TEACHER MENTORSHIP AS PROFESSIONAL DEVELOPMENT: *EXPERIENCES OF MPUMALANGA PRIMARY SCHOOL NATURAL SCIENCE TEACHERS AS MENTEES*

by

Adriana van der Nest

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Supervisor: Professor L.C. Jita

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DECLARATION

Student number: 8887233

I declare that this dissertation, **"Teacher Mentorship as Professional Development: *Experiences of Mpumalanga Primary School Natural Science Teachers as Mentees*"**, represents my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

---------- NOVEMBER 2012

A. VAN DER NEST (MRS.)

DEDICATION

I dedicate this dissertation

to

My husband, D.P.
who has supported me on all the paths I have set out to take.

and

my son, Bernhard and daughter, Carla
who inspired and encouraged me throughout my studies.

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SUMMARY OF THE STUDY

Title:

"Teacher Mentorship as Professional Development: *Experiences of Mpumalanga Primary School Natural Science Teachers as Mentees*"

Mentorship as a tool to develop the pedagogical and content knowledge of in-service teachers, regardless of experience, is a field in education which has gained popularity worldwide. The review of literature however, provided evidence that mentoring in education has primarily focused on the benefits received by novice teachers and not experienced teachers. Areas addressed in the literature review include the important role of continuous professional development programmes in the improvement of the teachers' classroom practices and by inference, their learners' achievements.

The purpose of this study was to explore and describe the experiences and understandings of seven experienced natural science teachers as mentees in a professional development programme (the ILLS project). Through the use of a qualitative case study approach, I examined the activities that supported the development of the participants as they interacted with the guided support of a mentor teacher, and aimed to understand how the mentees made sense of their experiences in this mentoring relationship. The activities included lesson-planning, classroom observations and reflection meetings and the professional development support, through mentoring, was embedded on-site and in-context.

This research revealed that the mentee teachers were motivated by the opportunity to enhance their professional growth through the support of a mentor. The teachers also perceived that their subject content and pedagogical knowledge were enriched by participating in the mentoring process.

KEY TERMS: Mentorship; Professional Development; Natural Science Teachers; Mentor; Mentee; Mentoring Relationship; Subject and pedagogical knowledge, Teacher Learning and Growth, ILLS Project.

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CHAPTER 1
OVERVIEW OF THE STUDY

"Everyone needs a mentor" D. Clutterbuck (1991).

1.1 INTRODUCTION

This study investigates the experiences of primary school natural science teachers as mentees in a specific professional development programme within the province of Mpumalanga in South Africa. These professionals were in a mentoring relationship in which they were assigned to the care of a teacher from a neighbouring school, who is regarded as an expert on the teaching and learning of natural sciences.

1.2 BACKGROUND AND RATIONALE

Supporting strategies and developmental programmes necessary for the continuous professional growth of teachers remain major issues in South Africa's education sector.

The implementation of mentorship programmes to ensure the professional development of in-service teachers could contribute to address some of the current critical challenges in education. Two of the key challenges in South Africa are poor learner performance and coping with the rather frequent change in curricula.

1.2.1 Current challenges in mathematics and science education in South Africa

1.2.1.1 Poor learner performance

Many ways of addressing the poor performance of science and mathematics at school level have been explored in order to contribute to the development of effective classroom educators. However, it remains an urgent issue to investigate

the different ways in which professional development is implemented in order to improve the quality of education especially in critical subject areas such as mathematics and science. It is clear that an effective intervention regarding development in the classroom practice of mathematics and science teachers in particular, needs to be explored and developed to overcome this challenge of poor performance still facing the quality of basic education in South Africa.

Several studies reveal that there still is low achievement levels in the country's public schools, despite the efforts for improvement in the quality of education (Bantwini, 2012; Jita, 2011; Luneta, 2006).

South Africa has participated in several learner achievement assessments to evaluate the standard of mathematics and science education, at both international levels, such as TIMSS (Trends in International Mathematics and Science Study) and in the national contexts such as the Annual National Assessments (ANA). TIMSS provides an international benchmark against which the achievement of learners in mathematics and science is tested. A number of developing and developed countries take part in these tests every four years. From results obtained in 2003 for both mathematics and science (fourth and eighth graders), it is evident that South Africa scored the lowest results in comparison with 45 other countries (TIMSS, 2003). South Africa did not participate in TIMSS 2007, but again participated in 2011 (TIMSS, 2011). From these results, for both mathematics and science, again South Africa scored the lowest average of all the participating countries (TIMSS, 2011). The overall poor results obtained by the South African learners in TIMSS 2011 should evoke a critical response from the country's National Department of Education. Such comparative international studies have consistently revealed the apparent skills and competence gap amongst science and mathematics learners and by inference also the educators in South Africa.

On the local front, standardised assessments also provide us with evidence that there is poor learner achievement in the numeracy and literacy levels in the current schooling system. When comparing pass rates of the National Senior Certificate (NSC) examination by province in 2008 and 2009, it is clear that the national pass rate of the NSC examination decreased from 62.6% in 2008 to 60.6% in 2009 (DBE, 2010:24). When one compares the achievement rates of candidates in eight selected subject areas in the 2008 and 2009 NSC examinations, it is obvious that the lowest overall achievement was in physical science in 2009. (See Figure 1.1).

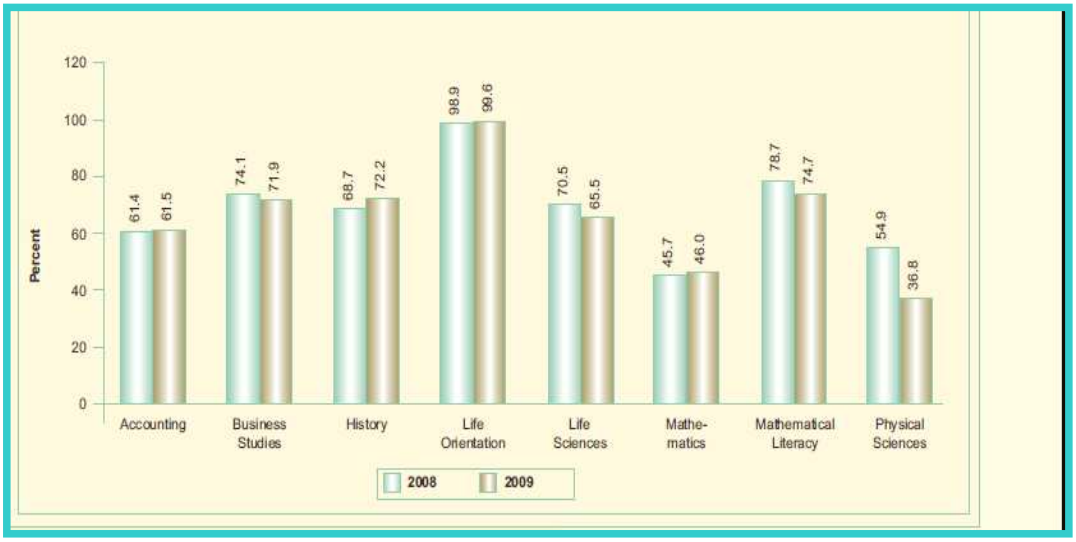

Figure 1.1: Percentage distribution of the National Senior Certificate examination achievements at 30% and above for selected subjects in 2008 and 2009 Source: Report on the 2009 National Senior Certificate Examination Results, DBE (January 2010)

More recently; UMALUSI[1] provided the media with the results of the 2011 NSC examination and by analysing these 'raw' statistics, (without the 25% internal assessment), reporters revealed shocking results that: despite the better national pass rate for 2011 compared to previous years; only six out of 10 learners have passed. For critical subjects such as mathematics and physical science; little or nothing has changed according to reporters, J. Pauw, et al. They claim that the average mark for the mathematics paper was 29%, for physical science 32% and

[1]**UMALUSI is the Council for Quality Assurance in General and Further Education and Training in South Africa**

for life sciences 38% (after being adjusted from 34.9%). Wits University education Professor, Mary Metcalfe's response to these statistics was cited in the media: "These results are deeply worrying for our progress in scarce skill areas. Many teachers need more support with both mathematics and the specific challenges of teaching concepts" (*City Press*, 2012).

Another national assessment instrument, the Annual National Assessments (ANA's), was recently introduced by the National Department of Education. Primary school learners had to write standardised national assessments for languages and mathematics in the intermediate phase (grades 4 – 6), and literacy and numeracy for the foundation phase (grades 1 – 3). The first ANA's were written in February 2011, and from the results obtained, it was clear that the quality of basic education is still, well below what it should be. The Report on the Annual National Assessments of 2011 reveals that the percentage of learners reaching at least a 'partially achieved' level of performance varies from 30% to 47%, depending on the grade and subject considered. The percentage of learners reaching the 'achieved' level of performance varies from 12% to 31%. Even the best provincial figure in this regard, 46% for Grade 3 literacy in Western Cape, is well below what can be considered as acceptable (*Report on the Annual National Assessments of 2011,* Department of Basic Education, 2011:6).

Against the background of the poor literacy and numeracy levels in South Africa, interventions for effective teacher development programmes to support practising, experienced teachers are much needed in the country (Soudien, 2007; Taylor, 2006).

For a long period now, the study of poor learner performance in science and mathematics at school level in South Africa has become an integral aspect in the continuous professional development (CPD) of educators. Since the introduction of the Revised National Curriculum Statement (RNCS) for General Education and Training (Grades R – 9) in 2002, government emphasises the important role all teachers have to play in the achievements of our learners. Government policy contends that, educators on all levels are key contributors to the transformation of education in S.A. (DoE, 2003:9). This curriculum framework therefore envisions

teachers who are qualified, competent, dedicated and caring and will be able to fulfil the various roles outlined in the Norms and Standards for Educators of 2000 such as "being the mediators of learning, interpreters and designers of learning programmes, administrators, leaders, managers, scholars, researchers and *lifelong learners* (DoE, 2003:9).

1.2.1.2 The changing roles of the curriculum and the educator

Since 1998 a new education dispensation, Curriculum 2005 (C2005)[2], has systematically been introduced in South African schools. This reformed curriculum required of teachers to follow new approaches regarding planning, teaching, and assessment. The emphasis is on putting the learners' interest first. These learner–centred approaches necessitate a paradigm shift of the educator in the approach towards learning and teaching. In 2002, the curriculum was changed again with the Revised National Curriculum Statement (RNCS) for General Education and Training (Grades R–9) and the National Curriculum Statement (NCS) for Grades 10-12 and then, most recently, the Curriculum and Assessment Policy Statements (CAPS)[3], to be implemented in January 2012. A change in curriculum consequently necessitates a change of the role of the teacher. Educators not only have to deal with changing content knowledge but also a change in pedagogical knowledge, which results in numerous challenges concerning the effective implementation of a new curriculum. Local research suggests that many teachers may have been ill-prepared for this paradigm shift (Adler, et al. 2009; Johnson, et al. 2003).

In July 2009, the Minister of Basic Education, Minister Angela Motshekga, appointed a panel of experts to investigate the nature of the challenges and problems experienced in the implementation of the *National Curriculum Statement* (NCS). They had to develop a set of recommendations designed to improve this implementation. The Minister's brief was in response to wide-ranging comments –

[2]Curriculum 2005 was a new curriculum that was introduced by the democratic government of South Africa post 1994 as a way of reforming fundamentally the apartheid curriculum of the past.

[3]CAPS is a comprehensive, and concise policy document, which will replace the current Subject and Learning Area Statements, Learning Program Guidelines and Subject Assessment Guidelines for all the subjects listed in the National Curriculum Statement (Grades R – 12) in 2012.

received over several years in writing and verbally – from a range of stakeholders such as teachers, parents, teacher unions, school management and academics, on the implementation of the *National Curriculum Statement*. While there has been positive support for the new curriculum, there has also been considerable criticism of various aspects of its implementation, manifesting in teacher overload, confusion and stress as well as widespread learner underperformance in international and local assessments. Whilst several minor interventions have been made over time to address some of the challenges of implementing the curriculum, these changes had not had the desired effect. The panel consequently set out to identify the challenges and pressure points, particularly with reference to teachers and learning quality, to deliberate on how things could be improved and to develop a set of practical interventions (DOE, 2009:5). From the Minister's response, it is clear that there is a need to investigate, among others, the professional development learning opportunities for teachers. Different interventions that can assist teachers to improve student achievement need to be investigated and understood as tools to ensure effective change in instructional practices.

Large sums of money and time have been spent to support staff development activities and initiatives to improve the standard of science educators in South Africa (Ono & Ferreira 2010). Teacher professional development programmes are delivered in the form of workshops, seminars, conferences, cluster meetings or courses. Unfortunately, many of these initiatives have not significantly changed teaching and learning when teachers returned to their classrooms (Jita & Ndlalane, 2009; Mokhele & Jita, 2010; Ono & Ferreira, 2010:60).

Rademeyer (2011:6) suggests, in the recent media that: "Maybe the time to experiment with teacher education or developmental programmes in South Africa which are not effective is over" (Rademeyer, A. in *Onnies se opleiding: 'Die tyd vir eksperimente is verby', Beeld*, 28 August 2011). Maybe it is now time to implement effective strategies, which can improve the quality of education, especially in subject areas where there is a perceived lack of content and pedagogical knowledge of educators, as in science and mathematics.

The question remains: how will this be achieved when there is such an expressed skills gap among the many science teachers in the system? How can teachers learn from each other to mitigate the skills gap in more efficient ways? How can we begin to conceptualise teacher professional development programmes to address the skills transfer issues? Since effective classroom practices rely heavily on the teacher's ability to understand complex subject matter, the expertise necessary in the transferring of content knowledge and instructional skills cannot be delivered by means of traditional training strategies (Darling-Hammond & McLaughlin, 1995). What kind of professional development would be effective to upgrade content knowledge and instructional competence of the teachers?

In-depth studies on CPD programmes for in–service teachers need to be conducted to find out which intervention programmes could prove to be the most effective in changing existing classroom practices. It is therefore inevitable that teachers have to do a great deal of learning to change their beliefs and values about teaching and learning, acquire new skills and knowledge in pedagogy and content, as well as change their views about learners to achieve the intents of new education reforms (Adler, et al. 2009).

As an experienced mathematics and life science teacher, I have for almost two decades, found myself constantly seeking opportunities to improve my pedagogical and subject content knowledge in order to improve my classroom practice and personal growth. Drawing on my own experiences, I have often wondered how easy or difficult it would be for many of my counterparts to seek similar opportunities in order to continue professional development and growth, especially from other colleagues in the profession regardless of their age or experience in terms of years in the teaching profession.

Mentees in education are typically regarded as inexperienced teachers who need guidance from more experienced mentor teachers. Recently, however, with knowledge and skills advancing rapidly, it is not uncommon for the more experienced generation to seek support and guidance from their less experienced (in terms of classroom responsibilities) colleagues. This is often the case for example with application of newer technologies, with the younger generations being

relatively more adept than their older (and more experienced) counterparts. How do researchers make sense of these situations where the classical roles of mentor and mentee are reversed? That is, where the more experienced has to learn from those who are relatively less experienced.

In the context of education, the question could be posed as follows: how do researchers make sense of situations where more experienced teachers seek guidance and support from their less experienced (in terms of classroom responsibilities) colleagues? These reversed or non-classical mentoring roles constitute the major puzzle of the present study. I am especially interested in understanding how experienced primary school teachers of natural science can become mentees under the guidance and tutelage of sometimes relatively less experienced, but more knowledgeable colleagues. It is thus the perspectives of the mentees' and their experiences of the relationship of learning and support that I am interested in understanding.

Research on the continuous professional development (CPD) of experienced teachers through mentoring by other teachers is still an under-developed area. Many studies have focused more on the mentoring of student or novice teachers and not on the further development of experienced, practising teachers (Cullingford, 2006; Harley & Wedekind, 2004; Schulman & Sato, 2006). Professional development, in the form of mentoring might create new opportunities for experienced teachers to deepen their understanding of the processes of teaching and learning throughout their careers (Feiman- Nemser, 1996). It is against this background, realising the need for practising teachers to change their existing practices with the collaborative support of subject expert teachers that I felt prompted to undertake this research project on teacher mentoring.

The School of Education at UNISA launched a teacher professional development project in the Ehlanzeni District of Mpumalanga in April 2011(UNISA 1000 Schools Project). The project aimed to include a year-long continuous development intervention that brought together 130 science and mathematics teachers from 52 selected primary and intermediate schools. 'Combining the *Japanese Lesson Study* (Jugyou Kenkyu) approach and the Instructional Leadership concept, teachers work

in small groups under the leadership of a UNISA trained mentor teacher to change and improve their classroom performance in the challenging subject areas of science, technology and mathematics. The ILLS project provided an opportunity for me to explore, describe, and understand the challenges of a mentoring relationship between experienced teachers with skills breaches in their content and pedagogical knowledge, and expert teachers who are assisting their colleagues in a collaborative manner to become effective educators. The challenges addressed by the ILLS project form part of this research on mentorship as a professional development tool for practising teachers in the subject area of natural science. The focus of this study however, is not the lesson study strategy, but the mentoring relationship between the mentor teacher and veteran teachers who have been recruited as mentees to address the inadequacies in subject content knowledge (SCK) and pedagogical knowledge (PCK).

Previous scholarship has already identified a gap our understanding of the professional development of primary school mathematics and science teachers (Adler, et al. 2009). Many authors argue that increasing the quality of the experience of science education for the majority of school pupils, and broadening its relevance and appeal, should start before pupils reach 14 years old as they develop their attitudes towards science as a subject before that age (Blatchford, 1992; Osborne & Dillon, 2008). Consequently, I have decided to conduct this study with a specific focus on the primary school teachers.

The present study therefore sought to explore teacher-mentoring relationships as opportunities for professional development within the context of the teachers' school settings. In the study, I wanted to uncover and understand the perspectives of primary school teachers in mentoring relationships and more importantly how they make sense of their experiences in this mentoring relationship.

1.3 PROBLEM STATEMENT

Education, the most humanitarian of all professions, falls short in developing its own human capital – its most valuable asset in addressing student achievement (Rotherham, 2008).

The challenging context for teacher development in South Africa has been outlined in a range of studies (Hattingh, 2009; Jita, 2008 and Mokhele, 2011). To understand the areas in which most support is needed for mathematics and science teachers, an overview of the challenges they face needs to be explored.

A common theme emerging continuously in professional development research is the lack of effective professional development interventions. For example, Hattingh (2009) argues that ad-hoc workshops do not seem to have the sustained impact required for significant teacher change and the improvement required to enhance learners' performance. She recommends an approach which is school based, offers follow up support and creates opportunities for reflection on newly acquired knowledge.

Robinson and Soudien (2009) support the stance that teacher development should become located within the real conditions of teachers' work i.e. 'it must be based on real questions of real teachers.' Unfortunately, in many CPD interventions in South Africa the real questions and needs of teachers remain unanswered (Mokhele, 2011). This argument is supported by Fricke et al. (2008) who suggest that there is a general agreement on the fact that teacher development programmes should be on-site, focused on individual teacher needs, built on current teacher practice and level of development in small incremental steps, and should encompass both content knowledge and teaching strategies.

A considerable amount of literature suggests that the professional development of teachers can be improved through experimentation, observation, reflection, the exchange of professional ideas, and shared problem solving (Zwart, et al. 2007).

As seen from the literature review, despite the on-going extensive research relating to teacher development and the mentoring of novice teachers, minimal research has been undertaken on the experiences and perceptions of experienced, in-service science and mathematics teachers (veteran teachers).Also, the actual individual mentorship process, as a tool for professional development of experienced teachers, has not been studied extensively.

Generally, experienced teachers feel uncomfortable when assessed by means of classroom observations. It is therefore important to explore ways of breaking these barriers to get a better understanding of challenges these teachers face. It is also difficult for an experienced teacher to re-orientate towards changing pedagogical knowledge and curriculum reforms. According to Bishop (1976), it is likely that when teachers become more experienced in their teaching, a kind of decision schema or criteria develops that teacher's value structure. This decision schema also monitors and mediates the on-going teaching situation, connecting choices with criteria for evaluating them, and as a result, they carry out these decisions in a consistent manner in their classrooms. Socio-cultural theories of learning also offer a framework to explore the ways through which mentees learn with more experienced others (Bandura, 1986, Vygotsky, 1978). On the other hand, 'Educational practices... involve more than simply behaviour, professional practices are manifest in behaviour, of course, but they entail thoughts, interpretations, choices, values, and commitments as well' (Wang & Paine, 2001) .

It is subsequently necessary to explore the relationship concerning the way in which mentees perceive a mentor teacher, as an experienced other, assisting them in ways that allow them to perform at a level they could not achieve on their own. The aspect that I am interested in, is the meaning that the experienced teacher, as a mentee, ascribes to this unique mentoring relationship. I am also interested in the influence their understanding of the mentoring relationship might have on change in the classroom practices of the teacher. While teaching natural science in a regularly changing curriculum environment may come naturally to some, many of the other educators need some form of coaching or mentoring to acquire the knowledge, skills, attitudes and beliefs.

The mentoring process may give experienced teachers the opportunity to become better equipped to accomplish goals set to meet their personal and development needs.

1.4 PURPOSE OF THE STUDY

The purpose of this study is to explore experienced teachers' understandings of a mentoring relationship in the context of primary school settings in a rural district in Mpumalanga. It is the aim of this study to provide an understanding of mentorship as a professional development approach. This understanding will indicate how mentorship could affect decisions regarding future professional development programmes for science teachers. Mentorship as a continuous professional development approach in this study, involves experienced teachers being mentored by an expert teacher in natural science.

More specifically, this study explores the perceptions of in-service natural science teachers regarding the process of being mentored by another experienced teacher and the factors that influence their feelings and decisions. Interactions between the mentee teachers and the mentor teacher are described from the mentees' point of view, and their sense of what causes a mentoring relationship to be positive and successful are put into perspective. In order to guide research in the areas of policy and practice, it is necessary to explore what and how teachers learn from professional development experiences and what their perceptions are of the way in which these processes have influenced their professional growth.

