assert that:

> "It *is important to accredit in-service training, certifying the professional development of the proficiency of the teacher. In this way a long term vision to put trained certified Technology Education teachers in the classroom may be reached"*

These suggested teacher development model operations were evident in the delivery of a CPD programme delivered through the ACE programme under review in this study. Teacher training was conducted at a central point followed by in-school support to deal with individual needs of each teacher. It was important that the CPD programme was designed in a manner that it was delivered in a differentiated manner in order to suit diverse schools contexts in which teachers operate.

However, it is worth noting that the value that the school management attaches to the teacher as a professional is paramount to the realisation of effective teaching and learning of Technology Education in the classroom. The researcher therefore argues that a well thought-out CPD programme coupled with effective SMT support for Technology Education teachers will enhance 'teacher change' in the undertaking of authentic technological practices in the classroom.

2.2.5   Teacher competences (roles of educators)

The outcomes of the CPD programme under review in this study (as outlined in section 2.2.6) have been directly influenced by the seven roles of educators as expressed in the Norms and Standards for Educators (2000), and the requirements of the National Policy Framework for Teacher Education and Training (2006). The seven roles of the educators as well as the outcomes of the CPD programme were used to structure the interview schedule, observation schedule, as well as the document analysis checklists applied in this study.

Kramer (2000:98) emphasises the importance of understanding what it means to be a professional teacher in the South African context in order to inform the nature of training and support required to enable teachers to perform optimally as professionals. According to him, professionalism in

teaching is described by the seven roles of educators and each role requires three different kinds of competencies described below:

- *"Practical competences which are the skills required to teach, assess, and manage the classroom;*

- *Foundational competence that encompasses the knowledge and understanding of learning, facilitation and educational issues and of the social context in which they work; and the*

- *Reflexive competence that is defined as the capacity for constant professional and intelligence engagement with the issues involved in teaching"* (Kramer, 2000:98-99).

The policy on the Minimum Requirements for Teacher Education Qualifications (2011) that replaced the Norms and Standards for Educators (2000) provides a framework for the development of core curricula for initial teacher education as well as for CPD programmes. The Norms and Standards for Educators (2000) was the initial formal policy that defined academic qualifications for educators as well as the integrated and applied competences as enshrined in the seven roles for educators. The objectives of the policy on the Minimum Requirements for Teacher Education Qualifications (2011:6-7) are aimed at:

- *"Describing clear, specific requirements for the development of learning programmes, as well as guidelines regarding practical and work-integrated learning (WIL) structures;*

- *Allowing for institutional flexibility and discretion in the allocation of credits within learning programmes, and encourages teacher educators to become engaged in curriculum design, policy implementation and research; and*

- *Ensuring that all teacher education programmes addresses the critical challenges facing education in South Africa today especially the poor content and conceptual knowledge found amongst teachers, as well all the legacies of apartheid, incorporating situational and contextual elements that will help teachers in developing competences that enable them to deal with diversity and transformation".*

The seven roles of educators outlined below provide a clear description of the way teachers are expected to perform their professional duties (Norms and Standards of Educators, 2000:5-6):

1.   Learning mediator

"The educator will mediate learning in a manner, which is sensitive to the diverse needs of learners, including those with barriers to learning; construct learning environments that are appropriately contextualized and inspirational: communicate effectively showing recognition of and respect for the differences of others. In addition, an educator will demonstrate sound knowledge of subject content and various principles, strategies and resources appropriate to teaching in the South African context".

2.   Interpreter and designer of learning programmes and materials

"The educator will understand and interpret provided learning programmes, design original learning programmes, identify the requirement for a specific context of learning and select and prepare suitable textual and visual resources for learning. The educator will also select sequence and pace the learning in a manner sensitive to the differing needs of the subject/learning area and learners".

3.   Leader, administrator and manager

"The educator will make decisions appropriate to the level, manage learning in the classroom, carry out classroom administrative duties efficiently and participate in school decision-making structures. These competencies will be performed in ways which are democratic, which support learners and colleagues, and which demonstrate responsiveness to changing circumstances and needs".

4.   Scholar, research and lifelong learner

"The educator will achieve ongoing personal, academic, occupational and professional growth through pursuing reflective study and research in their learning area, in broader professional and educational matters, and in other related fields".

5.   Community, citizenship and pastoral role

"The educator will practice and promote a critical, committed and ethical attitude towards developing a sense of respect and responsibility towards other. The educator will uphold the constitution and promote democratic values and practices in schools and society. Within the

schools, the educator will demonstrate an ability to develop a supportive and empowering environment for the learner and respond to the educational and other needs of learners and fellows educators. Furthermore, the educator will develop supportive relations with parents and other key persons and organisations based on critical understanding of community and environmental development issues. One critical dimension of this role is HIV/AIDS education".

6.   Assessor

"The educator will understand that assessment is an essential feature of the teaching and learning process and know how to integrate it into this process. The educator will have an understanding of the purpose, methods and reflection of assessment and be able to provide helpful feedback to learners. The educator will design and manage both formative and summative assessment in ways that are appropriate to the level and purpose of the learning and meet the requirements of accrediting bodies. The educator will keep detailed and diagnostic records of assessment. The educator will understand how to interpret and use assessment results to feed into processes for the improvement of learning programmes".

7.   Learning area/subject/discipline/phase specialist

"The educator will be well grounded in the knowledge, skills, values, principles, methods and procedures relevant to the discipline, subject learning area, phase of study or professional or occupational practice. The educator will know about the different approaches to teaching and learning (and, where appropriate, research and management), and how these may be used in ways which are appropriate to the learners and context. The educator will have a well-developed understanding of the knowledge appropriate to the specialism".

2.2.6   Outcomes of the CPD programme

The outcomes and the Assessment Standards of the CPD programme outlined below were extracted directly from the M/S/T Education Teacher Development Funding Proposal to the National Department of Education: University of Limpopo (2007). These outcomes, which should have been achieved by the teachers, were used as indicators to assess technology teachers' current classroom practices. The interview questions as well as the observation checklist items were therefore validated against the outcomes of the CPD programme under review in this dissertation.

Outcome 1: **Demonstrate practical understanding of effective educational approaches in M/S/T Education**

Assessment Standards:

1) A practical understanding of the role of language, resources and teaching aids within M/S/T Education teaching and learning.

2) A practical understanding of the role of learners' existing ideas, skills and attitudes within M/S/T Education, and their influence on learning programme and process.

3) A practical understanding of social constructivist learning approaches and techniques in the Senior and Intermediate Phase M/S/T Education teaching and learning.

4) An ability to reflect on teaching approaches used and the ability to adjust and change these approaches according to context (learners, school, geographic area) in which learning takes place.

Outcome 2: **Apply knowledge of assessment strategies to M/S/T Education context.**

Assessment Standards:

1) An ability to choose appropriate assessment techniques for different purposes recognizing underlying theories, assumptions, strengths and weaknesses.

2) An ability to use the results from formative and summative assessment appropriately for administrative purposes, learning programme development as well as feedback to learners' parents and colleagues.

3) An ability to design assessment according to the requirements of the learners, learning programme and language.

Outcome 3: **Demonstrate the ability to be an independent lifelong learner.**

Assessment Standards:

1) That s/he is numerically, technologically and media literate.

2) An ability to access and critically read a variety of professional texts.

3) An ability to select, develop and use simple research approaches and techniques meaningfully in appropriate educational context.

4) An ability to uphold academic integrity and educational excellence.

Outcome4: **Demonstrate effective knowledge and skills related to M/S/T Education**

Assessment Standards:

1) An achievement of Learning Outcomes for Technology Education.

2) An understanding of two of the subjects of M/S/T Education that is appropriate to the teaching and learning of the third learning area of specialisation out of M/S/T Education.

3) An ability to work with appropriate content knowledge and develop learners' understanding in accordance with OBE principles, recognising learners' needs.

4) An ability to integrate M/S/T Education learning with other subjects.

Outcome 5: **Demonstrate the ability to design and interpret learning programmes in M/S/T Education**

Assessment Standards:

1) An ability to interpret, adapt and design learning programmes appropriate for the learning context in which they occur.

2) An ability to design original learning resources.

3) An understanding of basic curriculum principles, including OBE.

4) An ability to critically reflect on learning programmes, learning resources and theoretical issues in the light of experiences with learners in particular contexts.

2.3 TEACHER DOMAIN

2.3.1 Technology Education-specific teacher knowledge

Jones and de Vries (2009:688) explain that "teaching, learning and assessment are central to the effective implementation of Technology Education irrespective of whether one is defining the subject, framing the curriculum, or setting the research agenda". Teaching, learning and assessment, to a great extent, define teachers' classroom practices; hence the aim of this study was to explore how those Technology Education teachers who had participated in the CPD programme were influenced by the outcomes of the CPD programme in terms of their classroom practices and professional development.

The focus was on Technology Education-specific teacher knowledge; the nature of technological knowledge (conceptual and procedural knowledge) as well the nature of teacher knowledge required to develop technological knowledge in learners (mediation of learning and authentic assessment in the classroom).

Rohaan, Taconis and Jochems (2010:17) found that "teacher knowledge is an umbrella term that covers a variety of cognitions, beliefs, skills, and knowledge domains". According to Verloop, Van Driel and Meijer (2001:446), "teacher knowledge involves the whole of knowledge and insights that informs teachers' actions in practice inclusive of the tacit knowledge". Xu and Connelly (2009:222) define tacit as "the background knowledge people carry in their minds and bodies, a form of personal practical knowledge that governs how people approach the practical world".

Fox-Turnbull (2006:53) argues that what to teach, how to teach and when to assess in Technology Education is depend on the quality of teacher knowledge. As a result, Shulman cited in Fox-Turnbull, (2006:54) calls for the development of Technology Education-specific teacher knowledge base on areas such as content knowledge, general pedagogy, and curriculum pedagogy content.

Jones and Moreland (2004:123) and Moreland et al., (2001:58) state that "the development of a knowledge base for teachers is central for the effective teaching and learning of Technology Education in schools and for expecting teachers to add Technology Education to other subjects that they are required to teach". In addition to this, Fox-Turnbull (2006:53) has this to say regarding teacher knowledge:

> " *For teachers to be able to plan and implement a unit of work that is based on authentic technological practice they must have a good understanding of the conceptual, procedural, technical and societal knowledge relevant to the practice*"

2.3.2   The nature of technological knowledge

McCormick (1997:144) argues that technological activity is by its nature a diverse subject that encompasses concepts and processes from other subjects like science, mathematics, economics and social studies that need understanding from various points of view. Furthermore, the application of technology activity in food processing, textiles and civil engineering makes it difficult to define a knowledge base, set of procedures and concepts exclusive to Technology Education (McCormick, 1997:143).

One of the major challenges that Technology Education present to learning theories worldwide is that there are contrasting approaches to the balance of process and content of Technology

Education in schools. In the USA, the role of design or the problem-solving process is being increased at the expense of content-dominated curricula; whereas in England and Wales, there has been a change from design process-based curriculum to a content-dominated curriculum, but with the balance still in favour of the process (McCormick, 1997:141-142).

McCormick (1997:142) states that terms such as 'procedures', 'process', and 'content' which defines the rationale for the Technology Education curriculum in most countries including South Africa, are neither familiar to most Technology Education teachers, nor provide a complete description of all kinds of knowledge relevant to Technology Education. McCormick (1997:142) further suggests some of the important points and challenges that are crucial for Technology Education teachers to understand about the nature of the technological knowledge which are as follows:

- *"Some ideas that technology teachers have about the process and content of Technology Education are often borne out of research, this is attributed to the misunderstanding of their nature;*

- *For effective teaching and Technology Education to happen, an understanding of the nature and relationship of the process and content is of paramount importance; and*

- *The two ideas of conceptual and procedural knowledge are often seen as separate, with their relationship being overlooked".*

In the South African context, Technology Education (DBE, 2011:6) is defined as follows:

> *"The use of knowledge, skills and resources to meet people's needs and wants by developing practical solutions to problems, taking social and environmental factors into consideration"*

The definition itself integrates both the procedural and conceptual knowledge needed for the effective teaching and learning of Technology Education as a subject in schools, hence the need to examine literature and explore the nature and relationship between the procedural and conceptual knowledge. The researcher concurs with McCormick (1997:144) who argues that procedural knowledge is easier to define than conceptual knowledge, particularly if viewed from a point of Technology Education as a school subject. McCormick (1997:144) argue that technological procedural knowledge, irrespective of the context it manifests itself, encompasses

design, modelling, problem solving, systems approaches, project planning, quality assurance and optimisation as the key concepts that must be taught and learned.

Ryle (1949:28-32) suggests that for one to explore the nature and relationship between procedural and conceptual knowledge is to understand the contrast of 'knowing how' and 'knowing that'. The 'know how' attributed to Technology Education is conceptualised as procedural knowledge, which is the "know how to do it' knowledge. Conceptual knowledge, on the other hand deals with the relationships among 'items' of knowledge, such that when learners are able to recognise these relations we can say they have developed 'conceptual understanding'. Anderson (1990:219) asserts that "cognitive psychologists also use the term 'declarative knowledge' to differentiate it with procedural knowledge, and identify it as 'knowledge of facts'". However, McCormick (1997:143) argues that this has two difficulties because it suggests that:

- *"The knowledge may be a compilation on unrelated facts, whereas conceptual knowledge puts the spotlight on relationships;*

- *A distinction of an inert form of knowledge (declarative) with an active form (procedural), whereas conceptual knowledge can be part of an active process".*

It is of paramount importance for Technology Education teachers to understand that conceptual knowledge is not simply factual knowledge, but provides the platform to think about technological activity (McCormick, 1997:143). The researcher agrees with Ropohl (1997:69) that even though procedural knowledge and conceptual knowledge can be differentiated in Technology Education, they can never be separated. However, for this study, the researcher will discuss the two separately, while being aware that the inter-relationship is more important than their differences.

2.3.3   Procedural knowledge (Technological Processes and Skills)

McCormick (2004:25) asserts despite the fact that there are a variety of procedural aspect used in Technology Education, little is known about them. However, in his study at the Open University, his focus was on 'problem solving' because it is the most important procedural knowledge that occurs in Technology Education. McCormick (2004:25) explains further that "Technology Education is aimed at improving or encouraging learners' problem solving skills, which is why almost any Technology Education curricula will have problem solving as an important part".

In the South African context, the purpose of Technology Education as a school subject is to produce skilled and competent workforce in the areas of engineering, technicians and artisans, and to develop a technologically literate population for the contemporary world. Furthermore, the subject is aimed at stimulating learners through teamwork to develop and apply specific design skills to solve technological problems responsibly whilst appreciating the interaction between people's values and attitudes, technology, society, and the environment (DBE, 2011:6).

Like it is the case in South Africa, McCormick (1997:150) asserts that in contexts where Technology Education exists as a separate subject in the curricula, the design process and problem solving (regarded as a high-order procedural knowledge) are the main domains for consideration. However, according to McCormick (1997:145), it is a term that is abused, not only in Technology Education but also in literature. McCormick (1997:145) argues:

> *"That the term is abused in terms of what counts as a problem and a problem solving strategy, but also what is described as problem solving"*

Problem solving requires expertise in the context of its application and not the teaching of it as an abstract general-purpose process (McCormick, 1997:146).

McCormick (1997:150) has this to say about the models of design and problem solving:

> *"Models of design or problem solving that indicate steps, even where these are seen as iterative or circular, are unlikely to represent what is carried out in practice either by expert technologists or students"*

In most countries, it is general practice to represent the procedural knowledge as a linear process, assuming that the process unfolds following a particular sequence (Johnsey, 1995:202-205, Mawson, 2003:118). In the South African context, the technological process encompasses ten procedural stages through which learners should navigate to reach the solution. These stages are:

- "Stage 1: Problem statement (brief description of the problem or need);

- Stage 2: Design brief (brief description of the plan to be used to solve the problem or to meet the need);

- Stage 3: Investigation (collection of data related to the problem or need);

- Stage 4: Proposal (written account (specifications) of what need to be done to solve the identified problem or meet need);

- Stage 5: Initial idea generation (generation and analysis of various ideas and the selection of the best idea);

- Stage 6: Research (solving specific problems related to the selected idea);

- Stage 7: Developing the selected idea to a final idea (adding further details to the selected idea);

- Stage 8: Planning (providing a detailed account on how the solution/product will be actualised);

- Stage 9: Making the solution/product; and

- Stage 10: Evaluation of the final solution/product based on specifications" (Ankiewics et al., 2000:128).

The RNCS (2002:6) condenses the ten stages listed above into five main skills that may not be necessary taught in the order set out in the design process. The design process in Technology Education is conceptualised as a Learning Outcome (Technological Process and Skills). This is regarded as the backbone outcome of Technology Education as a school subject to deliver the content. The five skills associated with the design process are:

"Investigate: Learners collect information, acquire knowledge and new skills relevant to the problem or need.

Design: Learners write a brief description of the plan to be used to solve the problem or to meet the need (Design brief). Provide specifications of what need to be done to solve the identified problem or meet a need. Generate initial ideas and choose the idea that best satisfies the specifications.

Make: Learners use of tools, equipment and materials to develop the product/solution. Learners will use a variety of tools to cut, assemble, shape and mix a variety of materials to build, test and modify their product/solution.

Evaluate: Learners evaluate their actions, decisions and results throughout the design process.

Communicate: Learners develop a Project Portfolio that reports on all the processes followed from the conceptualisation to the realisation of the product/solution" (DBE, 2002:6-7).

McCormick (2004:26) explains that the challenge facing most Technology Education teachers is that they "often teach the design process or problem solving as a sequence of steps". "This way can lead to it becoming a ritual; with lessons structured around a series of steps, but it is a ritual that not necessarily affects the students' thinking" (McCormick, 2004:26). These ideas concur with Rohaan et al., (2010:19), who found that "teacher's narrow perception about the nature of technological knowledge may inhibit learners' understanding of Technology Education and may lead to learners considering Technology Education as irrelevant to 'real' life".

2.3.4   Conceptual Knowledge (Technological Knowledge and Understanding)

McCormick (2004:24) states that most people carry the myth that there must be conceptual knowledge that is unique and exclusive to Technology Education as a subject. As earlier mentioned in section 2.3.3, McCormick (1997:143) argues that technological activity is by its nature a diverse subject that encompasses concepts and processes from other subjects like science, mathematics, economics and social studies that need understanding from various points of view. However, it is of great significance for Technology Education teachers to realise that the application of concepts in Technology Education may differ from those in science. This is attributed to the fact that "science concepts deal with generalities, whereas in Technology Education the focus is on how these concepts are occurring in a particular context" (McCormick, 2004:24).

From a perspective of situated learning, the context as well as the nature of the Technology Education task has a bearing on how a task is to be tackled (McCormick, 2004:24-25). Additionally, McCormick (2004:25) expound that "it is a challenge to learn Technology Education through science because in science, context is ignored and generalisation is emphasised". Research findings revealed that context has an influence on how learners acquire technological knowledge (McCormick, 2004:32). An example of the illustration of electrical circuit in Technology Education and science bears testimony to the fact that the context in which a problem is posed has an effect on the answer to be given. When dealing with "matter and materials', most technologists focus on the properties rather than molecular structure of materials (McCormick, 2004:30-33).

McCormick (2004:41) adds that:

> *"The role of context within which the knowledge is situated needs to be seen as part of that knowledge, not something that is transfers into and out of; context is not a box that contains learning situation"*

Although there are a variety of science concepts involved, they have little effect on the production of a working model. McCormick (2004:36-39) advocates for the inclusion of qualitative knowledge as part of teaching and learning in Technology Education. This is attributed to the fact that it reflects both the views of situated learning, and the nature of the task of Technology Education.

2.3.5   Mediating learning in the classroom

Teachers are central to the learning process of which teacher knowledge is of paramount importance to the whole process. Teaching, learning and assessment are the main pillars for the implementation of Technology Education, be it in defining the subject, conceptualising the curriculum or setting the research agenda (Jones & de Vries, 2009:688-689).

Killen (2000: vii, xiv-xv) notes that in OBE all decisions pertaining to planning, teaching and assessment are anchored by four principles which are:

- "The outcomes that learners should achieve;

- The content used by the teacher to enhance learning in the classroom;

- Mediation of learning by the teacher to assist learners to achieve the outcomes; and

- The assessment of learners".

Jones and de Vries (2009:690) argue that subject backgrounds have a direct effect on how teachers structure their learning activities and develop classroom practices to teach technological knowledge in the classroom. Furthermore, because most teachers have been offering other subjects prior to their teaching of Technology Education in schools, the influence of those subjects'

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background on what teachers believe to be technological concepts and processes that must be taught is evident in most classes (Jones, 1997:86). Student learning in Technology Education is being compromised because teachers have developed strategies to allow for learning outcomes that were often more inclined to their particular teaching subject than to Technology Education (Jones, 1997:86-87). According to Jones (1997:87), teachers with little understanding of the nature of the technological concepts and processes, when challenged by students' narrower concepts in Technology Education often revert back to their old ways of teaching approaches and learning outcomes (Jones, 1997:87). Thus, Jones and de Vries, (2009:690) argue that "for teachers to teach Technology Education in a manner that it support and extends student learning, they may need to develop new understanding and make change to their existing practices".

Jones and de Vries, (2009:689) identified the changes in how learners and learning are viewed and the appreciation of the relationship between teaching, learning, assessment, and curriculum as two key points that highlight the crucial role of the teacher in educational reform. In summary, the following were identified by Jones and de Vries, (2009:689) as the knowledge base that Technology Education teachers require to can effectively teach Technology Education in the classroom:

- *"Teachers need rich pedagogical content knowledge (PCK), as a specialized form of knowledge of the subject; and*

- *Teachers need to understand subject matter and be able to mediate it so that it can be grasped by the students".*

Jones (2009:689) and Jones and Moreland (2004:123) argue that distortions in classroom interaction with students is as a result of a lack of Technology Education-specific teacher knowledge as well as a lack of understanding of the nature of Technology Education as a school subject. As earlier mentioned, Technology Education does not have well-established concepts unique to it and there are a number of interpretations of what is described as technological knowledge. Moreover, there is no consistent definition of Technology Education concepts in literature (Jones, 1997:87). Gardner (1995:18-25) makes the argument that "if Technology Education is perceived as applied science that disregards the economic, social, personal and environmental needs and constraints will limit students' learning of technological concepts".

Jones (1997:87) asserts that "for students to undertake Technology Education activities, knowledge and processes cannot be separated". Furthermore, McCormick et al., (1994:7) assert that "for Technology Education teachers to develop problem-solving skills in learners, teachers need to plan actively to help their learners to consider the relationship between their intentions, and actions, and outcomes of these, as they proceed from problem to solution, and tackling emergent problems along the way. This will result in learners internalising the skills that will enable them to become effective problem solvers". Stevenson (2004:7) states that "to inculcate problem-solving techniques in learners, learners require the correct declarative knowledge and procedural knowledge (a deep conceptual understanding of particular kinds of technologies associated with relevant and useful procedures that can be enacted for different levels of abstraction), the ability to discern their applicability in new situations (i.e. the level of abstraction that the problem needs to be understood) and the capacity to engage in this application (done through the execution of procedures relevant to the way of viewing the problem and the level of abstraction)".

Some of the challenges facing learners in technology are more technical and conceptual in nature. For an example, it might be a challenge for most learners to choose suitable materials (based on their characteristics) to suit a certain situation as well as the correct usage of a particular tool perform a specific function. In most schools, teachers simply suggest the materials to be used for a particular project without engaging learners in practical activities that are aimed at assisting the learners to choose the appropriate materials befitting the situation.

Technology Education as a subject area offers authentic, real-life opportunities for learners to interact with each other within teams when they develop technological solutions (DBE, 2011:6). This calls for co-operative learning where tasks are shared according to expertise. McCormick (2004:29) advocates for the employment of the student collaboration model that can be done in a variety of ways such as through co-operation. One strategy is to give learners individual projects to complete. Since the nature of the tasks will be similar, learners may work alongside each other on a table, share tasks and collaborate with each other because they are doing similar things on individual projects (McCormick, 2004:30).

2.3.6   Developing learners' technological knowledge

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Stevenson (2004:5-6) suggests three ways in which teachers can employ in order to develop technological knowledge in learners. Firstly, he suggest that teachers might consult the research literature in order to determine the nature of technological knowledge that learners require to apply to both familiar and unfamiliar technological and design problems and subsequently design instructional approaches that will enhance learner attainment in its application. A second approach might be to peruse general statements that stipulate the importance of content to be taught but do not suggested how the content should be delivered to enhance learner attainment in the classroom.

The third strategy, teachers might consult the curriculum statements which will in turn accord learners with the opportunity to develop understanding of the relationship between specific techniques and general conceptions of technological processes, and between specific pieces of equipment and their functions as well as the categories of systems and processes which they are engaged with. In all these approaches, there is an attempt "to interconnect the specific with the general and the material with the abstract, i.e. connect different kinds of meaning" (Stevenson, 2004:6). This concurs with Jones (1997:88) in that students' learning technological concepts and processes are influenced by approaches supported by a particular curriculum at all levels of operation.

Jones (1997:88) has this to say about curricula framework:

> *"Curricula provide the framework for possible learning and assessment outcomes and will therefore influence the way in which students undertake technological problems"*

Fox-Turnbull (2006:53-54) identified two main factors that influence the quality of achievement of children in Technology Education. The first factor, Fox-Turnbull (2006), indicates that teacher knowledge regarding the relevant technological practice engaged by the students influences the quality of learning that occurs for the learner. The second factor was identified as the relevance of the authenticity of the task in relation to the children. 'Activity' is said to be authentic if it is (i) coherent and personally meaningful and (ii) purposeful within a social framework (Fox-Turnbull, 2006:54). Moreover, Shulman cited in Fox-Turnbull (2006:54) emphasises the need to develop a strong teacher knowledge based on areas such as content knowledge, general pedagogy, and curriculum pedagogy content.

Fox-Turnbull (2006:70) in his study of the influences of teacher knowledge and authentic formative assessment on student learning in Technology Education, explain that children

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completing the 'in-context' task are significantly motivated and more confident in justifying their decision making than those engaging in 'out-of-context tasks. This is attributed to the technological practice that preceded the 'in- context' task (Fox-Turnbull, 2006:70). This concurs with Jones (1997:88) who find that research reveals that engagement in authentic activities enhances students' learning in Technology Education.

2.3.7 Authentic assessment in a Technology Education classroom

Moreland and Jones (2000:299-300) assert that teachers view assessment in Technology Education as a difficult task. This is a result of teachers' lack of knowledge of the assessment practices that are appropriate in Technology Education. Jones (1997:89) adds that learners' technological practices and learning are also influenced by assessment approaches and the technological task definition. In Technology Education, learners are required to apply various skills to perform a particular task and evidence is created when learners are engaged in some form of action.

These tasks may either be technical (effective usage of tools), procedural (design or problem solving), conceptual (concepts set in-context) or societal (impacts) (Fox-Turnbull, 2006:71-72). "Authentic assessment is also called Performance Assessment because learners are often required to perform a task or produce something concrete that can be assessed" (Kramer, 2002:42). Fox-Turnbull (2006:70), further argues that the improvement of teacher knowledge and awareness of technological practices will enable teachers to plan units of work that are based on authentic practices.

Kramer (2002:42) further asserts that:

> "Authentic assessment is assessment that relates as possible to contexts and situations in real life, outside the classroom"

Teachers in Technology Education are expected to plan quality formative assessment tasks and provide reliable feedback to learners based on authentic practices aimed at improving learner attainment in the subject (Fox-Turnbull, 2006:73; DBE, 2011:6). Formative assessment of learners' own way of doing things (planning and thinking) will provide the teacher with insight into how learners used the information from prior learning and teacher-planned activities to produce a solution for a particular problem (Fox-Turnbull, 2006:72). Black and Wiliam (1998:4) in their review of literature on classroom formative assessment reveal that improved formative

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assessment that encompasses frequent feedback is more beneficial to low achievers than to the rest of the learners.

However, Jones (1997:89) argues that emphasis on a particular summative assessment procedure in the classroom may limit learners' creativity and thinking because learners will be confined to work within a stipulated and rigid framework. This is evident where students are constrained by a stipulated design process, prescribed resources and pre-determined outcomes that need to be achieved (Jones, 1997:89).

In conclusion, Sadler (1998:79-80) describes six resources that competent teachers brings to assessment in Technology Education. These encompass the conceptual knowledge (technological knowledge and understanding) to be learned, attitudes towards learners and learning skills in developing learning activities (tasks), knowledge of criteria and appropriate standards, skills and expertise in previous similar learning activities, and expertise in providing authentic, reliable feedback.

2.4   SCHOOL DOMAIN

2.4.1   Teacher's work environment

This section focuses on the school which was identified by Fox-Turnbull (2006:73) as one of the constraints within which Technology Education teachers have to operate. The school is seen as the premises where curriculum implementation takes place. Lieberman, (1996:185), in her study of the factors that limit the effectiveness of teacher professional development programme, listed the following amongst others as inhibitors to the realisation of effective teacher professional development programmes:

- Teacher professional development programmes often disregard the effect of the environment (context) within which teachers work; and

- The structure and strategies of the programme do not encompass the significance of the support structure, time and resources required to sustain and enhance teachers' newly acquired knowledge and skills in schools.

This is line with the Ofsted (2002a:3) that state that over the years, schools did not provide adequate time to support teachers to internalise the knowledge and skills acquired through their participation in teacher development programmes.

Technology Education in its nature is a practical subject that requires facilities, tools and other consumables for its effective implementation. Fox-Turnbull (2006:73) state that "the 'institutional politics and policy', as well as the nature of facilities in schools available will constrain processes available for effective professional teacher development thus impacting negatively on learners' technological practices". At present, most previously disadvantaged schools where most teachers are operating do not have the necessary facilities like workshops, dedicated exclusively for Technology Education. This concurs with Fox-Turnbull (2006:73) who notes that "it is neither practical nor feasible for schools to have expensive and complex facilities as well as the capacity to procure machines or equipments that will accord learners to undertake specialised technological practice". However, Nabhani and Bahous (2010:211) argue that irrespective of the financial constraints, schools should develop cultures that prioritise the continuous learning and development of teachers and learners alike.

Early and Bubb (2004:2) state that CPD programmes should be informed by teachers' needs and supported by all stakeholders in the school. This calls for the commitment of school managers to support the effective teaching and learning of Technology Education in schools. Hence, Rhodes, Nevill and Allan (2005:349) emphasise the importance of school-based managers supporting teachers in their endeavour to develop and grow as professionals. According to Getty (2002:37), the "collaboration between teachers, principal and school management team and support of professional development programmes enhance teachers' professional growth and promote transformation".

2.5   CONCLUSION

In conclusion, theories on the nature of CPD programmes and how they should be structured and implemented emphasise that CPD programmes should be on-site, and focus on the needs of an individual teacher. Furthermore, there is a need to create a positive learning climate which could be achieved by teachers choosing appropriate teaching or facilitation goals and assessment strategies, delivering the curriculum effectively and applying teaching strategies that can assist

learners to learn effectively. The school is seen as the premises where curriculum implementation takes place. Moreover Technology Education in its nature is a practical subject that requires facilities, tools and other consumables for its effective implementation. It is therefore important for SMTs' to support and accord teachers with a degree of empowerment in their own professional development. The next chapter, Chapter 3, provides a detailed description of the research design and methodology applied during the investigation.

CHAPTER THREE

RESEARCH DESIGN AND METHODS APPLIED IN THE STUDY

3.1   INTRODUCTION

The aim of this chapter is to outline the research paradigm, the research methods as well as the research design applied in this study. This chapter further provides a detailed description of the data collection strategies used, as well as the data analysis techniques applied in the investigation. The role of the researcher, as well as ethics considerations taken during the course of this study are also discussed.

Cohen, Manion and Morrison, (2000:73) expounds that the research design is determined by the notion of 'fitness of purpose, which in turn gives rise to the methodology and design of the research. Lee (1991:87) adds that the researcher's choice of research approach is dependent on the "aims of the research enquiry, the various roles of the researcher, and the researcher-respondent relationship". Hitchcock and Hughes (1995:21) assert that the choice of instrumentation and data collection strategies to be used in research is informed by the ontological assumptions which give rise to epistemological assumptions which in turn give rise to the methodological considerations. "Ontology is concerned with the nature of reality that is being studied and what can be learned about it and epistemology deals with how the researcher may go about studying whatever s/he feels it is important to be tackled" (Maree, 2007:53).

In literature, the nature and form of reality (ontology) is defined differently in various research methodologies and research approaches. Guba and Lincoln, cited in Maree (2007:56) identify positivism, post-positivism, critical theory and constructivism as the four paradigms of research, whilst Chua, and Orlikowski and Baroudi, cited in Maree (2007:57), view positivist, interpretive and critical paradigm as the three categories of research. In this study, the positivist (scientific method) and interpretive (emerging view) paradigms are discussed.

3.2   RESEARCH PARADIGM

Maree (2007:47-48) defines a paradigm as follows:

> *"A paradigm is the asset of assumptions or beliefs about fundamental aspects of reality which give rise to a particular world-view – it addresses fundamental assumptions taken on faith, such as beliefs about the nature of reality (ontology), and the relationship between knower and known (epistemology) and assumptions about methodologies"*

Lincoln and Guba (1985:15) further assert that "paradigms represent what we think about the world (but cannot prove) and our actions in the world, inclusive of the actions we take as enquirers, cannot take place without reference to those paradigms: 'As we think, so do we act'" and further "serve as the lens or organising principle through which reality is viewed and interpreted" (Maree, 2007:48). Schwartz and Ogilvy (1979:1) define paradigm as a means enabling us to tell a 'story' by depicting the culturally subjective yet meaningful and functional world.

From a positivists' point of view, knowledge can be exposed and revealed through the use of scientific knowledge where there is great emphasis on experimentation, observation, control, measurement, reliability and validity in the different processes of research (Maree, 2007:55). Cohen et al., (2000:8) assert that positivism views social scientists as observers, interpreters and analysers of social reality and are informed by the claim that science is the source of possible ideal knowledge. To the contrary, anti-positivists argue that an individual's behaviour can only be understood by the researcher sharing the participants' frame of reference, that is, the understanding of individual's interpretation of the world around them has to emerge from within not from outside (Cohen et al., 2000:20). The interpretive approach operates from the view that the world is made of people with their own unique assumptions, intentions, attitudes, beliefs and values, and that the way to discover reality is to explore the experiences of others regarding a phenomenon that manifests itself in their cultural context (Maree, 2007:55). This concurs with Cohen et al., (2000:

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19), who reject the notion that human behaviour is governed by universal laws and characterised by underlying regularities. However, Maree (2007:57) argues that while acknowledging that the three research epistemologies are philosophically different, in practice, these differences are not distinct and are often overlapping and contested.

Table 3.1 below provides a graphical representation of what Maree (2007:57) describes as "the continuum explaining the emergent world-view" instead of "positions". This is done to illustrate that, although in certain instances people may hold different views on a phenomenon, researchers may find themselves located somewhere between the positivist view and the emerging world-view.

Table 3.1: Continuums explaining the emergent world-view.

	Scientific method: Key terms	**Emerging view: Key terms**
What is knowledge?	"Rationally produced. Discovered by experimentation. Absolute truths/immutable laws".	"Relationally produced. Largely perceptual. Provisional answers/tentative".
What are phenomena?	"Observable. Can be empirically studied. Simplistic/reducible to essential aspects".	"Ideational. Empirical as process. Complex relations/holistic".
Relationship between phenomena	"Fixed order/hierarchical. Linear relations. Predictable behaviour".	"Fluid/systemic/messy. Integrative orders/complex relations. Open system/behaviour not predictable".
How is causation viewed?	"Linear cause-effect. Unidirectional interaction. Explained by deductive reasoning".	"Multi-causality. Complexity of interaction. Deductive/inductive/lateral reasoning".

What is use of research?	"Measuring/ classification/categorisation of phenomena. Describing/verifying theory. Prediction and control".	"Interpreting/understanding of phenomena. Describing/generating theory. Approximation of truth in terms of what it is".

Many researchers conduct most of their studies based on how they observe the world. Positivism may be ideal for those who are after objective 'facts' revealed through the use of scientific methods (Maree, 2007:55), whereas interpretive research may suit those researchers who consider the meaning that people attach to such 'facts', and social constructivism may be ideal for those researchers who wonder how the social world gets constructed as one, which contain facts (Cohen et al., 2000:22). Since the researcher intended to understand how individuals in everyday settings construct meaning and how they interact and relate to each other (Creswell, 2005:51), a qualitative approach to research, based on interpretivism, was the most appropriate for this study. The interpretive approach afforded the researcher the opportunity to intermingle closely with the participants in order to gain insight into how those Technology teachers who had participated in the CPD programme were influenced by the outcomes of the CPD programme in terms of their classroom practices and professional development.

As earlier mentioned in section 1.2.2, it is not known how the school set-up and the SMTs support teachers to nurture and sustain their professional development and growth in the teaching of Technology Education in schools. As a result, the researcher felt that it was important to highlight and describe teachers' views on the nature of support (if any) that the teachers received from their respective schools to enhance their professional development and growth. For this qualitative approach, semi-structured interviews, observations and document analysis were used as data collection methods.

3.3 RESEARCH DESIGN AND METHODS

In conducting a research project, there is a need to develop guidelines that are going to guide and anchor the research process. These guidelines provide the framework that is going to be used to

address the research questions by indicating what the researcher intends to do, how it is going to be done, why the researcher decided to follow a specific strategy and why is it important to learn about the phenomenon under review (Punch, 2005:10). This was done through research design and methods.

3.3.1 Research design

> *"Research designs are the specific procedures involved in the last three steps of the research process: data collection, data analysis and report writing"* (Creswell, 2005:59).

McMillan and Schumacher (2001:30) define a mode of inquiry as a collection of research practices that in turn inform the research design (McMillan & Schumacher, 2001:31). Barbie (1998:89) further asserts that "a research design is aimed at addressing the planning of the inquiry, designing strategy to explore, describe and explain a phenomenon". Bless and Higson-Smith (1995:46) describes "a research design as the plan of how to proceed in determining the nature of the relationship between variables". Hence, Creswell (2005:73) find that the 'fitness of purpose' regulates the research design, whereas the purpose of the research determines the methodology as well as the design of the research.

In this research, an exploratory qualitative approach was followed to obtain deeper understanding of the influence of the outcomes of a CPD programme on the classroom practices and professional development of Technology Education teachers. This provided the researcher with rich and detailed information about the phenomenon under study that was used to produce a theory that can be confirmed in larger scale surveys, experiments or other forms of research (Cohen et al., 2001:183).

3.3.2 Qualitative research approaches applied

A qualitative research method based on an interpretive paradigm was followed because the purpose of this study is to understand, describe and interpret the subjective nature of world of human experience (Cohen et al., 2000:22). Maykunt and Morehouse (1994:43) describe qualitative

research as being "exploratory and descriptive in its nature, and employs purposive sampling techniques with people as the main source of data".

Creswell (2005:46) describes qualitative research as:

> *"... a type of education research in which the researcher relies on the views of the participants; asks broad, general questions; collects data consisting of largely of words (or text) from participants; describes and analyses these words for themes; and conducts the inquiry in a subjective, biased manner"*

Qualitative research is a type of research that concentrates on the way people make meaning of the socially constructed nature of reality and make sense of their experiences as well as the world they live in (Denzin & Lincoln, 2000:8). According to Maree (2007:59), "the interpretive perspective is based on the assumptions that locating people in their social contexts, there is a high probability to understand the perceptions they have about their own activities, thus the uniqueness of a particular context is important and interpret the meaning constructed".

The term 'case study' has many different meanings which can be used to explain a unit of analysis (e.g. a case study of a particular organisation) or to describe a research method. This is however dependent upon the underlying philosophical assumptions of the researcher, where case study research could be positivist, interpretive or critical (Maree, 2007:75). Furthermore, Cohen et al., (2000:181) state that the paradigm most appropriate to case study research is an interpretive approach because it seeks to understand and interpret the subjective nature of the world in terms of its participants. It is for these reasons that this study applied a multiple case study design to obtain deeper understanding of the influence of the outcomes of a CPD programme on the classroom practices and professional development of Technology Education teachers thus generating a theory that can be tested in larger scale surveys, experiments or other forms of research (Cohen et al., 2000:183).

Cohen et al., (2000:181) assert that 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"*

According to Bromley (1991:302), case study research is a "systematic inquiry into an event or a set of related events which aims to describe and explain the phenomenon of interest". Yin

(1984:23) describes a case study research method as an empirical inquiry that uses multiple data collection strategies to investigate a current occurrence within its real context when the boundaries between occurrence and the context are not clearly evident. From an interpretive point of view, case studies seek to obtain a clear understanding of how participants relate and interact with each other in a specific context and how they make meaning of the occurrence under review (Maree, 2007:75). Additionally, Maree (2007:75) explain that "case studies offer multi-perspective analysis in which the researcher considers not just the voice and perspectives of one or two participants in a situation, but also views of other relevant groups of actors and the interaction between them".

Contexts are different and fluid in nature; hence case studies explore and report the complex dynamics and unfolding interactions of events, human relationships and other factors in distinctive instances (Cohen et al., 2000:181). Hitchcock and Hughes (1995:319) note that "case studies are (a) set in temporal, geographical, organisational, institutional and other contexts that enable boundaries to be drawn around the case; (b) can be defined with reference to the characteristics defined by individuals and groups involved; and (c) can be defined by the participants' roles and functions in the case". According to Merriam, (1998:75), a case study focuses on a unit around which there are limitations, hence the phenomenon under study, the CPD programme, provided the researcher with further boundaries to limit the case and provide the sampling strategy:

- The sample was drawn only from teachers who participated in the CPD programme under review.

- Teachers offering Technology Education in the Senior Phase of the GET band of the RNCS were considered to take part in this study.

- Teachers offering Technology Education in Grade 7, teaching in different schools and circuits but the same district of the Limpopo Province were considered to take part in this study.

Although there are limitations and criticisms levelled against a case study design (Smith, 1991:375), a key strength of the case study method is that it could use multiple data collection techniques and sources during the data collection process. Therefore the researcher collected data

from participants through qualitative data collection methods of interviewing, observation and document analysis.

Hitchcock and Hughes (1995:317) identified the following characteristics as strengths of a case study method:

- *"A case study is concerned with rich and vivid description of events relevant to the case.*

- *A case study provides a chronological narrative of events relevant to the case.*

- *A case study focuses on individual actors or groups of actors, and seeks to understand their perceptions of events.*

- *A case study blends a description of events with the analysis of them.*

- *A case study highlights specific events that are relevant to the case.*

- *The researcher is integrally involved in the case.*

- *An attempt is made is made to portray the richness of the case in writing up the report".*

3.4   POPULATION AND SAMPLE IN THE STUDY

Cohen et al., (2000:93) report that the quality of a piece of research is not dependent only on the appropriateness of the methodology and instrumentation, but also the appropriateness of the sampling strategy that has been applied. To justify the sampling strategy to be used in a research endeavour, the researcher considered factors such as expense, time and accessibility which often obstruct researchers from gaining data from the whole population (Cohen et al., 2001:93). To minimise the effects of these factors in the data collection process, Cohen et al., (2001:92) suggested four key factors that need to be considered when a researcher makes decisions and judgements about the sampling to be used:

1. *"The sample size;*

2. *The representativeness and parameters of the sample;*

3. *Access to the sample; and*

4. *The sampling strategy to be used"*.

McMillan and Schumacher (2006:119) describe a population as "a cluster of elements or cases existing as an individual, objects or events that match with a specific criteria and are intended to provide an appropriate base for the research". Creswell (2005:146) defines sampling as a sub-group of the target population that the researcher intends to investigate and the sample size is determined by the type of the targeted population as well as the style of the research (Cohen et al., 2000:91).

As mentioned previously, Maykunt and Morehouse (1994:43) describe qualitative research as being exploratory and descriptive in its nature, and employ purposive sampling techniques with people as the main source of data. Lawrence-Neuman (1997:491) adds that in qualitative research, "adequacy refers to the amount of data collected, rather than to the number of subjects as in quantitative research". It is for these reasons that in this study, the researcher considered and followed purposeful sampling so that the participants selected have hands-on experience with the phenomenon under review (Cohen et al., 2000:103). According to Maree (2007:79), purposeful sampling entails the inquirer hand-picking the participants based on the same traits in order to develop a sample that is large enough yet possesses the needed characters.

Merriam (1998:75) describes a case as "a unit around which there are boundaries". As earlier mentioned, the ACE programme under study in this research provided a distinct boundary; however, within these perimeters there were further boundaries that helped to limit the case further thus informing the chosen sampling strategy. Initially, the researcher intended to select six Technology Education teachers to participate in the study. However, due to time and financial constraints, the researcher decided to reduce the number of participants without compromising the representativeness of the sample. Since the researcher wished to understand, describe and interpret a particular situation in-depth and not generalise to the entire population (Merriam, 1998:208), the following rationale for the selection of participants was followed:

- Three Technology Education teachers who participated in the CPD programme under review were selected to take part in the study.

- Three Technology Education teachers presently teaching technology in the Senior Phase of the GET band of the RNCS were selected to take part in the study.

- Three Technology Education teachers offering technology in Grade 7, teaching in different schools and circuits but the same district of the Limpopo Province were selected to take part in the study.

To limit the case further and reduce costs, only teachers from the same district of the Limpopo province were randomly selected to take part in the study. This was aimed at ensuring that the selected participants were not necessarily the best teachers who might be performing well in their respective schools and the training had little influence on their performance in this regard. Furthermore, an attempt was made to locate schools with more than one teacher who meets the sample selection rationale. Although the sample size is small, a number of data collection instruments were used to collect "additional corroborative information by way of validation" (Cohen et al., 2000:95).

The unit of analysis for this study was the opinions of the participants and observed practices in terms of classroom practices and professional development of Senior Phase (Grade 7) Technology Education teachers who participated in a CPD programme. Data was collected through semi-structured interviews, classroom observations and document analysis (teachers' resource files).

3.5   DATA COLLECTION INSTRUMENTS

Creswell (2005:592) defines instrumentation "as a tool utilized for measuring or documenting quantitative data". In qualitative research, data collection is done through general interviews or observations so that there are no limitations on participants' views and the data is recorded on self designed protocols that in turn assist to organise data reported by the participants to each question posed (Creswell, 2002: 213).

In an attempt to ensure validity and credibility of the study, data was collected using multiple qualitative data collection strategies and instruments over a period of approximately six months that included the use of interviews, classroom observations and documents analysis. Before the researcher could embark on the data collection process, meetings were arranged with teachers at their respective schools. The meetings were aimed at discussing the nature and the aim of the study. The dynamics of the research process, including the strategies and instruments used, were clearly explained to the teachers, and they were informed of their rights and their voluntary involvement in the research indicating that they could withdraw at any time during the process if

they wished to do so. Confidentiality and anonymity were guaranteed and participants were requested to read the provided letter, ask questions for clarifications and those willing to be involved in the research ultimately signed the consent forms **(see Appendix A)**.

At the school, both the teachers and their principals were furnished with a copy of the permission letter from the District Senior Manager to conduct the study in their respective schools (see **Appendix B).**

3.5.1   Semi-structured interviews

Maree (2007:87) defines an interview as "a two-way conversation in which the interviewer asks participants questions to collect data and to learn about the ideas, beliefs, views, opinions and behaviours of the participants". The purpose of qualitative interviews is to see the world through the eyes of the participants thus obtaining rich detailed descriptive data that will assist the researcher to understand the participants' construction of knowledge and social reality (Maree, 2007:87). Silverman (1993:92-3) reports that interviews in qualitative research are helpful for: "(a) gathering facts; (b) accessing beliefs about; (c) identifying feelings and motives; (d) commenting on the standards of actions (what could be done about situations); (e) present or past behaviour; (f) eliciting reasons and explanations". Cohen et al., (2000:271) explain that there are different types interviews, which are structured; standardised; in-depth; ethnographic; elite; life history; focus group; and semi-structured.

For this study, once-off face-to- face semi-structured interviews **(see Appendix C)** lasting for 45 minutes each were conducted with each participant. The interview sessions took place at teachers' schools in the afternoon after they had completed all work related tasks, on days chosen by each teacher. The interview sessions, and with permission from the participants, were audio taped and later transcribed verbatim.

The semi-structured interview method of data collection was useful in this study because it allowed for probes and clarifications (Maree, 2007:87) and was also feasible for the small sample size chosen for this research project. The focus of the interview sessions was on how those Technology Education teachers who had participated in the CPD programme were influenced by the expected outcomes of the CPD programme in terms of their classroom practices and professional development.

The topic themes that were addressed by the interview sessions were arranged in the following chronological order:

Part 1: Eliciting Technology Education teachers' general beliefs and experiences about the teaching profession in general.

Part 2: Eliciting Technology Education teachers' general beliefs and experiences about the CPD programme as a professional development strategy.

Part 3: Exploration of Technology Education teachers' present classroom practices in relation to the nature of technological knowledge, mediation of learning in the classroom (teaching), development of learners' technological knowledge, as well as authentic assessment in the classroom.

Part 4: Exploration of Technology Education teachers' views about their general school experiences (teachers' own work environment). Focus was on the level and the nature of support (if any) that the teachers received from their respective schools to enhance their professional development and growth in the teaching of Technology Education in schools.

Reflective field notes were captured during the interview sessions and an interview protocol was developed and used to guide the interview process. In an attempt to validate and provide authenticity to the data collected through interviews, transcripts were forwarded to the participants for corrections and approval.

3.5.2   Classroom observations

Creswell (2005:211) describes observation "as the process of gathering first hand information by observing people and places at a research site". Moreover, Marshall and Rossman (1999:107) describe observation "as a systematic process that is aimed at noting and recording events, behaviours in a social setting related to the research project". Maree (2007:83) asserts that "observation is the systematic process of recording the behavioural patterns of participants, objects and occurrences without necessarily questioning or communicating with them". In qualitative research, and depending on the type of phenomenon to be investigated, Maree (2007:84-85) suggests that researchers can use any type of observations (complete observer, observer as

participant, participant as observer or complete participant) to gain a deeper insight and understanding of the phenomenon to be observed.

Since the researcher intended to learn as much as possible about the situation, he adopted the role of a participant observer where he was engaged with the activities at the study site. Permission was sought from the participants to enable the researcher to assume a comfortable role as an observer in the setting. The intentions of the observation sessions were to determine the influence of the outcomes of the CPD programme on the classroom practices and professional development of Technology Education teachers and to verify and confirm some of the information supplied by the teachers during the interviewing sessions. During classroom observations, the researcher recorded the descriptive field notes which are aimed at describing the events, activities and people as well as the reflective field notes that outline the personal impressions picked up at the observed sites (Maree, 2007:85). To triangulate the data collected from other instruments, during the class activities, when the learners were engaged, the researcher randomly perused teachers' lesson preparations, looked at learners' books, and looked at the teacher-learner interaction, observed learners' interactions during group work, the general classroom management and organisation as well the usage of resources such as LTSMs and tools to enhance learning.

The topic themes that were addressed by the observation sessions were formulated using adapted profiles for mathematics and science education as suggested by Rogan (2006:6). The profiles, together with the Norms and Standards for Educators (DBE, 2000), provided a framework that helped to identify variables that needed to be explored during classroom observation sessions.

The topic themes that were addressed by the observation sessions were arranged on the observation schedule following the chronological order listed below:

Part 1: Lesson preparations.

Part 2: Lesson presentation.

At the beginning of the lesson, teachers introduced the researcher to their learners and explained his presence in their classes. As previously mentioned, the researcher worked as a facilitator in the CPD programme and has already built a rapport with the selected sample as well as their learners, thus there was no tension caused by his presence in the classrooms.

This made it easy to administer qualitative data collection procedures. The duration of the observation sessions which were once-off were determined by the length of the periods at different schools. An observational protocol **(see Appendix D)** was developed and used to guide the observation process.

3.5.3 Document analysis

Documents are a good source of text (word) data for qualitative study. This is attributed to the fact that the information is captured through the participants' own language and words (Creswell, 2002:231). The main advantage of document analysis in qualitative research is that it provides data that is in the language and words of the participants, and they are also ready for analysis without the necessary transcription that is a requirement in observations and interviews (Creswell, 2002:231).

For the study, the researcher used a checklist **(see Appendix E)** to examine teachers' files. The focus was on teachers' resource files with more attention given to curriculum coverage, lesson plans as well as assessment tools and records. As with other data collection instruments used in this study, the intentions of the document analysis was to determine to the influence of the outcomes of a CPD programme on the classroom practices and professional development of Technology Education teachers as well as to verify and confirm some of the information supplied by the teachers during the interviewing sessions.