1.5 RESEARCH QUESTIONS

The major research question is:

What are the experiences and understandings of primary school natural science teachers as mentees in a mentoring relationship, which forms part of a professional development programme in Mpumalanga?

The critical research questions are:

How do mentees in this mentorship programme (the ILLS project) experience the relationship with their mentor?

What activities are mentees exposed to during the mentoring programme under the guidance and support of a mentor from a neighbouring school?

How do the mentees make sense of their experiences of mentoring? I.e. what are the thoughts and beliefs of the mentees regarding these activities and their involvement in the mentoring relationships?

How and why does the mentoring process influence the mentees in terms of personal and professional development, if at all?

1.6 RESEARCH OBJECTIVES

The main objectives of this study are to *explore* and *describe* the experiences and relationships between mentor teacher and their mentees, in a primary school setting in one province of South Africa.

The following objectives were pursued throughout this study:

I undertook a review of the relevant literature to *explore* the key aspects of mentorship and teacher professional development in different contexts, including local and international.

I assessed the mentoring relationship between different mentees with the same mentor. I collected data in order to gain information on the mentees' perceptions of the mentoring process by conducting a case study. This allowed me to *describe* the mentees' experiences in terms of beliefs, attitudes, and perceptions towards the mentorship programme and the activities they were exposed to.

I explored data to *determine* whether these mentoring experiences and relationships between in-service science teachers and their mentors could contribute to a change in attitudes, beliefs and perceptions, and also improve classroom practice.

I *assessed* the influence of the mentoring experiences with regards to the overall professional development of these educators. This enabled me to expand my knowledge on the limitations of mentoring relationships between natural science teachers.

I then formulated *recommendations* for implementing mentorship programmes as a strategy for in-service teacher professional development programmes.

1.7 RESEARCH APPROACH

This research is qualitative in nature. Qualitative research involves an inquiry in which researchers collect data in face-to-face situations by interacting with selected individuals in their settings (e.g. field studies); describe and analyse people's individual and collective social actions, beliefs, thoughts and perceptions (McMillan & Schumacher, 2006:315). Qualitative research can therefore be described as concerned with understanding people's experiences from the perspectives of the participants.

Minichiello and Kottler (2010) explain that qualitative research assumes a dynamic and negotiated reality with key characteristics such as inductive thinking, flexibility, inquisitive in nature, reflective listening, and insightful analysis. McMillan and Schumacher (2006) contend that qualitative research is based on a constructivist philosophy that assumes that reality is a multilayer, interactive, shared social experience that is interpreted by individuals. Stated differently, people form constructions to make sense of their world and reorganise these constructions as viewpoints, perceptions and belief systems.

This study aimed at understanding the natural science teachers' experiences as mentees by describing their viewpoints, perceptions, and belief systems in vivid, meaningful ways. By intensively studying a single case of mentorship as part of a professional development programme, this qualitative study may contribute by presenting a unique or meaningful example of mentoring as a tool for continuous professional development (Minichiello & Kottler, 2010).

1.7.1 Case study

According to Yin (2003), the case study is the method of choice when the phenomenon under study is not readily distinguishable from its context; which in this study will be the phenomenon of the mentoring relationship between a mentor and his mentees. Yin (2003) also states that case study research is an essential form of social science inquiry and promotes the diversity of applications of case study research methods. For deepening the understanding of mentorship in this study, I decided to begin with an exploratory pilot study based on a single case where a trained expert teacher mentored two mathematics teachers. For the purpose of the final study, I employed an explorative and descriptive single case study design, which presents a complete description of a mentorship relationship within a professional development context.

To assist me in attaining the research objectives, I had to rely on certain theoretical concepts to guide the design and data collection for case studies. The theoretical frame enabled me to advance my knowledge and understanding of professional development and mentorship. Additionally, it enabled me to define the unit of analysis, which in this study is represented by the relationship between one mentor and his mentees in a school-based learning context. These theoretical concepts also assisted me to identify the criteria for the selection and screening of potential mentee candidates and suggested the relevant variables of interest and as a result, the data to be collected as part of the case study (Yin, 2003:3).

1.7.2 Theoretical framework

As the aim of this study is to explore and understand experienced teachers' perceptions, beliefs and behaviours in a reversed mentoring relationship, I employed a combination of both social constructivist and developmental theories.

The suggested theoretical framework for this study emerges from Bandura's Social Cognitive Theory (1986). Social cognitive learning theory explains human behaviour in terms of continuous reciprocal interaction between cognitive, behavioural, and environmental influences (Bandura, 1986). To conceptualise the experiences of

teachers as mentees in a professional development intervention I found Bandura's Triadic Reciprocal Determinism (1986) particularly useful in understanding the phenomenon of mentorship as a process of the development of teachers' learning. In this study the cognitive domain represents the personal development of the teacher in acquiring new skills and knowledge, the environmental domain represents the activities within the teachers' familiar school settings and the behavioural domain represents the way in which the teachers implement the acquired knowledge and skills in their classrooms. 'People learn through observing others' behaviour, attitudes, and outcomes of those behaviours, most human behaviour is learned observationally through modelling: from observing others, one forms an idea of how new behaviours are performed, and on later occasions this coded information serves as a guide for action' (Bandura, 1997:4). This theory is rooted in Vygotsky's (1978) social constructivist theory, which proposes that learning is an inherently social process, aided by others who are more capable.

In addition, Clarke and Hollingsworth's (2002) "Interconnected Model of Teacher Professional Growth", provides an analytical framework concerning the change or professional growth of teachers. This empirically founded model suggests that teacher change (or growth) occurs through the two mediating processes of "reflection" and "enactment". These processes occur in four distinctive domains that comprehend the teacher's professional world: the *personal* domain, the domain of *practice*, the domain of *consequence* and the *external* domain. Change in one domain does not always lead to change in another, but when changes over domains do occur, different change patterns can be described. Although the focus of this study is to understand the mentees' perceptions of this mentoring relationship, and not the impact of the mentoring programme, I found this model particularly useful during the data analysis phase of this study as it enabled me to explore if the mentoring relationship brought any change in the beliefs and attitudes of the mentees. These theoretical frameworks for learning and professional development will be explored extensively in the literature study in Chapter 2.

1.8 RESEARCH METHOD

The following is an outline of the research process that I followed:

1. An extensive *Literature review* on professional development and mentoring relationships in education was done to establish an appropriate theoretical framework and methodology suitable to the purpose of this study.

2. *Purposeful sampling* methods were followed through the selection of a small, strategic group of teachers in the Ehlanzeni district in Mpumalanga. Purposeful sampling was done for the participants in the exploratory pilot study as well as for the participant teachers in the final study. The selection of these participants was also guided by the ILLS project.

3. An *Exploration* of mentoring relationships in the form of a pilot study was conducted between a mathematics mentor and two mentees; in a rural area near Mbombela. This pilot study was in many ways consistent with the final study.

4. The mentoring experiences of seven primary school natural science teachers with a mentor teacher, in a rural area of the Ehlanzeni district, Mpumalanga were studied intensively over a period of 10 months. A detailed profile of the sampled participants for the final study is discussed in chapter 4.

5. I chose observations, semi-structured interviews, and document analysis as primary *data collection strategies*. The chosen multi method strategy enhanced the validity of the study by means of triangulation.

6. An *analysis of the data* was conducted by coding and classifying the collected data into themes and concepts related to the experiences of the mentees. The data collection and analyses were interactive and occurred in phases as described by McMillan and Schumacher (2006), and Creswell (2007).

7. A rich descriptive *research report* was compiled; it combined an *understanding* of the relevant theory and previous research, with the findings and conclusions of this research. The findings of the results were reported in words or text to produce an understanding of the perceptions of the science mentee teachers. This report is therefore based on a general description of a

mentoring relationship as seen through the eyes of those individuals who have experienced the phenomenon of mentoring at first hand.

1.9 SIGNIFICANCE

"Education is about promoting learning and that professional development is about promoting learning among teachers." (Davis, et al. 2006:607).

I was fortunate enough to be educated by and to work with many accomplished teachers in my life. As I constructed my own classroom practice; I considered all of them to be my mentors. Through this study, I therefore sought to obtain an understanding of the compelling influence of a teacher mentoring relationship for science teachers, and how it can possibly contribute to the improvement of the quality of their existing classroom practices. The focus of this study is not on the mentoring relationship between a student teacher and his/her mentor but on the mentoring relationship between experienced in–service teachers. That is, both the mentor and the mentees are practicing teachers.

In order to understand the complexity of mentoring relationships in education it will help to reflect deeply on the act of mentoring. To disentangle some of the complexities of a mentoring relationship it is important to explore the different components that constitute a mentor-mentee relationship, understanding the many ingredients or components that are part of mentoring, in particular what is being regarded as "effective" mentoring. For example, Yendol-Hoppey and Dana (2007:28) describe the three different components of 'effective' mentoring as: creating a mentoring *context*, guiding professional knowledge development, and cultivate the dispositions of a successful educator. By exploring these components in a mentorship programme for science and mathematics educators, such as this study aims, valuable contributions to the improvement of the quality of education in these critical subject areas can be made.

It is particularly important to know more about the specific contexts of mentoring for science teachers, and about the ways in which mentors and mentees construct their roles and how they negotiate and implement their attitudes, beliefs, and skills.

It is also of value to explore how effective support strategies and resource structures were provided to the mentors in improving staff development, including empowering them to manage their relationships with the mentees. Although this study focuses on the experiences of the mentees, it is also significant to investigate the effort and the responsibilities of the mentor in an effective mentoring relationship. The relationship between mentor and mentee is a key determinant of the perceived effectiveness of the programme from the perspective of both the mentor and the mentee (Daresh, 2003; Fraser, 1998). Yendol-Hoppey and Dana (2007) highlight the important role of the mentor in an effective mentoring relationship, when they give emphasis to the fact that if you strengthen your skills as a mentor, some of the complexity of mentoring is untangled. 'More complete mentoring builds a more effective future teaching workforce and a more effective future teaching workforce will lead to a more effective education for all children!'(Yendol-Hoppey & Dana, 2007:30).

The focus on the needs and perceptions of the mentee teachers could assist in improving the effectiveness of the mentorship programme through re-structuring and improved empowerment to all participants. To investigate the value of mentor teachers for in-service science teachers seems worthwhile and can contribute to research on the professional development of South African teachers in general, but more significantly for the problematic subject areas such as mathematics and science.

Mentoring as part of professional development can create opportunities, not only for teachers to enrich their pedagogical and subject content knowledge, but they can also create new career pathways for experienced and 'good' mentor teachers. As Fosnot (1989:xi) puts it:

> *An empowered teacher is a reflective decision maker who finds joy in learning and in investigating the teaching/learning process –one who views learning as construction and teaching as a facilitating process to enhance and enrich development.*

1.10 DELINEATIONS AND LIMITATIONS

Since this study is explorative and descriptive in nature, it does not attempt to address the complete spectrum of professional developmental discourse in education, but limits its attention to the experiences of mentees during a specific mentoring relationship.

This study is also restricted to only one provincial education district; namely the Ehlanzeni District in Mpumalanga. The findings are therefore not representative of the national context of South Africa even though important lessons will derive from this case study.

The most critical limitation as far as the implementation of mentorship programmes is concerned, is the current limited research on experienced teachers in the reversed role as a mentee and not a mentor.

1.11 CLARIFICATION OF TERMS

Several key terms are used throughout this study. Those terms are defined below within the context of this research.

Japanese Lesson Study (Jugyou Kenkyu)

A well-established Japanese approach to examining practice, the origins of which can be traced back to the early 1900s. Lesson Study brings together groups of teachers to discuss lessons that they have jointly planned in great detail and then observed as they unfold in actual classrooms (C Fernandez, 2002:393).

Mentee

The mentee is the person around which the concept of mentorship evolves - the target for development. The mentee, who is selected according to certain criteria (one of which is potential), will ultimately be responsible for his or her own personal and professional development (Murray & Owen, 1991).

Mentor

Wang and Odell (2002:491) define a mentor as a person who helps novices to learn guiding principles and reflect on the reasons and assumptions for teaching practices, and the relationship between theory and practice. In addition, a mentor is expected to treat novices as active learners by engaging them in discovering important knowledge for teaching and to help novices develop an intellectual foundation for teaching through continuous professional development. In the context of the present study, however, a mentor is one who is more knowledgeable even though the mentee is not necessarily a novice in terms of teaching experience.

Mentoring/Mentorship

According to Jeffrey Glanz, as cited by Yendol-Hoppey (2007), mentoring is a process that facilitates instructional improvement where-in an experienced and specially prepared educator works with a *novice* or less experienced teacher *collaboratively* and *non-judgmentally* to study and deliberate on ways instruction in the classroom may be *improve.* (Yendol-Hoppey, 2007:x). Mentoring is a form of coaching that tends to be short-term (for example, a beginning teacher) or it can be on-going and long term (for example, an experienced teacher), according to Villegas-Reimers (2003).

Mentoring programme

A structured and established programme designed to guide the mentor and mentee toward teacher development through activities such as coaching, modelling (demonstration), and reflection (Feiman- Nemser, 1998; Fraser, 1998; Little, 1990).

Mentoring relationship

This term refers to the day-to-day functioning of the mentor and mentee whilst they are taking part in the mentorship programme. This relationship can be successful, meaning that the mentor is playing his or her role effectively and that the mentee is

benefitting from the relationship. This relationship focuses on the development of the mentee through the regular intervention of the mentor (Caruso, 1992).

Framed in a continuous professional developmental context, Daresh (2003:1) considers mentoring as 'an on-going process in which individuals in an organisation provide support and guidance to others who can become effective contributors to the goals of the organisation.'

Professional development

According to Bolam (1993) teacher professional development refers to any professional development activities engaged in by teachers which enhance their knowledge and skills and enable them to consider their attitudes and approaches to the education of children, with a view to improve the quality of the teaching and learning process. 'Professional development, in broad sense, refers to the development of a person in his or her personal role' (Villegas-Reimers, 2003).

1.12 RESEARCH PROGRAMME - CHAPTER OVERVIEWS

This research study comprises the following five chapters:

Chapter 1: The Introduction

This chapter sets out the background to the research as well as the problem statement, aims, paradigm perspective and the research design. It also describes definitions applicable for the study.

Chapter 2: The Literature review

This chapter introduces the results of the literature review on the characteristics of professional development, mentorship and the role of the participants. The benefits of a mentorship programme are discussed from different viewpoints at both international and national levels.

Chapter 3: The Methodology

In this chapter, the steps in the research method are explained. The chapter explains the methods and instruments used to gather data from the sample population as well as the strengths and weaknesses of the research design.

Chapter 4: The Presentation of results

In this chapter an analysis and evidence, the engaging of other scholars in mentoring relationships and charts, tables and other graphics are presented.

Chapter 5: Findings and Conclusion

This chapter contains a summary of findings, a discussion of problems, conclusions, implications for existing theories, recommendations for implementation as well as a summary of contributions and suggestions for future research on mentoring as an effective professional development tool for natural science teachers in South Africa.

CHAPTER 2
THE LITERATURE REVIEW

'We cannot teach people anything; we can only help them discover it within themselves.' Galileo

2.1 INTRODUCTION

This study focuses on the perceptions of experienced teachers with regard to their experiences of mentoring as an approach to professional development. It is informed by various bodies of research on professional development, including literature on teacher mentoring.

The purpose of the chapter is to clarify characteristics of teacher professional development (TPD) and mentorship, by examining recent scholarship in each one of these two fields of knowledge.

I begin the review with a discussion on the need for effective professional development strategies, including professional development theory and other applicable theoretical perspectives. After establishing the theoretical lens, a critical analysis of research pertaining to existing professional development models is provided. The review includes exploration of the conceptions of teacher professional development at both international and local levels.

I then discuss mentorship and related terms and components surrounding the concept. Accordingly, I investigate the roles of both the mentor and the mentee in a mentoring relationship and conclude with the potential benefits of mentorship programmes as a professional development tool for experienced science teachers.

2.2 THE NEED FOR EFFECTIVE CONTINUING TEACHER PROFESSIONAL DEVELOPMENT (CTPD) STRATEGIES

Villegas-Reimers (2003) defines professional development, in a broad sense, as the development of a person in his or her personal role. The area of continuing teacher professional development (CTPD) is an important focus in this study. Quality teacher professional development strategies are analysed to include the range of knowledge and skills needed by teachers to improve their instructional practices. Darling-Hammond, et al. (2009:49) argues that for teacher professional learning to be effective, educators should 'learn by engaging in continuous dialogue and examination of their practice and student performance and to develop and implement more effective instructional practices'. In other words, teachers must understand learning and engage in effective instructional practices while meeting student needs and connecting their students' learning to the goals of the intended curriculum.

Many researchers criticise previously implemented forms of teacher professional development interventions such as workshops, seminars, and courses usually provided by school districts or universities, for being mostly *ad-hoc,* fragmented, and far removed from classroom situations (Hattingh, 2009; Johnson, et al. 2000; Liebermann, 1995; Villegas-Reimers, 2003). A general perception amongst researchers is that professional development programmes usually do not consider the needs of the individual teacher (Bantwini, 2012; Hien, 2009; Mokhele, 2011). Much of the recent research has focused on deficit, on gaps and on failure. Therefore, Adler, et al. (2009:11) suggests a deliberate shift in the research agenda to 'a focus on what works, why, how and under what conditions'. Researchers need to be concerned with identifying instances of innovation and quality, and then describing, explaining and theorising these. In turn, these need to be developed into propositions that can, and should be empirically tested. Brief workshops or seminars do not encourage new skills and have no long- lasting effect on pedagogy (Guskey, 2002).

The challenge, therefore, for schools, districts and relevant role players, is to design development programmes with a focus on strategies to support the continuous

learning and growth of teachers close to their school settings, by considering the different needs of individual teachers. In her review of the literature, Little (1990) found that only a few studies were well-informed by theory and designed to examine in-depth the context, content, and consequences of mentoring. Feiman-Nemser (1996) identifies a gap in research pertaining to insights about learning to teach, the challenges of learning to teach for understanding, and the impact of different contextual factors (e.g. school culture, national policies) on mentors practice and novice learning (1996). She therefore argues for studies that are more direct on how mentoring fits into broader frameworks of professional development.

The present study seeks to understand the teachers' perceptions of a particular professional development initiative in Mpumalanga. That is, by studying the ILLS intervention project, the research focuses on the science teachers' perspectives on how and why the mentorship intervention influenced their instructional practices, if at all.

A gap in research exists concerning the structuring of teacher professional development programmes which focus on the learning of in-service, experienced science and mathematics teachers. We know less about how and why they might gain new understandings related to the subject they offer and if they implement the acquired knowledge and skills in their daily practice. The majority of research studies on teacher mentoring tend to focus on the professional development of novice or student teachers.

What kind of professional development would be effective for upgrading the professional competence of in-service teachers? It is the aim of this review to give an overview of different professional development approaches. The review focuses on the process by which teachers learn and grow professionally, the conditions that support this change and how this overall professional development relates to mentoring. By acknowledging change or growth as a form of learning, I explored a substantial amount of learning theory and research on teacher professional development. I felt prompted to acquire a deeper understanding of the concepts of *learning* and *change* in teacher professional development and the role that mentoring might play in their professional growth. Hargreaves (1998) confirms that

good teachers are also good learners and the significance of their learning and professional growth cannot be over emphasised. To develop a balanced understanding of continuous professional development, it is important to understand the process of learning and the conditions that support and promote professional growth (Feiman-Nemser, 1996).

In this study, I explore teacher learning, while simultaneously examining the role that mentorship plays in how the teachers approach learning and professional growth.

2.3 TEACHER PROFESSIONAL DEVELOPMENT THEORY (THEORETICAL FRAMEWORK)

This section is organised around the theoretical frameworks that help to contextualise teacher professional learning and growth. My examination of teacher learning and development is informed by the theoretical stances regarding the process of human cognition and development, including the importance of social learning and professional growth.

I refer to two major theories to construct my theoretical framework for this study:

- *Bandura's Social Cognitive Theory* (Bandura, 1986) which provides a *conceptual* framework for theorising teacher *learning* based on how the environment, personal cognitions, and behaviour can interact to result in *learning* and

- *Clarke and Hollingsworth's (2002) Interconnected Model of Teacher Professional Growth* which offers an *analytical* framework for this research to generate knowledge on how *change* in a teacher's world can contribute to change in instructional practices.

2.3.1 Bandura's Social Cognitive Theory

Bandura's Social Cognitive Theory (1986) is rooted in Vygotsky's (1978) Social Constructivism Theory, which states that social interaction, cultural tools and activity shape the individual's development and learning. Vygotsky's theory and Bandura's theory correspondingly emphasise the importance of social learning (Woolfolk, 2007). Bandura however goes further and is more concerned with cognitive factors such as beliefs, self-perceptions, and expectations when compared with the social learning theory of Vygotsky.

In Bandura's Social Cognitive Theory, the learner (teacher mentee in this study) is viewed as thoroughly integrated with the environment within which he or she is learning. The learner's (teacher mentee's) cognitive responses, behaviour, and environment all work together to create learning (Bandura, 1986). According to Bandura, most human behaviour is learned observationally through modelling. That is, from observing others, one forms an idea of how new behaviours are performed, and on later occasions, this implied information serves as a guide for action (Woolfolk, 2007).

Bandura explained human functioning in terms of a model of *triadic reciprocality* in which behaviour, cognitive factors, and environmental events all operate as interacting determinants of each other. Stated differently; environmental events, personal factors, and behaviours are seen as interacting in the process of learning (see Figure 2.1 below).

Schunk's (2004), application of Bandura's social cognitive view (1986) explains that social factors, such as demonstrations, instructional strategies, or feedback from more skilled peers (elements of the *environment*) can affect *personal* factors of teachers, such as their goals, sense of efficacy for the task, attributions (beliefs about causes for success or failure), and processes of self-regulation such as planning, monitoring, and controlling distractions. These social influences in the environment and personal (cognitive) factors can encourage the *behaviours* that lead to achievement such as persistence, effort (motivation) and learning. Reciprocally, these behaviours also impact on personal factors, for example, if

students achieve their goals their confidence and interest increase. Behaviours reciprocally also affect the social environment. For example, if students do not understand a concept, teachers may adjust their instructional strategies to improve student achievement.

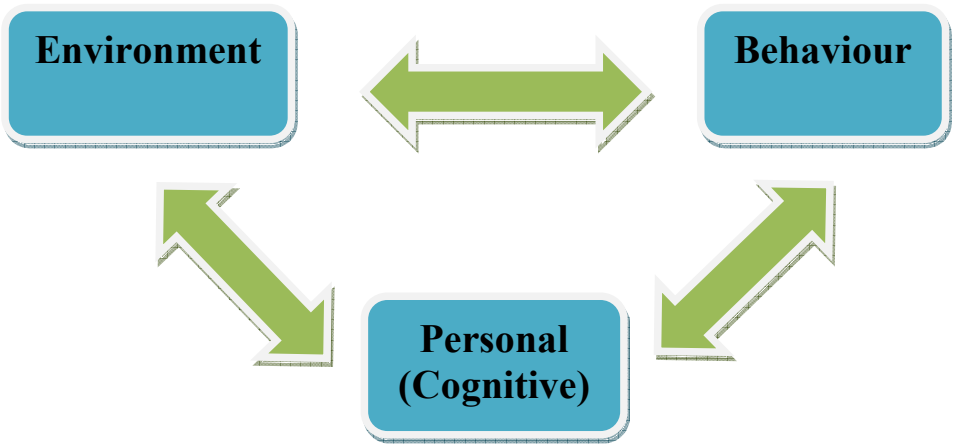

Figure 2.1: Bandura's Model of Triadic Reciprocality in Which *Learning* Is Influenced by the Interaction of Personal, Environmental, And Behavioural Factors (Woolfolk, 2007:330)

In order to explore if mentorship provides an opportunity for experienced natural science teachers to "learn", this study focuses on the collaboration between Bandura's three domains: *personal*, *environment,* and *behaviour* to ensure learning.

Experienced science teachers in this study were exposed to social learning experiences through their participation in the ILLS project. The ILLS project addressed Bandura's three domains, concerning learning theory, by providing opportunities for the mentee teachers to learn through participation in structured lesson planning (personal), observation of modelled lessons by an expert teacher (environment), and implementing the planned lesson (behaviour).

Bandura's model of *triadic reciprocal determinism* therefore provides this study with a conceptual framework for understanding the phenomenon of teacher learning in a

mentoring relationship. In particular, how the interaction of science teachers in their natural settings under the guidance of a mentor teacher might result in *learning*.

In addition to Bandura's Social Cognitive Theory, I also draw on Clarke and Hollingsworth's (2002) Interconnected Change Model not only to deepen the understanding of teacher change, but also on how this change influences behaviour (the implementation of acquired knowledge).

2.3.2 Interconnected model of teacher professional growth (Change model)

In this model, teacher professional growth is presented as an "inevitable and continuing process of learning" (Clarke & Hollingsworth, 2002:947).

This model focuses on active participation, particular activities, and consequences of professional development as a process and how it may lead to professional growth or change in a teacher's world. Learning is thus understood as a change in the teacher's cognition and/or behaviour.

Clarke and Hollingsworth (2002:950) suggest that change occurs in four distinct domains, which encompass the teacher's world.

The four domains are:

- the **external** domain (e.g. sources of information, stimulus or support, such as in-service sessions, and conversations with colleagues),
- the **personal** domain (e.g. teacher knowledge, beliefs and attitudes),
- the domain of **practice** (professional experimentation, activities e.g. lesson planning),
- the domain of **consequence** (inferred salient student learning outcomes, teacher control, motivation and student achievement)

The model suggests that a change in one domain is converted into another domain through the intervening processes of enactment and reflection. With the enactment

the translation of a belief or a pedagogical model into action is distinguished from "acting", 'on the grounds that acting occurs in the domain of practice' (Clarke & Hollingsworth, 2002:951). Enactment in this context refers to the invisible cognitive processes of translating beliefs into action. Each action represents the enactment of something a teacher knows, believes, or has experienced. In this study, it is particularly relevant, as the participant teachers are veteran teachers and not novices in terms of classroom practise, with ample knowledge, beliefs, and experiences. By implication, all four domains are interconnected and change in one domain may lead to change in the other domain. Thus, just like the personal domain, the domain of consequence also pertains to teachers' cognitions (interpretations), while the external domain can be considered as external stimuli that may influence teachers' understandings. The term reflection is considered 'as active, persistent, and careful consideration' (Clarke & Hollingsworth, 2002:953). Enactment consequently, according to the authors, leads to change of behaviour whereas reflection may result in change of cognition.

The interconnected change model's major value in this study lies in its ability to analyse teacher change (or growth) within the structure of the ILLS project. Participant activities were structured in such a way that it allowed enactment and reflection by the participants, and as a result provided the opportunity to identify change sequences. The interconnected model additionally provides a framework in which I could assume that when teachers change their knowledge, beliefs, and attitudes, their practice will improve, and student outcomes will increase (Guskey, 2002; Zwart, et al. 2007).

By linking Bandura's model of social cognitive theory of *learning,* and Clarke and Hollingsworth's analytical model of *change*, I could identify and analyse the interaction between self-efficiency beliefs, social learning, and behavioural change in the science teacher mentees' professional development. Both these models are non-linear in their approaches and focused on interactions of different influences concerning effective learning and professional growth. Although these models have unique elements, they both involve revealing and evaluating the learning process and change in perceptions, of the teachers participating in the ILLS project.

To deepen the understanding of teacher professional development one needs to examine the different ways in which effective Continuous Professional Development (CPD) interventions can be structured and organised. From the literature, I found many different interpretations of the concept of effective professional development in part because many scholars approach it from different perspectives. The following section samples a range of existing professional development models, which may help us to understand the motivation behind the different structures and organisation of effective professional development programmes.

2.4 EXISTING PROFESSIONAL DEVELOPMENT MODELS

From the literature, it is evident that no perfect model of professional development (Guskey, 1994) exists. As a result, I explored different models with a combination of characteristics that are perceived as effective in their outcomes and prominent themes that emerged from the literature and that are relevant to the focus of this study. The essence therefore, is to explore different interventions with the primary goal of understanding how teachers learn when they have opportunities to review the knowledge embedded in the work of expert teachers to deepen their own knowledge and expertise and as a result, may lead to change in classroom practice.

The components of professional development models I explore focus on context, activities, beliefs and attitudes, as well as change in behaviour as it relates to teacher learning and change according to Bandura (1986) and Clarke and Hollingsworth (2002).

Different forms of effective professional development targets different teacher competencies or knowledge areas. The different focus areas of professional development from the literature are discussed in the following section.

From the theoretical framework I adopted for this study, I aimed to structure the components characterising effective professional development in line with the perspectives or domains identified by Bandura (1986) and Clarke and Hollingsworth (2002). These components should not be seen as separate entities, but as

components interacting to address the purpose of this study, which seeks to understand the experiences of in-service teachers in a continuous professional development (CPD) intervention, the ILLS Project.

2.4.1 Professional development focused on the environmental (External) domain

2.4.1.1 School context

A growing body of literature documents the relationship between the professional environment in schools and teacher effectiveness. Feiman-Nemser (2001) agrees that learning to teach effectively is a developmental process that unfolds over time when teachers have appropriate support and opportunities to learn. Although she refers to the professional development of beginner teachers, I can relate this, from own experience, to all practising teachers. This suggests that involvement in staff learning allows principals to be informed of their staff's needs and challenges, and as a result they can inform relevant stakeholders as to what resources and support is necessary for the teachers' daily practice. The principals' involvement and support additionally promote the quality of teachers and teaching within their school communities.

In their view of building teachers' capacity, for twenty-first century teaching and learning, Wiliam and Thompson (2008:45), argue that, teacher professional development is more effective when it is 'related to the local circumstances, in which the teachers operate.' Effective professional development takes place over a sustained period of time, rather than being in the form of 'sporadic one-day workshops, and involves the teachers in active, collective participation' (2008:45).

Mc Alpine, et al. (2009) offer their perceptions on effective professional development programmes from underlying assumptions about what they as developers do and why they do it in relation to evaluating development programmes. The authors conceive the process of development as a dynamic one in the design of all their development programmes. An important assumption the authors make with regard to this process is that they consider teacher development

to ‘originate from the dynamic interplay between individual and organisational elements’ (2009:271). This therefore suggests that programme developers such as universities, should involve school leaders, principals, and teachers, attending to their particular contexts, before determining which learning practices to implement, and how to make it work. Villegas-Reimers (2003) refers to this organisational partnership between teachers, administrators, and universities to improve teaching and learning as professional development schools (or PDSs). The PDS model however, requires institutional support, and it is ‘one of the few models that does work to provide opportunities for teachers’ professional development from the beginning to the end of their career’ (Villegas-Reimers, 2003:71).

Recent research on the influence of the professional environment on teacher growth is supported by Johnson, et al. (2012) report that the professional environment in schools (local circumstances) supports teachers’ ability to improve their practice over time. They examine how changes in teachers’ productivity over time depend on the professional environments in which they work. In essence, a comparison is drawn between teachers in schools with strong and weak professional environments. From Johnson, et al.’s (2012) findings, it can be assumed that the professional environment in schools has the potential to affect teacher’s ability to improve their practice and consequently, student achievement. Important elements of the professional environment identified by the researchers are that the strongest predictors of student achievement appear to be effective peer collaboration, access to high-quality professional development opportunities, and administrative support in maintaining order and discipline.

Daresh, (2003) highlights an important downside regarding the support for professional development of teachers; that when community funding is limited in a school system, one of the first activities to withdraw, is the support for staff development. Another reason why some communities might withdraw their support is the negative view of the previously implemented professional development activities for in-service educators. In other words, the purposes and priorities associated with learning programmes for educators in the past, does not seem to be reviewed properly by district or school leadership. As seen from previous initiatives and interventions on staff development programmes in South Africa, ‘little

seems to have changed' (Ono & Ferreira, 2010; Luneta, 2006). This lack of improvement in instructional practices could also have added to the pessimism of principals and school leaders toward staff development programmes. Previous practices were characterised by once-off workshops taught by outside consultants with little knowledge of the local context and specific needs of teachers in a given school. For this reason, the present study seeks to explore teacher mentoring relationships as opportunities for continuous professional development within the teacher's own classroom and the teacher's day-to-day professional environment over a sustained period.

Rogan (2007) supports the argument that a school is only able to implement changes that are within the school's Zone of Feasible Implementation, a concept that draws on Vygotsky's (1978) notion of the Zone of Proximal Development. The value of this theoretical framework is that it provides a tool for studying curriculum change and its effect on teachers across a range of contexts; comparing the differences in ways that enable programme developers to understand there cannot be a "one size fits all" approach in a context of deep inequality, referring to a South African context. Although this framework is helpful in understanding curriculum implementation in rural contexts, much research still needs to be done to understand what it might mean to enable quality teaching in such contexts. For example, how do we expect teachers to prepare practical lessons in investigative ways with an overcrowded class of science learners in a school with no or underequipped science laboratories?

Adler (2000) argues that even though, resources serve as a critical means to the successful implementation of curricular innovation and reform, such a success is equally dependent on the "availability of supportive material resources" (2000:205). Adler (2000) classifies educational resources in three main categories, namely human resources, cultural resources and material resources. Firstly, human resources include the teachers themselves and the pedagogic content knowledge that they embody. Secondly, cultural resources include resources such as language, time, and other culturally available tools or concepts. Thirdly, material resources are, for example, technologies, curricular documents, textbooks, that may be incorporated into the teaching and learning process. Material resources

appear to be lacking or underutilised in many African mathematics classrooms. At the same time, Adler (2000) cautions that while bearing in mind that limited resources may have a negative impact on learners' mathematical experiences and performance it should not be assumed that an increase of material resources would improve teachers' instructional practices.

Scholars agree that professional development strategies within a supportive and well-managed milieu in the workplace enhance the competence of all participating members in a learning community to pursue life-long learning (Garcia, 2011; Hien, 2009; Voulalas & Sharpe, 2004). Nonetheless, research has revealed that a supportive, resource rich environment alone will not guarantee improvement in teachers' instructional practices, but also the way in which those available resources interact with other resources and practices (culture) of the school (Cochran-Smith & Lytle, 1999; Jita & Mokhele, 2008).

Jita and Mokhele (2008) describe another case of the importance of a well-managed professional environment with regards to teacher development. An interpretative research on one specific rural school's capacity to deliver quality instructional practices in the subject areas of mathematics, science and English, was conducted. They found that, despite a similar resource environment, there were noticeable differences in the quality of instruction of the teachers and student achievement in different subject areas within the same school, even within the same classroom. The authors argue that the ability to offer quality instruction in a given subject area is therefore not determined only by the presence or absence of particular resources but in the way in which this ability ("instructional capacity") is shaped by the (de)construction and organisation of the school's resources (Jita & Mokhele, 2008:254).

2.4.1.2 Collaboration

Understanding how learning is reciprocally interacting in the different domains according to Bandura (1986), allows a better appreciation of how collaborative practice evolves, and influences professional development in accordance with a supportive school context. A growing body of literature indicates that professional

development experiences are particularly effective when situated in a collegial learning environment, where teachers work collaboratively to inquire and reflect on their teaching. As a result, many university-run and school-based professional development programs have as a central feature the opportunity for teachers to participate collaboratively in professional communities.

Collaboration or collective participation refers to the extent that teachers from a specific school site, department, or district participate in the same activities. Collaborative interaction forces teachers to engage in conversations about their practice, which, in turn, can promote effective changes to instructional practices (Darling-Hammond, et al. 2009; Garet, et al. 2001). 'Teachers who work together are more likely to have the opportunity to discuss concepts, skills, and problems that arise during the professional development experiences' (Garet, et al. 2001:922). In their study of what makes professional development effective, Darling-Hammond, et al. (2009) found that 'nations that outperform the United States on international assessments invest heavily in professional learning and build time for on-going, sustained teacher development and collaboration into teachers' work hours' (2009:48).

From literature reviews, it became evident that collaboration amongst teachers received a lot of attention from educational researchers in both developed and developing countries. Wood (2007) conducted a research on establishing professional learning communities in a mid-Atlantic public school district in a quest to improve student performance. Traditional professional development models such as seeking expertise outside the field itself, was replaced with 'a learning community structure designed to foreground, critique, build, and enhance practitioner expertise' (2007: 701). The Learning Communities Project evolved out of the foundational idea that 'teachers, working in professional learning communities who share expertise, are more likely to improve student learning than teachers working alone' (Wood, 2007:711). The school's district learning community initiative had to re-conceptualise teachers' work and its meaning. Teachers' classroom doors began to open as they traditionally practiced with autonomy and authority. Teaching became public and no longer in isolation as they gathered a sense of efficacy in professional expertise. Communities of reflection, critique, and

inquiry, began to develop. According to Wood (2007), participation in a learning community allows teachers to accept primary responsibility for their growth in expertise by equipping them with fundamental strategies to build on their own knowledge. This growth in professional judgment additionally, allows teachers to 'respond effectively to student needs' (2007:710). Results of a survey given to participants of the learning community in this study, suggested that there was 'increased trust among professional colleagues, a better understanding of how to meet student needs, a district climate more conducive to risk taking and innovation, and a greater sense of professional efficacy to improve student learning' (Wood, 2007:717).

Collaborative practices in education to improve teacher development are also of growing interest in South Africa and other developing countries. Programmes such as clustering are worthwhile to mention, as teacher clusters are gaining popularity in South Africa, as a strategy for professional development. Jita and Ndlalane, (2009) have explored the efficiency of teacher clusters as an opportunity to assess science teachers' content knowledge (CK) and their pedagogical content knowledge (PCK) in order to facilitate change in classroom practises. The researchers identified serious gaps in the teachers' conceptual understanding of mathematics and science before they participated in cluster activities. Jita and Ndlalane, (2009:58) argue that it is not merely the existence of the structure, namely, the cluster that provides the opportunity for effective professional development, but more the interactions among teachers, together with relationships of trust and identity, that make clusters an attractive vehicle for challenging and (possibly) changing teachers' professional knowledge and practice.

However, a study done by Bantwini (2012) with regards to TPD, points to the lack of care towards clustering. Some cluster leaders' lack of leadership skills was blamed for the neglect in specifically, the science learning area. Study participants criticised the selection of cluster leaders, they expected subject advisors to monitor and support the clusters, especially at the beginning, until they were self-sustainable. However, the teachers were disappointed at the lack of support from their subject advisors. As a result, most teachers had lost interest in the science curriculum reforms and TPD programmes. It is important to note here that clusters are mere

tools of accomplishing the set objectives and, as with all tools; they need the skills and dedication of those using them to be effective to accomplish the set objectives (Jita & Ndlalane, 2009).

Despite the many advantages of teacher collaboration, it is important to recognise that fostering a collaborative culture may spark conflict. The challenges of existing norms of privacy, independence, and professional autonomy are so embedded in the traditional interventions that; the longer the existing school culture is in place and deemed successful the greater is the challenge to modify it through collaboration with others (Voulalas & Sharpe, 2004). In a study by Johnson (2003), teacher collaboration had negative consequences for approximately 25% of teachers in the sample. Many felt constrained and/or pressured to conform to the group. Loss of independence was also mentioned because of group activities, since teachers were forced to conform to the norms and decisions of their group.

2.4.2 Professional development focussed on the cognitive (Personal) domain

2.4.2.1 Pedagogical and Content knowledge

Shulman's (1987) focus on effective development is not only on teacher practice but also on teacher knowledge and the usefulness of a conceptual framework for representing how teachers learn and think; and about the essential features of a teacher's capacity to points of change. Under these conditions described by Schulman, teacher growth becomes a process of the construction of a variety of knowledge types. These knowledge types include content knowledge (CK), pedagogical knowledge (PK), and pedagogical content knowledge (PCK) acquired by individual teachers, in response to their participation in the experiences provided by the professional development programme, and through participation in the classroom. Shulman (1987) therefore, identifies the possession of good subject content knowledge (SCK) by teachers as a crucial prerequisite for effective teaching. However, effective teaching goes well beyond just a good knowledge of SCK, it also requires pedagogical content knowledge (PCK), which Shulman (1987) defines as 'the blending of content and pedagogy into an understanding of how

particular topics, problems, or issues are organised, represented, and adapted to the diverse interests and abilities of learners and presented for instruction' (Shulman, 1987:8).

In agreement with Shulman (1987), Garet, et al. (2001) suggests that effective professional development, must intentionally include challenging, content-specific learning experiences, complete with opportunities for teachers to reflect on practice within the context of their teaching. Garet, et al. (2001) conducted research on the Eisenhower Professional Development Program by examining a national probability sample of 1 027 mathematics and science teachers to provide a large-scale comparison of the effects of various professional development models on teachers' learning. Teachers in this study reported that professional development programmes, which focus on increasing subject content knowledge (SCK), resulted in positive changes in instructional practices and student learning.

Van Driel and Berry (2012), on the other hand, shift the emphasis from SCK to the importance of PCK. According to them, it cannot be assumed that experienced teachers already have pedagogical knowledge, because pedagogical content knowledge (PCK) includes teachers' understanding of how students learn, or fail to learn specific subject content. Thus, programme developers must not ignore the complex nature of PCK as a form of teachers' professional knowledge. The research literature clearly indicates that the development of PCK is highly specific to the topic, person, and situation. The authors imply that professional development programmes aimed at the development of teachers' PCK cannot be limited to supplying teachers with SCK input. Instead, they argue that programmes should be closely aligned to teachers' professional practice and, in addition to providing teachers with SCK, should include opportunities to enact certain instructional strategies and opportunities to reflect, both individually and collectively, on these experiences (Van Driel & Berry, 2012).

Garnett and Tobin, (1988) focused on the link between SCK and PCK when they identified how differences in SCK affected the way in which science teachers plan and teach. They have established a number of concerns for teachers' PCK when SCK is limited and underdeveloped. Garnett and Tobin suggest that, for science

teachers in particular, ‘good knowledge of the subject content enabled them to focus on instructional strategies that facilitated student learning’ (Garnett & Tobin, 1988:1). Sanders, Borko and Lockard (1993) in conjunction with Childs and McNicholl (2007) support this view, and report that science educators who taught outside their subject specialism, experienced difficulty in structuring lessons, and were troubled about how to respond to students accurately and in sufficient depth; as if they were novice teachers.

The National Policy Framework for Teacher Education and Development in South Africa (DoE, 2007), acknowledges the extremely complex conditions in which teachers in this country have to work. These working conditions are described as ‘largely due to the pervasive legacies of apartheid, but also as a result of new policies needed to bring about change in education’ (DoE, 2007:12). The National Department of Education thus acknowledges the fact that many science teachers experience gaps in their SCK because of factors such as teaching outside their subject expertise, or inadequate training or curriculum reforms. This implies that new strategies need to be implemented for the training of both new teachers and in-service educators. This particular policy framework stipulates the necessity for both content and pedagogical knowledge for effective teaching and recognises the need for qualified mathematics and science educators. According to this national policy framework, a new CPTD (Continuing Professional Teacher Development) system will ensure the improvement in the quality of teaching and the application of conceptual knowledge-in-practice (DoE, 2007). The National Policy Framework therefore implies that when embedded within an effective professional development context, content knowledge can be a critical vehicle through which change can be made in teachers’ understandings and perceptions of mathematics and science in South Africa.

Gomez Zwiep and Benken (2012) argue that although teachers involved in both mathematics and science can benefit from professional development programmes with similarities in overall structure, developers need to consider the fact there are some unique challenges that need to be addressed for each particular subject area.