3.6 DATA ANALYSIS

Mayan (2007:21) provides the following explanation of data analysis:

> *"...the process of observing patterns in the data, asking questions of those patterns, constructing conjectures, deliberately collecting data from specially selected individuals on targeted topics, confirming or refuting those conjectures, then continuing analysis, asking additional questions, seeking more data, furthering the analysis by sorting, questioning, thinking, constructing and testing conjectures and so forth"*

Maree (2007:99) asserts that "qualitative data analysis is usually based on interpretive philosophy that is aimed at examining meaningful and symbolic content of qualitative data" and is best achieved through the use of inductive analyses of qualitative data where the research findings emerge from frequent, dominant or significant themes embedded in the raw data. Furthermore, McMillan and Schumacher (2001:461) describe data analysis "as an inductive process of

organising the data into categories and identifying patterns and relationships amongst the identified categories". These results in categories emerging from the data instead of the categories imposed on the data before the data collection process. This concurs with Terre Blanche and Kelly, cited in Maree (2007:296), who assert that after the collection of information, there is a need to code the information and conduct content analysis by looking for specific words that will give rise to themes.

The qualitative data was collected through face-to-face interviews, classroom observations and document analysis. For this study, a tape recorder was used to capture data during the interview sessions and descriptive and reflective notes were compiled and arranged in files for easy access. The notes were constantly reviewed, identified and labelled in preparation of the coding process. The data analysis process was done inductively as outlined below:

3.6.1   Organisation of Data

Organisation of data is a crucial component in qualitative research due to the large amount of data to be collected (Maree, 2007:105). Data gathered through interviews, observations and document analysis was organised per participant. Each participant was allocated an identification code (pseudonyms) that were used in all data gathering procedures. Every participant's response was organised separately and later compared with other data captured from other participants' responses. Furthermore, duplicates for all forms of data gathered were kept for further reference.

3.6.2   Transcribing the Data

Owing to the limited time available and the huge amount of data to be collected, the researcher employed the services of a professional transcriptionist to convert audiotape recordings and field notes into verbatim text data. Each transcript **(see Appendices F, G and H)** was perused in order to gain insight of the holistic experiences of the participants.

3.6.3   Analysing the Data

The first step required the researcher to conduct an in-depth analysis of the data in order to familiarise himself with the qualitative data captured. During this process, the researcher took all the collected data, including field notes; classroom observation checklists; and interview transcripts, and begun to form a clearer understanding of the information.

The data was then broken down into categories that provided meaning to the findings and conclusions of the research project.

3.6.4 Coding the Data

Maree (2007:105) describes coding as "a process of reading carefully through your transcribed data, line by line, and dividing it into meaningful analytical units". Cohen et al., (2000:148) posit that after the collection of data, there is a need to establish the unit of analysis of data by assigning codes to the data. A systematic design in grounded theory advocates for the use of three data analysis phases that encompass open, axial and selective coding (Creswell, 2005: 434).

In this study, the researcher developed codes inductively after the data collection and during data collection and later conducted content analysis by looking for specific words with which categories were identified. This concurs with Terre Blache and Kelly, cited in Maree (2007:296), who assert that after the collection of data, there is a need to code the information and carry out content analysis by looking for specific words that will give rise to specific themes. This process assisted the researcher to eliminate any information that might be irrelevant to the phenomenon under study by identifying the similarities and differences in the data supplied by the participants.

3.6.5 Structuring and verification of categories

Once the data was categorised, the researcher revisited the original transcripts to verify whether all the important insights that come out of the data had been captured through the coding and categorisation process (Maree, 2007:110). The next step was for the researcher to examine the categories in order to identify how each is linked or related to the other categories (Maree, 2007: 110). This provided the researcher with the opportunity to consider other links that might clarify or explain the data and to reflect on possible contradictions, paradoxes, conflicting themes and evidence that seemed to negate the inquirer's interpretations (Creswell, 2005:450).

3.6.6 Drawing findings and conclusions

In compiling and writing a research report, it was imperative for the researcher to interpret the data so as to come to findings and draw conclusions based on substantiated findings from the collected data. The findings and conclusions were then reported in relation to what is already known about the occurrence thus providing new insight or affirmation of existing knowledge (Creswell, 2005:450). However, the conclusions and findings of this study cannot be generalised to a broader audience, but are only applicable to the participants in their own context (Maree, 2007:113). This is attributed to the fact that there was neither experimental, control group nor a baseline study conducted prior to this study.

3.7 TRUSTWORTHINESS OF THE RESEARCH

It is imperative for researchers to ensure that during the data collection and analysis process the research findings and interpretations are accurate and valid. Creswell (2002:266) explains that "validating findings means that the researcher determines the accuracy or credibility of the findings through strategies such as member checking or triangulation".

Furthermore, Merriam, cited in Maree (2007:38), identified six strategies that can be used by researchers to ensure internal validity in qualitative research:

- *"Crystallisation, where a number of investigators, sources and methods are used to compare the findings with one another;*

- *Member checks, requires for data and findings verification by other respondents than those originally involved;*

- *Long-term objectives that are aimed at increasing the validity of the study through the collection of data over an extended period of time;*

- *Peer examination to request the opinions of colleagues and co-workers,*

- *Collaborative research through the involvement of the participants in the research process; and*

- *Eliminating researcher bias by clarifying the researcher's assumptions, views and theoretical point of reference before the commencement of the research project".*

Richardson (2000:934) suggests the use of the term "crystallisation" rather than "triangulation" in qualitative research, because crystallisation is a better lens through which to view the components

in qualitative research. Furthermore, crystallisation provides the researcher with a deepened, complex, thorough understanding of the topic.

For this study, the researcher triangulated all data collected during the research process, including the results of the interviews; classroom observations and hand written notes, in order to locate common themes to provide reliable findings. Constant reflection of the research process, which was aimed at eliminating any bias that might be brought to this study, was conducted. The interview schedule; the classroom observation checklist and teacher file observation checklists were assessed by the supervisor prior to the commencement of the data collection process to ensure that there were adequate for measuring what they are supposed to measure, therefore ensuring content validity. In an attempt to validate the study, all the transcripts of the interviews were supplied to the teachers for confirmation of the accuracy of the captured data and allowed for further clarifications.

3.8   THE ROLE OF THE RESEARCHER

The researcher was directly involved as a facilitator of technology in the CPD programme and his involvement as a facilitator presented him with an opportunity to critically reflect on the delivery of the programme and reflect on his in-depth knowledge of the programme, the context and the participants. However, since the facilitator was familiar with the participants involved in the study, the teachers were willing to participate in the study without fear of victimisation thus ensuring that their actions are not modified due to the researcher's presence. The teachers (participants) were accorded a chance to speak for themselves, i.e. relating their own personal experiences and suggestions regarding the CPD programme, with minimal interpretation by the researcher.

To eliminate bias from the responses provided by the participants, the researcher made every effort to structure the interview sessions in a manner that the format of the questions, including the sequence of words, was the same for all participants. Throughout the research process, the researcher undertook this role in a responsible and professional manner by applying the research methodology in a correct and acceptable manner and adhering to measures that ensured the credibility and trustworthiness of the study.

3.9   ETHICAL CONSIDERATIONS

In conducting a research endeavour, it was imperative for the researcher to obtain clearance from the ethics committee before commencing with the data collection process. Before the data collection process, permission to undertake the study (**see Appendix I**) was sought from the District Senior Manager. During the data collection process, the researcher presented the participants with a letter of consent, in which the research objectives were clarified and outlined. Participants were requested to read the letter, ask questions for clarifications and ultimately signed the consent forms as an indication of their willingness to be involved in the research. Participants were also advised of their voluntary involvement in the research which made them aware that they could withdraw at any time during the process if they wished to do so.

For this study, the research strived for total professionalism by treating the participants with respect and sincerity. All participants' information and responses shared during this study will be kept private and the results have been presented in an anonymous manner in order to protect the identities of the participants. Moreover, the study was conducted in accordance with the Ethics and Research Statement provided by the Faculty of Education of the University of Pretoria.

3.10 CONCLUSION

Since the purpose of this study was to explore and explain how Technology Education teachers were influenced by the expected outcomes of the CPD programme, the choice of the data collection strategies and instruments were informed by literature on teacher knowledge in relation to the nature of technological knowledge, classroom practices, development of learner technological knowledge, as well as teacher development models used in both developed and developing countries. Chapter 4 provides the analysis and interpretation of the results of this study.

CHAPTER FOUR

DISCUSSIONS, MAIN FINDINGS, SYNTHSEIS AND REFLECTION

4.1 INTRODUCTION

The aim of this chapter is to present to the reader the findings and discussions that have emerged

from the data collected from the fieldwork phase, while reflecting on literature. In this research, a qualitative approach was adopted, as outlined in Chapter 3. Data for this research, as outlined in section 3.5, was collected through semi-structured interviews with Senior Phase Technology Education teachers. Classroom observations as well as document analysis of teacher files and learners' books were used to triangulate the data collected from interviews. In this chapter, the highlighted themes, in conjunction with the literature review and discussions, are used to present the results backed by the participants' own voices and triangulated through the data collected through classroom observations and document analysis.

This section further describes the background of the research sites (Buffalo; Rhino; and Lion) and also introduces the participants (Mr Black; Mr Green; and Ms Red) to the reader, focussing mainly on the characteristics I considered when selecting the participants for this study. In order to ensure the anonymity of the participants, pseudonyms are given to schools ('Buffalo', 'Rhino' and 'Lion') and participants ('Mr Black', 'Mr Green' and 'Ms Red'). These names are used throughout this chapter. Section 4.2 provides more detail on the first case study (Buffalo) and the participant (Mr Black), while section 4.3 focuses on the second case study, located at Rhino and the participant (Mr Green). Section 4.4 introduces Lion to the reader with Ms Red as the participant.

4.2   BUFFALO CASE STUDY

4.2.1   Background of the Research Site (Buffalo)

The first case focuses on Buffalo primary school in the Sekhukhune district of the Limpopo province, which was established in 1979. The research site is a primary school that accommodates learners from Grade R-7.The school accommodates one hundred and fifty-two learners and employs five teachers. The school has a management team of two, inclusive of the principal. The school is situated in a remote village and most people in the community are either unemployed or temporary employed as casual workers. This means that the school serves a low income community where public schooling is the only available means of acquiring education. The school is in quintile one and it is a no-fee school.

In terms of physical resources, the school is under-resourced as it comprises of only nine classrooms (of which two serves as an office and staffroom). The school does not have any

laboratory or library. The school has enough learning support materials and on average there are nineteen learners per class.

4.2.2 Background of the participant (Mr Black)

Mr Black is a black male aged 49 and has graduated from Dr. C. N Phatudi College of Education (formerly Lebowa) with a Senior Primary Teachers Diploma (SPTD) majoring in English; Sepedi; Biology; and Geography and an ACE in Technology Education from the University of Limpopo. He has nineteen years of teaching experience in the same school. He taught Technology Education since its introduction in 1998 in the Senior Phase (Grade 7) and he also taught Natural Sciences and Technology in Grade 5 and 6. However, it is worth noting that in his initial teacher training, he never received any training in Technology Education. The ACE in Technology Education was acquired as a result of his participation in the CPD programme under review in this study. This implies that the teacher has been offering Technology Education as a school subject for eleven years without the necessary qualifications. I therefore selected Mr Black to participate in this research in order to explore how he influenced by the expected outcomes of the CPD programme in terms of his classroom practices and professional development especially while teaching in a rural, under-resourced school. The researcher was mindful of the fact that the nineteen years of teaching experience could have influenced Mr Black to acquire certain skills that emerged during interviews and classroom observations.

4.3   RHINO CASE STUDY

4.3.1 Background of the Research Site (Rhino)

The second case focuses on Rhino primary school in the Sekhukhune district of the Limpopo province, which was established in 2010. The research site is a state-of-the art primary school that accommodates learners from Grade R-7. The school accommodates one thousand and fifty-nine learners and employs thirty teachers. The school has a management team of eight, inclusive of the principal. The majority of the learner population is from surrounding informal settlements and the Reconstruction and Development Programme (RDP) houses as the area is predominantly a semi-urban environment. Most people in the community are either unemployed or temporarily employed as casual workers in the mining sector. The school serves a mixture of middle class and low income community. The school is in quintile two and it is a no-fee school.

In terms of physical resources, as earlier mentioned, the school is one of the state-of-the art schools built in the Limpopo province. The school is well resourced as it comprises eighteen classrooms, an administration block, laboratory, computer room and library. However, the school does not have enough learning support materials and on average there are sixty learners per class. The school is experiencing overcrowding in certain classes.

4.3.2   Background of the participant (Mr Green)

Mr Green is a black male aged 42 and has graduated from Sekhukhune College of Education (formerly Lebowa) with an SPTD (majoring in English; Sepedi; Afrikaans; and Mathematics); ACE in Education Law Policy and Management which he obtained through distance learning from the Tshwane University of Technology as well as an ACE in Technology Education from University of Limpopo. He has eighteen years of teaching experience and has been teaching at the school for the past three years. Like with Mr Black, the researcher was mindful of the fact that the eighteen years of teaching experience could have influenced Mr Green to acquire certain skills that emerged during interviews and classroom observations. He also taught Technology Education since its introduction in 1998 in the Senior Phase (Grade 7) and he also taught Mathematics in Grade 5 and 6. However, it is worth noting that in his initial teacher training, he also never received any training in Technology Education. The ACE in Technology Education was acquired as a result of his participation in the CPD programme under review in this study. This implies that the teacher has been offering Technology Education as a school subject for eleven years without the necessary qualifications. I therefore selected Mr Green to participate in this research in order to explore how he was influenced by the expected outcomes of the CPD programme in terms of his classroom practices and professional development especially while teaching in a state-of-the art and well resourced primary school.

4.4   LION CASE STUDY

4.4.1   Background of the Research Site (Lion)

The third case focuses on Lion primary school in the Sekhukhune district of the Limpopo province, which was established in 1977. The research site is a primary school that accommodates learners from Grade R-7. The school accommodates three hundred and four learners and employs eleven teachers. The school has a management team of two, inclusive of the principal. Like Buffalo, the

school is situated in a remote village and most people in the community are either unemployed or temporary employed as casual workers. Like Buffalo, the school serves a low income community where public schooling is the only available means of acquiring education. The school is in quintile one and it is a no-fee school.

In terms of physical resources, the school comprises of an administration block and twelve classrooms (of which three serves as staffroom, storeroom and kitchen). The school does not have any laboratory or library. The school has enough learning support materials and on average there are thirty-four learners per class.

4.4.2 Background of the participant (Ms Red)

Ms Red is a black female aged 43 and has graduated from Thabamoopo College of Education (formerly Lebowa) with an SPTD (majoring in English; Sepedi; Biology; and Geography), an HDE in Geography and Biology which she obtained through distance learning from the South African College of Teacher Education (SACTE) as well as an ACE in Technology Education from the University of Limpopo. She has nineteen years of teaching experience in the same school. She taught Technology Education since its introduction in 2002 in the Senior Phase (Grade 7) and she also taught Natural Sciences and Technology Education in Grade 4, 5 and 6. However, it is worth noting that in her initial teacher training, she never received any training in Technology Education. The ACE in Technology Education was acquired as a result of her participation in the CPD programme under review in this study. This implies that the teacher has been offering Technology Education as a school subject for eight years without the necessary qualifications. I therefore selected Ms Red to participate in this research in order to explore how she was influenced by the expected outcomes of the CPD programme in terms of her classroom practices and professional development especially while teaching in a rural, semi-resourced school. As was the case with the other participants, the researcher was mindful of the fact that the nineteen years of teaching experience could also have influenced Ms Red to acquire certain skills that emerged during interviews and classroom observations.

4.5   PRESENTATIONS OF FINDINGS FROM INTERVIEW SESSIONS

The data presented below was collected through semi-structured interviews and the data obtained through interviews was transcribed (**see Appendix F, G, and H**) and coded by the researcher in order to identify themes that are used in the presentation of the findings of this research.

In this chapter, the data is grouped into three research sub-questions below:

i. *How do Technology Education teachers develop as professionals in terms of the expected outcomes of the CPD programme?* (Data extracted from interviews) (Section 4.5.1).

ii. *How do Technology Education teachers presently manage, plan, facilitate, resource and assess technology lessons in the classroom as against the expected outcomes of the CPD programme?* (Data extracted from interviews, classroom observations, and document analysis) (Section 4.5.2).

iii. *What are Technology Education teachers' perception of the support offered by their SMTs in relation to their professional development and growth?* (Data extracted from interviews) (Section 4.5.3).

Within each research sub-question, data synthesis and reflection on literature are presented, followed by the evidence: the voices of the three teachers.

4.5.1 How do Technology Education teachers develop as professionals in terms of the expected outcomes of the CPD programme?

In this section of the dissertation, some personal aspects of the teachers are presented and discussed while reflecting on the literature. The focus is on how these personal attributes contributed to their successful professional development and also on the change in these personal traits that emerged as a result of the possible influence of the outcomes of the CPD programme. The researcher was mindful of the fact that there could have been other factors outside the CPD programme that could have had influence on teachers' classroom practices and professional development.

4.5.1.1 Teachers' attitudes towards the teaching profession

Findings from data collected revealed that teachers have multiple reasons as to why they decide to become teachers. Teachers have strong views and a high regard for the teaching profession. Mr

Black regards teaching as a calling and cites his willingness to share with others as a factor that contributed to his decisions to follow the teaching profession. Moreover, Mr Black views teaching as the mother of all professions and believes that everything originates from teaching. Ms Red indicated that her desire and interest to teach as well as the need to develop communities motivated her to follow the teaching profession. However, Mr Green mentioned that he followed the teaching profession because he found teaching to be the only available and affordable profession to follow as opposed to other professions.

Teachers view teaching as a means to transform lives. Education is viewed from a nation perspective where the emphasis is on the production of a skilled workforce that will contribute positively to the economy of the country. Furthermore Table 4.33 indicates that teachers felt that the priority of each and every teacher should be the fulfilment of the roles of the educators as outlined in the Norms and Standards for Educators (2000). Mr Black indicated that teachers are expected to be good leaders, lifelong learners as well as developers of work schedules and other teachers. Ms Red and Mr Green indicated that teachers should teach learners in a manner that they will ensure that they become better people in future.

When asked what he thought was the most important component of a teacher's job, Mr Green answered:

> "The most important component of a teacher's job I think it is to transform the lives of the learners that are entrusted to them. You see the parents bring them to school and they bring them with the idea that teachers will help them [learners] to become responsible and active as a decent citizen of the country so I think the main thing of the teachers should transform the lives of the learners and make them better people".

All three teachers that were interviewed have strong views about why technology should be offered as a school subject. Mr Black indicated that Technology Education will help his learners in future and Mr Green pointed out that Technology Education creates technological awareness and also offers authentic learning to learners. Ms Red indicated that Technology Education as a school subject exposes learners to different environments. These concur with the literature in that the purpose of Technology Education as a school subject is to produce a skilled and competent workforce in the areas of engineering, technicians and artisans, and to develop a technologically literate population for the contemporary world (McCormick, 1997:143, DBE, 2011:6). Furthermore, the subject is aimed at stimulating learners through teamwork to develop and apply

specific design skills to solve technological problems responsibly whilst appreciating the interaction between people's values and attitudes, technology, society, and the environment (DBE, 2011:6).

As mentioned in section 2.2.3 of this dissertation, Nabhani and Bahous (2010:221) assert that it is important for CPD programmes to support and assist teachers to build professional identities whilst taking into cognisance teachers' experiences related to the expectations of the different management structures they are exposed to, as well as the roles they need to fulfil as teachers. Since factors such as teachers' roles and responsibilities has been identified as key to the formation of teachers' professional identity it is important for any CPD programme aimed at the development of teachers to be contextualised to suit the teacher as an individual with prior knowledge and experience working in an environment (school) that has its own politics that can either enhance or inhibit development and growth (Day et al., 2007:102). This will in turn result in teachers' being content and satisfied with the teaching profession, thus retaining them in the system.

Some teachers were not content and satisfied to be teaching previously (due to ever-changing curriculum, insufficient training for teachers and support) they are presently more positive about their work due to the influence of the outcomes of the CPD programme on their classroom practices and professional development. Ms Red described her level of wellness in the teaching profession as follows: "I was partially happy because the education system changes rapidly. The department did not give us enough training and enough workshops and at the end you find some teachers not coping with the changes."

Mr Green, who initially never wanted to become a teacher, indicated that his positive interaction with teaching and learning materials during the CPD programme as well other teachers resulted in change of attitude towards the teaching profession. He further pointed out that he was now self-reliant and he does not rely on a textbook anymore to structure his teaching and learning activities. This was in line with the prescripts of Outcome 1 (see section 2.2.6) that advocate for teachers to have practical understanding of the effective educational approaches in education.

Evidence: The voices

Mr Black

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Mr Black had this to say about the teaching profession "Teaching is a calling to me and I decided to share what I had with other people because everything originates from teaching". Mr Black further indicated that "Teaching is the mother of all professions"

When asked what his priorities as a teacher were, Mr Black had this to say "I always strive to be a good leader, lifelong learner, and a designer and developer of work schedules".
When asked what they think is the most important component of a teacher's job, Mr Black answered "Teachers contribute in the economy of this country and without good education I think the economy will suffer."

When asked about what he thought was the importance of Technology Education as a school subject to their learners, Mr Black responded "My view is that if they can learn some of the projects done in the subject; it will help them in future when they are grown-ups.

Ms Red

Ms Red, who is passionate about the teaching profession, responded as follows: "I have the desire and the interest to teach learners to become better people in future and also to develop the community at large" and her "Priority is to teach learners so that they can become better people in future. In fact I have the best interest of my learners at heart".

When asked what she thought was the most important component of a teacher's job, Ms Red responded by saying "I think is to teach the learners and encourage them to be educated". Ms Red describes the importance of Technology Education as a school subject as follows "It helps them (learners) to be exposed to the environment they live in".

Mr Green

However, Mr. Green who initially never intended to be a teacher had this to say "Basically I never decided to become a teacher, I only find myself faced with a college of education as the only available and affordable institution of higher learning."

When quizzed about his priorities as a teacher, Mr Green responded as follows: "I want to see my

learners developed and coping in the technological world. Moreover, learners must be able to compete with the outside world. That is my aim".

4.5.1.2 **Teachers' self-discovery and attitude to professional self-development**

As indicated in section 1.2.1 most teachers that used to offer Technology Education in schools do not possess the necessary qualifications, background, knowledge and skills to teach technology as they do with other subjects. Hence Potgieter (2004: 216) and Ankiewicz and De Swardt (2002:76) advocate for a Continuing Professional Development (CPD) programme to facilitate the paradigm shift from their old subjects to Technology Education as a school subject.

As outlined in section 2.2.6 of this dissertation, Outcome 5 of the CPD programme demand teachers to demonstrate the effective knowledge and skills required to teach Technology Education in schools. During the data collection process, teachers reported that the outcomes of the CPD programme had to some extent influenced their classroom practices and professional development. Teachers indicated that they have been exposed to different context in Technology Education and given a chance to expand their teacher Technology Education-specific knowledge. Teachers indicated that they have acquired new knowledge that in turn enhanced their teaching abilities in the subject. When asked how the CPD programme met his expectations as a professional, Mr Black responded by saying "...now I know the strategies of teaching Technology Education".

One teacher pointed out that he was now self-reliant and he does not rely on a textbook anymore to structure his teaching and learning activities. When asked what she found about herself during her participation in the CPD programme, Ms Red responded by saying "I found myself being a new person who has acquired new knowledge and skills and even exposed to various environments (contexts) in Technology Education". When asked to elaborate further she had this to say "... now I know what and how to teach Technology Education in the classroom".

Presently, Mr Green felt that:

> "CPD programmes are aimed at helping us as teachers to understand how the NCS is going and how we should teach our learners and I also think it is the issue that some of us were not understanding the Technology Education policy document and the stuff, so that program helped us a lot in order to understand those learning outcomes and the assessment standards, how to go through them. That is what I think I learnt more from the programme".

Evidence: The voices
Mr Black

When asked if he was happy to be teaching, Mr Black answered "I'm happy to be teaching and contributing to the economy of this country". Mr Black had this to say about his desire to develop further as a professional "I want to develop further in the teaching of Technology Education" and when asked how that could be achieved, he responded like as follows "By reading books and enrolling with institutions of higher learning to increase my content and pedagogical knowledge in Technology Education".

When asked what he found about himself during his participation in the CPD programme, Mr Black responded as follows "I have developed educationally".

Ms Red

Ms Red also has the desire to develop further as a professional "Yes; I want to develop further as a teacher because I am intending to register for an Honours degree in Technology Education. This will help me to gain more insight knowledge of the subject".

When asked how the CPD programme met her expectations as a professional, Ms Red responded by saying "Presently, I feel that have been developed because I am able to access information using various resources and also I am able to use policy statements when preparing for lessons".

Mr Green

Mr Green who initially never intended to be a teacher shared his experiences as follows
"I'm happy because initially I never wanted to become a teacher but this time around, through my interaction with the teaching and learning materials and other staff members, I become used to it, then I am happy, I don't have a problem now". At the time of the study, Mr Green indicated that he was content and satisfied with the teaching profession. He described his position as follows "I'm in the process of development because after completion of the ACE programme, I am now doing honours in Technology Education".
Further Mr Green indicated the following:

> "I think it helped me a lot by being self-reliant and not only relying on the prescribed text book. Initially when I was teaching Technology Education; I was

just taking a text book and going through it page to page but now; I can do it
without relying on the textbook...”

4.5.1.3 CPD programme as a professional teacher development strategy

Outcome 1 of the CPD programme, as outlined in section 2.2.6, demanded that teachers demonstrate the ability to be lifelong learners. Findings from this study revealed that teachers were motivated to enrol for the CPD programme because it was an accredited course (ACE) that subsequently improved their qualifications. This was evident during in-house workshops were class attendance was never a problem because one of the condition for the successful completion of the CPD programme was at least 95% workshop attendance for the duration of the programme. This concurs with the viewpoint of Reitsma and Mentz (2009:25) who assert that it is crucial to accredit in-service training, certifying the professional development of the proficiency of the teacher. In this way, a long term vision to put trained certified Technology Education teachers in the classroom may be reached.

There is also evidence from the results of this study that suggest that teachers had been greatly motivated by the CPD programme to improve their Technology Education- specific teacher knowledge. As outlined in section 2.2.6, the prescripts of Outcome 4 of the CPD programme demanded that teachers be independent life-long learners. There is evidence from the results of this study that all the three teachers had been greatly influenced by the outcomes of the CPD programme to improve their Technology Education- specific teacher knowledge. Two teachers (Mr Black; and Ms Red) are intending to register for honours degree in Technology Education and Mr Green is doing his final year of his honours degree in Technology Education.

However, teachers are calling for continuous support from the department in order to sustain and improve the knowledge gained during their participation in the CPD programme. Lack of capacity by the department to provide teachers with on-going support in their schools will always defeat the gains acquired through teachers' participation in CPD programmes. When asked what he found out about himself during his participation in the CPD programme, Mr Green answered "I really enjoyed being part of the CPD programme because now I realise that I can be a better teacher especially if I can be given the necessary guidance and support".

Findings from this study further revealed that before their participation in the CPD programme teachers were not aware of the expected outcomes of the CPD programme and as a result other

teachers felt frustrated and even contemplated quitting the programme. To minimise the effects of the frustration indicated above, during workshops teachers were accorded the opportunity to give inputs on how future training sessions should be designed and delivered. This was in line with Bybee (2001:27) who finds that in general, effective CPD programme for teachers should take into cognisance the needs and experiences of teachers, the curriculum requirements, Technology Education -specific teacher knowledge required to promote effective learning in the classroom as well as the support for standards-based reform and associated changes of curriculum, teaching strategies' and assessment. Furthermore, Reitsma and Mentz (2009:16) report that the content of the training should be delivered according to different themes and should incorporate content and methodology, as well as practical skill work. As outlined in section 1.5.2.3, the structure and the format of the CPD programme incorporated centralised workshops and school-based support visits.

Teachers mentioned that the outcomes of the CPD programme influenced them to transform and improve their teaching of Technology Education in the classroom. This was in line with the literature where various researchers advocates for teacher development model that a combines out-of-school workshops and in-school support for teachers (Lessing & de Witt, 2007; Desimone et al., cited in Reitsma and Mentz, 2009:17). Lavonen et al., cited in Reitsma and Mentz (2009:25) call for the combination of the theoretical content and practical teaching examples as a means to enable teachers to implement their acquired knowledge and skills in their own teaching.

Guskey and Yoon (2009:497) emphasise the importance of follow-up and support activities to sustain the knowledge that has been acquired by teachers through their participation in CPD programmes.

Findings from the literature revealed that the structure and the format of the CPD programme under review had influenced teachers' classroom practices and professional development. As outlined in section 5.1, teachers indicated that the workshops and schools support visits helped them (teachers) to acquire Technology Education-specific teacher knowledge relevant to their teaching of Technology Education in the classroom. Teachers indicated that the workshops delivered through the CPD programme were hands-on and relevant and helped them with practical work. When asked how the CPD programme met his expectations as a professional, Mr Green responded by saying this:

"I was helped a lot in the usage of the design process during lesson presentation. In technology they are saying when you teach Technology Education; you teach it through the design process. I think that is one of the most things that I have learnt because now I am able to go through any aspect of Technology Education like maybe say structures. I can teach structures using the design process and everything goes smoothly up until the end of the lesson"

Furthermore, Ms Red indicated that "They (workshops and school support visits) were motivating and encouraging. They actually assisted to be always ready to deal with the challenges one faces in the teaching of Technology Education in the classroom". When asked what about the relevance of workshops and school support towards enhancing his teaching abilities, Mr Black replied by saying "I have acquired new strategies of teaching Technology Education". When asked to elaborate further, Mr Black answered "I now know how to make a project; I know methods of teaching Technology Education such as using projects and case study. Initially; I was not in the know that if you teach technology you can make use of projects and the case studies". However, one teacher indicated his discontent with workshops. He indicated that most of the workshops he had attended, there was little attention given to individual teacher's needs. According to him this is attributed to the large number of participants admitted in such workshops.

When asked why, he explained as follows:

"Because if I get lost in my strategies of teaching Technology Education; then if you are here, you can help me with the correct procedure that I can apply in the effective teaching of Technology Education rather than it is in a workshop" and "sometimes in the workshop; you find that we are clustered in a big hall. Sometimes if you ask questions, it takes time to understand unlike if you are alone, like we are sitting now; if I ask you something that if I get lost during teaching then you'll help me"

Teachers also found the school-based support visits offered by the CPD programme very useful. Teachers appreciated the one-on-one interaction with facilitators during school-based support visits. This was confirmed during such visits where teachers were always cooperative and supportive.

Evidence: The voices

Mr Black

When asked what if he had made full use of the support offered by the CPD programme, Mr Black responded "Yes, I made use of it" and when asked how, he answered "I always ensured that every time I came into contact with our facilitators; I presented all my challenges for advice and clarification".

Ms Red

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When asked to give her opinion about the components of the CPD programme that she found useful, Ms Red responded by saying "I think both the workshops and school support visits were useful because I gained more insight about Technology Education and how it should be taught in the classroom. When asked to elaborate, she had this to say: "I enjoyed workshops because they helped me to acquire new skills and knowledge in Technology Education. I also enjoyed the one-on-one sessions with facilitators during school support visits because it gave me chance to deal with the real challenges I am facing daily in the classroom".

Mr Green

Regarding the content offered in workshop, Mr Green indicated the following:

> "Ja [Yes], basically the content was relevant because it is like; it helped us because as I indicated, we were not able to interpret the policy document and also our interaction with our facilitators and even when they were doing the school visits were helpful. I think it was more helpful because after we have presented our lessons we sit down with them, we discuss and they indicate to us that this and this should happen in this way, this is where I benefitted a lot"

4.5.2 How do Technology Education teachers presently manage, plan, facilitate, resource and assess Technology Education lessons in the classroom as against the expected outcomes of the CPD programme?

The findings presented and discussed below are based on Technology Education teachers' present classroom practices in relation to the outcomes of the CPD programme. This section reports on the findings from interview sessions, classroom observations and document analysis conducted.

4.5.2.1 Confidence in content and methodological knowledge

As outlined in section 2.2.6 of this dissertation, Outcome 1 and 5 of the CPD programme expected teachers to demonstrate practical understanding of effective educational approaches in education, in relation to the development of Technology Education-specific teacher knowledge and skills necessary for the effective teaching of the subject in schools.

Findings from this study revealed that teachers were to some extent influenced by the outcomes of the CPD programme to effectively teach all the sections of the syllabus including those sections that gave them problems in the past. Teachers indicated that they were confident in their content

and methodological knowledge of Technology Education as a school subject and as a result, their learners are also benefitting from their newly acquired knowledge. According to them, this is attributed to the influence of the outcomes of the CPD programme on their classroom practices and professional development as teachers. When asked if he was confident in his content and methodological knowledge in Technology Education, Mr Black responded: "I am confident because now my learners can compile a project portfolio and they can make projects in Technology Education" and when asked if that was not the case prior her participation in the CPD programme, he had this to say "No, no, they (learners) didn't know how to make a project and how to compile a project portfolio".

A brief glance teachers' resource file, learners' books and portfolios, it was evident that teachers covers all the sections of the syllabus as per the work schedule. For example: during classroom observation, Ms Red treated a topic on 'Processing' and Mr Green treated a topic on 'Structures' which were all in line with the prescripts of the work schedule. Mr Green explained how his Technology Education content knowledge had improved owing to his participation in the CPD programme:

> "Presently I do not have any serious problem with that. Initially I had a problem with the part of processing. What I did is that I decided to outsource the topic to other teachers. Before I attended the CPD programme, I was only teaching structures and electricity because I did not understand the topics under processing. The materials on processing as well as the practical work that we did during the programme helped me a lot".

From all the classroom observations conducted, it was clear that teachers' pedagogical content knowledge is on par with the outcomes of the CPD programme under review in this study. Observing Mr Black in class, it was evident that he was confident in his content knowledge and presented it in a systematic manner. He used the procedural knowledge (design process) effectively to deliver the content. Checking on learners' books, there was evidence of learners compiling portfolios for different projects. It was also clear from classroom observations that Ms Red was also confident in her content and methodological knowledge.

This was in line with Jones and Moreland (2004:123) who note that: "Teachers' understanding of the nature and purpose of the discipline strongly influences their pedagogical content knowledge i.e. what they highlight as important". Fox-Turnbull (2006:53) posits that what to teach, how to teach and when to assess in Technology Education is depend on the quality of teacher knowledge. Shulman, cited in Fox-Turnbull, (2006:54) advocates for the development of an extensive teacher

knowledge base in the areas of content knowledge, general pedagogy, curriculum pedagogy content, learners' educational context, and educational ends. Moreland, Jones and Chambers, cited in Fox-Turnbull, (2006:54) argue that effective teaching and learning of Technology Education is influenced by the development of teacher knowledge based on four domains: procedural, conceptual, societal and technical. Additionally, Fox-Turnbull (2006:53) has this to say about teacher knowledge:

> " *For teachers to be able to plan and implement a unit of work that is based on authentic technological practice they must have a good understanding of the conceptual, procedural, technical and societal knowledge relevant to the practice*"

Assessment Standard 1 of Outcome 3 (see section 2.2.6) of the CPD programme emphasised the importance of teachers' ability to interpret, adapt and design learning programme appropriate for the learning context in which they occur. Findings from the study revealed that teachers have a clear understanding of the nature of the Technology Education-specific teacher knowledge required to facilitate effective Technology Education lessons in class, hence they are able to question the standard of the common work schedules supplied by the department. Teachers pointed out that the work schedules and policies supplied by the department are questionable and confusing.

Perusing the work schedule, it was confirmed by the researcher that teachers' observations were correct. The work schedule is not user-friendly to any novice Technology Education teacher because it lacks cohesion amongst various activities. For example, the assessment strategies infused in the work schedule does not cover all the required different tasks but mainly covers class work, homework and tests. Moreover, the work schedule separates the procedural knowledge (Design Process) from the conceptual knowledge (content). This is in line with the findings of Jones (1997:88) which revealed that the teaching and learning of technological concepts and processes are made even more difficult by a curriculum that separates knowledge and understanding, and skills and processes which was evident in this study. Jones (1997:86) asserts that for students to effectively undertake technology activities, procedural knowledge and conceptual knowledge cannot be separated.

Teachers further revealed that the reason why they follow the work schedules supplied by the department was that their learners sit for common quarterly tests. However, due to the influence of the outcomes of the CPD programme as outlined in Assessment Standard 1 of Outcome 3,

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teachers were able to reconfigure the work schedule and ensured that the teaching and learning activities were aligned to the work schedule and presented in an organised manner. Moreover teachers even used a variety of assessment strategies not specified in the departmental supplied work schedule. Mr Green had this to say about his acquired skills: "I am a confident Technology Education teacher. Like I indicated, my ability to unpack the policy document helped me to know what is expected of me in a Technology Education classroom".

Ms Red exclaimed: "I am so confident because presently I am different from the way I used to teach Technology Education before registering for the CPD programme". When asked to justify her statement, she said "I am different because now I am able to use the policy statements to structure my teaching and also when I am to assess my learners I make use of the assessment policy statements as a guide to assess the learners".

Evidence: The voices

<u>Mr Black</u>

Mr Black indicated that the departmental prescript forced him to teach all the sections of the syllabus. In his own words he had this to say "Because the government have supplied us with a work schedule which is divided according to terms. I am following this because we are to write common formal assessment tasks".

However, Mr Black raised issues about the nature of the work schedules supplied by the department. In his own assessment, the work schedules were not properly done. He voiced out that "Sometimes they [the department] just provide us with questionable policies and work schedules that are confusing. Some of the policies and work schedules only cover certain topics and in most instances only to one assessment standard and LO which is not the way Technology Education should be planned and taught". Mr Black further mentioned that the work schedule separated the procedural knowledge from the conceptual knowledge. He had this to say "LO 1 cannot be separated from LO 2, they is inseparable".

When asked what he did prior his participation in the CPD programme when faced with a section of the syllabus that he did not understand, Mr Black answered "I consult, for example, sometimes I consult subject specialist for help when I do not understand some aspects in the subject".

<u>Ms Red</u>

Like Mr Black, Ms Red also indicated that the departmental prescript forced her to teach all the sections of the syllabus. In her own words she indicated "Yes; I teach all the topics that appear on the work schedule because they are the ones the learners are assessed on". Ms Red also indicated that the work schedule was confusing as it separated the procedural knowledge from the conceptual knowledge. She had this to say "I must be honest; the (work schedules) are confusing. When asked to elaborate, Ms Red had this to say "It separates the LO2 from LO1".

Like Mr Black, Ms Red mentioned that she "Consult[s] with other Technology Education teachers in my school as well with those from neighbouring schools. I also consult my HOD and where possible I can invite the Curriculum Advisor for assistance".

Mr Green

Mr Green explained how his Technology Education content knowledge had improved owing to his participation in the CPD programme:

> "Presently I do not have any serious problem with that. Initially I had a problem with the part of processing. What I did is that I decided to outsource the topic to other teachers. Before I attended the CPD programme, I was only teaching structures and electricity because I did not understand the topics under processing. The materials on processing as well as the practical work that we did during the programme helped me a lot".

Furthermore, Mr Green appreciated and values the materials drawn from the CPD programme. In his own words, he said "There is a booklet that I got from the programme that I am still using today as reference".

4.5.2.2 Lesson preparations, structuring and classroom management

As outlined in section 2.2.6, one of the key roles of a teacher is to select, sequence and pace the learning in a manner that makes teaching and learning in the classroom meaningful and effective. Moreover, Assessment Standard 2 of Outcome 4 of the CPD programme emphasises that teachers should demonstrate the ability to design original learning resources for their teaching.

During the workshops teachers were extensively trained on the development of lesson plans for their classroom teaching. The focus was on the following:

- The formulation of lesson outcomes which must be meaningful, relevant attainable and be linked to the assessment standard(s);
- Selection of assessment standards (drawn from the Technology Education Assessment

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policy) which must be clearly stated and linked to the Learning Outcome (LO) and the lesson outcomes;

- Subject matter which must be adequate, well-sequenced and matched with outcomes;
- Formulation of learning activities which must be appropriate to the lesson outcomes anchored on learners' prior knowledge, contextualised and linked to outcomes and assessment standard(s);
- Selection of teaching methods which are learner-centred; and
- Selection of assessment strategies which are relevant and adequate for chosen outcomes.

Findings from this study revealed that due to the influence of the outcomes of the CPD programme some teachers recognise the importance of lesson planning hence they now do it. While Ms Red does see the importance of doing lesson plans, she does not think they should be in a written form because, according to her they (lesson plans) are time consuming. This is in contrast with literature where Kramer (2002:155) argues that the critical element of a lesson plan which outlines the crucial aspects of teaching and learning is that it must be written. However, Ms Red mentioned that the only time she did lesson preparation was when she was faced with a challenging topic: *"Depending on the topic to be handled, I sometimes do it daily or on weekly basis"*. When asked about her earlier submission about written lesson plans, she answered "Yes; sometimes when have written them, I make use of them" and when asked what happens if she did not write them down, she replied as follows "they are done here" (pointing at her head). On the contrary, Mr Green acknowledged that even though he is an experienced technology teacher, there was a need for him to do lesson preparations. In his own words, "I am always prepared though can I say that I've been teaching technology for long and sometimes you see I think I now know what I am going to do in the class, but Ja [Yes], I try to be prepared every day".

It should be noted that in most schools, lesson plans are neither enforced nor monitored. This is to some extent attributed to the lack of capacity in the schools and department to monitor this process as well as the pressure exerted by teachers' unions to the department and school managers to do away with formal lesson plans because they (lesson planning) are viewed as 'extra work' on top of teachers' responsibilities in schools. Despite the non-monitoring of written lesson plans in schools, there is evidence from this study that suggest that teachers' classroom practices and professional development have been influenced by the outcomes of the CPD programme. During the document analysis sessions, teachers' resource files were up-to-date and contained lesson

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plans, learner assessment records as well as subject and assessment policies.

Teachers did not supply sufficient information on how they structured their lessons, but what was conspicuous during classroom observations was that teachers used the materials drawn from the CPD programme to structure their learning and teaching activities.

For example, Mr Black used the materials drawn from the CPD programme to present a lesson on 'Mechanical Systems' and learners followed the instructions on the hand-outs and engaged with the tasks in their groups.

Clarke (2007:95) emphasises the training of teachers in classroom management as an important component that must be incorporated in all CPD programmes. In the CPD programme under review in this study, teachers were extensively trained on classroom management and safety which encompass the following:

- Provision and maintenance of clear and effective set of behavioural rules in the classroom and workshop (Technology Education designated classroom);

- Formulation of organisational roles which are aligned to safety in the workplace.

All learners observed in all the three schools were generally well disciplined. Teachers attributed this to effective classroom management strategies they gained from their participation in the CPD programme. All three participants (Ms Red; Mr Black; and Mr Green) mentioned that they found their learners disciplined, attentive and engaged during lessons as they take instructions very well and can even do the work without the immediate supervision of the teacher. According to two participants (Mr Black and Ms Red), this is attributed to good teaching as well as exciting projects that they have acquired from the CPD programme. Ms Red indicated that her learners are motivated to learn Technology Education by 'exciting projects'. She posits that her learners enjoy making projects in Processing because they (learners) can relate their products to their real life experiences.

Ms Red indicated that she normally did projects on 'Processing' because the resources required are readily available and can be improvised with much ease. Processing is one of the key content areas of Technology Education as a school subject. Processing focuses on practical ways in which materials may be processed or manufactured to solve a problem or meet a particular need. Ms Red also claimed that learner attention is enhanced by exciting projects. She mentioned that though her

learners are "shy in nature, they sometimes asks questions especially when doing projects that excite them".

Perusal of learner' books revealed that learners are able to compile a project portfolio that explains the design and the making of a particular model.

In all classes observed, there were a variety of completed models that are being displayed as a testimony of some practical work that had been done. However, most models observed in most schools were for 'Processing'.

It was a marvel to watch Mr Green in class. During classroom observation it was confirmed that he kept his learners engaged and attentive. His learners followed instructions very well and their general behaviour was conducive to effective teaching and learning. Even though his class was big, he made sure that his learners were engaged and attentive. Mr Green believes that the way the teacher interacts with their learners in class has an effect on learner discipline. When asked if he experiences any disciplinary problems with learners in class, Mr Green responded "No, not at all, my belief is that the way the teacher interacts with the learners in class has a great bearing on discipline. If learners are kept active I think they won't be any ups and downs".

Mr Black provided and maintained a clear and effective set of behavioural rules that regulated learner behaviour in class. He pointed out that his learners are able to do a project and attributes learners' engagement to his way of teaching "They are engaged because of the way I teach them". In Ms Red's classroom the 'Safety in the workplace charter' drawn from the CPD programme was displayed on the class's notice board for easy reference. However it should be noted that none of the classes visited has a 'First-Aid kit' readily available in classes to assist the teacher and the learners in case of emergency.

Teachers effectively used group work during their lessons and their learners organised themselves in groups, shared the tasks amongst themselves and ensured that everyone completed the work. An observation of Mr Black's class confirmed that learners were working in groups and shared the tasks amongst themselves. They (learners) also brought to schools materials required to make a project on a 'tipper truck'. It should be noted that the same project was done by the teachers during their training. Perusing learners work, it was evident that learners were able to compile a project portfolio. However, learners' books revealed that the nature of designs (drawing) was not

up to the required standards. It is worth noting that the component of design (drawing) in Technology Education as outlined in section 1.2.2 is aimed at introducing learners to basics needed in Civil Technology, Mechanical Technology, Electrical Technology and Engineering Graphics & Design offered in the FET band of the RNCS.

This is attributed to teachers themselves being unable to draw, hence their inability to effectively teach drawing skills to their learners. This was one aspect of the training that was not thoroughly done during the CPD programme because the technology curriculum does not have Design (drawings) as core content by itself but instead it is being incorporated into the Design Process.

Evidence: The voices

Mr Black

When asked if he does lesson preparations, Mr Black answered "I prepare for a lesson plan of 2 weeks and I prepare in advance. I can make it for a month". When quizzed about the resources he uses in his lesson preparations, Mr Black answered "Sometimes I make use of the encyclopaedia, sometimes the internet, sometimes I make use of pictures or the manuals which I got from the University of Limpopo, I make use of them".

Mr Black described how he starts his lessons as follows "I just group the learners according to their abilities and assess them continuously with the lesson.

When asked what if he experiences any disciplinary problems with learners in class, Mr Black answered: "I don't have any problems with my learners because the school has an effective discipline code for teachers and learners"

When asked about the demands he makes of his learners in terms of punctuality, completion of tasks, Mr Black indicated that he usually encouraged his learners to be punctual and complete tasks on time and does follow-ups when necessary. He describes his situation as follows "I encourage them to be punctual for class and completion of tasks and when asked if they (learners) do not complete tasks on time, he said "I must do some follow-ups to ensure that they to finish their work".

When asked how he interacts with learners in class, Mr Black responded "I just guide them. Learners work in groups and all the work is done by them".

Mr Black when asked how he ensured that his lessons are 'learner-centred, responded by saying "I make sure that all learners in the groups are given responsibilities". When asked if he finds

group work effective, Mr Black replied "Yes; I always ensure that each individual contributes meaningfully to the entire group" and "When they do a project, they do it in groups".

When asked if his learners were taking responsibility and control of their own learning, Mr Black answered "Yes, because they usually come with other sources and resources, especially if we don't have material for doing projects; they compromise to come with some materials needed to do the project".

<u>Ms Red</u>

Ms Red described written lesson preparations as a time consuming exercise. Ms Red's reaction to lesson preparations was as follows: "Written lesson preparation is time consuming and as long as I am prepared, is fine". She further emphasised that she prepares but it is seldom done in a written form: "I prepare but I do not do it in a written form. I just go through the textbook and other sources but not necessarily writing them down".

Ms Red mentioned that the only time she did lesson preparation was when she is faced with a challenging topic: *"Depending on the topic to be handled, I sometimes do it daily or on a weekly basis".*

When asked how she introduces her lesson in class, Ms Red responded "I start from known to unknown. Technology Education is about solving problems hence I usually ask them questions related to their experiences about the problem to be solved in order to provoke their thinking and curiosity".

When asked about her earlier submission about written lesson plans, she answered "Yes; sometimes when I have written them, I make use of them" and when asked what happens if she did not write them down, she replied as follows "they are done here" (pointing at her head).

Ms Red indicated that her classroom management strategies as well the effective disciplinary code contributed to the 'good' behaviour of her learners in class. In her own words, she described her situation as follows "I try to manage my class very well". She further mentioned that "there are classroom rules and my learners usually obey them. The school also has a disciplinary code for all learners". When asked about the demands she makes of his learners in terms of punctuality, and completion of tasks, Ms Red answered "I always encourage my learners to be punctual to class and to complete their work on time" and "I have not encountered any problems regarding non completion of tasks and punctuality".

When asked how she interacted with learners in class, Ms Red answered "I give learners tasks in their groups and allow the groups to interact with each other through discussions". When asked if she finds group work effective, she answered "Group work is very much effective in technology because it allows learners to share ideas that will result in the design and making of a solution for a particular problem". Ms Red explains how she conducts group work as follows:

"Firstly, I group learners according to their different abilities and the type of learning activities to be undertaken determines the teaching strategy to be followed".

However, she was concerned with the number of learners in the class "the number of learners in the classroom is also a factor that needs to be considered when choosing the teaching strategy".

Mr Green

When quizzed about the resources he uses in his lesson preparations, Mr Green described his situation as follows:

"Basically I use text books, relevant text book and whatever I come across written Technology Education I go through it. Furthermore; I am now able to use my computer in searching for information. Initially I didn't know how to use a computer to find information, but now I can use a computer to find information that I can print as hand outs for my learners".

When asked how he introduced his lesson in class, Mr Green described the situation as follows:

"It depends on what I have to teach in that lesson. The approach varies as per the demands of the lesson. I normally start by explaining the concepts that underpins the lesson. Sometimes those concepts are given to them beforehand and as an introduction to the lesson we check the learners' responses and deliberate on them".

Mr Green had this to say about the usage of group work in his class:

"I use group work. Learners do most of the work on their own and then they present to others and to me. I only interact with the groups in order to help them where they need help and some of them [the learners], believe me, they are intelligent, and they might even come up with something that you were not aware of".

Mr Green however mentioned that even though his learners take responsibility and control of their own learning, they need to be pushed to complete the work. "I think they do, but sometimes you see they want to be pushed; you understand how a wheelbarrow works. If you push it, moves but if you leave it, it stays there until you come and push it, so it depends, but you have to push them to finish the work". Mr Green further indicated that his learners were so attentive to a point where they (learners) would do the work without his immediate supervision. He pointed out that "Their

responses and the way they take instruction, to me, it shows they are attentive because they are able to do what you say they must do even if you are not around".

4.5.2.3 Usage of resources

Assessment Standard 2 of Outcome 1 (see section 2.2.6) of the CPD programme emphasised that teachers were expected to demonstrate practical understanding of the role of language, resources and teaching aids within M/S/T Education teaching and learning. During the training teachers were trained on the selection of appropriate textbooks and the usage thereof in the teaching and learning situation. Findings from the data collected revealed that teachers acknowledge the influence of outcomes of the CPD programme on the importance of textbooks as a source of reference. Although Mr Green pointed out that there are not enough books in his school; teachers mentioned that they used textbooks during their lessons as source of reference for the development of learning and assessment tasks.

Assessment Standard 2 of Outcome 3 (see section 2.2.6) of the CPD programme expected teachers to be able to demonstrate the ability to design original learning resources. All the participants indicated that they provided their learners with notes to supplement the information supplied in the class. However findings from this study revealed that either teachers lacked the ability to design their own learning resources or they were just reluctant to do it. This observation was made by Taylor and Vinjevold (1998:178) who assert that most teachers lack the capacity to design original teaching and learning materials. What was conspicuous during classroom observations was that teachers used the LTSMs drawn from the CPD programme to structure their lessons and to provide their learners with notes. This is because teachers found the LTSMs drawn from the CPD programme meaningful and helpful in many ways. Mr Green valued the materials drawn from the CPD programme to the extent that he felt that the materials will be part of his repertoire for as long as he is still a Technology Education teacher.