Researchers and policy makers agree that teachers need to be knowledgeable in their subject matter, but they must also understand the manner in which students learn content if they are to be effective. A focus on both subject matter and pedagogical content knowledge is therefore critical if teachers are to change their instructional practices. In order to allow professional development to play an effective part in educational reform, policies and organisational structures also need to reform in a supportive manner. In other words, on a national, district and school level, policies must be supportive of the changes that teachers are asked to make in order for teacher professional development to be successful (Darling-Hammond & Mc Laughlin,1995).

2.4.2.2 Teacher beliefs and attitudes

Guskey (2000) theorises that a key to teachers' changing their attitudes and beliefs about their instructional practices is found in student learning. Guskey noted that, although the professional development that teachers receive may initially motivate them, they will not change their attitudes and beliefs until they see how this change positively affects their own students' learning. Stated differently, if teachers perceive that student achievements increase due to the different instructional approach, they are likely to change their own attitudes and beliefs. This approach is in line with the process of change described by Clarke and Hollingsworth (2002), assuming that attitudes, beliefs and behaviour are interactive. A change in one brings about and then reinforces change in the other. Professional development that allows this process to take place is more likely to affect teachers' instructional practices positively.

According to Huberman (2001), teachers' career stages influence their attitudes and beliefs. Huberman (2001) defines and identifies five stages of teachers' career development from the beginning to their retirement as follows:

- Career entry (1-3 years in the profession): Teachers try to survive and discover their profession;
- Stabilisation (4-6 years in the profession): Teachers show their commitment;

- Divergent period (8-18 years in the profession): Teachers learn about themselves and develop new methods of teaching;
- Second divergent period (19-30 years in the profession): Some teachers relax and assess themselves; others criticise the system, administration, colleagues, etc.
- Disengagement (up to 50 years of experience): Teachers gradually separate from their profession; some other teachers find it a time of bitterness *(*Hien, 2009).

Gathering from these stages, teachers' needs may differ from one stage to others in their life-long learning continuum. Stated differently, teachers' beliefs and attitudes towards teaching and learning may vary according to their career stages and personal identities. The participants in this study are in the second divergent face, according to the abovementioned description by Huberman (2001).

Jansen (2001:242) defines teacher identity as 'their sense of self as well as their knowledge and beliefs, dispositions, interests, and orientation towards work and change.' To elaborate on identities, Jita (2004) explored the connections between teachers' identities and their teaching practices. In his study he discussed how a black South African science teacher, 'used his experiences of challenge and marginalisation in his own life as a springboard for constructing a counter identity that enabled him to change his teaching practices' (2004:11). Jita's study focused on teachers' lives in the context of their work and workplaces; in this case within the context of a low-income area. The author based his research on the theory of "transformative practice" and the impact of the teachers' identities on their classroom practices; essentially making the case that changing classroom practices result from changing teachers' identities. He draws attention to the dimension of personal change; that is, how teachers' sense of self (identity) has to change in order to enable the required changes in their teaching (2004:25). Jita's major argument is that this '(re)construction of an identity (of a transformative teacher) begins from and uses as tools his/her previous and current identity forms' (2004:25).

The numerous changes of curriculum in South Africa over the last two decades also contributed to the fact that educators not only have to deal with changing content knowledge, but also a change in pedagogical knowledge. These changes necessitate a reconstruction in teachers' identities and beliefs towards change in their existing instructional knowledge and skills (Jansen & Christie, 1999). This reformed curriculum requires teachers to follow new approaches to planning, teaching, and assessment. In other words, educators have to learn to teach in reform-minded ways. Reform-minded teaching is seen by some researchers as potentially effective for helping students learn in ways that are consistent with social, economic and political needs of society (Cochran-Smith, 1991). Reform-minded teaching also relies on curriculum standards developed by professional organisations and supports teacher's active construction, discovery, sharing and examination of knowledge of various contents (Darling-Hammond & Ball, 1998). It is therefore necessary for transformative or reform-minded teachers to (re)construct their identities by beginning to use their previous and current identity forms as tools.

This study extends the CTPD discussion by identifying teachers' perceptions and the role they play in the success of a mentorship intervention programme. Perceptions play a fundamental role in individuals' decision-making as well as a critical role in how teachers learn; for the reason that perceptions inform the changes that teachers eventually make in their teaching practice (Borko & Putnam, 1995). A recent study by Bantwini (2012) supports the importance of examining and addressing teachers' perceptions to maximise the returns of their professional learning. He conducted a study against the background of South Africa's stream of new curriculum reforms and the hindrances towards learning which primary school science teachers' experience. Bantwini (2012) suggests that if teachers experience that they are professionally developed, their belief system and perceptions of professional development will change for the better, and as a result, they may appreciate their district's efforts in creating a supportive work environment.

As noted above, teachers of natural science, or teachers in general, can hold constricted, inflexible beliefs of their existing content and/or pedagogical knowledge and skills. However, by exposing them to challenging content and activities within a CTPD programme, enables teachers to recognise their own knowledge and skills

limitations, thereby providing an environment in which their knowledge and views toward positive change can expand.

2.4.2.3 Activities

The theory of Darling-Hammond and McLaughlin (1995), argues that traditional ideas of in-service training, need to be replaced with opportunities for “knowledge-sharing”, based on real-life situations. Darling-Hammond and McLaughlin (1995) propose seven elements that should be included in activities for CTPD that engage teachers in practical tasks and provide opportunities to observe assess and reflect on the new practices viz.

- be participant-driven and
- grounded in inquiry, reflection and experimentation;
- be collaborative and involve the sharing of knowledge;
- directly connect to the work of teachers and their students;
- be sustained, on-going and intensive; provide support through modelling, coaching and the collective solving of problems and
- be connected to other aspects of school change.

A growing amount of research central to CTPD focuses on active engagement and concrete tasks. Darling-Hammond et al. (2009:3) remind us that, ‘the content of professional development is most useful when it focuses on concrete tasks of teaching, assessment, observation, and reflection.’ Active engagement experiences can include the conducting or observing lessons, followed by interactive feedback and discussion; reviewing student work to better understand the student's thinking; planning implementation of the learning into their classroom practices; and becoming a presenter or leader of the actual professional development (Borko, 2004; Desimone, 2009; Garet, et al. 2001).

Garet, et al. (2001) concur with the view that teachers who are actively engaged in planning and practice during professional development will learn the subject content better and are more likely to transfer acquired knowledge into their classroom practices. Darling-Hammond et al. (2009) had similar findings, suggesting, ‘active

learning opportunities allow teachers to transform their teaching and not simply layer new strategies on top of the old' (2009:7). Somekh (in Kennedy, 2005:245) elucidates on action research as 'the study of social situation, involving the participants themselves as researchers, with a view to improving the quality of action within it.' If the goal of professional development is to influence the instructional practices of teachers, then professional development must include opportunities for teachers to participate actively in this learning experience.

The issues related to the content of teacher development programmes and activities were given attention in this study, by drawing on the Japanese Lesson Study Model. The Instructional Leadership for Teacher Development through Lesson Study (ILLS) project in Mpumalanga, forms part of the activities to which the participants in this study were exposed (see section 1.2.1.2).

The Japanese Lesson Study (JugyouKenkyu) Model offers a good example related to implementation of teacher professional development, that considers active participation as effective. Lewis (2002) describes the Lesson Study Cycle as having four phases:

- Goal-setting and planning – including the development of the Lesson Plan;
- Teaching the research lesson – enabling the lesson observation;
- The post-lesson discussion; and
- The resulting consolidation of learning

Doig and Groves (2011) and Lewis, (2009) emphasise a number of reasons why Lesson Study offers the potential for sustained teacher professional development. First, it offers teachers the opportunity to develop professional communities of inquiry, with ownership of the improvement effort, a commitment to inquiry, shared goals, and a sense of responsibility to their colleagues and students. Secondly, while progress is often slow at the start, the learning process can evolve over time with teachers. For example, 'beginning by weaving some of the simpler components of lesson study (such as collaborative lesson planning) in with their existing practices, and only later… the significance of other ideas such as developing a lesson rationale and documenting their own learning' (Doig & Groves,

2011:90). Thirdly, Lesson Study enables teachers to build on their efforts and refine their understandings. Lesson Study as a structured activity, therefore, provides teachers with an opportunity to engage in shared activities in an integrated form, and offers the opportunity for observation and reflection.

In the present study, I define Lesson study as a configuration of activities that a selected group of teachers (mentee teachers) undertake in the workplace, with the intention to support each other, with the guidance of an expert teacher (mentor). This configuration may differ from group to group and from situation to situation, but there are some basic activities in the ILLS project, which create the route for mentoring as a professional development strategy.

2.4.3 Professional development focussed on the behavioural perspective

2.4.3.1 Change in instructional practice

Of all aspects of professional development, sustaining change is perhaps the most neglected. It is clear that, to be successful, professional development must be seen as a process, not an event (Guskey, 2002). Research on educational change has found that experienced science teachers have conceptions and teaching models that have been consolidated by their own professional experience, which are often very firm and resistant to change (Friedrichsen & Dana, 2005; Peme-Aranega, et al. 2012).

Friedrichsen and Dana (2005) contend that experienced science teachers have conceptions and teaching models that have been consolidated by their own professional experience, which are very stable and resistant to change. Research with science teachers has also found that the process of teacher change is continuous but gradual. Teachers do not usually make drastic changes. Instead, they progressively put the ideas that seem to them to be important and at the same time attainable into practice (Rogan, 2007). Hence, professional development should not be seen and presented as change from one model to another, but rather as an internal process of growth and gradual development. The prime aim must be to rather support and enhance the teachers' motivation, confidence, willingness,

collaboration, and commitment to their own professional development (Rogan, 2007). This is in line with Clarke and Hollingsworth's suggestion that professional growth is a process of the 'construction of cognition by individual teachers in response to their participation in the experiences provided by the professional development trajectory and through their participation in the classroom' (2002:955).

According to Clarke and Hollingsworth (2002), the interconnected model of change can be used as an analytical framework to serve at least three functions, one of these being a tool for the categorization of teacher change data. The model helps to analyse the data specific to each of the four change domains, and supports the empirical identification of patterns in teacher professional growth (see section 2.3.2). Zwart, et al. (2007) conducted a study on teacher learning (change in cognition and/or behaviour) and reciprocal peer coaching using the interconnected model of Clarke and Hollingsworth (2002) as an analytical tool. This model allowed the researchers to recognise the complexity of professional growth by identifying multiple patterns of learning, and by its non-linear nature defining professional growth as an on-going process of learning of experienced teachers. The authors obtained rich descriptions of multiple patterns of change of four experienced secondary school teachers. For example, the participant teachers changed in response to student outcomes. This is in line with Guskey's view that teachers feel rewarded when students' behaviour and results seem satisfactory, if not, an explanation is needed and as a result, the teacher's classroom practice changed in action (Guskey, 2002). Bandura (1986) devised the term "self-efficacy" and elaborates on this meaning by defining perceived self-efficacy as ''people's judgments of their capabilities to organise and execute courses of action required to attain designated types of performances'' (1986:391).

Although the research on effective practices pertaining to teacher professional development is highlighted in the aforementioned literature, a gap exists in research on how experienced teachers perceive the different strategies implemented to improve the quality in their instructional practice.

Fundamental to this study is the concept of effective professional development of experienced teachers. To be more specific, the perceptions, activities, and the

experiences of natural science teachers as mentees were explored. This study focuses and how these teachers made sense of the professional development intervention (ILLS Project) and how this learning experience and the context in which it occurs affect their personal and professional development. By using the case of the ILLS project, the study explores the experiences of teachers in a mentoring relationship. It is therefore necessary to investigate existing literature on the nature of mentorship.

2.5 MENTORSHIP

2.5.1 Background

In order to understand the complexity of mentoring relationships in CTPD, it helped to reflect deeply on the conceptualisation of mentoring. To unravel some of the complexities of a mentoring relationship it is important to explore the different components that constitute a successful mentor-mentee relationship, understanding the many ingredients or elements that are part of mentoring. Aspects to be addressed are firstly descriptions and definitions of concepts in order to clarify what mentoring is, common characteristics, and the role of the mentor as well as the mentee. Another aspect to be explored is the benefit of a mentorship programme for the different role players in the mentoring relationship. Finally, the ways in which mentee teachers collectively participate in activities, how they construct meaning to these activities and how new understandings emerged from the mentorship experience, will be discussed.

The concept of mentorship is thought to originate in Greek mythology. In the Odyssey by the Greek poet, Homer, Odysseus one of the characters, was preparing to go and fight in the Trojan War. He was leaving behind his son, Telemachus and realised that he might be away for quite a while. While he was away Telemachus would need coaching and guidance, he therefore hired a trusted friend, with the name Mentor to be his son's tutor (Clawson, 1980). Modern versions of mentoring have been implemented in several fields of professional development .The practice of mentoring has also being linked to several theoretical perspectives e.g. Vygotsky's (1978) social constructivist theory which posits that,

social interaction, cultural tools and activity shape the individual's development and learning. Vygotsky's perspective served as a foundation for the practice of mentoring, in which a more capable (mentor) guides the learner (mentee). Bandura's Social Cognitive Theory (1986), also applies to mentoring, specifically to the learner (teacher mentee in this study) who is viewed as thoroughly integrated with the environment within which he or she is learning. Bandura (1986:18) contended that the teacher mentee's 'cognitive responses, behaviour, and environment all work together to create learning.'

According to Sundli (2007), connotations of the word mentoring or mentorship vary from person to person, but the word mentorship commonly still denotes a mentoring – situation between two persons, where one is defined as a mentor, and the other as a mentee. The mentor leads the less-knowledgeable mentee in the correct direction i.e. the "road to the right goal" (Sundli, 2007:209).

Mentoring is often defined as a close, intense mutually beneficial relationship between someone who is older, wiser more experienced, and more powerful (the mentor), with someone younger or less experienced (the mentee). According to Shulman-Sato (2006:110), mentoring is a 'complementary relationship...built on both the mentor's and mentee's needs.' This perception on mentoring relationships puts an emphasis on emotional support, rather than on-going, career-related support.

Framed in a continuous professional developmental context, Daresh (2003:1) considers mentoring as 'an on-going process in which individuals in an organisation provide support and guidance to others who can become effective contributors to the goals of the organisation.' These descriptions differ in that Daresh defines the mentor more as passing on one's legacy in an effort to promote career development for both the mentor and the mentee. Little (1990) examined the difference between mentors in the field of education and mentors in the field of business and industry, in which the latter relationship was more focused on career advancement. Little (1990) concluded that many mentors in education provided social and emotional support, but not sufficient support in the continuous development of the teachers' classroom practices.

Mentoring as a popular strategy for teacher professional development gained interest for the first time in the 1980's for assisting novice or student teachers (Feimann-Nemser, 1996; Little, 1990; Wang & Odell, 2002). Many studies have focused more on the mentoring of novice teachers and not on the development of experienced, veteran teachers (Cullingford, 2006; Harley & Wedekind, 2004; Schulman & Sato, 2006). Mentorship as a tool for the continuous professional development of experienced teachers is an important aspect on which sufficient research is still lacking.

In this study, the classical older person as a mentor is, in some instances, being reversed as the mentee. The mentor is a person who may be less experienced in terms of years, but who is being regarded as more knowledgeable and skilled in the field of natural science education. This study focuses on research pertaining to both emotional and career development support in a mentoring relationship and seeks to explore characteristics of mentoring which may pursue the continuous professional growth of teachers. I am particularly interested in the process of how experienced teachers are learning new practices, how they attempt to adopt new ways of thinking and practising, and why the mentoring relationship may lead to change in their classroom practices.

It is inevitable to look at the different components of a mentoring relationship individually; for example, the '"typical" characteristics of good mentoring, the role of the mentor, the role of the mentee and the benefits obtained from mentorship programmes.

2.5.2 Mentoring characteristics

Research has indicated that although no particular programme or model can be considered more successful than others, however, successful mentoring programmes do have some characteristics in common.

According to Daresh (2003:7), mentoring has the following characteristics:

- It is a powerful device that may help teachers develop new insights into the profession. This is true whether we are talking about experienced or new teachers.
- Mentoring may reduce isolation and can build a collegial network among professional colleagues.
- It helps move the novice teacher from a level of mere survival to initial success when used with beginning teachers. When applied to experienced teachers, mentoring can be a way for professionals to develop a sense of renewed enthusiasm for their jobs and enhanced commitment for the profession of education.

It is clear that the aforementioned characterisation relates to the theoretical framework I have adopted for this study. For this reason, I now wish to structure my discussion of the components characterising effective mentoring, according to the domains identified by Bandura (1986) and Clarke and Hollingsworth (2002).

2.5.3 Mentoring and the external domain

2.5.3.1 School context

Understanding the context in which the mentee teacher is working is vital to the success of the mentoring relationship. Research indicates that sustained and active participation in quality professional development interventions can change teacher attitudes, beliefs, and instructional practices (Darling-Hammond, 1998; Feiman-Nemser, 2003; Guskey, 2003; Garet, et al. 2001; Robinson, 2001).

Feiman-Nemser (2003) emphasises the contextual dimension of mentoring and focuses on the important influence of the school organisation and culture on teacher learning. She contends that the learning needs of beginning teachers – which embrace 'issues of curriculum, instruction, assessment, management, and the larger community' (2003:6) – arise from particular contexts of teaching and therefore have to be addressed within the relevant contexts.

For example, Heller's (2004) studied a mentoring programme between senior and junior teachers and focussed on factors influencing teacher attrition. He found that attrition might be limited if a continuous, in-service training programme which cultivates a rich, supportive learning environment is implemented. Johnson, et al. (2004) agree that a positive school culture and support might be linked to job satisfaction and teacher retention. They suggest that 'substantive, structured, regular interactions with expert, veteran colleagues' are necessary for effective mentoring programmes (2004:16). Mentoring provides on-site support for teachers because the most important focus is on collaborative peer relationships, particularly one-to-one relationships, between two teachers working together, reflecting on current teaching practices with the purpose to improve their skills in transformative ways (Kennedy, 2005).

Robinson (2001) conducted a critical review on teacher development in South African schools. She investigated a mentoring programme, focussing on school infrastructure and support, over a period of three years. The mentoring programme aimed to develop in-service teachers as mentors for student teachers during a teaching practice module at their schools. Robinson agrees that school based mentoring is a potentially powerful strategy for teacher development. However, her research has shown that the realities of factors such as the school culture and school policies on mentoring (i.e. the institutional conditions at the schools) in fact constrained, rather than enhanced the mentoring programme. As a result, she argues that:

> *if professional development initiatives do not have the infrastructure to 'work', they will become an obligation and a burden, rather than a learning experience. A stable environment for teaching and learning is a necessary first step here, as disruptions to the day can only demotivate teachers and learners, and interfere with a programme of on-going learning. In a climate of demotivation, it will be difficult to promote any professional development programmes. The nurturing of motivation and commitment is especially crucial, as fiscal limitations in the country mean that professional growth will depend as much, if not more, on the spirit and will of the teaching profession rather than on any external incentives* (Robinson, 2001:113).

2.5.3.2 Collaboration

Darling-Hammond (1990) also argues for a supportive environment to enhance professional growth, and proposes that the structure of schools must be such that they provide for collegial sharing and decision-making. She contends that teacher isolation stands in the way of developing professional standards of practice, and appeals for frequent and regular opportunities within the school culture to discuss problems of practice. Wang and Paine (2001) agree that mentoring should occur in the context of teaching, close to the classroom (or even in it), with the support of an experienced person (the mentor), collaboratively working in the mentee's zone of proximal development, to ensure effective professional development.

Schools and school districts should not only provide teachers with opportunities to learn in a supportive environment, but also with the understanding of the teachers' needs, and their learning styles. Fowler (2008) believes that learning occurs through a combination of experience and reflection. He argues that optimal learning begins with reflective observations, and then the learner [mentee] makes sense of his or her experiences, followed by active experimentation; a theory also known as "experiential learning" (Dewey, 1938). According to Fowler (2008:430), 'experiential learning is the learning which results from the coming together of experience, of a certain quality, with meaningful reflection.' The author emphasises that barriers such as personal or social problems, or active resistance to reflect upon an experience, may prevent optimal learning. He proposes that the intervention of a coach or mentor can break down these barriers Fowler explains that 'a coach [mentor] seeks to refocus the person's [mentee] priorities, remotivates when necessary, and breaks down any resistance to learning' (2008:432). Mentoring offers the opportunity to experience, reflect, and experiment in a supportive environment, which promotes optimal learning and cultivates professional development. The supportive intervention of an expert teacher [mentor] may lead to a positive influence on professional growth from the external domain Clarke and Hollingsworth (2002) describe. School districts or school leadership should therefore consider a professional development model that ensures the growth and development of their teachers for the shared benefit of all.

2.5.4 Mentoring and the personal domain

2.5.4.1 Subject and pedagogical content knowledge

Cochran-Smith, (1991) as well as Feiman-Nemser and Parker (1992) share the perspective that a central goal of teacher mentoring, is not to reproduce the existing knowledge of teaching through transmitting the presumed expertise and context knowledge from mentor to mentee. Instead, it is to explore new ideas and approaches of teaching through an on-going, collaborative inquiry into teaching practice. The knowledge of teaching developed in this kind of mentor-mentee relationship is expected to transform the existing practice of teaching. According to Cochran-Smith and Lyttle (1999) teacher learning for experienced teachers is no longer seen as a process of periodic staff development wherein experienced teachers meet to receive the latest information about the most effective teaching techniques but as a process informed by experienced teacher bringing in prior knowledge and experiences to all new learning situations.

The continuous change in policies and curricula calls for reorientation of teachers towards their existing knowledge pertaining to teaching and skills. The implication is that teachers must stay up to date with new knowledge on teaching. Cochran-Smith (1991) sees reform-minded teaching as potentially effective for assisting educators to learn in ways that are consistent with social, economic, and political needs of society.