> "I think they are very much valuable because I am using them. I think it is the source of most information. The materials are also having websites that one can consult for more information. Most of the materials that we were given that time, I'm still using them and I think it will be part of me as long as I am still a teacher or unless maybe the syllabus changes, but really, those materials have helped me a lot".

The LTSMs were developed in such a manner that it allowed teachers to replicate the activities that they have done during their own training in their own classroom. Observing teachers in class

revealed that teachers did provide learners with notes. However, it should be noted that teachers did not design the original learning resources as per the outcome mentioned above. Instead teachers used hands-outs sourced mainly from the materials drawn from the CPD programme.

Evidence: The voices

<u>Mr Black</u>

Mr Black acknowledged the availability of textbooks in his school which he uses for reference purposes. He described his situation as follows "Yes, the learners have textbooks", and when asked how he uses them in his lessons, he had this to say "I use this textbook if there is something which is needed in that textbook..."

When asked to comment about the usage of LTSMs drawn from the CPD programme, Mr Black indicated that he was presently making use of the materials drawn from the CPD programme. This is what he had to say about the materials "They are so useful; even now I am making use of them in class" and when asked how he uses the materials in class he pointed out that "they are useful because there are some topics that are not well outlined in our text books".

Mr Black mentioned that he provided his learners with notes to supplement information in the textbooks "Sometimes if there is insufficient information in their (learners) books then I get something from the internet which I can print for the learners".

When asked if he provided remedial work to those learners that require it, Mr Black explained "It is not always the case, but sometimes I do provide some remedial work for those learners who do not understand".

A brief glance at learners' books revealed that remedial work is provided in a form of corrections to the completed tasks.

<u>Ms Red</u>

Like Mr Black, Ms Red also acknowledged the availability of text books which are used as a source of reference. She explained: "I use them during the lesson for reference and sometimes I use them to develop assessment tasks".

Ms Red indicated that "I really find the Learner Teacher Support Materials I received from the CPD program as being meaningful and helpful because I usually use them as a guide when I prepare my lessons. In most instances I use them as a supplement to the textbook".

When asked if the materials were used as a replacement for lesson preparations, Ms Red answered that "... they make my life easy".

Ms Red pointed out that she provided her learners with notes to supplement information provided in class. "I normally give them hand-outs and I also encourage them to use their textbooks to get more information."

When asked if she provided remedial work to those learners that require it, Ms Red described her situation as follows: "I always encourage my learners to help one another and in some instance I conduct extra lessons to address problematic sections".

<u>Mr Green</u>

Mr Green indicated that his school did not receive any supply of textbooks and had to borrow textbooks from other schools. He described his situation as follows "No, this is a new school; we never had a supply of text books in this school. A few texts that we have, we took them from our neighbouring schools".

Asked how he used the 'borrowed books' in his lessons, Mr Green answered "Normally I use text books to find some exercises for the lesson, home activities and even learners may be able to get information when they are at home".

Mr Green indicated that the structure of his lessons was based on his personal belief on how Technology Education should be taught, as well as the availability of materials at his school. In his own words, he said "Actually my learning and teaching activities are based on my belief. I basically search for information on the topic and how my presentation will be like in class will depend on the availability of materials. In most cases we improvise".

Mr Green, like the other two teachers indicated that he provided notes to his learners to supplement information provided in the class. In his own words, he said "I provide them with notes more often. Sometimes I search information from the internet and from text books. Actually that is how I work. I just go out and find information and make copies for my learners".

4.5.2.4 Assessment

During the CPD programme under review in this study, teachers were extensively trained on the following assessment strategies applicable in the assessment of technology in schools: tests; assignments; projects; research; and case studies. This was in line with Outcome 2 (see section

2.2.6) of the CPD programme, which expected teachers to apply knowledge of assessment strategies relevant and appropriate to Technology Education.

Findings from the data collected revealed that the outcomes of the CPD programme had, to some extent, influenced teachers' understanding of what is required of them in terms of the new assessment strategies as outlined in the technology assessment policy. Teachers mentioned that the outcomes of the CPD programme helped her to understand assessment in Technology Education better to a point where they help other teachers from their clusters during departmental workshops. When asked how the CPD programme helped them in terms of assessment, Mr Black responded as follows:

> "...now I understand how to interpret the policy documents. This has been my main problem in the past, even now, there are teachers who still have problems of understanding what assessment standard are, because they do not understand assessment. This is a major problem for most educators".

Despite the department supplied work schedule that indicate that only class work, home work and tests should be administered as forms of assessment, teachers made use of class work, homework, baseline assessment, projects, case studies and even assignments to assess their learners in class. According to the teachers, these changes are attributed to the influence of the outcomes of the CPD programme on their teaching practices.

Perusing the teachers' resource files, learners' books and portfolios, it was confirmed that a variety of assessment strategies in the form of projects, assignments, tests, class works and home works had been administered. Mr Black had this to say about his newly acquired skills, "I now know how to make a project; I know methods of teaching Technology Education such as projects and case study. Initially; I was not in the know that if you teach Technology Education you can make use of projects and the case studies". Even though Moreland and Jones (2000:299-300) argue that teachers view assessment in Technology Education as a difficult task, there is evidence from this study to suggest that the outcomes of the CPD programme has influenced teachers' understanding of what is required in terms of new assessment strategies as outlined in the Technology Education assessment policy. When asked about the standard he sets these tasks at, as with Mr Black and Ms Red, Mr Green also indicated that he made use of the assessment policy statements for Technology Education to develop the assessment tasks. In his own words he indicated that "Basically I rely on the assessment standards that are prescribed by the department".

However, Ms Red indicated that her learners are struggling to deal with 'high order questions' and what compounded the problem further is that she does not have any strategies at hand to redress the situation. Since the teacher indicated that she only included 'high order questions' in her tests, the researcher suggests that 'high order questions' be incorporated in all assessment strategies applied in class as this will provide learners with enough practice. The other strategy that can be employed is for teachers to provide their learners with the definitions of most of the action words (e.g. name, analyse) that are used in assessment tasks.

Finding from the study revealed that teachers marked, recorded and reported on learner achievement. One teacher pointed out that monitoring and control of learners' work is done on a continuous basis. This concurs with (Fox-Turnbull, 2006:73) who explain that teachers in Technology Education are expected to plan quality formative assessment tasks and provide reliable feedback to learners based on authentic practices aimed at improving learner attainment in the subject. Formative assessment of learners' own way of doing things (planning and thinking) will provide the teacher with insight into how learners used the information from prior learning and teacher-planned activities to produce a solution for a particular problem (Fox-Turnbull, 2006:72). Black and Wiliam (1998:4), in their review of literature on classroom formative assessment revealed that improved formative assessment that encompasses frequent feedback is more beneficial to low achievers than the rest of the learners. Jones (1997:89) asserts that learners' technological practices and learning is also influenced by assessment approaches and the technological task definition.

Two teachers (Mr Black and Ms Red) provided remedial learning in the form of follow-up activities to enhance learning. Checking their learners' books, it was evident that effective control and monitoring of learners' work was done. All the work in learners' books were marked and signed off by the teacher as well as the Head of Department (HOD).

However, Mr Green indicated that his big class made it difficult for him to provide regular remedial work to his learners. Checking learners' books in Mr Green's classroom confirmed that control and monitoring of written work was done on regular basis by the teacher; however there were no HOD's signatures in the teacher's file and learners' books. This revealed the lack of effective 'Curriculum Management' in schools.

Evidence: The voices

<u>Mr Black</u>

Mr Black pointed out that he made use of a variety of assessment tasks to assess his learners in the class. He described his situation as follows "Sometimes I make use of class work, home work, and then tasks, even assignments" and when asked about the standards he sets these tasks at, Mr Black indicated that he made use of the assessment policy statements for Technology Education to develop the assessment tasks for his learners. In his own words, he indicated that "These tasks depend on the assessment standards that are set out in the policy document of the subject".

When asked how he controlled and monitored learners' work, Mr Black answered "I mark their scripts in the form of assessment tasks and record their marks in the mark sheet and give them feedback".

<u>Ms Red</u>

Like Mr Black, Ms Red also pointed out that she made use of variety of assessment tasks to assess her learners in class. Ms. Red pointed out that she assesses her learners using different forms of assessment. When asked to elaborate further, Ms Red indicated that she includes both the low and high order questions in her tests. However, she indicated that her learners are struggling to deal with high order questions.

She described her situation as follows "In case of a test, I usually have the low and high order questions. However in terms of high order questions, it is always difficult for learners". When asked what she thought could be done to help the learners to overcome this challenge, she had this to say "Haai; it is difficult". She further indicated that her learners in their own words usually react by saying "Immediately you ask them questions requiring high thinking, eish; they start to act somehow and say Mam; this is very difficult". When asked to justify her statement, she explained "Let us say you ask them to analyse, in most instances they do not respond".

When asked about the standard she sets these tasks at, Ms Red indicated that she made use of the assessment policy statements for Technology Education to develop the assessment tasks. In her own words she indicated that "I try to use the standards set in the policy document but it is difficult for them".

<u>Mr Green</u>

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Like Mr Black and Ms Red, Mr Green also indicated that he used a variety of assessment strategies on a continuous basis to assess his learners. The assessment strategies encompass baseline assessment to assess learners' prior knowledge. He described his approach as follows "Normally I make use of what we call baseline assessment where I ask learners some questions to check their prior knowledge and sometimes I ask questions, to check whether the teaching and learning is going effectively".

4.5.2.5 Practical work

In Technology Education, learners are required to apply various skills to perform a particular task and evidence is created when learners are engaged in some form of action. These tasks may either be technical (effective usage of tools), procedural (design or problem solving), conceptual (concepts set in-context) or societal (impacts) (Fox-Turnbull, 2006:71-72). This skill of 'making' as captured in the Design Process demands that learners be given the opportunity to use tools, equipment and materials to built, test and modify their solutions/products (DoE, 2000:7).

Findings from the study revealed that all teachers were eager to conduct practical work on a regular basis but the unavailability of resources was a big constraint. Mr Black indicated that he does practical work on a daily basis because he understands Technology Education to be a practical subject. When asked about the advantages of involving learners in practical work, Mr Green answered:

> "Basically Technology Education is a practical subject, so I think the advantage is that we want our learners to be a responsible adults and citizens. Learners must be able to solve their own problems as well as those problems that exist in their respective communities. I think projects prepare learners for any future practical work that they might be engaged in".

Like Ms Red, Mr Green pointed out that he does practical work more often but the challenge is that they do not have the necessary apparatus. Ms Red responded by saying that she did practical work "Once a week" and "It depends on the topic and the availability of apparatus. We are experiencing a challenge in terms of materials and tools hence we only do the practical that is easy to perform and the materials can be improvised".

Mr Green had this to say the skills he acquired from the CPD programme:

> "The workshop or the classes I have attended, they helped us a lot especially when we were doing practical work. I remember when we were dealing with; we were doing something like a toy transport. Initially we didn't know what was going to happen and our facilitator told us that we were going to do it. He wanted to see it [toy transport]

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moving forward and backward on its own. Initially it was like he was talking something that was not possible and on the third day when I saw myself doing the project and it was able to move on its own, I said Yes, thanks to the programme".

Evidence: The voices

Mr Black

When asked if he conducted any practical work, Mr Black answered "Almost in each and every lesson of Technology Education, in fact I do practical work almost every day when I teach technology" and "I do practical work because Technology Education is a kind of subject that should be taught through projects and case studies".

When asked about the kind a of projects he had involved his learners in, he said the following "For now we have built a model of a house and we have made some textile bags" and "these models, they will help them because sometimes they will sell them to get a living wage".

Ms Red

When asked about the advantages of involving learners in practical work, Ms Red described her situation as follows: "Practical work in Technology Education is aimed at actively involving learners in the production of real models that solves their day-to-day problems".

Mr Green

Mr Green also mentioned the challenges he experienced with the availability of apparatus "I do them more often though the problem is that we do not have necessary apparatus but I always try to find whatever is needed". When asked how it was done, he answered: "Normally when we do practical work; I ask learners in their groups so to bring 1, 2, and 3 that we are going to use. I also bring mine. I usually tell them what to do and how to do it, then I do, they follow me and where they have got a problem I try to help them".

When asked about the kind of projects he had involved his learners in, he explained as follows: "The projects; (shot pause), actually, the projects that I involve my learners are based on the topic that we are dealing with".

4.5.2 How do Technology Education teachers perceive the support offered by their SMTs in relation to their professional development and growth?

Since the school acts as a premise for teachers to implement their acquired experiences from their participation in CPD programmes, the researcher felt that it was also important to highlight and describe from Technology Education teachers' point of view the nature of support (if any) that the

teachers received from their respective schools to enhance their professional development and growth. The findings presented below are based on Technology Education teacher's own work environment and the above research sub-question was used as a frame of the interview questions.

4.5.3.1 The shared sense of direction of staff members

Generally teachers felt valued at their schools as others (teachers) serve as resource persons within their respective schools. However, lack of stable, committed and effective management structures in schools has been highlighted as a factor that demoralise and discourages teachers. Mr Black acknowledged that the CPD programme has empowered him to a point where he serves as a resource person at the school. In his own words he explained: "...I help them (other teachers) in other subjects especially in the interpretation of policy documents".

However, Mr Green indicated that the lack of stable, committed and effective management structure in his school resulted in teachers not having a shared sense of direction and not being valued. Mr Green, who was disillusioned, described his situation as follows:

> "... you see when you come up with an idea on development, they will say, "Ja [yes]; it's a good idea, it can be done but that will be the first and the last time you will hear them talking about it. No one will never come and check as to whether the idea is working or not. In fact, it is discouraging to initiate new things at this school".

There is a general reluctance amongst teachers in the same schools to support teachers' individual initiatives in the same school. The researcher agrees with Fricke (2008:265) who asserts that this is fuelled by jealousy and unhealthy competition amongst teachers themselves. Furthermore, Fox-Turnbull (2006:73) finds that the 'institutional politics and policy' as well as the nature of facilities in schools available constrain teachers' professional development thus impacting negatively on learners' technological practices.

Evidence: The voices

Mr Black

When asked if teachers in his school have a shared sense of direction, Mr Black responded "Yes, sometimes I use to help them where they get lost especially as far as this policy document is concerned. We help each other".

Asked if other teachers supported individual teacher's initiative in his school, Mr Black affirmed and said "We always support and help each other. Even when we have sport activities we help and support each other so that everything runs smoothly".

<u>Ms Red</u>

Ms Red also affirmed that teachers at her school have a sense of direction. She attributed this to the encouragement they receive from the SMT. She describes her situation as follows: "The SMT always encourages us as teachers to contribute ideas that will help our school grow. We even have a staff representative who represents teachers' interests during parents meetings".

Ms Red asserts that support from other teachers is not always guaranteed at her school because "Some teachers do support if the idea is going to be beneficial to the school but others just don't support. Maybe it is in their nature not to support any new initiative".

<u>Mr Green</u>

Mr Green teaches at a school where the school management is unstable, non-committed and ineffective. Since its inception in 2010, the school has had numerous principals. When asked if teachers in his school have a shared sense of direction, he answered "I don't think so because they should be supporting me and helping me in my initiatives but that is not the case".

4.5.3.2 Support and monitoring by school management and administration

Technology Education in its nature is a practical subject that requires facilities, tools and other consumables for its effective implementation. At present, most previously disadvantaged schools where most teachers are operating do not have the necessary facilities like workshops dedicated exclusively to Technology Education. This concurs with Fox-Turnbull (2006:73) who posits that it is neither practical nor feasible for schools to have expensive and complex facilities as well as the capacity to procure machines or equipments that will accord learners the opportunity to undertake specialised technological practices. However, Nabhani and Bahous (2010:211) argue that irrespective of the financial constraints, schools should develop cultures that prioritise the continuous learning and development of teachers and staff.

Findings from this study revealed that teachers received some form of support from their SMTs, though it takes time to be realised. Findings from this study further revealed that in schools where

there is stable and committed management structure, teachers receive support in the form of resources that assist teachers to execute their work effectively. For example, Mr Black mentioned that in his school, the SMTs assist by buying support material for the teachers and resources so that teaching can be effective. However, Mr Green mentioned that teachers at his school do not feel valued. His school was established in March 2010 but there have been five principals already. According to him this was due to internal politics that he was not prepared to share with this study.

Ms Red indicated that her management was open to change but they took time to understand the necessity thereof. When asked why, she responded, "Some of these changes are also new to them as a result they are reluctant to accept them especially when they are mentioned by us". Mr Green described the situation at his school as follows "As a teacher, if you want something that can help you, you have to go to them (SMTs) more often and sometimes you end up giving up. Actually, to me, support is not there in so far as the resources are concerned". Hence teachers are advocating for the training of SMTs on the prescripts of the new curriculum.

The effectiveness of the teaching programme was regularly monitored in schools where there is a stable, committed management structure. Discussing how the effectiveness of the teaching programme was monitored in his school, Mr Black indicated that monitoring was effectively done and explained, "It starts with the SMTs and then the principal does the overview" and "... they check our work weekly". However, Mr Green indicated that in his school there was just no monitoring of the effectiveness of the teaching programme. Teachers just taught without monitoring. This is attributed to the unstable and non-committed management structure in his school. Mr Green described the monitoring of the effectiveness of the teaching process at his school as follows:

> "It is like we just teach without monitoring. To be honest, thou these are internal politics, for the whole of this year I never saw the principal or one of my seniors demanding to check the contents and composition of my file. I cannot say there is any monitoring; they [SMTs] don't even know what is in my file".

Findings from the study further revealed that teachers are in need of departmental support to assist them in technology, as is the case with other subjects. This concurs with Nkopodi (2006:81), who argue that teacher development programmes should be reinforced through sustainable follow-up activities in their different schools to help implement new knowledge and skills. Mr Green had this to say about the need to support Technology

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Education teachers in schools:

> "The Department of Education should make sure that there are people who are assigned to support us because like now, in Technology Education in my circuit, there is no person who is responsible for Technology Education or if that person is there, I have never seen her/him in my life. The last time I saw a person to offer me support was during the CPD programme where our facilitators came to support me at my school..."

Evidence: The voices

Mr Black

When asked in what ways his school management supported teachers to seek information and resources that can improve their work, Mr Black answered "Oh, OK, sometimes they assist by buying support material for the teachers" and "even resources they do buy so that teaching can be effective".

Asked if the management valued open discussions and were flexible to change, Mr Black answered "Yes' and "they are always open to implement new ideas. Especially if there is something which they do not know, or there is something that we are supposed to change for the benefit of the school".

When asked if he consulted with HODs and other staff members for assistance and support, Mr Black responded "Unfortunately we don't have a HOD for Science, we have a principal and HODs for other departments".

Ms Red

Ms Red indicated that her SMT was very helpful to a point where "They allow us to attend workshops and presently they are installing computers with internet that will help us to access and store information with ease" and "The SMT has promised to purchase some of the basic tools and materials required for practical work..."

When asked if she consulted with HODs and other staff members for assistance and support, she replied "They (SMT) must also be trained by the department". Ms Red also affirmed that monitoring of the teaching programme was effectively done and "The HODs are the one who monitors our work" and "It is done on monthly basis".

Mr Green

Mr Green indicated that management and administration in his school were open to change "But it is not as easy as it seems. If you want them [SMT] to help with something, it will take you longer

than expected. It is not like they don't do, they just take their time. This is very frustrating".

When asked if he consulted with HODs and other staff members for assistance and support, Mr Green affirmed, but described his situation as follows:

> "... I do, but in terms of this learning area and in terms of other things, actually, you see the problem in the school is that they believe too much in me. Whenever they need help on something, they will always come to me. They think I know everything to a point where they think if I am unable to do it; then no one can do it, so sometimes I get discouraged because even if I go to them I won't get any help".

4.5.3.3 The expectations of teachers on SMTs and their attitude towards authority

Findings from this study revealed that teachers expected their principals to help them fulfil their roles as educators and to develop them professionally using the available processes available in the department, like the IQMS. Ms Red expected her principal to accept her personality and invite Curriculum Advisors to the school. All three teachers (Mr Black; Mr Green and Ms Red) expected their principals to be supportive and listen to their grievances. Mr Black further indicated that his principal should develop him through the IQMS processes. Mr Green emphasised the need for principals to understand that Technology Education is a practical subject that requires resources for its effective implementation.

Mr Green expected that his principal:

> "Should understand that Technology Education is a subject and its teaching and learning activities are different from other learning areas. Actually I think the principal should just understand that as a teacher I need support from the managers. The only thing that the principal should do is just to give me the necessary support and to listen to my grievances and do whatever is possible".

All three teachers (Mr Black; Mr Green and Ms Red) do respect persons with authority over them. They further indicated that they work amicably with their superiors. However, Mr Green indicated that in most instances that lack of support from SMTs impacts negatively on the general relations in the school. This calls for commitment of school managers to support the effective teaching and learning in Technology Education. Rhodes, Nevill and Allan (2005:349) emphasise the importance of school-based support by managers to accord teachers a degree of empowerment in their own professional development. According to Getty (2002:37) the collaboration between teachers, principals and school management teams and support of professional development programmes enhance teachers' professional growth and promote transformation.

Evidence: The voices

Mr Black

When asked about his expectations from his principal, Mr Black answered "My principal must support me to acquire and implement new ideas, that is, they must develop me". When asked how he expected to be developed, Mr Black suggested "Using the IQMS as a tool to develop me as a teacher". When asked what about his attitude to person with authority over him, Mr Black answered "I respect them" and further believes that "If you want to develop then I think you must respect your leaders".

Ms Red

Ms Red responded by saying that she expected her principal "To accept my personality and the way I do things. The principal should also be very supportive and where possible invite Curriculum Advisors to school". When asked what about her attitude to persons with authority over her, Ms Red indicated that she "...work amicably with them for the realisation of the objectives of the school".

Mr Green

Mr Green indicated that though he works amicably with his superiors, the

relations are usually soured by the SMTs' reluctance to offer them support.

He described his challenges as follows:

> "Ja, there are no serious problems. However; like I indicated that sometimes you indicate to them that for one to be able to work effectively in my classroom I will need 1, 2, and 3. They will just say; OK; it is noted then after two weeks you go back to them only to find that nothing has been done. Our relationship starts to be soured because it is like you are pushing them to help you".

4.6   CONCLUSIONS

This chapter has provided the reader with insight regarding the research sites (schools) as well as the participants. Further, this chapter presented the results backed by the participants' own voices and data collected through classroom observations and document analysis. Chapter 5 will present to the reader the summary of the findings, recommendations as well as the implications of the study.

CHAPTER FIVE

SUMMARY OF THEMAIN FINDINGS, RECOMMENDATIONS AND IMPLICATION OF THE STUDY

5.1   INTRODUCTION

The aim of this chapter is to present to the reader the summary of the findings, recommendations as well as the implications of the study.

As outlined in section 2.1, the study adapted the interconnected model of professional growth as suggested by Clarke and Hollingsworth (2002:951) and fused it with the components of programme evaluation as suggested by Stronge (2012), as depicted in figure 2.1, to explore how those Technology Education teachers who had participated in the CPD programme might have been influenced by the outcomes of the CPD programme in terms of their classroom practices and professional development. This could then enhance the development of learners' technological knowledge in the classroom.

Without effective evaluation of teacher professional development programmes, it is impossible to ascertain whether there has been any meaningful learning in the adult learner (Technology Education teachers), whether teachers apply what they have learned in their classroom teaching or how best teacher professional development programmes can be designed and delivered to meet teachers' needs.

The school's structure and its management set-up were not part of the outcomes of the CPD programme, but the researcher felt that it has effect of the realisation of the outcomes of the CPD programme. As a result, this study highlighted and described teachers' own experiences on nature of support (if any) the teachers received from their respective schools to enhance their professional development and growth.

This section presents the summary of the findings of this study which are being integrated into each research sub-question as outlined in section 1.7. The findings per research sub-question are based on the following constructs that were used to develop the conceptual framework:

(i) The CPD programme as a teacher development strategy was captured under the Professional and personal domain.

(ii) The enactment of Technology Education teachers with the outcomes of the CPD in relation to teacher knowledge and classroom practices (teaching, learning and assessment in technology education) is captured under the Teacher domain.

(iii) Experiences of Technology Education teachers on the support offered by School SMTs to enhance their professional growth are captured under the School domain.

5.2   SUMMARY OF THE MAIN FINDINGS

5.2.1   Professional and Personal Development Domain

Findings from the data collected revealed that teachers have multiple but different reasons as to why they decided to become teachers. Some teachers have strong views and a high regard of the teaching profession and relate their priorities as teachers to teacher's roles and nation building in general. Teachers view teaching as a means to transform lives, and education is viewed from a

nation perspective where the emphasis is on the production of a skilled workforce which will contribute positively to the economy of the country. Furthermore, teachers have strong views about Technology Education as a school subject which offers authentic learning and creates technological awareness in the learners.

Findings from the study, further revealed that some teachers were not content and satisfied previously as teachers (due to the ever-changing curriculum, insufficient training for teachers and support) they are presently more positive about their work due to the influence of the outcomes of the CPD programme on their classroom practices and professional development. Ms Red described her level of wellness in the teaching profession as follows: "I was partially happy because the education system changes rapidly. The department did not give us enough training and enough workshops and at the end you find some teachers not coping with the changes". Mr Green who initially never wanted to become a teacher indicated that his positive interaction with teaching and learning materials during the CPD programme, as well other teachers, resulted in a change of attitude towards the teaching profession. He further pointed out that he was now self-reliant and he does not rely on a textbook anymore to structure his teaching and learning activities.

Findings from this study further revealed that teachers view CPD programmes as a means to develop teachers as professionals by enriching their understanding of the new curriculum, thus improving their teaching abilities in class. Moreover, findings from this study also revealed that prior to their participation in the CPD programme, teachers were not always aware of the expected outcomes of the CPD programme and as a result, other teachers felt frustrated and even contemplated quitting the programme. However, after their participation in the CPD programme teachers were now aware of the outcomes. Teachers described the outcomes of a CPD programme as a means to develop teachers as professionals by enriching their understanding of the new curriculum thus improving their teaching abilities in class. Teachers mentioned that the outcomes of the CPD programme influenced them to transform and improve their teaching of Technology Education in the classroom, and they found the support visits offered by the CPD programme very useful.

Teachers appreciated the one-on-one interaction with facilitators during school visits and this was confirmed during such visits where teachers were always cooperative and supportive. The structure and the format of the CPD programme had a positive impact on the professional development of

teachers. Teachers indicated that the workshops and school support visits helped them (teachers) to acquire Technology Education- specific teacher knowledge relevant to their teaching of Technology Education in the classroom. Teachers indicated that the workshops delivered through the CPD programme were hands-on and relevant. Teachers acknowledged that the workshops helped them with practical work. The workshops and schools support visits helped teachers to acquire new knowledge relevant to their teaching of Technology Education in class. Moreover, Ms Red indicated that "They (workshops and school support visits) were motivating and encouraging. They actually assisted to be always ready to deal with the challenges one faces in the teaching of Technology Education in the classroom". Mr Green asserts that "the school visits helped us to transform and improve the way we teach Technology Education in the class and even the materials that were provided". However, one teacher indicated his dissatisfaction with workshops in general. He indicated that in most workshops he had attended there was little attention given to individual teacher's needs. This is attributed to the large number of participants admitted at one go in such workshops.

Findings from this study show that all three teachers had been greatly motivated by the CPD programme to improve their Technology Education- specific teacher knowledge. There is evidence from the results of this study that all the three teachers had been greatly influenced by the outcomes of the CPD programme to improve their Technology Education- specific teacher knowledge. Two teachers (Mr Black; and Ms Red) are intending to register for honours degrees in Technology Education and Mr Green was doing his final year of his honours degree in Technology Education. However, teachers called for continuous support from the department in order to sustain and improve on the knowledge gained during their participation in the CPD programme. Lack of capacity in the department to provide teachers with on-going support in their schools will always defeat the gains acquired through teachers' participation in CPD programmes.

5.2.2   Teacher Domain

The study revealed that teachers were, to some extent, influenced by the outcomes of CPD programme to a point where they are confident and can effectively teach all the sections of the syllabus as prescribed by the department supplied work schedules. Teachers indicated that they were confident in their content and methodological knowledge of Technology Education as a school subject and as a result, their learners are also benefitting from the knowledge acquired.

Mr Green indicated that before his participation in the CPD programme, there were sections of the syllabus that gave him problems which he outsourced to other teachers. During the data collection session, he mentioned that he felt capacitated to deal with all the sections of the syllabus with greater ease. Mr Green explained how his Technology Education content knowledge had improved owing to his participation in the CPD programme:

> "Presently I do not have any serious problem with that. Initially I had a problem with the part of processing. What I did is that I decided to outsource the topic to other teachers. Before I attended the CPD programme, I was only teaching structures and electricity because I did not understand the topics under processing. The materials on processing as well as the practical work that we did during the programme helped me a lot".

Findings from this study revealed that teachers now have clear understanding of the nature of Technology Education-specific teacher knowledge required to facilitate effective technology lessons in class, hence they are able to question the standard of the common work schedules supplied by the department. Teachers pointed out that the work schedules and policies supplied by the department are questionable and confusing. In perusing the work schedule, it was confirmed by the researcher that teachers' observations were correct. The work schedule was not user-friendly to any novice Technology Education teacher because it lacks cohesion amongst various activities. For example, the assessment strategies infused in the work schedule do not cover all the required different tasks but mainly covers class work, homework and tests.

Moreover, the work schedule separates the procedural knowledge (Design Process) from the conceptual knowledge (content).

Due to the influence of the outcomes of the CPD programme, some teachers recognise the importance of lesson planning hence they now do it. However, Ms Red does see the importance of doing lesson plans but not in a written form because, according to her they (lesson plans) are time consuming. As mentioned in section 5.2, there could be other factors outside the CPD programme that could have had an influence on teachers' classroom practices and professional development. Like Mr Black and Mr Green, Ms Red makes use of a variety of resources in her preparations: "... I make use of work schedule provided by the department and textbooks. I also use charts as well as the materials I received from the CPD programme. These materials are also helpful during lesson preparations".

On the contrary, Mr Green acknowledged that even though he is an experienced Technology Education teacher, it was necessary for him to do lesson preparations. It should be noted that in

most schools, lesson plans are neither enforced nor monitored. This is to some extent attributed to a lack of capacity as well as the pressure exerted by teachers' unions on the department and school managers to do away with formal lesson plans because they (lesson planning) are viewed as 'extra work' on top of teachers' other responsibilities in schools. Despite the non-monitoring of written lesson plans in schools, there is evidence from this study that teachers have been influenced by the outcomes of the CPD programme hence they now do it.

All of the learners observed in all the three schools were generally well disciplined. According to the teachers, this is attributed to effective classroom management strategies that these teachers adopted from the CPD programme. Teachers effectively used group work during their lessons and their learners organised themselves in groups, shared the tasks amongst themselves and ensured that everyone completed the work. In perusing the learners' work, it was evident that learners were able to compile a project portfolio. However, learners' books revealed that the nature of designs (drawing) was not up to the required standards. It is worth noting that the component of design (drawing) in Technology Education is to introduce the learners to basics needed in Civil Technology, Mechanical Technology, Electrical Technology and Engineering Graphics & Design. This is attributed to teachers themselves being unable to draw and hence their inability to impart drawing skills to their learners. This was one aspect of the training that was not thoroughly done during the CPD programme because the Technology Education curriculum does not have Design (drawings) as core content by itself but is incorporated in the Design Process.

Findings of this dissertation further revealed that teachers do try to conduct practical work on regular basis but the unavailability of resources in schools is a big constraint. Teachers' teaching strategies were influenced by the LTSMs drawn from the CPD programme to a point where one teacher declared that the materials would be part of his practice as long as he is still offering Technology Education in school. However, what was conspicuous during the data collection process was that most of the teachers seem to lack the capacity to design their own teaching and learning materials, or they are just reluctant to develop their own LTSMs. Teachers used the LTSMs drawn from the CPD programme to structure their lessons and to provide their learners with notes.

Moreover, findings from the data collected through interviews revealed that teachers claimed to understand what was required of them in terms of new assessment strategies contained in the

Technology Education subject's assessment policy. However, classroom observations revealed that even though the teachers are making use of variety of assessment instruments, the standards of the tasks were not in accordance with the requirements of the assessment policy. Most of the questions were of low order with little emphasises on problem-solving. Teachers do provide their learners with follow-up activities to enhance learning. However, the teachers pointed out those large classes made it difficult for them to provide regular remedial work.

5.2.3 School Domain

Findings from the study revealed that generally, teachers feel valued at their schools to a point were some teachers act as resource persons within their respective schools. However, lack of stable and effective management structures at schools has been highlighted as one of the factors which impact negatively on support and the monitoring of effectiveness of the teaching programmes in schools.

Teachers expect their principals to help them fulfil their roles as educators and to develop them professionally using the available processes in the department, such as IQMS. Technology Education in its nature is a practical subject that requires facilities, tools and other consumables for its effective implementation hence teachers are calling for departmental support to assist teachers in Technology Education as is the case with other subjects, and also to train their SMTs on the prescripts of the new curriculum. There is a need to get the commitment of school managers to support authentic learning in Technology Education in schools.

5.3   SIGNIFICANCE OF FINDINGS

This study can offer significant contribution to the following field of research:

- There is a need to conduct a longitudinal study in high schools to determine how those Technology Education teachers who participated in the programme engage holistically with all the skills of the Design Process (Investigate, Design, Make, Evaluate and Communicate) and how this process impacts on learner attainment in FET subjects like Civil Technology and Engineering Design and Graphics.

The findings of this study may be used to inform policymakers on how future CPD programmes in Technology Education could be structured and strengthened.

5.4   LIMITATIONS OF THE STUDY

A number of limitations were identified in this study. It should be noted in this study, there has not been a classical impact study forming part of a quasi-experimental design. As a result there, has been no control and experimental group, or baseline study prior to commencement of the investigation. Hence the findings from this multiple case study cannot be generalised to the whole population of teachers who participated in the CPD programme under review in this study. Secondly, this study was conducted more than two years after the completion of the CPD programme and there are some teachers who were initially targeted to take part in this study but did not end up taking part therein. Initially the researcher intended to select six Technology Education teachers to participate in the study. However, due to time and financial constraints, the researcher decided to reduce the number of participants without compromising the representativeness of the sample. The third limitation is related to the fact that the researcher was directly involved as a facilitator of Technology Education in the programme, which brought an element of subjectivity and positive bias to this study. To ensure trustworthiness of the study, the researcher triangulated the data received by cross-reference between the interviews, document analysis (teachers' files and learners' books) and classroom observations. Additionally, this study does not take into consideration the opinions of School Management Teams (SMTs) on how they support personal and professional development technology teachers in their schools.

5.5   RECOMMENDATIONS AND IMPLICATIONS

This section of the report presents recommendations that could be considered when using a CPD programme to convert practising teachers of other subjects into Technology Education teachers. Based on the findings of the research the following recommendations can be made.

5.5.1. The researcher was worried about whether any development and change has taken place within the adult learner (Technology Education teachers) owing to their participation in the CPD programme. As outlined in section 1.1 of this dissertation, none of the Technology Education teachers admitted in the CPD programme had any professional qualifications in Technology Education and had been offering the subject without the necessary experience and background. Findings from this study revealed that the CPD programme had made a significant attempt to convert other subjects' teachers into Technology Education teachers. Therefore, there is a need for

the department to replicate and strengthen the model used by the University of Limpopo to convert more teachers into qualified and competent Technology Education teachers. Design (drawing) has emerged as one section of the content of Technology Education that needs to be improved. Hence, there is a dire need to train teachers specifically in Design, which will in turn improve learner attainment in subjects such as Engineering Graphics offered in the FET band of the RNCS.

5.5.2. Teachers view CPD programmes as a means to develop teachers as professionals by enriching their understanding of the new curriculum thus improving their teaching abilities in the class. The workshops and school support visits helped teachers to acquire new knowledge relevant to their teaching of Technology Education in class. Teachers indicated that workshops were hands-on and relevant and helped them with practical work. Teachers indicated that they have been exposed to different context in technology and given chance to expand their teacher Technology Education -specific teacher knowledge, and as a result they have acquired new knowledge that helps their learners to learn effectively. However, teachers are calling for continuous support from the department in order to sustain and improve on the knowledge gained during their participation in the CPD programme. To remedy the situation, the researcher argues that there is a dire need for the department to appoint enough and capable Curriculum Advisors (CA) who will ensure that a manageable number of participants are trained at a time. All CPD programmes should have a component of school based support for teachers to sustain the knowledge gained during trainings.

5.5.3. The teachers found that the work schedule supplied by department was confusing. The work schedule was not user-friendly to any novice Technology Education teacher because it lacks cohesion amongst various activities. For example, the assessment strategies infused in the work schedule do not cover all the required different tasks but mainly covers class work, homework and tests. Moreover, the work schedule separates the procedural knowledge (Design Process) from the conceptual knowledge (content). To remedy the situation, the researcher suggests that the Limpopo Department of Education should constitute a provincial task team that will review the work schedule and adjust it to the demands of CAPS document. There is also a need to develop more structured classroom activities that will help both the novice and experienced Technology Education teacher to deal with the dynamics of the subject with greater ease. This will in turn minimise the tension created by the writing and recording of lesson plans by teachers in schools. Teachers should ensure that they adapt existing and/or develop their own teaching and learning programmes instead of using ready-made documents that stifle their creativity.

5.5.4. At school level it is recommended that SMTs should be encouraged to allocate a portion of the school's state allocation budget for the procurement of non-expensive basic tools and equipment that will allow learners to undertake authentic learning in Technology Education.

5.6   CONCLUSION

The study adapted the interconnected model of professional growth, as suggested by Clarke and Hollingsworth (2002:951) and fused it with the components of programme evaluation suggested by Stronge (2012) to explore and explain how (after the successful completion of the ACE programme) Senior Phase Technology Education teachers were influenced by the outcomes of the CPD programme in relation to their professional development and growth.

The school's structure and its management set-up were not part of the outcomes of the CPD programme, but the researcher felt that it has the effect of realising the outcomes of the CPD programme. As a result, this study highlighted and described Technology Education teachers experiences on the nature of support (if any) that the teachers received from their respective schools to enhance their professional development and growth.

Findings from this study revealed that teachers who participated in the study were exposed to the outcomes of a CPD programme which were aimed at upgrading the qualifications of already practicing teachers as well as the changing of other subject teachers in to qualified, competent Technology Education teachers. In this study, teachers confirmed that most of the teaching strategies they apply in class were adopted from the CPD programme itself. Teachers acknowledged that they have acquired new Technology Education-specific teacher knowledge which in turn helped their learners to learn effectively in class. The sampled teachers' classroom practices (teaching, learning and assessment in Technology education) have improved tremendously due to the influence of the outcomes of the CPD programme. Mr Green expounds on how his classroom practices were improved by his participation in the CPD programme. When asked if he had made full use of the support offered by the CPD programme, he responded "I think so because what I'm doing on daily basis when I come to school or when I go to the technology classroom, much of the information or much of the strategies that I use are the ones that I adopted them from the programme".

Although it was not envisaged that the attitude of SMTs would be influenced by the outcomes of the CPD programme, the support offered by SMTs to Technology Education teachers to enhance

their professional growth was not evident because these teachers are lacking basic tools and apparatus to perform their work effectively. The study managed to reveal that despite the fact that the teachers feel valued at their schools, unstable and/or non-committed management as well as lack of effective 'Curriculum Management' in schools had been identified as a constraints to the professional development and growth of Technology Education teachers in schools. Teachers are urging the department to offer support to Technology Education teachers in schools as is the case with other subjects. These teachers also called for the training of SMTs on the prescripts of the new curriculum.

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APPENDIX A: LETTER TO TEACHERS

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Education

Department of Science, Mathematics and Technology Education

William.fraser@up.ac.za

012 420 2207

19 July 2012

Dear participant,

I am a post graduate student with the University of Pretoria researching the topic "The influence of a Continuing Professional Development (CPD) programme on the classroom practices and professional development of Technology Education teachers' and request your kind participation in the study.

The purpose (aim) of this study is to explore and explain how (after the successful completion of the ACE programme) Senior Phase Technology Education teachers were influenced by the outcomes of the CPD programme in relation to the classroom practices and professional development. Furthermore, the study will highlight and describe teachers' own experiences about the nature of support (if any) the teachers received from their respective schools to enhance their professional development and growth.

Data will be collected using semi-structured interviews (face-to-face interviews) and classroom observation schedule at your school. Furthermore, I will be using and observation checklist to observe your assessment file and lesson preparations.

The interview schedule will collect data about (i) teachers' general beliefs and experiences about the teaching professional in general; (ii) teachers' general beliefs and experiences about a CPD

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programme as professional development strategy; (iii) teachers' present classroom practices as well (iv) as the support teachers receive from their own work environment.

The classroom observation will capture data on teachers' lesson preparations and facilitation of technology lessons in the classroom.

The researcher therefore asks for your permission to audio tape the interview session and to be a participant (active) observer during classroom observation. Furthermore, the researcher seeks permission to take notes and where possible scan some of the documents for further reference. Do not hesitate to contact me should you wish to have more information on the study before or during my visit to your school. You will be given access to the transcribed interviews and findings before they are captured in my report. Your name, or the name of your school, will not be linked to the findings in any way. Your identity will also be protected by the researcher. All activities that you participate in will remain confidential and anonymous. You will be free to participate or to withdraw at any time from the study. This will not affect your relationship with the researcher. You will not be subjected to any risks. The information and findings to be shared with you should contribute towards and enhance your classroom teaching practices. You will receive full recognition should this be required, in any publication that might emerge from the study.

You will be requested to sign the consent form during my visit to your school. You are signing it with full knowledge of the nature and purpose of the procedures. You will receive a copy of the signed consent form.

Regards

_____

Mr. N.P Mahlase   Prof. W.J Fraser (Supervisor)

083 325 1510

CONSENT AND APPROVAL TO PARTICIPATE IN THE INVESTIGATION

I.. have read the information contained in the accompanying letter. I understand the reasons for participating in the study and therefore agree to participate.

I also agree to be interviewed and that permission is given to audio-tape the interviews. I understand that my name and personal details will remain confidential and anonymous.

Signed:... Date:...

APPENDIX B: PERMISSION LETTER FROM DSM

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

SEKHUKHUNE DISTRICT
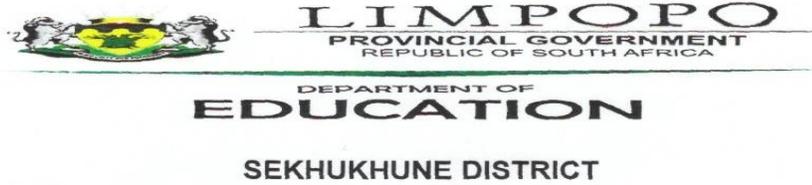
Enq: Mothiba B.O Tel:
015 633 2902 Date:
23/07/2012

To: Mr. Mahlase N.P (Student: Master of Education)
Faculty of Education
Department of Science, Mathematics and Technology Education
University of Pretoria

From: District Senior Manager
Sekhukhune District

SUBJECT: GRANTED PERMISSION TO CONDUCT A RESEARCH.

1. The above matter refers.

2. Kindly be informed that your research application to conduct research in schools which is within the confines of Sekhukhune District, focusing on the title **"THE INFLUENCE OF CONTINUING PROFESSIONAL DEVELOPMENT (CPD) ON THE CLASSROOM PRACTICES AND PROFESSIONAL DEVELOPMENT OF TECHNOLOGY EDUCATION TEACHERS",** is approved.

3. Please note you should conduct your research in line with research ethics as prescribed by your institution and international norms and standards for research.

4. The district wishes you well in your project and awaits your findings with great interest.

NKADIMENG T.G   23 · 07 · 2012

NKADIMENG T.G   DATE

DISTRICT SENIOR MANAGER

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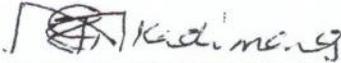
APPENDIX C: TEACHER INTERVIEW SCHEDULE

Part 1

This section elicits teachers' general beliefs and experiences about the teaching profession.

a. Why did you decide to become a teacher?

b. Presently, what is your opinion about the teaching profession? Are you happy to be teaching?

c. What do you think is the most important component of a teacher's job?

Part 2

This section elicits teachers' beliefs and experiences about the CPD programme as a professional development strategy.

a. Did you understand at the start what the outcomes of the CPD programme were?

b. Presently, what do you think the outcomes of the CPD programme were/are?

c. Please indicate in general about the components of the CPD programme that you find useful (the workshops, school support visits) and what you enjoyed about having enrolled for the ACE programme?

d. Please indicate in general about the components of the CPD programme that you find not useful?

e. Were the workshops and school support visits relevant to develop you towards your field of teaching (Technology Education)?

f. What did you find about yourself during the course of your participation in the CPD programme?

g. Are there any aspects of the CPD programme that have been of long benefit to you? Please explain.

h. In what ways did the CPD programme meet your own expectations as a professional?

Part 3: This section collects data about teachers' present classroom practices after their successful completion of the ACE programme.

a. Are you confident of your content and methodological knowledge of technology as a school subject?

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b. Describe your interaction with the learners in class: do you ask questions? Do you encourage them to ask questions?

c. Are you well prepared for your lessons? What preparations do you do, and when do you do it?

d. What resources do you use to help you in your lesson preparations?

e. Describe to me the general approach you use to start a lesson?

f. How do you monitor and control learners' written work?

g. When the learners have textbooks in the classroom, you do you use these in your lessons?

h. What principles do you normally use to structure your teaching and learning activities?

i. Do you have disciplinary problems with your learners? What is the reason for this?

j. What is your pedagogical belief about your teaching subject? i.e. of what importance do you believe it is to your learners? How do you think it will help them to learn effectively?

k. Describe how you assess your learners in terms of the strategies you use. Comment on the standard you set for your learners. On what basis do you judge this standard?

l. Do you teach all sections of the syllabus?

m. Do you generally find your learners attentive and engaged in your lessons? Please give explanation for why this is the case.

n. To what extend do you provide learners with notes, and under what conditions do you do these? Please comment on the value and usefulness of LTSM you have received from the CPD programme.

o. Do your learners take responsibility and control of their own learning?

p. How do you make lessons "learner-centred"?

q. Do you use group work in your class? Under what circumstances, and how do you structure these activities? Do you find this method effective or has your implementation change in any way? How and why?

r. What demands do you make to your learners, e.g. punctuality for class, completion of tasks?

s. As a Technology Education teacher: how often do you do practical work in your class, and how are they conducted?

t. What kind of projects do you involve your learners n? What merits do you see in learners doing project work?

u. Was remediation is supplied to those learners who require it so that all could achieve the lesson outcome(s) and assessment standard(s) for the lesson plan?

v. Prior your participation in the CPD programme, what did you do when faced with a section of the syllabus that you did not understand?

w. Do you desire to develop yourself further as a teacher or change your teaching practices in any way?

x. Have you made maximum use of the CPD programme support offered? If not, what has most hindered you from making more use of this support?

y. What drives you most as a teacher? What are your priorities?

Part 4

This section collects data about teachers' general school experiences (teachers' own work environment).

a. Does the school's member of staff have a shared sense of direction?

b. Do other staff members feel valued in your school?

c. Is the school management and administration open to change?

d. Do all the school structure and fellow teachers support individual teacher initiatives? Please elaborate.

e. Is the effectiveness of the school's teaching programmes regularly monitored? How is it being done?

f. In what ways do the school's management support teachers to seek information and resources that can improve their work?

g. What would you like your principal to understand about your role as a teacher in his/her school? What role do you think your Principal should play in your professional life?

h. Do you use the schools" discipline systems to help you with disciplining learners? Does the school have such support systems?

i. Do you consult with your HOD or other colleagues for assistance or support?

j. What is your attitude to persons in authority over you, e.g. HOD or Principal? Do you work amicably with them?

APPENDIX D: CLASSROOM OBSERVATION SCHEDULE

PART 1:   LESSON PREPARATION

Aspect of teaching	Expected qualities:	YES/ NO
1.1 Lesson outcomes	(a) Meaningful, relevant and attainable.	
	(b) Appropriately linked to assessment standard(s)	
1.2. Assessment standards	(a) Appropriate linked to learning outcome(s) and lesson outcome(s), and clearly stated.	
1.3 Subject matter	Adequate scope & quantity; sequenced; matched with outcomes.	
1.4 Learning activities	(a) appropriate for lesson outcome(s) .	
	(b) eliciting, activating and exploring learners' prior knowledge.	
	(c) contextualises / problematises topic, relevance to daily life.	
	(d) linked to outcomes and assessment.	
	(e) adequate timeframe.	
1.5 Educator's role (teaching methods)	(a) Balances teacher centered (provision of info) and learner centered (processing of info) activities.	
1.6 Learner's role	Varied activities that fit the outcomes and activate learners.	
1.7 Assessment strategies	(a) Strategies are relevant and adequate for the chosen outcomes.	
	(b) Assessment results are used to improve teaching.	
1.8 Resources	(a) Creative and inventive use of local opportunities, improvisation, original, relevant to topic, motivating.	

PART TWO: PRESENTATION OF LESSON

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Aspect of teaching:	Expected qualities:	Yes/No
2.1 Introduction	(a) Inspiring (providing context, relation to daily life or other interests).	
	(b) Motivating.	
	(c) Elicits / reviews relevant pre-knowledge, links it to new matter.	
	(d) Clear statement of outcome.	
2.2 Learning activities	(a) Integrates outcomes, executed activities and assessment strategies.	
	(b) Develop understanding.	
	(c) Include higher order thinking.	
	(d) Appropriate time management	
2.3 Teacher's role	(a) Responsive to students needs.	
	(b) Directs appropriately.	
	(c) Learner-centered/teacher centred activities appropriately balanced.	
2.4 Learners' role	(a) Learners made aware of expectations.	
	(b) Development: learners are timely informed about progress and given opportunities to act on the basis of this feedback.	
2.5 Tasks / questions for learners	(a) Well structured; varied in type and level.	
	(b) Solicits learner questions, appreciates and develops them.	
2.6 Subject Mastery	(a) Structured; error free and responsive to learners needs.	
2.7 Classroom Management	(a) Classroom management: provides and maintains a clear and effective set of behavioural rules, can plan and carry out corrective strategies.	
	(b) Organisation of roles is deliberate and appropriate to the tasks (specifies individual	

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Aspect of teaching:	Expected qualities:	Yes/No
	tasks in group work, rules in class discussion etc.).	
	(c) Responds to words and actions of the learners.	
	(d) Asks and provides opportunity for questions.	
	(e) Is able to orchestrate, to direct and organize individuals and the group.	
	(f) Addresses all, does not focus on one or a few learners.	
	(g) Improvises where appropriate.	
	(h) Generally has a good contact with the class.	
2.8 Assessment	(a) Is well structured, e.g. includes diagnostic, formative and summative.	
	(b) Is relevant to the lesson outcomes, adequate to determine their attainment.	
2.9 Conclusion	(a) Summarizes the lesson with more input from the learners.	
2.10 Presentation	(a) Body language: Confident, relaxed, enthusiastic.	
	(b) Voice: articulate, relaxed, loud enough.	
	(c) Language: fluent, correct English, few 'stopgaps'.	
2.11 Use of resources	(a) Chalkboard: neat, legible; organised.	

APPENDIX E: CHECKLIST: TEACHERS' FILES

PART 1:   **CURRICULUM COVERAGE**

			YES/NO
	1.	Do teacher have a work schedule, subject statement/assessment giudelines/learning programme guidelines supplied by the department?	
	2.	Do the work schedule show LO's; AS's; content; assessment strategy and resources?	
	3.	Do the teaching and learning activities on the work schedule following a logical sequence?	
	4.	Are practical activities included in the work schedules?	
	5.	Are the revision activities included in the work schedule?	

PART 2:   **LESSON PLANS**

			YES/NO
	1.	Are the lesson plan neat and well arranged?	
	2.	Are the lesson plans linked and in accordance to the work schedule?	
	3.	Is the duration of the lesson indicated on each lesson plan?	
	4.	Is the lesson plan format NCS compaint?	
	5.	Do the lesson plans flow from previous lesson plans?	
	6.	Are the links with work prevoiusly done and work ahead, shown?	
	7.	Are the LO's and AS's of each lesson specified?	
	8.	Are the LO's linked to the As's?	
	9.	Are the teacher and learners activities clearly specified?	
	10.	Are the teacher and learner activities related?	