Yendol-Hoppey and Dana (2007:6), on the other hand, define reform-minded teaching as a ‘progressive stance towards teaching that acknowledges the importance of research based practices, problematising teaching and learning, and embracing change with the aim of educating all children’.

Since the early 1980’s, reform-minded teaching is the goal for mentoring programmes for novice teachers in many countries such as the USA (Darling-Hammond, 1998), England (Furlong, 2002), and China (Wang & Odell, 2007). Feiman-Nemser (1996) asserts that by promoting observation and conversation

about teaching, mentoring can help teachers develop tools for continuous improvement and promotes learning to teach in reform-minded ways.

Wang and Odell (2007) agree that mentoring has the potential to help mentees learn to teach in reform-minded ways. Although they focus on the mentoring of novice teachers, they have identified challenges and complexities in mentoring relationships, which can be helpful in the exploration of relationships between experienced teachers. Based on both critical constructivist and socio-cultural perspectives of learning, and research on learning to teach, they suggest that helping mentors and mentees develop a shared vision for teaching and relevant beliefs about learning to teach is a central challenge for using mentoring to support reform-minded teaching. According to Feiman-Nemser (2001:1048), teachers "learn to teach over time"; they need to know subject matter, learning, students, curriculum, and pedagogy. Feiman-Nemser (2001) conceptualises three phases of mentored learning to teach, in a framework, known as the "Central Tasks of Learning to Teach Framework" (2001). First, the pre-service phase in which the mentee examines beliefs critically in relation to vision of good teaching. Followed by the induction phase, in which the mentee develops a professional identity. This stage will encourage mentees and in-service teachers to test out new teaching ideas and approaches, thus expanding their beginning repertoire. In addition, the final stage, the continuing professional development phase in which experienced teachers can be mentored or act as mentors. During this continuous professional development phase, in-service teachers extend and deepen subject knowledge, refine instructional practices and strengthen skills to improve teaching. This framework for teaching practice related mentoring, 'provides the most needed learning opportunities for in-service teachers' Lai (2010:461). Lai (2010) argues that in-service teachers are learners, and therefore, teaching practice related mentoring, as conceptualised by Feiman-Nemser (2001), should play an important role in their continuous professional development stage.

Effective teaching not only requires knowledge of subject matter (subject content knowledge), communicative skills and pedagogical knowledge, but also demands reflective thinking and a commitment to promote student learning. According to Darling-Hammond and McLaughlin (1995), professional development today should

provide ‘occasions for teachers to reflect critically on their practice and to fashion new knowledge and beliefs about content, pedagogy, and learners’ (1995:597).

2.5.4.2 Reflection

Among the many theories of mentoring in existing literature, and how it relates to learning and learning to teach, is the theory of “learning by reflection”. The term reflection defines “active, persistent, and careful consideration”, which may lead to a change of cognition (Clarke & Hollingsworth, 2002:953).

In an interesting narrative study by Chitpin (2011), the author explains, from personal experience, how mentoring helped her to improve her own teaching practices through critical conversations with an experienced colleague, whom she regarded as her mentor. Being a teacher education professor, the author was involved in developing a programme focussing on the needs of her student teachers. Unfortunately, the course posed great difficulties for her in linking theory to practice. The collaborative nature of mentoring and conversations with her colleagues and students enabled her to reflect critically on her successes and failures. She explains that by being a mentor and a mentee, provided contexts for her enhanced understanding of her students’ learning experiences and her role in them. Chitpin (2011) further explores the relationship between mentoring, reflection, and the way in which it influenced her own professional development as a teacher educator. She asserts that the reflective nature of mentoring enabled her to examine her own assumptions and beliefs with a desire to improve her own teaching, and explains, that ‘in reflecting on my practice, it not only changes my teaching practice, it has also changed me as a teacher’ (Chitpin, 2011:230). Yendol-Hoppey and Dana (2007) also view reflection as an important component of effective professional growth in the mentoring process. The authors propose that mentors should use reflection to connect with other professionals by sharing, discussing and debate difficult issues in a mentoring context.

2.5.4.3 Attitudes and beliefs

In a three year, university-implemented mentoring programme to improve in-service educators' attitudes to maths and science, Fricke et al. (2008) determined that teachers, in general, do not show any desire to learn or improve from the start. It took almost the first year of the programme to establish a relationship of trust and for the mentor teachers to initiate discussions on content issues, investigations, and practical experiments. This study indicates that 'no assumptions should be made about a teacher's prior experience or understanding of a new task/concept that the mentor is introducing' (2008:68). Concrete demonstrations or examples of the most basic level had to be provided by the mentor teachers "in almost every case" (Fricke, et al. 2008:68). However, it was observed that the mentee teachers' desire to improve increased as their learners begin to respond differently towards them. According to Fricke, et al. (2008), mentoring can thus provide an opportunity for in-service teachers to be motivated and to restore their confidence and their belief in teaching. This desire for empowerment of the teachers is in line with Bandura's (1986), self- efficiency beliefs.

Wang and Odell (2002) summarise the work of a mentor in effective mentoring as follows: 'First, mentors can engage novices [mentees] in reflective interactions by focusing on specific events and teaching situations. Second, mentors can challenge novices [mentees] to re-examine the crucial events and situations in teaching or learning to teach and can challenge them to reinterpret or reconstruct their meaning from the perspective of constructivist teaching. Third, mentors can offer alternative interpretations for events and situations and model the reflective process necessary for discovering the alternative interpretations and methods of decision making that are important in resolving teaching problems. Fourth, mentors can engage novices [mentees] in such interactive reflections constantly and flexibly in a way that is consistent with where the novices[mentees] are in learning to teach and where they need to go' (Wang & Odell, 2002:524).

It is widely assumed that when teachers change their knowledge, beliefs, and attitudes on for example, new instructional methods, their practice will improve and student outcomes will increase (Clarke & Hollingsworth, 2002; Guskey, 2002;

Zwart, et al. 2007). According to Guskey (2002), however, 'for the majority, becoming a better teacher means enhancing student learning outcomes' (Guskey, 2002:382). He argued that significant changes in beliefs and attitudes of teachers are likely to take place only after changes in student learning outcomes have become evident. Stated differently, '…once the teachers have 'field-tested' change proposals in classrooms and experienced first-hand change in student learning outcomes', a change in instructional practices might occur(Clarke & Hollingsworth, 2002:949).This study aims to contribute to an understanding of how professional development or change can be enhanced by mentoring activities and practices.

2.5.5 Mentoring and the domain of practice

A considerable amount of literature on peer coaching and mentoring suggests that the professional development of teachers can be improved through the three components, experimentation, observation, and reflection (Gomez Zwiep & Benken, 2012; Lewis, 2009; Maynard & Furlong, 1993; Yendol-Hoppey & Dana, 2007).

Maynard and Furlong (1993) identified three models of mentoring, which correspond with the changing needs of student teachers in practice situations. The apprenticeship model; in the beginning of practical teaching, in which student teachers work alongside mentors who act as models and interpreters, to assist the mentees in "visualising" the teaching process [experimentation]. The second stage of practical teaching, also known as the competency model, is the stage in which mentors act as trainers or instructors to engage the mentees in a more systematic training programme. This programme involves routines of observation and feedback on agreed competences [observation]. The reflective model comes in the final stage of practical teaching, in which mentors act as co-enquirers or colleagues to promote critical reflection on teaching and learning [reflection].

Mentoring can therefore, be understood as a professional development tool in which pairs of teachers actively work together to support each other's professional growth. In organising and structuring activities around the experimental, observational, and reflective components of mentoring, effective professional development can be attained.

The Japanese Lesson Study Method, followed in the present study, provided the mentor teacher with the opportunity to ensure that the activities are structured in a way consistent with the components as agreed upon by several authors that ensure effective professional development (see section 1.2.1). This process therefore includes a three-phase cycle:

- pre-observation,
- classroom observation,
- and post-observation.

For further clarification of the mentoring process I also explore the dynamics of a mentoring relationship and the impact it might have on the participants involved.

2.5.6 The mentoring relationship

Clutterbuck (1991:3) views the mentoring relationship as 'a protected relationship in which learning and experimentation can occur, potential skills can be developed, and in which results can be measured in terms of competencies rather than curricular territory covered.'

To be able to establish a successful mentoring relationship one has to look at the underlying beliefs and goals of the implemented programme first. The purpose of specific goals of a mentoring relationship, are to 'help the mentee learn procedures that will become a part of his/hers teaching life' (Wang & Odell, 2007:473). Teacher learning is a process of knowledge construction and reconstruction through individual and collaborative inquiry into one's own teaching. Conceptual conflict and transformation are therefore unavoidable, but an important mechanism for learning to teach effectively (Feiman-Nemser, 1996). This dynamic relationship between different kinds of teaching and various ways of learning to teach, between teachers, would determine the nature of a mentoring relationship and its potential to focus on their professional development (Wang & Odell, 2007). Kennedy (2005) describes the mentoring relationship as a collaborative peer relationship, with the focus on the importance of a one-to-one relationship, generally between two teachers to support

professional development. Yendol-Hoppey and Dana (2007:75) emphasise that every mentor and mentee is different; consequently, every mentor-mentee relationship is different.

Katherine Kram (1983), conducted a major study on the mentoring process in an attempt to discover the significance of the relationship for the mentor and the mentee and how mentoring influenced each party's career and self-development. She also tried to establish whether mentoring relationships share any similar characteristics. Kram (1983), conducted her survey in a public utility company of 15 000 employees in the United States, using in-depth interviews. She found that each relationship generally progressed through four distinct stages:

- **The start of the relationship**

The mentoring relationship depends on whether the mentor wins the mentee's respect, as the nature of the job he does and the difficulty and the decisions he takes becomes clearer.

- **The middle period**

The most rewarding for the two parties as the relationship is cultivated as the mentor coaches and promotes his mentee. Strategies and tactics to achieve objectives are more regularly discussed and project work, which the mentor sets his mentee, is aimed both at developing skills and at assessing how well they have been absorbed.

- **Dissolving the relationship**

When the mentee feels the relationship has served its purpose, and he or she is seeking to gain independence from the mentor.

- **Restarting the relationship**

The mentoring relationship becomes a collegial relationship.

It is important to mention that every mentoring relationship is unique, just as every individual is unique, however, according to Clutterbuck (1991:81), and '…a high proportion of mentoring relationships does seem to follow these abovementioned basic stages of development.' Clutterbuck (1991) additionally provides this study with a framework to explore the mentoring relationship and the development of the mentee as it unfolds during this process.

Although each person develops unique perspectives of how to improve instructional practices for the benefits of their students, it is significant to mention that the beginning of a positive mentoring relationship between a mentor and mentee will influence the success of the outcomes of any implemented programme (Feiman–Nemser, 1996; Jones & Straker, 2006). Yendol-Hoppey and Dana (2007) support this stance with the argument that, by establishing a trusting relationship with the mentee, the mentor can capitalise on the mentee's ability to be responsive to coaching sessions.

2.5.6.1 The role of the mentor

Although this study is focused on the experiences of the mentees, I find it necessary to discuss the role of the mentor, since the development of a successful mentoring relationship relies heavily on the role of the mentor (Wang & Odell, 2002).

Feiman-Nemser and Parker (1992), suggest that the way in which mentors view their roles, impacts the long-term effectiveness of the mentoring program in which they participate. Effective mentors are those who act as agents of change, breaking down barriers and fostering a culture of collaboration. Professional development programmes that include this type of mentorship create opportunities for conversations among teachers about best teaching practices, and schools become learning communities that include experienced and novice teachers equally. When

mentors act as agents of cultural change, they seek to break down the traditional isolation among teachers by fostering norms of collaboration and shared inquiry. They build networks with novices and their colleagues, create opportunities for teachers to visit each other's classrooms and they facilitate conversations among teachers about teaching (Feiman-Nemser & Parker, 1992:17).

In addition, Van Louw and Waghid (2008) argue that the role and the functions of the mentor are complex; they include sub-roles such as the role of counsellor, coach, role model, and guide, wise, patient, talented and experienced. As one of the many roles of a mentor, a coach assists a teacher, usually on an individual basis, to improve practices in the classroom. This role generally includes assistance with lesson planning, lesson delivery, classroom management, and assessments (Kennedy, 2005).

Clutterbuck (1991) summarises the criteria needed for fulfilling the role as a successful mentor. According to Clutterbuck (1991:36), a mentor must:

- **M**anage the relationship
- **E**ncourage the mentee
- **N**urture the mentee
- **T**each the mentee
- **O**ffer mutual respect
- **R**espond to the mentee's needs

The value of Clutterbuck's criteria for being a successful mentor is that it provided me with a framework for criteria to use in this study to evaluate the relationship of the mentees with their mentor during the ILLS project (see section 4.5).

However, Little (1990) who has done a meta-analysis of the mentoring research found the body of research around mentoring to be insufficient. Little (1990) describes basic mentor behaviours such as providing guidance to new teachers during the induction phase, acting as teacher leaders, and functioning as the main supports during curricular or programmatic development phases. In examining the

effectiveness of mentors, Little (1990) explained that many mentors provided social and emotional support, but not sufficient support in the development of teaching practices.

2.5.6.2 The role of the mentee

Mentorship, in essence, is learner (mentee) centred, and the development is thus at the mentee's own pace and according to his/her own specific requirements (Fraser, 1998). However, teachers, regardless of their experience, are expected to learn about teaching in reformed ways to the benefit of their learners. The role of the mentee teacher in today's classroom is to learn a kind of teaching different from that of prevailing practice. New expectations on the role of the teacher can therefore be seen as a movement from the all-knowing guardian working in isolation, to a co-operating individual, seeking continuous professional growth (Fraser, 1998; Villegas-Reimers, 2003).

A considerable amount of literature on peer coaching and mentoring suggests that the professional development of teachers can be improved through collaboration with other teachers in professional communities, observe colleagues' classrooms, be observed by expert mentors, analyse their own practice, and network with other teachers (Darling-Hammond, 1998; Huling & Resta, 2001; Villegas-Reimers, 2003). Mentoring and coaching therefore provides teachers with the opportunity to engage in such activities, if they are willing and committed to participate in mentoring practices.

Unfortunately, many teachers in South Africa feel that they are ill- prepared for this paradigm shift in their teaching practice due to the fact that various new curriculums were inefficiently introduced in the last few years. Because of the multiple changes in curriculum and assessment policies, teachers felt less confident of what is expected from them in terms of classroom practice and became more dependent on the support of their district officials (Bantwini, 2012).

According to Wang and Odell (2002), it was only recently, that some mentorship programmes were developed to transform the teaching profession, hence, the role

and the expectations for mentee teachers have changed. In an extensive literature review, by Wang and Odell (2002), they explored what reformers in education expect from novices or mentees. The researchers suggest that mentee teachers need to develop the following crucial dispositions and knowledge necessary to teach in ways as envisioned by new teaching standards:

- A strong commitment to standards based and reform-minded teaching and its assumptions about knowledge, learning, and teaching;
- A deeper understanding of subject matter and its representation in relation to real teaching situations;
- A broader knowledge of diverse student populations and skills in observing and interpreting their learning; and
- A flexible connection between these dispositions and knowledge in various teaching contexts and for diverse student populations (Wang & Odell, 2002:490).

2.5.7 Benefits of mentorship programmes

The benefits of mentorship programmes in education are substantial for both mentee and mentor teachers.

2.5.7.1 Mentee benefits

Mentoring has been widely implemented in educational systems across the globe as a tool for supporting novice teachers and improving teacher attrition (Feiman-Nemser, 1996; Ingersoll& Smith, 2004). Mentoring is also intended to ease the transition into teaching and reduce the isolation felt by novice teachers (Feiman-Nemser, 1996). Teacher mentoring programmes became a popular support for novice teachers at the pre-service and induction levels in the United States. In the early 1980's, with various intents; some were designed to reduce novice teacher's attrition; some to move novices smoothly and efficiently into existing teaching culture; some required mentors to be a substantial support to learn to teach (Wang & Odell, 2002:491).

Specific benefits experienced by novice teachers who participate in mentoring are varied. Ingersoll and Smith (2004) conducted a study of the effects of induction programmes on teacher attrition. The authors used data from a survey to examine the effects of many induction activities including mentoring, group activities, reduced workloads, and provision of extra resources. The study indicated that mentoring in education, particularly when the mentor had a background in education, benefited novice teachers, specifically in the area of retention (Ingersoll & Smith, 2004).

Although the benefits of mentoring for both novice and experienced teachers have yet to be agreed upon in the literature, and significant professional development programme variation exists, mentoring programmes are contemplated to be an answer to improve an overall teacher quality.

2.5.7.2 Mentor benefits

Recently, there has been a trend in research toward recognizing the benefits of mentoring for experienced mentor teachers (Holloway, 2001; Huling & Resta, 2001). The idea that mentors derive benefits from mentoring, however, is not completely new. As early as the mid-1980s, a few educators were beginning to examine this question. For example, in a 1986 study of 178 mentor teachers, more than two-thirds responded "definitely" to the statement that participation in the mentoring programs "provided positive professional growth for me" (Hawk, 1986:62). Mentors were asked to elaborate upon the ways they grew professionally, more than half of them responded with the following benefits: 1) Focus on and improve in classroom teaching skills; 2) Awareness of the need for educators to communicate with each other and 3) Understanding the principal and central office supervisors' roles. These findings led Hawk to conclude that “educators should look not only at the direct effects that teacher induction programs have on beginning teachers, but also at residual effects that such programs have on all involved professionals” (Hawk, 1986:62).

Since 1986, only a few studies have focused on the primary question of mentor benefits, but a considerable number of researchers and mentor program evaluators

have reported mentor benefits. It is clear that implementing a mentorship programme in any organisation has benefits for participating individuals as well as the organisation itself. Huling and Resta (2001:2), for example, categorised the reported mentor benefits as follows:

- Professional competency: Mentors benefit by applying cognitive coaching skills with their students such as listening, asking inquisitive questions, providing non-judgmental feedback.
- Reflective Practice: Provided mentors with opportunities to validate the experience they have gained over the years.
- Renewal: Mentors commitment to the teaching profession was often strengthened.
- Psychological Benefits: Enhancement in mentors' self-esteem and feelings of empowerment.
- Collaboration: Collegial interaction strengthened relationships.
- Contribution to Leadership: Mentor training and experiences can build mentors' capacity for leadership through structured professional development including training and experience in classroom observation and coaching skills.

The benefits of mentoring programs are substantial for both novice and mentor teachers. This reality has important implications for professional development decisions to be made by education departments, universities and school management. Principals or relevant key players need to understand that creating a structure that allows experienced mentee teachers to work with expert mentor teachers, will ultimately benefit the students of both mentee and mentor teachers.

Wang and Paine (2001) contend that mentoring, as assisted performance, benefit teachers in constructing a professional practice. The authors explored the possibilities and challenges of mentoring as an assisted performance as a tool to reform classroom practice in a study in China. In their study, they assumed that mentoring has significant potential and benefits to support teacher learning because it is consistent with two important tenets from sociocultural perspectives of learning. First, all knowledge, and theories are situated in and grow out of the contexts of their use. In other words, mentoring occurs in the context of teaching, close to the

classroom (or even in it). Second, with the support of an experienced person [mentor], working in a mentee's zone of proximal development, teachers can learn to perform beyond their independent performance level.

2.5.8 International and national perspectives on mentorship as a professional development strategy

2.5.8.1 Mentorship in developed countries

Internationally, the popularity of mentorship as a professional development strategy has increased to such an extent that, with regard to the situation in the USA, there is hardly any district, business institution or societal service agency that does not have a mentorship component (Van Louw & Waghid, 2008:209).

A substantial amount of literature on professional development programmes focus on the positive effects of mentoring on teaching and learning, but a critical review on mentoring is also needed to fully understand the process of mentoring. According to Sundli (2007), the current educational reform in Norway provides new opportunities for the professional development of student teachers. However, some of the author's studies indicate that Norwegian education is lacking in quality, in that mentoring is perceived to be an activity dominated by mentors' plans and values. She agrees that mentoring programmes can assist in the professional growth of educators, but proposes measures that are building tighter bonds and contracts with each mentee by taking a constructivist view on teaching and learning. Sundli (2007) thus argues that good mentoring must become a personal and professional engagement, with the focus on reflective thinking as part of the mentees successful professional development.

In a similar critical review, Stewart (2004) identifies a gap in existing research defining quality mentoring. Her research found little empirical studies that identified quality mentoring despite the widespread agreement for the need for quality mentoring as part of professional development for new teachers. She argues that the inconsistency and lack in quality control of mentoring programmes across the U.S. are responsible for the critical teacher shortages and low quality teaching.

Stewart (2004) identifies obstacles or concerns of mentor teachers in the U.S.A. that could undermine the quality of a mentoring programme and divides it into the following four categories:

1. Lack of time for meetings and classroom visits.
2. Other responsibilities interfering with mentor responsibilities.
3. Mismatch between the mentor and the mentee teacher, concerning the teaching assignments and teaching ideology.
4. Lack of managerial support.

Stewart (2004) contends that, by addressing these concerns, the quality of mentoring programmes can improve, and as a result, may lead to effective professional development. She suggests that quality mentoring should focus on the different levels of support needed by both new and veteran teachers. Quality mentoring according to Stewart (2004) includes personal-, classroom-, professional-, evaluative- and reflective support.

a) Mentorship in mathematics and science education in developed countries

There has not been much research performed in science around professional development programmes such as mentoring and its impact on in-service teachers and science. Most of the studies focused on the mentoring of initial teacher training or the impact of professional developmental programmes, but not specifically on mentorship programmes.

Childs and McNicholl (2007) found that mentoring could assist science teachers in gaining subject content knowledge (SCK) and pedagogical content knowledge (PCK). The authors investigated the issues and challenges both experienced and trainee science teachers in the U.K. face when teaching new and unfamiliar areas of the science curriculum. Respondents in this qualitative case study reported that they used a range of strategies to develop their expertise in teaching outside subject specialism. For instance, at the planning stage the teachers related strategies for learning new SCK and PCK, such as reading science textbooks and

teaching schemes. However, Childs and McNicholl (2007) found the most significant form of help was from colleagues who were specialists in the subject area. The authors argue 'that although it needs to be acknowledged that there is considerable potential for this support to be time-consuming for all parties, the expertise that one teacher might offer another, in some ways, removes much of the need to spend time searching through textbooks or teaching schemes' (Childs & McNicholl, 2007:12). Assistance from colleagues was seen to be crucial in gaining SCK and PCK in science education, particularly with the practical work in the classroom. However, more research pertaining to workplace learning, and its contribution to beginning and experienced science teachers' professional learning is needed.

De Vries, et al. (2011) also found that science teachers' SCK and PCK were increased through engagement in shared, reflective mentoring practices. The researchers reported on a professionalization programme (VTB- Pro), developed by the knowledge centre for science and technology in the southern parts of the Netherlands. The VTB - Pro programme enabled 5000 primary school teachers and 5000 student teachers to professionalise themselves in the field of science and technology. The objectives of the programme were to enhance the teachers' subject matter knowledge, attitude, and pedagogical content knowledge in science and technology education. The programmes involved in –service courses addressing the domains of teacher knowledge, practical assignments and learning from experience, which in essence are rooted in socio-cultural perspectives. The results of the research showed that the teachers' subject matter knowledge was enhanced by retrieving previous knowledge. Positive changes in their pedagogical content knowledge and attitudes were attributed to their engagement in practical activities, inquiry and design-based learning, and the reflection and discussions with their fellow participants. The researchers conclude that in–service courses for primary school science teachers should contain many possibilities for participants to engage in practical activities, and focus on the "shared meaning" by all the participants (De Vries, et al. 2011:248).

Pegg, et al. (2010) examined teachers' perspectives of the role that mentoring by scientists and science educators played in their professional development in the U.S.A.

According to Pegg, et al. (2010), scientist–teacher partnerships traditionally have often involved limited follow-up to assist teachers with incorporating content and pedagogical knowledge into classroom practice. Mentoring, on the other hand, provides on-site support for teachers directly focused on instructional practices. Results indicated that primary benefits of the mentoring included assistance in translating science content and inquiry-based pedagogy from the professional development into practice and breaking the isolation felt by secondary science teachers. Specific characteristics that were found to support the teachers in the mentoring relationship included: (1) mentors who were seen as objective, outside observers; (2) a sustained relationship with the mentors; and (3) accountability (Pegg, et al. 2010:98).

In a study by Koch and Appleton (2007), in-service science teachers (veteran teachers) participated in a university-school partnership programme. As a result of participation in this mentoring relationship, the veteran science teachers "began to question differently and to think differently about student ownership of their own learning" (Koch & Appleton, 2007:228). They also began to employ inquiry-based strategies in their classrooms and revise their perceptions about effective teaching. Koch and Appleton (2007) emphasise that this model was effective only because it was utilised in conjunction with a mentoring model that enabled the veteran teachers to practice the new knowledge that they were acquiring, as well as reflect on their new teaching ideas. In this case, professional development and mentoring were used together for the benefit of veteran teachers.

2.5.8.2 Mentorship in South Africa and other developing countries

Only a few studies exist that have examined the influence of mentoring on the professional development of experienced teachers in South Africa and other developing countries.

In a South African context, teacher unions and organisations play an important role in the education landscape. Education International (EI, 2006) represents organisations of teachers and other education employees across the globe. It is the world's largest federation of unions, representing thirty million education employees in about four hundred organisations in one hundred and seventy countries and territories, across the globe. In a news article published in EI (2006) on a mentorship scheme in South Africa, the South African Democratic Teachers Union (SADTU) has criticised the Eastern Cape educational department's initiative to hire mentors and retirees to help solve the education crisis in the province. The education department had advertised mentorship and motivational speakers' vacancies at 50 under-performing schools as part of an initiative to help schools that achieved poor exam results the previous year. According to SADTU, this can be seen as an 'act of desperation, which undermines the fundamentals and the mission of education and also a lack of strategy for teacher development' (Education International, 2006). These negative perceptions on mentoring by one of South Africa's largest unions need to be addressed and existing conceptions on mentorship programmes as part of professional development need to be redefined, as misconceptions can hinder the country's vision for quality education.

a) Mentorship in mathematics and science education

In the context of a developing country, particularly with respect to rural schools in South Africa, it is a common occurrence that many practising teachers are teaching science or mathematics outside their subject specialization.

There are a few projects on teacher mentoring that have been reported in the literature recently. For example, according to Fricke, et al. (2008), the University of Pretoria developed and launched a professional development programme in 2003, the Teacher Mentorship Programme (TMP). The main aim of this programme was to provide mentoring and giving support to maths and science teachers at previously disadvantaged schools. Principals and maths and science teachers from Tshwane schools were invited to attend information workshops that informed them of the programme and the implications for the school and the teachers. As a result, those schools participating proved to be some of the neediest in this area of

Tshwane. Fricke, et al. (2008) argue that the most cost effective and sustainable support for mathematics and science teachers in South Africa can be achieved mentoring them in their work environment using experienced teachers as mentors (Fricke, et al. 2008:64).

Hattingh (2009) supports the cost effectiveness of the abovementioned TMP programme, and additionally emphasises the importance of an in–context and assisted learning approach. She gives an overview of this mentoring initiative, also known as the 'mentorship by master mathematics teachers' programme. This mentoring initiative targeted experienced teachers who had been teaching mathematics for years in township schools, but without the appropriate qualifications. Hattingh (2009:341) suggests that a pure workshop approach lacks in-context follow up support and reflection on newly acquired innovations, and recommends that in-service programmes need to be school based, and need to address the learning needs as identified by teachers themselves, and, should be subject focused. She argues, 'Teachers are not merely cast into the role of a technical-rationalist to receive knowledge; but instead, they are perceived as knowledge producers through joint reflection with expert mentors' (Hattingh, 2009:341). Ndlovu (2011) supports the university - school partnership as proposed by Fricke, et al. (2008) and Hattingh (2009). Ndlovu (2011) additionally argues 'that by sharing knowledge and resources at a time when little significant additional support or funding is available, a university, and its partnership schools may indeed be each other's best resource (Ndlovu, 2011). This is especially relevant in the context of rural schools in developing countries.

Luneta (2006) conducted a study in South Africa, in an action research framework on the reflections of mentor teachers as they were trained to supervise student teachers of mathematics. The purpose of his study was to determine why these mentor teachers in mathematics, regarded the mentorship relationship with student teachers as professional development. From Luneta's findings, it became clear that the mentors experienced the mentorship training as beneficial to their own personal and professional development. The participants indicated that their energy for teaching was renewed, as their classroom management improved, and their general instructional knowledge increased. The mentor teachers benefitted as they

critically reflected on their own practice and in the process developed new knowledge directly related to their work in the classroom (Luneta, 2006).

This literature reviewed on mentoring points to my argument that practicing teachers' perspectives on their experiences with mentorship can help to develop the teacher professional development experience. University based programs and school districts that work together to design and implement a mentorship model as part of the teacher development program value or 'honour' the knowledge and expertise of the mentor science teacher and establish a strong, practice focused environment for in-service teachers.

2.6 CONCLUDING DISCUSSION

There is a large body of research with relevance to the study in the field of teacher professional development. The literature review points to various aspects of teacher professional development such as contexts, collaborative practices, and teacher beliefs found amongst structures and systems that sustain teacher growth and as a result, positive student outcomes.

There is general agreement on the fact that teacher development programmes should be on-site, focused on individual teacher needs and build on current teacher practice. Intervention programmes should ‘encompass both content knowledge and teaching strategies and should entail regular follow-up to ensure that there has been successful implementation of new strategies’ (Fricke, et al. 2008:75).Most of the literature studied, emphasise the importance of forms of professional development for teachers that are built on on-site collaboration, collegial interactions, and the fostering of relationships.

This study aims to present a reciprocal model of mentoring as an alternative approach to more traditional professional development models for in-service science teachers. Within the body of mentoring research, it is understood that the mentor-mentee relationship is mutually beneficial, whether the mentee is a novice or experienced teacher. Mentoring is widely perceived to be a professional

development strategy that sustains 'long-term, on-going professional learning embedded within the school culture' (Loucks-Horsley, et al. 2003:219).

Effective mentoring practices were reviewed and its impact on classroom practice and results, in especially subject areas such as mathematics and science reveals a contribution to improve the quality of professional growth. Effective mentoring not only assist novice teachers through their induction phase, but also provide a sense of renewal for experienced teachers, and in the process create a local resource for continuous professional development (Little, 1990).

The goals of many of the teacher support programmes, is to improve educators' attitude to maths and science, to promote understanding and application of the techniques of teaching and learning, and to assist teachers to develop strategies to enhance their knowledge and skills. Educators should therefore be motivated to restore their confidence and their belief in teaching, in order to bring about improved maths and science in schools.

Reviewing literature about mentoring and professional development, and field experiences, shed light on the fact that there is more recent, yet still limited research from the perspective of in-service teachers who participate in mentoring experiences with expert teachers. Understanding how in-service science teachers, involved with professional development intervention programmes, perceive the experience and how they view the mentoring process will add to the limited perspective and support the suggested strategies for changing existing classroom practices.

The present study investigates the perceptions on mentoring held by mentees in a university-initiated mentoring intervention (ILLS Project).The conceptualisations of mentoring derived from early and current mentoring literature provided this study with a deeper understanding of the mentee teachers' perceptions of mentoring and its influence on classroom practices.

The next chapter contains an overview of the research methodology, including the research design and data collection methods used to explore the way in which in-

service natural science teachers perceive the mentoring initiative in the ILLS project.

CHAPTER 3
METHODOLOGY

3.1 INTRODUCTION

This chapter describes and justifies the research methodology chosen to answer the major research question:

What are the experiences and understandings of primary school natural science teachers as mentees in a mentoring relationship, which forms part of a professional development programme in Mpumalanga?

To explore and develop an understanding of these experienced teachers' perspectives of being mentored and how they experienced the Continuous Professional Development (CPD) intervention, I had to choose a suitable research approach which led to answers to the research questions and realisation of the aims and objectives of this study. I am specifically interested in how the mentees make sense of the activities and events in this developmental programme and how their understanding of it influences their behaviour.

Accordingly, in this chapter the research approach for the study is discussed first, after which I elaborate on the research design and elucidate on the nature of the single case study design as well as the motivations for employing this particular methodology. In addition, I discuss the research instruments and analysis procedures. Issues such as validity and reliability as well as the ethical considerations are also explained.

3.2 RESEARCH APPROACH

This research is essentially qualitative in nature.

Qualitative research is a situated activity where researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them (Denzin & Lincoln, 2005:3).

In this study, I tried to grasp the experiences of a group of seven natural science teacher mentees from four different primary schools and one mentor teacher, by exploring, reflecting, and describing how the mentees made sense of this non-traditional mentoring relationship. I sought to understand how the mentoring relationship, structured within the ILLS project, influenced their personal and professional development, if at all.

I was particularly interested in trying to interpret and make sense of this unique mentoring relationship in the mentee teachers' "natural world". McMillan and Schumacher (2006) explain that a qualitative research inquiry is one in which researchers collect data in face-to-face situations by interacting with selected individuals, in their settings (e.g. field studies); and in which the researcher describes and analyses peoples' individual and collective social actions, beliefs, thoughts and perceptions (McMillan & Schumacher, 2006:315). The face-to-face meetings with this group of seven experienced natural science teachers to explore their perspectives, actions and beliefs, directly aligned with a qualitative approach.

The main objectives of the study were to explore and describe the meanings ascribed by the mentees, as they engaged in lesson planning, lesson presentation, and reflection on their instructional practices. These activities took place within a structured professional development programme (the ILLS project), with an expert science teacher (the mentor), Mr William, who guided them through the mentoring process. To obtain an in-depth understanding of the mentees' realities and the sense they made of the mentoring relationship, I opted for a qualitative rather than quantitative approach in this study.

3.3 RESEARCH DESIGN

According to Creswell (2007:341), *research design* refers to the entire process of research, based on certain design principles.

As mentioned in chapter 1, I opted for the case study approach as my primary interest is in understanding mentorship as a continuous professional development tool for in-service teachers.

The following section provides the background to and reasons for the selection of the single case study method while designing the research process.

3.3.1 Case study

Merriam (1998) argues that a case study method is particularly appropriate, for exploring a specific phenomenon. For this study, I was more interested in understanding teacher mentoring as a phenomenon between experienced science educators (mentees) and their mentor.

According to Goddard and Melville (2007:9), a *case study* design can be used in research in which a specific situation is studied either to see if it gives rise to any general theories, or to see if existing general theories are borne out by the specific situation. It was therefore appropriate in this research to use a case study design to explore and explain mentoring and professional development as it occurs in the context of natural science teaching and learning. I designed and planned this study in order for it to lead to further possible inquiries and aimed to provide some detailed descriptions, which, in general, may contribute to knowledge regarding mentoring as a professional development tool in subject areas other than natural science.

Originally, I planned to include multiple cases in the study, to avoid limitations in generalization. However, due to a dispute between the district officials and the teachers union at the time of the research, my access was reduced to one case of a science mentor with his mentees. A positive side effect was that a single case study allowed for deeper exploration into the experiences of the science teachers and in hindsight turned out to be a good decision.

Consistent with a single case study design, I explored the mentoring experiences of only seven natural science teachers with one science mentor teacher, in one district

in Mpumalanga (one bounded system), over a period of ten months (time). Detailed, in-depth data involving multiple sources of information, such as interviews with the district officials, programme implementers (ILLS Project), school leaders and teachers, enabled me to understand and describe the mentoring phenomenon as a tool for the professional development of experienced teachers (Creswell, 2007).

I began this case study with a thorough *literature review* and document analysis on mentoring relationships, focusing not only on the mentoring of student teachers but also on the mentoring of experienced, in-service teachers. I also reviewed literature on different professional development strategies employed to improve classroom practice, including the Japanese Lesson Study (Jugyou Kenkyu). The Lesson Study approach provided the structure for the activities that were planned by the mentor teacher in this research and enabled me to conduct an exploratory and descriptive case study built on the experiences and perceptions of mentees in this structured mentoring relationship of a lesson study.

My study followed the implementation of the ILLS project in April 2011.

3.4 DATA COLLECTION

The choice of data collection procedures in this study was guided by the research questions and the single case study design. The case study typically combines data collection methods such as archives (documents), interviews, and observations (Yin, 2003). I chose a combination of observations, semi-structured interviews, and document analysis, with the main emphasis on individual interviews with the selected participants. In order to identify the participants for the observations and interviews I needed to explore different sampling procedures.

3.4.1 Sampling procedures

I chose purposeful sampling to obtain detailed knowledge of the teachers' experiences on the phenomenon of mentoring. The participants in this study had to be experienced, in-service primary school teachers who were involved in the

mentoring project. Creswell defines purposeful sampling as a method of intentionally selecting participants based on their experience with the topic under study, the 'inquirer selects individuals and sites for study because they can purposefully inform an understanding of the research problem and central phenomenon in the study' (Creswell, 2007:125).

The project initiators, viz. the UNISA School of Education was responsible for the first sample selection. The project was launched in April 2011 in the Ehlanzeni district of Mpumalanga. The project involved a year-long continuous professional development intervention for science and mathematics teachers from 52 selected primary and intermediate schools. The project's aim was to help teachers (mentees) change and improve their classroom practice in the critical subject areas, such as mathematics and science. The initial site selection in this study was therefore pre-determined by the location of the project in the one district of Mpumalanga.

District officials in Ehlanzeni were responsible for the second sample selection. The officials selected the mentor teachers from the nominated schools, based on performance. That is, those teachers whose students performed well on the national and provincial examinations were selected as mentors. The mentors underwent training in the *context of practise* at a local level, on the Japanese lesson study approach. A *cluster approach* in which small groups of teachers worked together collaboratively was then adopted for the teacher mentoring. This CPD programme therefore provided a structure which enabled the mentor teachers to establish mentoring relationships with the selected teachers (mentees).

The trained mentor teachers made the third purposeful sampling decision. It was the mentor teachers who had to select their own mentees – at least four mentees – preferably two from their own schools and two from neighbouring schools. This constituted the cluster– different mentees under one mentor. The ILLS project required the mentor to arrange meetings for lesson-planning, implementation of lessons, and reflection.

For this study, I selected seven primary school teachers from a single cluster, and one mentor teacher who worked at a secondary school in the same area.

Both the project coordinators of the ILLS project and two of the district officials acted as key informants in providing me with information for the selection of participants. I began the sampling procedure with the selection of the mentor teacher. This sampling of participants necessitated that I had to identify a single group based on prior information from all the relevant role-players such as the district officials, subject advisors, the coordinators of the ILLS project and the selected group of trained mentors. Based on the recommendations of these knowledgeable experts, I identified mentor teachers and arranged meetings with the district officials responsible for mathematics and science development programmes. During the sampling of a specific group of teachers, I also had to consider issues of access to the school sites and people. I worked with teachers from three rural schools and one township school in the Ehlanzeni district. I had to first obtain written permission to conduct the research (see Appendix 1).

McMillan and Schumacher (2006) describe *network sampling* as a type of purposeful sampling strategy. Network sampling is 'a strategy in which each successive participant or group is named by a preceding group or individual' (2006:321). I employed network sampling as a strategy in selecting the mentees; the mentor teacher initially selected some of the mentees in this study. These mentees in turn, informed some of their colleagues of the ILLS project, i.e. they participated in the programme by "word of mouth". This cluster was unusual in that it had far more than the required number of mentees to one mentor. Mr William, the mentor teacher, provided me with a list of mentees. I had a choice between twenty one mentee teachers, which made the selection process for a qualitative single case study more challenging. The aim of the study was to obtain an in- depth understanding of the perceptions of the mentee teachers towards mentoring as a tool to improve their classroom practices. Based on observations and recommendations by the mentor teacher, I then selected seven mentees from four neighbouring schools in the Ehlanzeni district, to observe and interview them over a period of ten months; keeping time and cost limitations in mind. If at times it proved

logistically impossible to interview the participants, I overcame this impediment by utilizing voice recordings, telephonic interviews, fax- and e-mail correspondence.

I made use of a template (Table 3.1, below) to obtain important background information on the participants, to understand the context of the study, and to determine how well it aligns with their own contexts. (See section 4.2 for a detailed profile of the participants)

Table 3.1: Template used for the participating primary school natural science teachers

School	Area	Name of Teacher	Sex	Subjects & Grade(s) Taught	Qualifications & Post Level (PL)	Teaching experience (Years)

3.4.2 The role of the researcher

Unlike quantitative techniques where objectivity is the goal, qualitative studies also accept researcher subjectivity as something which cannot be eliminated. In qualitative research, the role of the researcher as the "research instrument" in the data gathering process is critical (Maree, et al. 2010; Leedy & Ormrod, 2005). In this study, the researcher served as an instrument, in the sense that responses of the participants were analysed and interpreted by the researcher herself. In order to limit researcher subjectivity, and to establish research credibility, I chose to use the strategy of reflexivity. McMillan and Schumacher (2006:327) describe reflexivity as a rigorous examination of one's personal and theoretical commitments to see how they serve as resources for relating to participants and suggest personal self-awareness, or "let the participants speak for themselves" and being accurate in seeking the truth.

According to McMillan and Schumacher (2006) the researcher's role in qualitative studies may vary with the degree of interaction and intensity. In this study, I chose to establish the role of non-participant observer during the planning and discussion meetings held between the mentor and his mentees. This role was selected to limit the way my presence might have affected the social system and the persons under study. On the other hand, I had to establish a more interactive and intensive role as a researcher when I interviewed each of the mentee teachers in the study.

Based on the variation in the role of the researcher as described, I employed a combination of particular data collection strategies such as limited participation, field observation, interviewing, and artefact collection in this case study.

3.4.3 Research instruments and data collection strategies

Multiple forms of data collection such as observations, interviews, written documents, field notes, digital voice recordings, and electronic documents (e.g. e-mails) were employed in this study to answer the research questions. Qualitative researchers, such as Creswell (2007), Yin (2010), and Merriam (2002), recommend this multiple data collection strategy because it enhances the validity and reliability of the study through the process of triangulation.

3.4.3.1 Pilot study

In order to obtain adequate skills as a confident researcher, I studied relevant publications and consulted with my supervisor, regarding a pilot study in the same school district as the one the final study was conducted in.

I conducted a pilot study, with participants similar to those in the identified sample – which enabled me to evaluate the types of issues relating to data collection – such as entry and access, the type of information collected and potential ethical issues (Creswell, 2007).

I started the fieldwork with a pilot study, where I did my observations, informal interviews, and took field notes in a group of primary school mathematics teachers,

working together with a trained mentor in the same school district as the natural science teachers. This pilot study with the mathematics teachers assisted me in the development of the interview protocol and formulation of the questions, which I later used in the semi-structured interviews with the natural science teachers. I included the mathematics teachers in the pilot study as they also participated in the ILLS Project, within the same context and background as the natural science teachers. They were the first to set up their cluster and start the mentoring activities. The cluster of mathematics teachers provided me with rich data on the Japanese lesson study method. I conducted the pilot study to test the questions for the interview guide, also to establish a pattern of communication with the participants, and to gain insight into the shape of the final study.

I observed teachers' planning meetings, classroom implementation and reflection meetings. I also conducted informal interviews with the mentor teacher, three of the mentees, and the headmaster of a remote rural school in the Ehlanzeni district. From these observations and informal interviews, I gathered valuable information on the structure and questions prepared for the interviews with the natural science mentees.

I chose *observational fieldwork, semi-structured interviews*, and *documents* as the major research instruments and compiled *field notes* throughout the empirical study to interpret the data collected.