		YES/NO
11.	Are the learners' abilities and previous knowledge considerd?	
12.	Are the teaching and learning resources specified relevant to the topic?	
13.	Do lesson plans show how learners will be working in the classroom, i.e. as individuals, in pairs or in groups?	
14.	Do lesson plans indicate the assessmenr strategy to be employed, i.e. tool, method and type of task (formal/informal)?	
15.	Are teachers' reflections done after each lesson?	

PART 3:   ASSESSMENT

		YES/NO
1.	Are the assessment tasks aimed at achieving LO's and AS's?	
2.	Are the assessment tasks graded, i.e. simple to difficult?	
3.	Do the assessment tasks cover the six (6) cognitive levels of complexity?	
4.	Are the assessment tasks administerd in accordance with the work schedule?	
5.	Are the assessment tasks informed by the lesson plans?	
6.	Is the teacher's assessment plan informed by the school's assessment plan?	
7.	Are the dates on which formal assessment is to be conducted ?	
8.	Are all assessment tasks marked and/or controlled?	
9.	Are the sufficient enrichment and remedial exercises?	

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10.	Are all assessment tasks (classworks, tests etc.) and assement tools (memos' rubrics etc.) available?	
11.	Are the learners' abilities and previous knowledge considerd?	
12.	Are the teaching and learning resources specified relevant to the topic?	
13.	Do lesson plans show how learners will be working in the classroom, i.e. as individuals, in pairs or in groups?	
14.	Do lesson plans indicate the assessment strategy to be employed, i.e. tool, method and type of task (formal/informal)?	
15.	Are teachers' reflections done after each lesson?	
16.	Are learners'assessment records kept.	

APPENDIX F: **Mr. BLACK'S INTERVIEW TRANSCRIPT**

TRANSCRIPTS

PART 1: **Eliciting teachers' beliefs and experiences about the teaching profession.**

INTERVIEWER: Sir, why did you decide to become a teacher?

P1: Teaching **is a calling to me** and I **decided to share** what I had with other people because **everything originates from teaching**.

INTERVIEWER: So you took it like it is something that you love?

P1: Yes.

INTERVIEWER: Presently; what is your opinion about the teaching profession?

P1: **Teaching is the mother of all professions** and **teachers contribute in the economy** of this country and **without good education I think the economy will suffer.**

INTERVIEWER: Are you happy to be teaching now?

P1: Yes. **I am happy to be a teacher.**

INTERVIEWER: Can you please elaborate?

P1: Why I am happy to be a teacher?

INTERVIEWER: Yes, to be teaching.

P1: Like I have said, **teaching is a mother of all professions**, so I'm happy to be teaching and **contributing to the economy** of this country.

PART 2: Eliciting teachers' beliefs and experiences about the CPD programme as a professional development strategy.

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INTERVIEWER: All right fine. Now let us come to your experiences and beliefs about the CPD programme that you attended.

P1: Yes.

INTERVIEWER: Did you understand at the beginning what the outcomes of the CPD programme were?

P1: No, firstly I was **not in the know** of the outcome of the CPD programme were.

INTERVIEWER: Presently; what do you think the outcomes of the CPD programme were?

P1: Presently; **I understand** the outcomes of the CPD programme because it was for the **teachers development**.

INTERVIEWER: Meaning what was key out of this entire programme was for your own development as a teacher?

P1: Yes; It is for my own **development**.

INTERVIEWER: Now please, indicate in general about the components of the CPD programme that you find useful and what you enjoyed about having enrolled for the ACE programme?

P1: What was important to me was **school support visit**; just **like as we are doing now**, **it is important to me.**

INTERVIEWER: How?

P1: Because if I get lost in my strategies of teaching technology; then **if you are here**, **you can help** me with the correct procedure that I can apply in the effective teaching of technology **rather than it is in a workshop**.

INTERVIEWER: So what is your problem with the workshops?

P1: Sometimes in the workshop; you find that we are **clustered in a big hall**. Sometimes if you ask questions, **it takes time to understand unlike if you are alone**, like we are sitting now; if I ask you something that if **I get lost during teaching then you'll help me.**

INTERVIEWER: Meaning that you value school support more than workshops?

P1: **School support visits are more important than the workshops**.

INTERVIEWER: But school support visits, are they not meant to support what is being taught in the workshops?

P1: Yes, come again.

INTERVIEWER: I want to know actually why you say you prefer school visits because m understanding is that school visits are supposed to support what has happened during workshops.

P1: I am talking about **my opinion**, I see **school visits as being most important than the workshops.**

INTERVIEWER: Meaning that you will need more of school visits than workshops.

P1: Yes.

INTERVIEWER: All right, now please indicate to me in general about the components of the CPD program that you find not useful.

P1: To me? There is **no one**.

INTERVIEWER: Everything is OK?

P1: It is OK.

INTERVIEWER: Were the workshops and school visits relevant towards your

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development in the teaching of technology? Did they help you to become a competent teacher in the subject?

P1: Yes; because I have **acquired new strategies** of teaching technology.

INTERVIEWER: Can you elaborate, what do you mean with that?

P1: **I now know how to make a project; I know methods of teaching Technology** Education such as by using projects and using a case study. **Initially; I was not in the know** that if you teach technology you can make use of projects and the case studies.

INTERVIEWER: What did you find about yourself during the course of your participation in the CPD programme?

P1: I find about myself?

INTERVIEWER: Yes; in terms of your own personal development.

P1: I have **developed educationally**.

INTERVIEWER: Wilson, were there any aspects of the CPD programme that have been of long benefit to you?

P1: Yes.

INTERVIEWER: Can you please explain to me.

P1: Because **now I know** the strategies of teaching technology.

INTERVIEWER: OK, now in what way did the CPD program meet your own expectations as a professional?

P1: As a professional, the CPD programme assisted me **to ensure that learners are progressing in technology, to develop me as an educator to be good leader and for social development**.

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PART 3: **Exploring teachers' present classroom practices:**

INTERVIEWER: Are you confident with your content and methodological knowledge of Technology Education as a school subject as we speak?

P1: Yes. **I am confident.**

INTERVIEWER: Please elaborate.

P1: I am confident because now my **learners can compile a project portfolio and they can make projects** in Technology Education.

INTERVIEWER: In Technology Education.

P1: Yes.

INTERVIEWER: Was that not happening before you attended.

P1: **No, no, they didn't know** how to make a project and how to compile a project portfolio.

INTERVIEWER: OK, now describe to me how you interact with the learners in your class, do you ask questions or do you encourage them to ask you questions?

P1: **I just guide them because they work in groups.**
Learners work in groups and **all the work is done by them**.

INTERVIEWER: But is there any interaction between you as a teacher and the learners?

P1: Yes. {inaudible} **I just monitor them and their work.**

INTERVIEWER: Now when it comes to lesson preparations, are you always well prepared for your lessons?

P1: Yes.

INTERVIEWER: Now tell me, what preparation do you do and when do you do

it?

P1: My lesson preparation, I prepare for a lesson plan of 2 weeks and then after 2 weeks, **I prepare in advance**, I can make it for a month.

INTERVIEWER: Now what resources do you use to help you in your lesson preparations, if any?

P1: Sometimes I make use of; I go to the **encyclopaedia, sometimes the internet, sometimes I make use of pictures** or the **manuals** which they I got from the University of Limpopo, **I make use of them.**

INTERVIEWER: Describe to me how you start your lessons.

P1: I just **group the learners according to their abilities** and **assess them continuously** with the lesson.

INTERVIEWER: Then how do you monitor and control learners' written work?

P1: Controlling the learners work, I **mark their scripts** in the form of assessment tasks and **record their marks** in the mark sheet.

INTERVIEWER: Do your learners have textbooks in the classroom?

P1: **Yes. The learners they have textbooks.**

INTERVIEWER: Then how do you use these in your lessons?

P1: I use this textbook **if there is something which is needed** in that textbook, but if **it doesn't have anything** we should have to **look for another strategy** for the learners to learn them effectively.

INTERVIEWER: Now when it comes to teaching and learning, what principle do you normally use to structure your teaching and learning activities?

P1: I start from the **theoretical to practical work**.

INTERVIEWER: Do you have any disciplinary problems with your learners?

P1: **No.**

INTERVIEWER: Why is it like this, because other people are complaining about it?

P1: I don't have any problems with my learners because the **school has an effective discipline code** for teachers and learners.

INTERVIEWER: So discipline, everything is OK.

P1: It is OK, we don't have any problems.

INTERVIEWER: What is your categorical belief about technology as a school subject, that is, of what importance do you think it is to your learners' effective learning?

P1: If I **apply good strategy of teaching** I think they will make them learn effectively.

INTERVIEWER: But I'm talking about technology as a subject.

P1: Technology Education as a subject?

INTERVIEWER: Yes; what do you think it is the importance of your learners taking Technology Education as a school subject?

P1: My view is that if they can learn some of the projects done in the subject; **it will help them in future** when they are grown up.

INTERVIEWER: Now describe to me how you assess your learners in terms of the strategies that you use.

P1: Sometimes **I make use of** class work, home work, and then tasks, even assignments.

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INTERVIEWER: Now at what standard do you set these tasks?

P1: These tasks depend on the assessment standards that are **set out** in the policy document of the subject.

INTERVIEWER: Do you teach all sections of the syllabus?

P1: **Yes.**

INTERVIEWER: Please explain to me.

P1: Because the government have **supplied us** with a work schedule which is divided according to terms. I am following this because we are to **write common formal assessment tasks.**

INTERVIEWER: So you teach them because they are there already in the policy already, you teach them because you've got the competence of teaching all the sections.

P1: I teach, those we are given.

INTERVIEWER: But do you have any challenge on any of the aspects?

P1: Yes, I've got some challenges. Sometimes they just provide us with **questionable policies and work schedules that are confusing**. Some of the policies and work schedules only cover certain topics and in most instances only to one assessment standard and LO which **is not the way Technology Education should be planned and taught.**

INTERVIEWER: Now how should it be taught?

P1: LO 1 cannot be separated from LO 2, they is inseparable.

INTERVIEWER: Now during your teaching, do you normally find your learners attentive and engaged during the lesson?

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P1: Yes, **they are engaged.**

INTERVIEWER: Please elaborate.

P1: As I have already said; my **learners are able to do projects.**

INTERVIEWER: All I need to know is the reasons why your learners are always attentive and engaged during lessons.

P1: They are engaged **because of the way I teach them**.

INTERVIEWER: To what extent do you provide learners with notes and under which conditions do you do this?

P1: Sometimes if we don't have information in their books then **I get something from the internet** which I can print for the learner.

INTERVIEWER: Now, please comment on the value and the usefulness of the teacher support materials that you received from the CPD programme.

P1: They are so useful; **even now I am making use of them in class.**

INTERVIEWER: How do you make use of them?

P1: They are useful because there are **some topics that are not well outlined** in our text books.

INTERVIEWER: Do your learners take responsibility and control of their own learning?

P1: Yes, because **they usually come with other sources and resources,** especially if we don't have material for doing projects; they compromise to come with some materials needed to do the project.

INTERVIEWER: Earlier on your mentioned the fact that you engage your learners and you make sure that **they do all the work in their groups**. How do make sure

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that the lesson is learner centred?

P1: I make sure that **all learners in the groups are given responsibilities.**

INTERVIEWER: But do they really work in groups?

P1: Yes; I always ensure that **each individual contributes meaningfully to the entire group.**

INTERVIEWER: Do you find group work method being effective or do you want to change it?

P1: **It depends on the focus of the lesson.**

INTERVIEWER: Please; explain

P1: **When they do a project, they do it in a group**.

INTERVIEWER: What demands do you make to your learners in terms of punctuality, completion of tasks?

P1: Yes; **I encourage them to be punctual for class and completion of tasks**.

INTERVIEWER: Do they do that?

P1: Sometimes. Yes, sometimes.

INTERVIEWER: They don't complete?

P1: They don't complete.

INTERVIEWER: Now if they don't complete, what do you normally.

P1: I must **do some follow-ups** to ensure that they to finish their work.

INTERVIEWER: How often do you do practical work in your class and how is this conducted?

P1: Almost in each and every lesson of Technology Education in fact **I do practical work almost every day** when I teach technology.

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INTERVIEWER: Why is that the case?

P1: I do practical work because **Technology Education is a kind of subject that should be taught through projects and case studies.**

INTERVIEWER: What kind of projects do you involve your learners in?

P1: For now we have built a model of a house and we have made some textile {inaudible} bags.

INTERVIEWER: How do you think the making of all these models will help your learners?

P1: These models, they will help them because sometimes **they will sell them to get a living wage.**

INTERVIEWER: I am mindful of the fact that learners' potential is not the same. Can you explain to me as to whether there is any remedial work that you provide to those learners who require it so that all could achieve the lesson outcomes and assessment standards? Meaning basically do you cater for everybody in your classroom?

P1: Yes, **I cater all of them.**

INTERVIEWER: How is it done?

P1: It is not always the case, but sometimes I do **provide some remedial work** for those learners who do not understand.

INTERVIEWER: Now for those who are bright, do you give them some enrichment tasks?

P1: **I have not really done that**.

INTERVIEWER: What do you normally do when faced with a section of the

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syllabus that you don't understand?

P1: **I consult,** for example, sometimes I consult subject specialist for help when I do not understand some aspects in the subject.

INTERVIEWER: Do you desire to develop further as a teacher or change your teaching practices in any way?

P1: Yes; **I want to develop further** in the teaching of technology.

INTERVIEWER: How do you think that would be achieved?

P1: By **reading books and enrolling** with institutions of higher learning to increase my content and pedagogical knowledge in technology.

INTERVIEWER: Have you made maximum use of the CPD programme support offered?

P1: **Yes, I made use of it.**

INTERVIEWER: How?

P1: I always ensured that every time I came into contact with our facilitators; **I presented all my challenges** for advice and clarification.

INTERVIEWER: OK, now tell me, what drives you most as a teacher? What are your priorities?

P1: I always **strive to be a good leader, lifelong learner, and a designer and developer of work schedules.**

PART 4: Exploring teachers' general school experiences (teacher's own work environment)

INTERVIEWER: Do other teachers in your school' have a shared sense of direction?

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P1: Yes, sometimes **I use to help** them where they get lost especially as far as this policy document is concerned. **We help each other**.

INTERVIEWER: How often do you meet?

P1: Besides normal staff meetings; **we meet** when there are problems that need to be tackled.

INTERVIEWER: Do teachers at your school feel valued?

P1: **More than the word.**

INTERVIEWER: Please explain.

P1: Because we are given the opportunity to **share new strategies** on how to teach effectively, **I use to help them** in other subjects especially in the interpretation of policy documents.

INTERVIEWER: If I get you clear; you are saying that the CPD program helped you to a point whereby you able to help other teachers in other subjects?

P1: Yes; because **now I understand** how to interpret the policy documents. This has been **my main problem in the past**, even now, there **are teachers who still have problems** of understanding what assessment standard are, because they do not understand that in the assessment. **This is a major problem for most educators.**

INTERVIEWER: Is your school management and administration open to change?

P1: Open to change? **Yes.**

INTERVIEWER: Please explain.

P1: **They are always open to implement new ideas.** Especially if there is something which they do not know, or there is something that we are supposed to

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change for the benefit of the school.

INTERVIEWER: Do all the school structures and fellow teachers support individual teacher's initiative? For example, yourself as a teacher, you initiate something; will your colleagues support it?

P1: Yes.

INTERVIEWER: Please elaborate.

P1: **We support each other**.

INTERVIEWER: How?

P1: I don't know how can I put it, but **we always support and help each even when we have sport activities** we help and support each other so that everything runs smoothly.

INTERVIEWER: Is the effectiveness of the school teaching programme regularly monitored?

P1: **Yes.**

INTERVIEWER: How is it monitored?

P1: **Normally it starts with the SMT and then the principal does the overview.**

INTERVIEWER: How often is it being done?

P1: **We have decided weekly**, they check our work weekly.

INTERVIEWER: In what ways do the school management support teachers to seek information and resources that can improve their work?

P1: In which ways?

INTERVIEWER: Yes.

P1: Oh, OK, sometimes **they assist by buying support** material for the teachers.

INTERVIEWER: Then in terms of resources?

P1: **Even resources they do buy** so that teaching can be effective.

INTERVIEWER: What is that that you would like your principal to understand about your role as a teacher in the school?

P1: **My principal must support me**.

INTERVIEWER: How?

P1: To acquire and implement new ideas, that is, **they must develop me**.

INTERVIEWER: How must they develop you?

P1: For example, by **using the IQMS as a tool to develop me** as a teacher.

INTERVIEWER: Do you consult with your HOD or other colleagues for assistance or support?

P1: **Unfortunately we don't have a HOD for Science**, we have a principal and HOD's for other departments.

INTERVIEWER: For those who are available, do you sometimes consult with them?

P1: Yes; **we do consult** with them for assistance and support.

INTERVIEWER: What is your attitude towards persons in authority over you, that is your SMT's and the principal.

P1: **I respect them**.

INTERVIEWER: Do you work amicably with them?

P1: We do work amicably with them.

INTERVIEWER: Please elaborate.

P1: If I don't respect them, I don't think I am going to be a good teacher. **If you**

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want to develop then I think you must respect your leaders.

INTERVIEWER: Now, let me thank you.

APPENDIX G: **Mr GREEN'S INTERVIEW TRANSCRIPT**

TRANSCRIPT

PART 1: **Eliciting teachers' beliefs and experiences about the teaching profession.**

INTERVIEWER: Morning Mr. Mametja; how are you this day?

P2: I am fine and how are you sir?

INTERVIEWER: Fine. Tell me, why did you decide to become a teacher?

P2: Basically **I never decided to become a teacher**, I only find myself faced with a **college of education as the only available and affordable institution** of higher learning.

INTERVIEWER: And how did you become part of the program?

P2: Beginning part of the program is actually maybe it can be the question of how did I come to teach technology. I was, you see at the school I was the only teacher who was teaching mathematics, then they said no, teachers who are teaching mathematics should also teach technology and then that opportunity comes there, the department is offering a bursaries for teachers who are teaching maths and technology to study further, so basically that is how it happened, then I fill in the form, only to find out that somebody went to there and tell me that you are selected to be part of {inaudible}.

INTERVIEWER: And what do you think is the most important component of a teacher's job?

P2: The most important component of a teacher's job I think it is to **transform the lives** of the learners that are entrusted to them. You see the parents bring them to school and they bring them with the idea that teachers will **help them [learners] to become responsible and active** as a decent citizen of the country so I think the main thing of the

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teachers should **transform the lives** of the learners and make them better people.

INTERVIEWER: Now tell me, presently; are you happy to be teaching?

P2: Ja, I think **I'm happy** because **initially I never wanted to become a teacher** but this time around, **through my interaction with the teaching and learning materials and other staff members, I become used to it**, then **I am happy**, I don't have a problem now.

PART 2: Eliciting teachers' beliefs and experiences about the CPD programme as a professional development strategy.

INTERVIEWER: OK fine, now let us go directly into your experiences and beliefs about the CPD program that is the ACE programme that you attended.

Did you, in the beginning, understand what the outcomes of the CPD program were?

P2: Basically **I can say no**. Initially **I was actually frustrated** because of how it was presented and actually I didn't understand what was going on and it was like **I wanted to withdraw**. However, after some months **I became very much interested** in it and I enjoyed it very much.

INTERVIEWER: Presently; what do you think the outcomes of the CPD programme were?

P2: I think the CPD programme was aimed at **helping us as teachers to understand** how the NCS is going and **how we should teach our learners** and I also think it is the issue that some of us were not **understanding the technology policy document** and the stuff, so that program helped us a lot **in order to understand those learning outcomes and the assessment standards,** how to go through them. That is what **I think I learnt more from the programme.**

INTERVIEWER: Now please, indicate in general about the components of the CPD

program that you find useful and what you enjoyed about having enrolled for the ACE programme?

P2: Like I indicated, **I enjoyed and benefitted a lot about the teaching strategies** and also how to go through the relevant documents that are used in the teacher's learning like policy documents. I actually had the policy document but **I was not able to interpret it**, so through the programme; I am **now able to interpret** them and **I think I can help somebody** if the need arises.

INTERVIEWER: What is your view about the workshops conducted? Were the content and the general structure of the CPD programme relevant?

P2: **Ja, basically the content was relevant** because it is like; it helped us because as I indicated, we were not able to interpret the policy document and also **our interaction with our facilitators and even when they were doing the school visits were helpful**. I think it was more helpful because after we have presented our lessons we sit down with them, we discuss and they indicate to us that this and this should happen in this way, this is where I benefitted a lot.

INTERVIEWER: Now let us talk about those components of the CPD program that you did not find useful.

P2: I can't say there was any component of the CPD programme that was not useful to me. I think **all of them were useful**.

INTERVIEWER: Were the workshops and school visits relevant towards your development in your field of teaching?

P2: **Yes, the workshop or the classes I have attended, they helped us a lot especially when we were doing practical work.** I remember when we were dealing with; we were

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doing something like a toy transport. **Initially we didn't know what was going to happen** and our facilitator told us that we were going to do it. He wanted to see it [toy transport] moving forward and backward on its own. Initially it was like **he was talking something that was not possible** and on the third day when **I saw myself doing the project and it was able to move on its own,** I said Yes, **thanks to the programme.** The other issue is that of school visits. The **school visits helped us to transform and improve** the way we teach Technology Education in the class and even the materials that were provided. Most of the materials that we were given that time, **I'm still using them** and I think **it will be part of me as long as I am still a teacher** or unless maybe the syllabus changes, but really, those materials have helped me a lot.

INTERVIEWER: What did you find about yourself during the course of your participation of the CPD programme?

P2: I really enjoyed being part of the CPD programme because **now I realise that I can be a better teacher** especially **if I can given the necessary guidance and support**.

INTERVIEWER: Are there any aspects of the CPD program that has been of long benefit to you?

P2: Ja; I think **I was helped a lot in the usage of a project during lesson presentation.** In technology they are saying when you teach Technology Education; you teach it through projects. I think that is one of the most things that I have learnt because now **I am able to go through any aspect of technology** like maybe say structures. I can teach structures using the project and everything goes smoothly up until the end of the lesson.

INTERVIEWER: In what ways did the CPD program meet your expectations as a professional?

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P2: I think it helped me a lot by **being self-reliant** and not only relying on the prescribed text book. I think this is one of the things that our facilitators used to say, no text book is absolute. Initially when we were teaching Technology Education; we were just taking a text book and going through it page to page but now; **I can do it without relying on the text book** as long as I know what I am going to teach.

PART 3: Exploring teachers' present classroom practices:

INTERVIEWER: Are you confident of your content and methodological knowledge of Technology Education as a school subject?

P2: Ja, **I am a confident** technology teacher. Like I indicated, **my ability to unpack the policy document** helped me to know what is expected of me in a Technology Education classroom.

INTERVIEWER: Describe to me your interaction with learners in class.

P2: My relationship and interaction my learners are at an acceptable level. I normally encourage the **question- answer sessions to assess the process of teaching and learning.** Mostly I ask questions about the issue of, like you see, in technology, we check how the technology products are working. The question of how does it work and even the **learners, they ask those questions,** something like 1,2,3, how does it work, then we interact with it, you see, if you are able to unpack how it works so that we, all of us, we get informed about that product.

INTERVIEWER: Are you always well prepared for your lessons?

P2: Ja, I think **I am always prepared** though can I say that **I've been teaching technology for long** and sometimes you see **I think I now know what I am going to do** in the class, but ja, I try to be prepared every day.

INTERVIEWER: So what preparations do you do?

P2: One of the things that I prepare, **I actually prepare** the **content** and even **also the teaching and learning material** that we are going to use. Then **those that are not available I try to make them available** and normally I, when I have something to present I prepare myself in advance like I also give my learners some home activities to do at home which are based on the lesson that I will be teaching tomorrow. Then **we start by interacting with their home activity** then it gives us a way forward to our lesson that day.

INTERVIEWER: Then what resources do you use to help you in your preparations.

P2: Eish; in terms of resources, basically I use text books, relevant text book and **whatever I come across written Technology Education I go through it.** Furthermore; **I am now able to use my computer** in searching for information. Initially I didn't know how to use a computer to find information, but **now I can use a computer** to **find information that I can print as hand outs for my learners.**

INTERVIEWER: Generally, how would you start your lesson?

P2: Starting a lesson, **it depends on what I have to teach in that lesson.** The approach varies as per the demands of the lesson. I normally **start by explaining the concepts** that underpins the lesson. Sometimes those concepts are given to them beforehand and **as an introduction to the lesson we check the learners' responses** and deliberate on them.

INTERVIEWER: How do you monitor and control learners' written work?

P2: Controlling and monitoring learners' written work, it is **normally done on a continuous basis**. It is like I do not have a specific time of saying, now I am going controlling the learners' written work. In most cases while the learners are busy.

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INTERVIEWER: OK; tell me; do your learners have text books?

P2: No, this is a new school; **we never had a supply of text books** in this school. A few texts that we have, **we took them from our neighbouring schools**.

INTERVIEWER: But if it happens that your learners are having text books like you said, how do you use them in your lesson?

P2: **Normally I use text books to find some exercises for the lesson**, home activities and even **learners may be able to get information** when they get a home.

INTERVIEWER: What principles do you normally use to structure your teaching and learning activities?

P2: Actually my learning and teaching activities are **based on my belief**. I basically search for information on the topic and how my presentation will be like in class will **depend on the availability of materials**. In most cases **we improvise**.

INTERVIEWER: Do you have any disciplinary problems with your learners?

P2: **No, not at all**. **My belief** is that the way the teacher interacts with the learners in class **has a great bearing on discipline**. If learners are **kept active I think they won't be any ups and downs**.

INTERVIEWER: What importance do you believe Technology as a school subject is to your learners?

P2: I think it helps our learners **to be aware of the technological products** that they are using every day. You see; Technology Education is a learning area which deals with what learners see every day.

At their homes there are a lot of technological products and even when they are playing, they are playing with some of the technological products. I think my duty is also to make

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them aware that 1, 2, 3 which they are playing with are technological products

INTERVIEWER: How do you think that will help them to learn effectively?

P2: I think they **will learn effectively by interacting with those things that exist in their daily lives**. Like for an example, when they are making their toys, they are using a lot of technological components like the gears and the pulleys. They use those things but they are not aware that this is 1, 2, and 3.

INTERVIEWER: Now when it comes to assessment; which strategies do you use?