Although the focus of this study was to obtain an understanding of the perceptions of the mentees, and how they related to this mentoring relationship, I had to employ the mentor's input as background information when I did document analysis before I could start with the sampling procedures in selecting the mentees, and the actual fieldwork for the main study.

3.4.3.2 Observational fieldwork

According to McMillan and Schumacher (2006:207), the observational method relies on a researcher's "seeing and hearing" things and recording these observations, rather than relying on subjects' self-reports responses to questions or

statements. I therefore attended meetings between the mentor and his group of mentees and based the observations on predetermined categories of behaviour that I would like to observe (structured observation). I particularly focused on what the participants' goals were, how they negotiated their mentoring needs, how they defined instructional improvement as well as on how they reached their outcomes. I also focused on the extent to which they managed to balance their emotional needs and instructional goals. I recorded these observations as accurate as possible, by making use of field -notes and digital voice recordings to ensure that both verbal and non-verbal behaviour could be recorded and studied. The field notes I made were short descriptions of basic actions observed, objective with no self-reflective notes (anecdotal records), and more detailed, continuous accounts of what was observed in context (running records), in accordance with the suggestions of Nieuwenhuis in Maree, et al. (2010). These field notes were analysed immediately after the observations had been made during the pilot study and during the final study. The presence of video cameras made some of the participants feel uncomfortable. It was therefore important to experiment with various data recording strategies (field notes, audiotapes,) before the final study could commence; therefore, I decided to use a small digital voice recorder, which enabled me to capture verbal data. The field notes and voice recorder allowed me to limit the shortcoming in observations: the researcher may unconsciously influence what people say and do with his/her presence (Maree, et al. 2010).

As a non-participant observer during the planning meetings and the reflection meetings between the mentor and the group of mentees, I could focus more on the participants' behaviour and interactions without getting involved in the discussions. Yin (2003), McMillan and Schumacher (2006) and Creswell (2007) emphasise the importance of maintaining one's distance in direct observations as it is the least obstructive form of observation. Although I needed to become part of the situation, as an observer, I maintained my distance to enable me to focus on patterns of behaviour to understand the assumptions, values, and beliefs of the participants, and to make sense of the social dynamics of the mentoring relationship.

Another advantage of using observation as a data collecting method in this qualitative study was its flexibility: 'the researcher can take advantage of

unforeseen data sources as they surface' (Leedy & Ormrod, 2005:145). At this point, it is important to mention that these observations were not the primary data collection strategy in the study. However, the unanticipated data I collected during the observational fieldwork for example, the differences in teacher beliefs, and attitudes about teaching and learning, added to a better understanding of the experiences of the natural science teachers in the mentoring relationship.

The observational data in this study therefore represented a first-hand encounter with the topic of interest, the mentoring experience (Merriam, 2002). Used in conjunction with semi -structured interviews and document analysis in this study, these observations offered me an opportunity to triangulate the data to better understand perspectives presented during interviews, and to gain a 'holistic interpretation of the phenomenon being investigated' (Merriam, 1998:11). The observation process, combined with semi-structured interviews, and document analysis therefore provided me with an opportunity to enhance the validity of this study.

3.4.3.3 Semi-structured interviews

The primary source of data in this study came from the responses of the seven mentees, from face-to-face semi-structured interviews designed to elicit the mentees' lived experiences. I chose individual interviews as a method of data gathering since it yielded a great deal of useful information related to peoples' beliefs and perspectives about the mentoring process, their feelings, present and past behaviours, and conscious reasons for their actions or feelings towards the implementation of this professional development intervention (the ILLS Project).

Before I could begin with these interviews, I tried to build a relationship of trust between the interviewee, and myself, by establishing a procedure of explaining the key features of the research project and outlining the broad issues that I intended to address in the interview as well as the amount of time needed to complete the interview. The interviewees were also asked to sign a consent form to participate in the study before I started to interview them (see Appendix 2). Ethical considerations are discussed in detail in section 3.7.

The interviews were designed around a list of open-ended questions, the interview protocol (see Appendix 4) that explored different components of the mentoring experience, such as background information, beliefs concerning teaching and learning, and how they made sense of the activities and relationship with their mentor. The open-ended nature of the semi-structured interviews acknowledged that each individual defines his or her experience in a unique way, and allows the interviewees to answer from their own frame of reference and describe things in their own words (Merriam, 1998).

In line with the explorative nature of the study, the goal of the interviews was to see the research topic, namely mentorship, from the perspective of the interviewee, and to understand why he or she came to have this particular perspective. Patton (2002) remarks that the purpose of interviewing is to allow the researcher to enter the other person's perspective. To meet this goal, I have redesigned some of the questions during the process of research to reflect and to establish a better understanding of the experiences of the participants. In addition, the pilot study helped me to rephrase and change the order of the questions.

The interviews with the mentees were all voice-recorded, and I could thus concentrate fully on asking questions and following up on the interviewees' answers.

3.4.3.4 Documents

Merriam (2002:13) advocates that the strength of documents as a data source lies with the fact that they already exist in the situation, as they do not intrude upon or alter the setting in ways that the presence of the investigator might. Due to time constraints and insufficient document keeping by participants, it was impossible to collect and analyse all the documentation concerning the ILLS project, and thus I had to make a selection.

I chose to collect and analyse the following documents:

- minutes from the participants' planning meetings, provided by the mentor teacher
- pre-observational templates, observational templates and post-observational templates, which were completed by the participants during their meetings

The choice of documents was guided by the research question of this study and was particularly helpful in a number of ways. For example, they were used as input in the interview guide because the various activities and reflections of the participants were noted down.

All the data I collected was stored manually in separate files as well as electronically on multiple hard drives.

3.5 DATA ANALYSIS

McMillan and Schumacher (2006:364) describes qualitative data analysis as primarily an inductive process of organising data into categories and identifying patterns (i.e., relationships) among the categories, seeking for plausible explanations. By inductively analysing the data obtained through the observation field notes and the semi-structured interviews, I was able to compare, contrast and also identify similarities between the responses of the mentees. I therefore examined the qualitative data by working inductively from particulars (raw data) to more general perspectives, which are called themes or categories (Creswell, 2007).

I also employed interim analysis – a process that occurs during data collection to keep track of changes in data collection strategies and evolving ideas by writing observational field notes and comments on the interview guides to reflect upon and writing descriptive summaries of the interviews directly after the field visits (McMillan & Schumacher, 2006).The analysing of qualitative data is usually based on an interpretive philosophy that is aimed at examining meaningful and symbolic content of the acquired data. For this study, I tried to establish how participants make meaning of a mentoring relationship by analysing their perceptions, attitudes, understanding, knowledge, values, feelings and experiences in an attempt to

approximate their construction of the mentorship phenomenon (MacMillan & Schumacher, 2006; Denzin & Lincoln, 1994).

An *analysis of the data* in this study was obtained through multiple sources of information such as observation field notes, semi-structured interviews, and documents.

Field notes were kept of every observation and all the information collected during the study, participants' comments during and after the interviews, activities, interactions, conversations, and personal preliminary interpretations (Merriam, 1998).

I listened to the recordings of the interviews, made notes and transcribed each interview verbatim into a typed text and documents of relevance to this study were also analysed throughout the empirical investigation (see section 3.5).

Creswell (2007) and Stake (1995) provide valuable guidelines for organising and analysing the collected data. I used *categorical aggregation* in which issue relevance emerged and *direct interpretation* where I looked at single instances to draw meaning from and established *patterns* between categories. In the final phase, I tried to apply generalisations to similar studies and provided a detailed description of the case (see section 4.2). In the final interpretive phase of this study, I gave an account of the meaning of the mentorship-based themes, which surfaced from this study. An overall portrait of this qualitative case study was constructed in the form of a research report and conclusions were drawn that may have implications beyond this specific case that has been studied (see Chapter 5).

In the following paragraphs, I will focus on the validity and reliability strategies I applied in this study.

3.6 VALIDITY AND RELIABILITY

In this research, I used a combination of possible strategies to enhance design *validity* such as prolonged fieldwork, multi-method strategies, triangulation,

participants' verbatim language, low-inference description, mechanically recorded data, and member checking participant review (McMillan & Schumacher 2006; Creswell, 2007; Merriam, 1998). Additionally, I conducted a pilot study with mathematics teachers who also participated in the ILLS Project. I then used the information from the pilot study to enhance the validity of the study. For example, I made several necessary changes to the interview protocol to ensure content validity (see section3.6).

3.6.1 Prolonged fieldwork

In this study, I allowed interim data analysis and corroboration to ensure a match between my findings and participant reality, by communicating with the participants and the research team at the university that was involved in the mentoring project. This was done by means of e-mails, telephonic conversations, informal visits, and faxes in order to ensure prolonged fieldwork. As the data collection process took place in the Ehlanzeni Region, Mpumalanga, I had to make use of multiple data sources as I travelled frequently from my home in the Gauteng province.

3.6.2 Triangulation

I also made use of triangulation – comparing multiple data sources in search of common themes – to support the validity of my findings as described by Leedy and Ormrod (2005). Four face-to-face meetings, telephonic interviews and conversations with all the role players involved, in-depth semi-structured interviews with the participants, were digitally recorded and noted, observations during the meetings with their mentor were noted and several documents concerning the ILLS project as well as minutes of previous meetings were analysed. These multiple sources of data made it possible for me to compare and validate the data, which I collected in search of commonalities. Typically, according to Creswell (2007:208), this process of triangulation involves corroborating evidence from different sources to shed light on a perspective, of which in the focus in this study is on the perspectives of the mentees.

3.6.3 Internal validity

Sometimes the participants in a research study change their behaviour simply because they know that they are in a research study – an effect known as the Hawthorne effect or reactivity (Leedy & Ormrod 2005; McMillan & Schumacher, 2006). This could obstruct the internal validity of this research study and I had to remain conscious of the fact that I had to eliminate other possible explanations for the results obtained such as anxiety or fear as described by Creswell (2007:207). It was therefore important for me to establish a relationship with the mentees and the mentor built on trust; for example to learn to understand their culture and the school settings by visiting or phoning them on a regular base and providing refreshments during all the meetings. On a more professional level, I had to respect the fact that these mentees are experienced teachers and not novices in the field of education.

3.6.4 Participant verbatim language

Unfortunately, none of the interviews I conducted was in the participants' mother tongue but in their language of instruction, which was English. In presenting quality results of this case study, I had to digitally record and transcribe the semi-structured interviews in the participants' own words. The interviews were phrased on the level of the informant's language and not in abstract social science terms and the use of direct quotations from the data illustrated the participants' meanings and thus ensured validity (McMillan & Schumacher, 2006).

3.6.5 Low-inference descriptors

McMillan and Schumacher (2006:325) define low-inference descriptors as concrete, precise descriptions from field notes and interview elaborations and the principal method for identifying patterns in the data. In this study I recorded the participants' exact words, rather than reconstructing the meaning from own perspectives. The use of a digital voice recorder during the interviews supported the low-inference strategy to enhance the validity of this study.

3.6.6 Member checking participant review

I have employed the strategies of member checking and respondent validation to verify my understanding of this unique mentoring relationship. The teachers received an overview of what I have observed during the mentoring activities and interviews to evaluate if they agree with my conclusions. This was also important to improve the trustworthiness of this study. Important feedback from the ILLS Project researchers and the mentor teacher was also obtained.

3.6.7 Rich thick descriptions

I described the background information and the settings, in which the mentees teach, in sufficiently rich "thick" detail that allows readers to draw their own conclusions from the data presented. These detailed descriptions serve to understand the extent to which the findings may be generalised to coincide with their setting based on the similarities between the settings (Merriam, 1998). (See section 4.2).

3.6.8 Reliability

Reliability refers to the consistency of measurement – the extent to which the results are similar over different forms of the same instrument or occasions of data collection, according to McMillan and Schumacher (2006:183). I have consistently utilised the instruments of observation and semi-structured interviews for this study for the different mentees to increase the reliability of the results of this study.

3.7 ETHICAL CONSIDERATIONS

Ethics generally are considered to deal with beliefs about what is right or wrong, proper or improper, good or bad according to MacMillan and Schumacher (2006). Naturally, there is some disagreement about how to define what is ethically correct in research, nevertheless most relevant for my research are the ethical principles published by the American Educational Research Association as cited in McMillan and Schumacher (2006:142):

1. The primary investigator of a study is responsible for the ethical standards to which the study adheres.
2. The investigator should inform the subjects of all aspects of the research.
3. The investigator should be as open and honest with the subjects as possible.
4. Subjects must be protected from physical and mental discomfort, harm, and danger.
5. Informed consent from the subjects must be secured by the investigator before they participate in the research
6. Information obtained about the subjects must be held confidential
7. For research conducted through an institution, such as a university or school system, approval for conducting the research should be obtained from the institution before any data are collected.
8. The investigator has a responsibility to consider potential misinterpretations and misuses of the research.
9. The investigator has the responsibility of recognising when potential benefits have been withheld from a control group.
10. The investigator should provide subjects with the opportunity to receive the results of the study in which they are participating.

Following the above mentioned ethical guidelines, as the primary investigator, I first had to get the permission of the Regional Director of the Ehlanzeni district prior to entering the research field (see Appendix 1). I also had to request permission from the school principals involved, explaining the aim and purpose of the research, taking into consideration that the school's programme would not be interrupted (see Appendix 3). I also familiarised myself with the ethics policy of the relevant schools I visited.

With regard to the abovementioned ethical issues, I informed the mentor teacher and the mentee teachers of my role during the research process, which was primarily to observe and interview them during the mentoring process. All aspects e.g. the specific dates for my visits in Mpumalanga were discussed and confirmed, the reason for my research were discussed in broad terms with all the participants.

For the purpose of this study it was not necessary to withhold information as full disclosure would not seriously have affected the validity of the results.

I obtained voluntary participation and informed consent from all the participants before the commencement of the study. This informed consent assured the participants that they were free to withdraw at any stage during the study without the fear of negative consequences. Procedures, risks, and benefits were explained to all the participants before any data was collected. I also assured the participants of the protection of their privacy and confidentiality (see Appendix 2).

Well-planned interviews and visits were organised in order to protect the participants from unnecessary stress, embarrassment or loss of self–esteem, and I reported my findings to professional colleagues in a complete and honest fashion to add to the ethics protocol as directed by Leedy and Ormrod (2005).

3.8 SUMMARY

This chapter provided information regarding the research design and methods utilised for this study. It also addressed issues about the sample, instrumentation, data collection and analysis procedures. An account of the ethical issues was given and strategies taken to ensure validity and reliability were also discussed.

In chapter four, the findings of the research and the analysis of these findings will be presented.

CHAPTER 4
FINDINGS AND DISCUSSION

4.1 INTRODUCTION

The major research question of this study was '*What are the experiences of in-service primary school natural science teachers as mentees in a mentoring relationship, which forms part of a professional development programme in Mpumalanga?'*Accordingly, the aim of the study was to explore, describe, and interpret the experiences of selected in-service primary school natural science teachers in a mentoring relationship to understand the complexity of this professional development intervention.

The previous chapter explained the way in which data was gathered. In this chapter, the findings of this qualitative study are presented and discussed by using inductive analysis. Creswell (2007) described Inductive analysis as working from particulars (raw data) to more general perspectives, which are called themes, dimensions, categories, or codes.

True to the nature of a case study, its analysis consists of making a detailed description of the case and its setting. I followed the forms of data analysis and interpretation in case study research as advocated by Stake (1995) as cited in Creswell (2007:163):

- *Categorical aggregation* : the researcher seeks a collection of instances from the data in which issue - relevance will emerge
- *Direct interpretation:* the researcher looks at a single instance and draws meaning from it without looking for multiple instances. It is a process of pulling the data apart and putting them back together in more meaningful ways
- *Patterns:* the researcher establishes patterns and looks for a correspondence between two or more categories.

- *Naturalistic generalizations:* the final phase in which the researcher develops generalizations that people can learn from the case either for themselves, or to apply to a population of cases, from analysing the data.

Creswell (2007) adds another phase to these analysis steps:

- *Description of the case:* A detailed view of aspects about the case – the "facts", in which the "major role players", sites, and activities, are described (Creswell, 2007).

In this study I analysed the findings according to the aforementioned structure by starting to categorise and organise the data into themes by making use of triangulation; I compared and analysed data which was collected through the use of multiple strategies such as field notes from observations of the lesson study process, semi-structured interviews with the mentees and document analysis of minutes of previous meetings. This analysis method also enabled me to find consistencies in the data I compared and I was able to see whether the same patterns keep recurring. It also serves as a cross validation among data sources; data collection strategies, time periods (ten months) and theoretical schemes as McMillan and Schumacher (2006), emphasise.

One of the research objectives of this study is to *describe* the experiences of the natural science mentee teachers who participated in the ILLS project. The transcriptions of at least seven semi-structured interviews with primary school natural science teachers made it possible to describe their experiences in their own words. In a composite manner, I could highlight significant statements, sentences, or quotes, which provided me with an understanding of how they experienced the process of mentorship as they were exposed to during the ILLS project (see chapter 2).

4.2 PROFILE OF THE PARTICIPANTS

4.2.1 Participants in the study

Tables 4.1 and 4.2 represent the profiles of the participants in a mentoring relationship between natural science teachers whose experiences are the main focus of this study.

Table 4.1: Participating natural science teacher as a *mentor* for primary school natural science teachers

School	Area	Name of Teacher	Sex	Subjects & Grade(s) Taught	Qualifications & Post level (PL)	Teaching Experience (Years)
Secondary	White River, Mpumalanga	Mr. William	M	Physical Science and Life Science Gr.8 – 12	STD HED PL 1	26

Table 4.2: Participating primary school natural science teachers as *mentees*

School	Area	Name of Teacher	Sex	Subjects & Grade(s) Taught	Qualifications & Post Level (PL)	Teaching experience (Years)
Primary	Rural Area	Mac	M	Natural Science Gr 9	PTD PL 3	32
Primary	Rural Area	Zinzi	F	Natural Science Gr 4,5,6 PL 2	PTD ACE BED	21

School	Area	Name of Teacher	Sex	Subjects & Grade(s) Taught	Qualifications & Post Level (PL)	Teaching experience (Years)
Primary	White River, Mpumalanga	Amos	M	Natural Science Gr 7 PL 1	PTD	18
Primary	White River, Mpumalanga	Hope	F	Natural Science Gr 4&5 PL 2	PTD HED	20
Primary Ex-Model-C school	Suburb	Sheryl	F	Natural Science Gr 4 & 6 PL 1	D.E.III.J.JP.	26
Primary Ex-Model-C school	Suburb	Grace	F	Natural Science Gr 6 PL 1	PTD HED	33
Primary	Rural	Rachel	F	Natural Science Gr 4 PL 1	PTD HED	21

The sampled teachers' qualifications indicate that most of the teachers have at least a three or four year diploma in teaching and an average primary school teaching experience of more than twenty years. I noticed that the mentor teacher's academic qualifications were not the highest of the participants. His teaching experience in terms of years was also not the most advanced of the participants. The reason why I mentioned the qualifications or experience in teaching is that this may influence the perceptions of the participants regarding their pedagogical and subject content knowledge and the way in which they are willing to implement change in their classroom practice (see section 2.4.3).

In terms of the number of years of teaching experience it is evident that all of the participants are veteran teachers and that some of them are older than the mentor teacher, Mr William.

It was also interesting to see that three of the mentees were in managerial positions, such as post level 2, also known as head of department (HOD).One of the mentee educators is also on post level 3, which designates him as a deputy principal. Post level 1 teachers can either be junior or senior teachers who have not applied or been promoted to post level 2.The mentor teacher however is not in a school leadership position, but his proven high student achievement in physical science in a secondary school puts him in a position to be regarded as a subject "expert".

The context of the two mentees in a suburb of White River was a little different in that their learners were more privileged than the learners in the rural schools and they had slightly better stocked laboratories and a better infrastructure at their disposal. However, they share the common challenge of teachers who are teaching natural science in a reformed curriculum.

4.3 CONTEXTS

All the mentors and mentees were from schools in rural areas, with the exception of two mentees from a school in a suburb in White River.

The infrastructure of the selected schools was generally poor with regards to resources such as well-stocked libraries and laboratories. Gathering from data obtained through the interviews and observations it is clear that these schools are situated in poverty-stricken areas, and as a result teachers and learners are deprived of access to resources such as computers, relevant study material and qualified natural science teachers.

4.4 FINDINGS

Certain repetitive themes and sub-themes had been identified during the data collection and analysis phases of this case study.

Figure 4.1 presents the themes and the various sub-themes that were derived from the semi-structured interviews with the natural science mentees as well as a document analysis of their planning (pre-observation), observation- and reflection (post-observation)meetings.

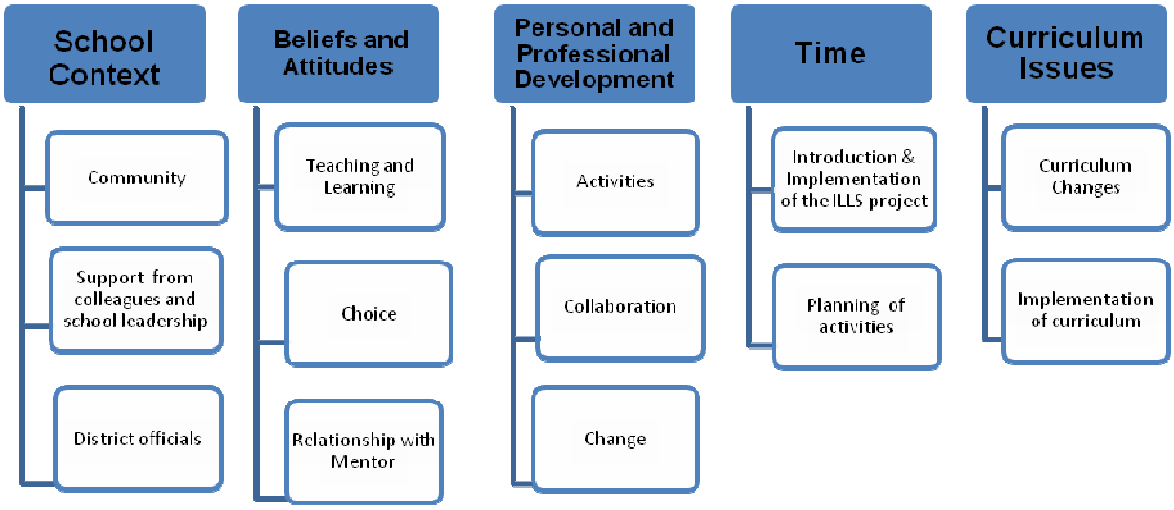

Figure 4.1: Themes And Subthemes Related To The Experiences Of The Mentees During A Mentoring Process

4.5 THEMES AND SUBTHEMES

In the following sections, I will discuss each major theme and its sub-themes in the order in which they appear in Figure 4.1.In the discussion of each finding, I will use quotes from the various interviews to substantiate the discussion as well as to compare it with the relevant literature on mentoring and learning experiences. I also linked the theoretical models as described in chapter 2, such as Bandura's social cognitive theory and the interconnected model of professional development as analytical tools to support the findings of this case study.