P2: Normally I make use of what we call **baseline assessment** where I ask learners some questions to check their prior knowledge. Sometimes I ask questions, to **check whether the teaching and learning is going effectively**. So I ask questions before the lesson and during the lesson and after the lesson. Furthermore; **I assess the learners for record purposes.**

INTERVIEWER: Are there any specific standards that you set for your learners to achieve?

P2: Not exactly. Basically **I rely on the assessment standards that are prescribed by the department**.

INTERVIEWER: Do you teach all the sections of the syllabus?

P2: **Ja**, like the **first quarter I deal with structure, second quarter I deal with processing then third quarter I deal with mechanical systems and control and in the fourth quarter I deal with electrical system and control. I think I cover everything**; I'm trying to cover everything.

INTERVIEWER: Do you generally find your learners attentive and engaged during lessons?

P2: Most of the time they are attentive. Their responses and the way they take instruction, to me, **it shows they are attentive** because they are able to do what you say they must do **even if you are not around**.

INTERVIEWER: To what extent do you provide your learners with notes?

P2: **I provide them with notes more often**. Sometimes **I search information from the internet and from text books.** Actually **that is how I work**. I just go out and find information and **make copies for my learners.**

INTERVIEWER: Please comment on the value and usefulness of the Learner/ Teacher Support Materials you have drawn from the CPD programme.

P2: I think **they are very much valuable because I am using the**m. I think it is the source of most information. **The materials are also having websites** that one can consult for more information.

INTERVIEWER: Do your learners take responsibility and control of their own learning?

P2: **I think they do**, **but sometimes you see they want to be pushed**; **you understand how a wheelbarrow works**. If you push it, moves but if you leave it, it stays there until you come and push it, so it depends, but **you have to push them to finish the work.**

INTERVIEWER: How do you ensure that your lessons are learner centred?

P2: **I use group work**.

Learners do most of the work on their own and then they present to others and to me. I only interact with the groups in order to help them where they need help and **some of them [the learners], believe me, they are intelligent**, and they might even come up with something that you were not aware of.

INTERVIEWER: How do you structure teaching and learning activities to suit group

work?

P2: When grouping my learners, I **group them according to their different abilities.**

INTERVIEWER: What demands do you normally make to your learners in terms of punctuality and completion of tasks?

P2: On the completion of tasks, ja; **I have a problem** because in most instances; find that I give them an assignment that they must hand-in tomorrow and other do not bring it. In terms of punctuality in the classroom, **we don't have a problem** because learners are always in the class and teachers are the one doing the rotation.

INTERVIEWER: How often do you do practical work in your class?

P2: **I do them more often** though the problem is that **we do not have necessary apparatus** but **I always try to find whatever is needed**.

INTERVIEWER: How is it done?

P2: Normally when we do practical work; I ask **learners in their groups so to bring 1, 2, and 3 that we are going to use**. I also bring mine. **I usually tell them what to do and how to do it, then I do, they follow me and where they have got a problem I try to help them**.

INTERVIEWER: What kind of projects do you normally involve your learners in?

P2: The projects; (shot pause), actually, **the projects that I involve my learners are based on the topic that we are dealing with**.

INTERVIEWER: What do you think are the advantages of the project work or practical work?

P2: Basically **Technology Education is a practical subject,** so I think the advantage is that we want **our learners to be a responsible adults and citizens. Learners must be**

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able to solve their own problems as well as those problems that exist in their respective communities. I think **projects prepare learners for any future practical work** that they might be engaged in.

INTERVIEWER: Do you normally provide remedial work for those learners who need it?

P2: **It is difficult to provide focussed remedial work** because the **class is too big**. I mean it is over a hundred and something in one class. It is really difficult to find learners who need remediation and to find time to help them. **Normally the remedial work that I provide is during the lesson** presentation where through questions I realize that some learners are struggling. I therefore ask other learners to help them. I also give my own inputs.

INTERVIEWER: You indicated earlier on that you teach all the sections of the syllabus; in case you are faced with a section of the syllabus that you don't understand what do you do?

P2: **Presently I do not have any serious problem** with that. **Initially I had a problem with the part of processing**. What I did is that **I decided to outsource the topic to other teachers**. Before I could attend that the CPD programme, **I was only teaching structures and electricity** because I did not understand the topics under processing. **The materials on processing as well as the practical work that we did during the programme helped me a lot.** There is **a booklet that I got from the programme that I am still using today** for reference.

INTERVIEWER: Do you like to develop yourself further as a teacher or change your teaching practices in any?

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P2:   **Ja**, I'm in the process of development because after completion of the ACE programme, **I am now doing honours in Technology Education**. This could be my final year.

INTERVIEWER: Now tell me, have you made maximum use of the CPD program support offered?

P2: **Ja**, I think so because what I'm doing on daily basis when I come to school or when I go to the technology classroom, much of the information or much of the **strategies that I use are the ones that I adopted them from the programme.**

INTERVIEWER: What drives you most as a teacher, that is, what are your priorities?

P2: **I want to see my learners developed and coping in the technological world**. Moreover, learners must be **able to compete with the outside world.** That is my aim.

PART 4: Exploring teachers' general school experiences (teacher's own work environment)

INTERVIEWER: Do other teachers in your school' have a shared sense of direction?

P2:   **I don't think** so because they should be supporting me and helping me in my initiatives but that is not the case.

INTERVIEWER: Do teachers at your school feel valued?

P2: **Not exactly.** My school was established in March 2010, can you believe me, **this is the 5th principal that we are having.** All of these are due to **internal politics** that I am not prepared to discuss at this stage.

INTERVIEWER: But in terms of school management and administration, are they open to change?

P2: **Ja**, but it is not as easy as it seems. If you want them [SMT] to help with something,

it will take you longer than expected. It is not like they don't do, they just take their time. **This is very frustrating**.

INTERVIEWER: Do all school structures and fellow teachers support individual teacher initiatives?

P2: **They do**; but, you see when you come up with an idea on development, they will say, ja; it's a good idea, it can be done but **that will be the first and the last time you will hear them talking about it**. No one will never come and check as to whether the idea is working or not. In fact, **it is discouraging** to initiate new things at this school.

 INTERVIEWER: Is the effectiveness of the school teaching programme regularly monitored?

P2: No I don't think so. Like I indicated before, **the monitoring systems in the school are not effective**.

INTERVIEWER: Can you please elaborate.

P2: My view is that when we talk about the effectiveness of the monitoring of the teaching and learning process. It is like **we just teach without monitoring.** To be honest, thou these are internal politics, **for the whole of this year I never saw the principal or one of my seniors demanding to check the contents and composition of my file**. I cannot say there is any monitoring; **they [SMT] don't even know what is in my file**.

INTERVIEWER: In what ways do the school management support teachers to seek information and resources that can improve their work.

P2: **That is also very much difficult**. As a teacher; if you want something that can help you, you have to go to them more often and sometimes **you end up giving up**. Actually, to me, **support is not there** in so far as the resources are concerned.

INTERVIEWER: What is that that you would like your principal to understand about your role as a teacher in the school?

P2: My principal **should understand that technology is a subject** and its teaching and learning activities are different from other learning areas.

INTERVIEWER: What role do you think your principal should play in your professional life?

P2: Actually I think the principal should just understand that **as a teacher I need support from the managers**. The only thing that the principal should do is just to give me the necessary support and to **listen to my grievances** and do whatever is possible.

INTERVIEWER: Do you consult with your HOD or other colleagues for assistance or support?

P1: **Ja**, I do, but in terms of this learning area and in terms of other things, actually, you see the problem in the school is that **they believe too much in me**. Whenever they need help on something, **they will always come to me**.

They think I know everything to a point where they think if I am unable to do it; then no one can do it, so sometimes **I get discouraged** because even if I go to them I won't get any help.

INTERVIEWER: What can be done to rectify the situation?

P2: Ja, I think the Department of Education **should make sure that there are people who are assigned to support us** because like now, in technology in my circuit, **there is no person who is responsible for technology** or if that person is there, I have never seen her/him in my life. It is like when we are having problems in technology, we have nowhere to go, we have nobody to tell. I think the department should make sure that there is

somebody who will be able to help us like with the other subjects. I use to see people for social sciences who use to come here and give support to our teachers, but in terms of technology I have never seen anybody. **The last time I saw a person to offer me support was during the CPD programme** where our facilitators came to support me at my school.

INTERVIEWER: What is your attitude to persons with authority over you; do you work amicably with them?

P2: **Ja,** there are no serious problems. However; like I indicated that sometimes you indicate to them that for one to be able to work effectively in my classroom I will need 1, 2, and 3. They will just say; OK; it is noted then after two weeks you go back to them **only to find that nothing has been done**. Our **relationship starts to be soured** because it is like you are pushing them to help you.

INTERVIEWER: Sir, let me thank you for your time. Thanks very much for taking part in this study.

P1: OK, thank you.

APPENDIX H: Ms RED'S INTERVIEW TRANSCRIPT

TRANSCRIPTS

PART 1: Eliciting teachers' beliefs and experiences about the teaching profession.

 INTERVIEWER: Mam;

P3: Mmh

INTERVIEWER: Why did you decide to become a teacher?

P3: Mmm; because **I have the desire and the interest to teach learners to become better people in future** and also to **develop the community at large**.

INTERVIEWER: OK, now tell me, what do you think is the most important component of a teacher's job?

P3: I think is to **teach the learners and encourage them to be educated.**

INTERVIEWER: Presently; what is your opinion about the teaching profession and are you happy to be teaching?

P3: Mmm; in fact **I am partially happy** because **the education system changes rapidly** and the **department did not give us enough training and enough workshops** and at the end you find **some teachers not coping with the changes.**

PART 2: Eliciting teachers' beliefs and experiences about the CPD programme as a professional development strategy.

INTERVIEWER: Now; let us go to your participation in the CPD program. At the beginning, Did you understand what the outcomes of the CPD programme were?

P3: Eeh; **not at all**.

INTERVIEWER: Presently; what do you think the outcomes of the CPD programme were?

P3: I think it is for the **development of educators** because after the completion of the program, **I was expected to facilitate effective technology lessons in the class**.

INTERVIEWER: Now please, indicate to me in general about the components of the CPD program that you find useful.

 P3: I think **both the workshops and school support visits were useful** because **I gained more insight about technology and how it should be taught in the classroom**.

INTERVIEWER: Please elaborate

P3: **I enjoyed workshops** because they helped me to **acquire new skills and**

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knowledge in technology. I also **enjoyed the one-on-one sessions with facilitators during school support visits** because it gave me chance to **deal with the real challenges I am facing daily in the classroom.**

INTERVIEWER: Now, let us talk about the components that you did not find useful, which are those?

P3: When doing this CPD programme?

INTERVIEWER: Yes?

P3: **None.**

INTERVIEWER: So you found them all useful?

P3: Yes; they were all useful.

INTERVIEWER: Were the workshops and school visits relevant towards your development in your field of teaching?

P3: Yes.

INTERVIEWER: How?

P3: Because **they were motivating and encouraging.** They actually **assisted to be always ready to deal with the challenges one faces in the teaching of technology in the classroom**.

INTERVIEWER: Personally, what is that which you found about yourself during the course of your participation in the CPD programme?

P3: **I found myself being a new person** who has **acquired new knowledge and skills** and even **exposed to various environments (contexts) in technology.**

INTERVIEWER: Mam, please elaborate?

P3: Like I said before, **the workshops that I have attended helped me a lot because**

we were always hand-on. When we were doing projects, I feel is where **I was given chance to expand my knowledge of the subject**

INTERVIEWER: Can you please explain to me.

P3: Because now **I know what and how to teach technology** in the classroom.

INTERVIEWER: In what way did the CPD programme meet your own expectations as a professional in terms of your professional development and growth?

P3: Presently, **I feel that have been developed** because   **I am able to access information using various resources and also I am able to use policy statements when preparing for lessons.**

 PART 3: **Exploring teachers' present classroom practices:**

INTERVIEWER: Presently; are you confident with your content and methodological knowledge of technology as a school subject?

P3: Yes. **I am confident**.

INTERVIEWER: Please elaborate.

P3: **I am so confident** because presently **I am different from the way I used to teach technology before** registering for the CPD program.

INTERVIEWER: What makes you feel that you are different?

P3: I am different because **now I am able to use the policy statements to structure my teaching and also when I am to assess my learners I make use of the assessment policy statements** as a guide to assess the learners.

INTERVIEWER: Was that not been happening before you attended the CPD programme?

P3: Yes;**I was always in the dark not knowing what to do.**

INTERVIEWER: Now let us go to your interaction with your learners in class. Describe to me how your interaction with the learners is like in your class.

P3: **I usually explain the concepts to them and later give them chance to discuss** amongst themselves and **encourage them to ask questions**.

INTERVIEWER: Do you find the strategy useful?

P3: Yes; because the normally asks questions and **mine is to give them clarifications.**

INTERVIEWER: Do they really ask questions?

P3: Yes.

INTERVIEWER: Now let us come to lesson preparations. Do you do lesson preparations?

P3: **Yes; but not always.**

INTERVIEWER: Why?

P3: **A written lesson preparation is time consuming** and **as long as I am prepared, is fine.**

INTERVIEWER: Okay, but I want to know about the preparedness thereof.

P3: **I prepare but I do not do it in a written form.**

INTERVIEWER: How do you do it?

P3: **I just go through the textbook and other sources** but not necessarily writing them down.

INTERVIEWER: When do you do them?

P3: **Depending on the topic to be handled**, **I sometimes do it daily or on weekly basis**.

INTERVIEWER: Coming to resources, what resources do you use to help you in your

lesson preparations?

P3: Like I said, **I make use of work schedule provided by the department and textbooks**. **I also use charts as well as the materials I received from the CPD program.** **These materials are also helpful during lesson preparations.**

INTERVIEWER: What is the approach that you use to start your lessons?

P3: Mmmh; I start from **known to unknown.** Technology is about solving problems hence **I usually ask them questions related to their experiences about the problem to be solved** in order to **provoke their thinking and curiosity.**

INTERVIEWER: Then; how do you monitor and control learners' written work?

P3: **After every task**, **I mark or control learners' work** and **give them feedback** on their progress.

INTERVIEWER: Do your learners have textbooks in the classroom?

P3: **Yes.**

INTERVIEWER: Then how do you use the textbooks in your lessons?

P3: Sometimes **I use them during the lesson for reference** and sometimes **I use them to develop assessment tasks**.

INTERVIEWER: Are they enough?

P3: **Yes; but only one series.**

INTERVIEWER: Coming to teaching and learning situation. What principles do you normally use to structure your teaching and learning activities?

P3: Sometimes **I make use of lesson plans.**

INTERVIEWER: But earlier on you indicated that you normally do not write them down?

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P3: Yes; sometimes when have written them, I make use of them.

INTERVIEWER: Then; if you did not write them down?

P3: **They are done here (pointing at her head).**

INTERVIEWER: So you do them in your head?

P3: (Laughs) Yes, I do them in my head.

INTERVIEWER: Do you have any disciplinary problems with your learners in your class?

P3: Aah, **not at all. I try to manage my class very well.**

INTERVIEWER: So you don't have any discipline problems?

P3: Yes.

INTERVIEWER: Why is the reason?

P3: There are **classroom rules and my learners usually obey them**. **The school also has a disciplinary code** for all learners.

INTERVIEWER: What is your categorical belief about technology as a school subject, that is, of what importance is technology to your learners and how do you think it will help them to learn effectively?

P3: Eeh, in fact, **they learn through actions and demonstrations** where **learners are actively involved in the learning process.**

INTERVIEWER: What I want to find out is your view about the importance of technology as a subject to your learners? Or why is it important to teach learners technology?

P3: It helps them **to be exposed to the environment they live in**.

INTERVIEWER: Now describe to me how you assess learners in your class.

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P3: **I assess the learners using different forms of assessment.**

INTERVIEWER: Please elaborate?

P3: In case of a test, **I usually have the low and high order questions.** However in terms of high order questions, **it is always difficult for learners.**

INTERVIEWER: How do you think you can help your learners to overcome this challenge?

P3: Haai; **it is difficult**.

INTERVIEWER: Why?

P3: It is difficult due to the **standard of teaching**

INTERVIEWER: What about the standard of teaching?

P3: Let us say you ask them to analyse, **in most instances they do not respond.**

INTERVIEWER: What are the reasons?

P3: **The standard of teaching.**

INTERVIEWER: Are you saying the problem is with the standard of teaching and not with the learners?

P3: Even with the learners because immediately you ask them questions requiring high thinking, eish; **they start to act somehow and say Mam; this is very difficult.**

INTERVIEWER: At what standards do you set the tasks for your learners?

P3: I try **to use the standards set in the policy document** but it is difficult for them.

INTERVIEWER: Do you teach all sections of the syllabus?

P3: **Yes; I teach all the topics that appear on the work schedule** because they are **the ones the learners are assessed on.**

INTERVIEWER: Are you confident in teaching all the topics?

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P3: Yes; **I am very much confident** in teaching all the topics.

INTERVIEWER: Who decides on the topics to be included in the work schedule?

P3: It is the department but I must be honest, **they (work schedules) are confusing.**

INTERVIEWER: How is it confusing?

P3: **It separates the LO2 from LO1**.

INTERVIEWER: How should it be structured?

P3: It should be structured in a way that **LO2 which is the design process is used to deliver the content defined by LO1**.

INTERVIEWER: Now during your teaching, do you normally find your learners attentive and engaged during the lesson?

P3: Yes, they are **attentive** and **engaged**

INTERVIEWER: Please elaborate.

P3: Thou they are shy in nature, **they sometimes asks questions especially when doing projects that excite them**.

INTERVIEWER: Which projects excite them most?

P3: Projects in processing because they can **relate their products to real life experiences like drying meat etc**.

INTERVIEWER: To what extent do you provide learners with notes?

P3: I normally **give them hand-outs and** I also **encourage them to use their textbooks to get more information.**

INTERVIEWER: Now, please comment on the value and the usefulness of the Learner Teacher Support Materials (LTSM) that you received from the CPD programme.

P3: I really find the **Learner Teacher Support Materials I received from the CPD**

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program as being meaningful and helpful because **I usually use them as a guide when I prepare my lessons**. In most instances **I use them as a supplement to the textbook**.

INTERVIEWER: Does this imply that the materials are used as a replacement for lesson preparations?

P3: (Laughs) Yes; **they make my life easy.**

INTERVIEWER: Do your learners take responsibility and control of their own learning?

P3: Yes, they take responsibility and control of their own learning because **they organise themselves into groups and even choose a group leader to lead and monitor the group**. Again, **they share the tasks amongst themselves and ensure that everyone completes the work**.

INTERVIEWER: How do make sure that your lessons are learner centred?

P3: **I give learners tasks in their groups** and allow the groups to interact with each other through discussions.

INTERVIEWER: Then what becomes your role in the classroom?

P3: I only **monitor the process and intervene where necessary.**

INTERVIEWER: Do you find group work method being effective?

P3: Group work is very much effective in technology because **it allows learners to share ideas that will result in the design and making of a solution for a particular problem**.

INTERVIEWER: How do you do it?

P3: Firstly, **I group learners according to their different abilities** and **the type of learning activities to be undertaken determines the teaching strategy to be followed.**

The **number of learners in the classroom is also a factor** that needs to be considered when choosing the teaching strategy.

INTERVIEWER: What demands do you make to your learners in terms of punctuality to class and completion of tasks?

P3: I always **encourage my learners to be punctual to class and to complete their work on time**.

INTERVIEWER: Do they really do that?

P3: Yes they do; **I have not encountered any problems regarding non completion of tasks and punctuality**.

INTERVIEWER: As a technology teacher, how often do you do practical work in your class?

P3: **Once a week.**

INTERVIEWER: How are they done?

P3: **It depends on the topic and the availability of apparatus.** We are experiencing a challenge in terms of materials and tools hence **we only do the practical that is easy to perform and the materials can be improvised**.

INTERVIEWER: What kind of projects do you involve your learners in?

P3: We normally do projects in processing because **they are less costly** and learners enjoy doing them. Moreover, **learners usually bring to school some of the required materials and tools.**

INTERVIEWER: What do you think are the advantages of involving learners in practical work of this nature?

P3: The practical work in technology is aimed at **actively involving learners in the**

production of real models that solves their day-to-day problems.

INTERVIEWER: Do you normally provide your learners with remedial work? Or do you cater for everybody in your classroom?

P3: Yes, **I cater all of them.**

INTERVIEWER: How do you do it?

P3: I always encourage my learners to help one another and in some instance **I conduct extra lessons to address problematic sections.**

INTERVIEWER: Now tell me, when faced with a section of the syllabus that you don't understand, what do you do?

P3: **I consult with other technology teachers** in my school as well with those from neighbouring schools. **I also consult my HOD** and **where possible I can invite the Curriculum Advisor for assistance**.

INTERVIEWER: Do you desire to develop further as a teacher?

P3: Yes; **I want to develop further** as a teacher because **I am intending to register for an Honours degree in technology.** This will help me to gain more insight knowledge of the subject.

INTERVIEWER: Are you intending to change your teaching practices in way?

P3: Not necessarily to change but **to improve on my practices.**

INTERVIEWER: How do you intend doing that?

P3: By **reflecting on my present practices and seeking information on new methods** that can help my learners learn effectively.

INTERVIEWER: Let us go back to the CPD programme. Have you made maximum use of the CPD programme support offered?

P3: **Yes**.

INTERVIEWER: How did you do it?

P3: The support offered by the **CPD program helped me to deal with the challenges I face in the classroom**. **In the workshops, I was taught the content and how to conduct technology in the classroom.** The one-on-one sessions I had with the facilitators during **school support visits helped me to interpret the policy statements very well.** Now **I know how to assess learners using different forms of assessment strategies and instruments. I also help other teachers from our cluster** during departmental workshops.

INTERVIEWER: What drives you most as a teacher? What are your priorities?

P3: My priority **is to teach learners so that they can become better people in future.** In fact **I have the best interest of my learners at heart**.

PART 4: Exploring teachers' general school experiences (teacher's own work environment)

INTERVIEWER: Do your school's staff have a shared sense of direction?

P3: Yes. The SMT always encourages us as teachers to **contribute ideas that will help our school grow**. We even have a **staff representative who represents teachers' interests during parents meetings.**

INTERVIEWER: Is your school management and administration open to change?

P3: Yes; **they are open to change** but they take time to understand.

INTERVIEWER: Why?

P3: **Some of these changes are also new to them as a result they are reluctant to accept them** especially when they are mentioned by us.

INTERVIEWER: What do you think must be done?

P3: **They must also be trained by the department.**

INTERVIEWER: Do all the school structures and fellow teachers support individual teacher's initiative?

P3: Aai; **not always**. **Some teachers do support if the idea is going to be beneficial to the school but others just don't support.** Maybe it is in their nature not to support any new initiative.

INTERVIEWER: Is the effectiveness of the school teaching programme regularly monitored?

P3: **Yes.**

INTERVIEWER: How is it done?

P3: **The HOD's are the one who monitors our work.**

INTERVIEWER: How often is it being done?

P3: **It is done on monthly basis**.

INTERVIEWER: What do they look at?

P3: They check the **number of tasks as well as the general standard of our work including learner performance.**

INTERVIEWER: In what ways do your school management support teachers to seek information and resources that can improve their work?

P3: **They allow us to attend workshops** and presently **they are installing computers with internet that will help us to access and store information with ease.**

INTERVIEWER: What are about resources for practicals?

P3: The SMT has promised **to purchase some of the basic tools and materials**

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required for practical work. I just hope that they will keep their promise.

INTERVIEWER: What is that that you would like your principal to understand about your role as a teacher in the school?

P3: **To accept my personality and the way I do things.** The principal **should also be very supportive and where possible invite Curriculum Advisors** to school.

INTERVIEWER: Do you consult with your HOD or other colleagues for assistance or support?

P3: Yes; **I usually consult my HOD as well other staff members** when I encounter some challenges. They are very much supportive.

INTERVIEWER: What is your attitude towards persons in authority over you, that is your SMT's and principal.

P3: **I respect my HOD as well other members of the School Management Team (SMT)**.

INTERVIEWER: Do you work amicably with them?

P3: Yes, **I do work amicably** with them for the realisation of the objectives of the school.

INTERVIEWER: Is there any other information that you want to share with us?

P3: None

INTERVIEWER: Now, let me thank you.

P3: You are welcome.

APPENDIX I: **LETTER TO DISTRICT SENIOR MANAGER**

Faculty of Education

Department of Science, Mathematics and Technology Education

William.fraser@up.ac.za

012 420 2207

19 July 2012

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The District Senior Manager

Greater Sekhukhune District

Lebowakgomo

0737

Dear Mr. Nkadimeng,

APPLICATION TO CONDUCT RESEARCH IN YOUR DISTRICT

I the undersigned hereby request permission to conduct research in six (6) schools in your district.

The title of my research is "The influence of a Continuing Professional Development (CPD) on the classroom practices and professional development of Technology Education teachers". The research is conducted to meet the requirements pertaining to my studies at the University of Pretoria.

The purpose (aim) of this study was to explore and explain how (after the successful completion of the ACE programme) Senior Phase Technology Education teachers were influenced by the expected outcomes of the CPD programme in terms of their classroom practices and professional development thus enhancing the development of learners' technological knowledge in the classroom. I wish to seek permission to conduct interviews and classroom observations with the selected six (6) technology teacher(s) who have participated in the ACE programme offered by the University of Limpopo between 2008 and 2009. I also wish to have access to teachers' curriculum documents, preparation files and assessment documents.

The interview schedule will collect data about (i) teachers' general beliefs and experiences about the teaching professional in general; (ii) teachers' general beliefs and experiences about a CPD programme as professional development strategy; (iii) teachers' present classroom practices as well (iv) as the support teachers receive from their own work environment. The classroom observation will capture data on teachers' lesson preparations and facilitation of technology lessons in the classroom.

Participants' names, or the names of their schools, will not be linked to the findings in any way. The participants' identities will also be protected by the researcher. All activities that the participants will participate in will remain confidential and anonymous.

The participants will not be subjected to any risks. The information and findings to be shared with the participants should contribute towards enhancing participants' classroom teaching practices. The participants will receive full recognition should this be required, in any publication that might emerge from the study.

The participants will be requested to sign the consent form during my visit to their schools to confirm their voluntary participation in the study. Participants will be free to participate or to withdraw at any time from the study. This will not affect their relationship with the researcher.

Thanking you in anticipation

Yours faithfully

_____

Mr. N.P Mahlase   Prof. W.J Fraser (Supervisor)

083 325 1510