As this study contains information about the actions and attitudes of individual participants in a mentoring relationship, I include narrative information about one or more of the individuals to report on their perceptions, beliefs or behaviours (Yin, 2010) and also descriptive reports and quotes from the participants to substantiate the findings of this study.

4.5.1 School context

One of the essential findings in this study was the role that school context played in determining an understanding of the experiences of the teachers during this mentorship programme. For example, some of the teachers that I interviewed find the context of their schools challenging while others experience their context as supportive.

4.5.1.1 Community

Many of the interviewees found parent involvement in their professional development particularly challenging since they are teaching in communities with many orphans and a high poverty level. Mac, for example highlighted the difficulty of involving parents in his quest to improve his classroom practice as follows:

> *If there is no support, it becomes difficult. So, that is what we experience, especially in rural areas like the one where we are. They [the parents] don't take this education seriously. They put everything to the teacher, and it really becomes a problem.*

Voulalas and Sharpe (2004) confirm that teachers experience the lack of the involvement of the community as a barrier in their professional and personal development. Obstacles regarding the transformation process vary from school to school, however 'traditional school cultures and structures, lack of necessary time, and the difficulty of obtaining support from staff and parents appear to be the main barriers to the change process'(Voulalas & Sharpe, 2004:194).

Sheryl, on the other hand, was positive about the support from the community; she is a teacher from a school situated in a suburb and not a rural area:

> *There is a lot of support here, even the community they like the school. They like the school very much, even the parents they like the school very much, that's why we'll find. During the course of the year, everyone wants to bring his or her child here at this school. Even the teachers they got lot of support, we help each other very much.*

From the semi-structured interviews, most of the participants mentioned the influence of their immediate surroundings as one of the reasons they remain in the teaching profession, in particular the school and the community where they currently teach. It was clear that most of the interviewees have never taught at other schools before.

When I asked the mentees about their personal backgrounds and experiences in teaching at one specific school, they responded with positive comments such as:

> '*It is the community that I know*; *I grew up here*, and *the laughs of the learners keep me here*…' and 'the *children, I must say, compared to the cities, the discipline is quite good*…'and '*I travel far with a taxi and walk another 4km to school to be here*…'

All the rural schools in this study are situated in high poverty areas, where many of the learners are orphans and the school infrastructure does not allow optimum learning opportunities. As a result, one would assume that these teachers would be demotivated, but on the contrary, it seems as if they are positive towards developmental programmes, such as the ILLS project, which can improve learner outcomes. For example, Zinzi mentioned rather emphatically that: 'I want to develop my learners...' Similarly, Amos explained the reason why he wants to teach in this community as follows:

To me it is a call, I like it here... Eh... as we are living here in maybe this is some rural area man so I think maybe if as a teacher I can maybe uplift the standards of living in the community and give some light and knowledge in the society.

One of the mentees, Hope, who came from another Province, with a different cultural background, and who really made an effort to get involved in community activities, illustrates the importance of the support of the community on her personal and professional growth. Hope has been teaching at her present school for 9 years and elaborates on her experience:

You know what when I come to this school, in fact I am from … Province. I didn't know anybody, I didn't even know the principal but the fact that I came to a new place meeting new people and I adjusted myself to this school and I just told myself that I have to make friendship and have to make it a point that I like the people, I like the subject, I like the children, although I didn't know the language which they are speaking. Yeah, I learned it while I was busy teaching, I was asking the learners even the teachers, but now I can even speak their language... I like it because you know, my coming here I think I changed most of the things in this school or the teachers learned something because like for instance, you know, inter-relation social, to be social, I made it a point that I socialise with everybody. Because I was a new teacher, so I have to make it a point that this is not my foreign place, it is not a foreign school, I have to socialise with everybody and I must learn their language and I know it, and I must also love the children, so that's why they also love me. To my surprise, you know. The kids who are in Grade 7 when their teachers tell them go and do research, they even come to me, I help them, I even let them go to the library, there are children which I have taught which I am not the teacher. They come to me, they say Mam, you know you taught us how to live, how to respect, all those things, look at where we are now.

This positive experience of Hope concerning the support from the community and the learners, and her attitude towards the development of the learners is consistent with Bandura's Triadic Reciprocal Theory (Bandura 1986). The influence of environmental factors such as the support from her community on Hope's

behaviour and attitude (personal factors) became evident, since in the present instance she was motivated and willing to engage in personal and professional developmental activities.

4.5.1.2 Support from colleagues and school leadership

All the participants mentioned the support of their colleagues and their school leadership, who created opportunities for them to participate in development programmes such as the ILLS- mentorship programme. Participating in the ILLS project was time consuming, and many colleagues from their schools had to assist the participants by taking over some of their administrative duties and they offered to help with transport to the venues where meetings were scheduled. The importance of having supportive colleagues and engaging in collaborative activities in the same school contexts became evident from the selected teachers who participated in the mentorship programme. During informal conversations three natural science teachers from the same district, who did not participate in the mentorship programme, offered several reasons for their non-participation such as: 'I disengaged from the project, as teachers refused to be observed by me,' or 'My principal would not allow us to participate as there is not enough time' or 'The Union has threatened us if we participate.'

However, the school principals and management who allowed their teachers to participate in the project, despite union issues, were found to be very positive. When I approached them, informally, they seemed to be very enthusiastic about creating opportunities for their school's natural science teachers to improve their classroom activities. Robinson and Timperley (2007) emphasise that school leaders' involvement in planning, coordinating, and evaluating teaching and curriculum was found to be an important factor in student achievement in higher performing schools. When school leaders (management) are actively involved in teacher learning and development, higher student achievement and gains are reported.

Although four of the teachers interviewed in this case experienced their respective schools' leadership as very supportive of their engagement in professional

development interventions, three of them also expressed some challenges such as the way in which the school's leadership addresses the shortage of qualified natural science teachers. This study shows that many of the teachers interviewed, were not trained to teach natural science and as a result, they experienced many challenges in their teaching. One of the interviewees, for example, explained her frustration and the reason for this shortfall in effectively teaching natural science as:

> *Most of the schools have teachers who were teaching natural science and because of age, leave. So, when we checked the enrolment there is no teacher that is going to come and substitute him or her. So, it is up to the principal now that he must pick a teacher so that he may come and teach that subject.*

Two of the more experienced mentees were concerned about the high turnover rate of science educators and experienced it as disturbing because school management is forced to appoint teachers who are not qualified to teach science. As Hope explained:

> *Because as I have learnt from some of the other people that, especially in the science and maths, they just, if a teacher retires, they just interview, or they just select another teacher. That teacher is not always being replaced by an expert. So they just go to a teacher and they say okay you must not learn to teach Natural Sciences.*

Zinzi also experienced the high turnover rate and teachers who did not specialise in teaching natural science as:

> *Because sometimes when you go to the workshop they usually say I am new in this subject, I am new, and you always... yes.... so you can see that maybe this one don't like this subject at all.*

Drawn from the remarks made by these mentees, it is evident that there are considerable challenges indeed when teaching outside the subject specialisation. This finding is supported by Childs and McNicholl (2007:3): 'not only do science teachers have to learn *what* to teach (subject content knowledge, SCK), they also

need to learn *how* to teach it (pedagogical content knowledge, PCK).' (see section 2.4.2)

The majority of the natural science teachers, 4 out of the 7 interviewed in this study, were natural science teachers who were teaching outside their subject specialisation and experienced this effort to improve their content knowledge as "very challenging". Even though these teachers seem to be very appreciative of the support from their principals and colleagues, the need for the support of a "knowledgeable" subject expert to guide them on a continuous basis especially came out as one the most important needs expressed by the mentees. Amos, one of the few mentees who specialised in teaching primary school natural science and also a trained mentor in the ILLS Programme, describes his frustration with the frequent replacement of natural science educators in his district as follows: 'These teachers can never become subject experts as they have to teach a different subject each year...'

In a study conducted by Jita and Mokhele (2008) on schools' capacities to promote quality teaching and learning in schools, similar findings were observed regarding the substitution of qualified teachers, with teachers who lack the necessary experience or qualifications to teach a critical subject such as science. This way of dealing with the substitution of teachers, unfortunately, has serious implications for a 'school's capacity to offer high quality instruction' in certain subjects and leaves schools with "glaring gaps" in these subject areas (Jita & Mokhele, 2008:270).

4.5.1.3 Communication with the district officials

The participants in this study refer to the district officials as the CI's (curriculum implementers). From the observational field notes, document-analysis and interviews the inadequate communication between the natural science teachers and the district officials emerged as one noticeable theme in this study. During a meeting, which I arranged with the district office to meet with the trained natural science and mathematics mentors, there was only one trained natural science mentor from a total of twenty mentors who attended the meeting. The remainder of the attendees were from the mathematics division. One of the attendees explained

this lack of attendance as follows: ‘My natural science colleagues were not aware of this meeting; the CI’s did not inform them’. Another mathematics teacher apologised for her natural science colleagues’ absenteeism by explaining that they feel ‘threatened by being observed in their classes’ as their union is in a dispute with the some of the district officials. It was evident from that meeting that the communication between the mathematics teachers and their CI’s, compared to the natural science teachers, in this particular district,was relatively more effective.

Three of the natural science interviewees, for example, described the communication with their CI’s as follows:

Sheryl complained about the short notice:

> *Okay, I would say... eh ... well Mr William [The mentor] gave us a call a day before the meeting and apparently there were the circulars that had gone out, we didn’t get a circular. So it would be nice if we get notified timeously, you know, so that you can also plan.*

Rachel said:

> *At this project I wasn’t selected. You know, I thought it was just a workshop, usually I didn’t meet but it was my first time yesterday when I meet. Sometimes Mrs X, the CI of the Natural Science, call some workshops, then I went to the workshops, I didn’t realise this one...she didn’t inform us.*

According to Hope she also did not receive any circulars from the district office to communicate the meetings with regards to the ILLS project. She explained that she wanted to borrow a textbook from Mr William and unintentionally got involved in this mentorship programme:

> *I ... I told him that I was not aware about this ... I am hearing it for the first time... so he said okay there is no problem I am giving this lesson plan... then I can involve you also to this programme. If you want. I said there is no problem, I can be there, he said... he told me that this about for mentoring each other,*

mentoring the teachers who will have meeting of workshop and then we will mentor each other and we can even visit the school, present a lesson, then we can help you if you have a problem.

These remarks of the mentees regarding the manner, in which they were informed about the ILLS project, clearly indicate the inadequate communication between the district officials and the primary school natural science teachers in this particular district. However, not all the remarks were negative as one of the mentees felt that the CI's are more approachable than they were compared to previous years. Sheryl, for example, explained that:

Because the minute you see a CI, especially like the old days, obviously they kind of had a paradigm shift in you know... In the old days they used to be terrifying. You used to call them inspectors in those days...Ja...You hear an inspector is coming you start shivering, you must make sure your class is perfect, you know. It used to be very very stressful. But now things have changed, even they have changed; maybe they [the CI's] have changed their attitudes.

It was apparent from Sheryl's remarks that there has been an improvement in the approachability of the district officials in the last few years, but also a strong indication that there is more room for improvement regarding the manner in which communication may transpire between the mentees and the district officials in the future.

These findings concerning the context of the participants in this study can be related to the way in which teacher productivity improves when the professional environment in schools – comprised of collegiality, leadership, professional development opportunities, school culture, and the support of the community – is related. Furthermore, these findings are consistent with socio-cultural beliefs, that, all knowledge and theories are situated in and grow out of the contexts of their use (Wang & Paine, 2001). Stated differently, mentoring that occurs in the context of teaching, close to the classroom, in familiar settings, is one of the important features of such mentoring interventions (see section 2.5.3.1).

Johnson, et al. (2012)suggest that dedicating both time and resources to professional development that is viewed as meaningful and specific to the context of a given school proved to be important for learner achievement. Furthermore, they found that although a wide range of working conditions matter to teachers, the specific elements of the work environment that matter the most to teachers are not narrowly conceived working conditions such as clean and well-maintained facilities or access to modern instructional technology. Instead, it is the social conditions – the school's culture, the principal's leadership, and relationships among colleagues – that predominate in predicting teachers' job satisfaction and career plans (Johnson et al. 2012). An action research study conducted by Modisenyane, Rollnick, and Huddle (2004) also concluded that school-based support is more effective as it is contextualised and it gives greater opportunity for teachers' voices to emerge in the research.

The important role of the interpersonal and organisational contexts in which teachers work and the effect it has on their beliefs and attitudes towards professional growth was confirmed by this research study. Jita's study (2004) on teacher identities and science teaching, contends that the way in which teachers construct their classroom practices depends on more than just the knowledge and beliefs they have around teaching and learning. 'It also depends on who they are and how they see themselves in relation to the learners, their colleagues and the subject matter (their identities).Teachers' identities therefore will be shaped within multiple *contexts* such as schools, classrooms, subject departments or cultures.' (Jita, 2004:12).

4.5.2 Beliefs and attitudes

The teachers in this study had strong beliefs on what good teaching is supposed to be; drawn from their explanations, two major orientations emerged i.e. emotional and instructional. Some of the participants responded with *emotional beliefs* and others based their beliefs on *instructional* knowledge and skills or they experienced a *mix between instructional and emotional* beliefs.

4.5.2.1 Teaching and learning

In asking the mentees the question: *What is a good teacher?* I could determine the mentees' ideas about teaching and learning, and how their explicit beliefs influenced their classroom activities, which their mentoring activities were designed to influence.

Mac, the most experienced in terms of years in the teaching profession, believed that a good teacher needs to be committed and dedicated and from what he said about being "open-minded", indicates that he has a positive attitude towards being mentored in new ways of teaching. All the participants indicated their willingness to reform their teaching strategies, whether the reform is based on instructional, emotional or mixed between instructional or emotional beliefs. Mac, for example, holds mixed beliefs between instructional and emotional reform:

> *I think a good teacher; it's one who is maybe committed and dedicated to his or her work, you know. And the one who is open minded, honest and fair and also eh... work in a partnership with other stakeholders.*

Grace also indicated that she would accept advice from a subject expert in order to improve her teaching skills, which points to instructional beliefs:

> *You know a good teacher always is willing to help. He is always willing to help. What I know about a good teacher. Even if you can be negative but she or he will be always positive. To be polite to anyone who is willing to help. If you can be polite and understanding, the communication with that person can make me a good teacher if I got the listening skill, if you want to listen to other people's advice then you become a good teacher.*

Some of the other mentees were emotionally more focused on the way in which their learners perceive a "good teacher" such as Zinzi who is very concerned about the needs of her learners (emotional beliefs):

A good teacher I can say that first of all I must be a good listener. Yes. And I have not to discriminate. I have to treat each learner equally. And I... I have to give each learner his or her space in the class... There are many things. I have to show them love. Maybe if I can someday,... they have to see me as their parent, their friend, their teacher, but I have to be approachable. If ever he or she got that problem, she has to approach me.

Amos, on the other hand, regards a good teacher as a person with a good content (CK) and pedagogical knowledge(PK),someone who does not rely only on text books but also needs to know how a lesson is presented (instructional beliefs) :

The textbook tell me the activities, but as a teacher I must know how to partake in those activities because the learners; they depend on the teacher; they take you as if you know that thing. Because even though there were some questions there say 'ha, what if I do it like this? There must be activities but the teacher must also have the information.

Research has shown that positive teacher beliefs influence student achievement (Jesse, Davis & Pokorny, 2004; Reeves, 2003). It was evident in this study that all teachers interviewed have high expectations for their students, and that they were willing to implement effective instructional practice. Hope was also an excellent example of the teachers who hold positive teacher beliefs, when she explained what has kept her in the teaching profession:

It means that I am producing something so I am also helping and I am helping because I am even trying to ... in fact I want this area to develop! And I want them to be good leaders, and even if there are lot of orphans at this school, I try to be a parent, not only a teacher....

Despite all the positive theories and attitudes reflected by the participants, it was not possible to establish if these beliefs were actually implemented in their classrooms due to the short time in which this study was conducted. From the interviews, observational field notes and document-analysis, I could however establish that some of the participants experienced a conflict between the traditional

teacher model and teaching-centred models prevailing in their professional environment and the reformed models of teaching, which are more student- and learning-centred.

4.5.2.2 Choice offered about training topics

Another subtheme that emerged from the semi-structured interviews was the belief of the mentees that this particular programme (the ILLS – project) had a greater impact on the improvement in their instructional skills than previous developmental programmes such as one-day workshops. The participants reasoned that this was because they had a choice and input into the topics covered during the planning meetings with Mr William. Teachers also stated they preferred having a choice in the professional development programmes offered by their district office. They explained their preferences when they compared this mentorship programme with other professional developmental programmes they had previously attended.

One participant highlighted the importance of choosing the "right" mentor in a successful mentoring relationship. Sheryl shared her preference for a mentoring relationship in the following manner:

> *It is so much less pressure on you as you know; your colleague is kind of at the same level as you are, he is not there to come and force down things and you know, you are open to speaking to each other, you know, so ja. It's kind of less stressful, and a comfort thought. I prefer this one with the mentor.*

Similarly, Amos emphasised that the mentees participated in the mentorship programme out of their own choice, 'they wanted to attend, to learn more, and to gain knowledge.' He enthusiastically described the involvement of natural science teachers from other schools, who were not initially selected to participate in the programme, as follows:

> *Even other teachers who were not mentees, other natural science teachers, they become interested, they want to know, what are you doing there? Then we say: welcome, come and see what we are doing here, that makes me to see that that*

means that the mentees even discuss it with other teachers and they explain to them that is why they like it, they want to join it. They say hi maar ... call us please. Even if they are busy, they will come. Ja, really. They say it is a good thing to do. That's why they are coming. That is why I say they are positive about the programme.

According to Wood (2007), teachers are ultimately responsible for the success or failure of efforts to improve student performance. Since teachers are entrusted with the responsibility of student learning, they should identify areas of professional development relative to their individual needs. Offering a choice of professional learning would allow educators to target areas required by the learners they teach and as a result, it can improve student performance. Hope has stated the reason why she chose to participate in this mentorship intervention:

We are developing one another here at school but if we've come together all of us, you know, we will have one thing in common, here we will have one thing in common, and these kids are of the same area.

Amos emphasised the reason why he chose to be involved in the mentoring programme and how the ILLS project differs from previous cluster meetings he attended:

Ja, it differs, even though ...but it differs because in clusters we just say how to plan but in this one now it is how to plan, what to plan, what to change, no. Say ... lesson plan can be changed like this and this you know, but in this programme, it is how to plan, what to plan, what to teach that you planned.

In giving these teachers a choice to get involved in this mentorship programme and also to assist in the choice of topics, it became apparent that they felt that their input and needs were considered.

4.5.2.3 Relationship with mentor

The experience of having a knowledgeable mentor is highly valued in mentoring relationships and this relationship with the mentor is described by Clutterbuck (1991) as one of the core factors of effective professional development. Clutterbuck, as cited earlier in the literature review chapter, listed the criteria for being a successful mentor as to: '**M**anage the relationship, **E**ncourage the mentee, **N**urture the mentee, **T**each the mentee, **O**ffer mutual respect and **R**espond to the mentee's needs' (see section 2.5.6). These criteria offered a valuable framework against which I could evaluate and analyse the experiences of the mentees in this mentoring relationship. Drawn from the following remarks made by the mentees it seems as if the mentor, Mr William, was successful in bringing out to life some of the criteria of a successful mentor according to Clutterbuck (1991). For example:

Rachel described how Mr William was **M**anaging the mentoring relationship; by making the mentees feel comfortable; but at the same time establishing clear goals for the programme:

> *Yes, I feel comfortable because he feels like my colleague. And you know, it is the person that always brings together the colleagues. Ja, I can say he is my peer. It is more comfortable to ask some difficult things I come across. He can explain maybe to such an extent that they do understand, rather than the CI's who is just always afraid maybe they will write the bad report with you, something like that, …Before we go to the meeting, we have to prepare, what are you going to say or what are you going to do to the meeting, rather than just to sit and listen all the time.*

Zinzi shared her perceptions of how Mr William managed the mentoring relationship and voiced the general feeling of all the participants:

> *Someone who introduce something and motivate other people about that particular thing. Yes. That is a mentor and people become interested.*

Rachel expressed her appreciation for the way in which Mr William managed to convey important information:

> *The mentors like Mr William and..., they usually go to the circuit office and ask there the circuit manager to issue circulars. Ja. But if we didn't get the circulars Mr William himself would phone us. But the circulars are through the circuit manager*

The way in which Mr William managed the mentoring relationship with all the participants seems to be focused on the quality of the relationship. Interpersonal skills are crucial in a mentoring relationship to be supportive and transformative. This resonates with Kennedy's assumption that the key characteristic of a successful mentoring relationship is its reliance on a one-to-one relationship (Kennedy, 2005).

Other participants such as Sheryl, described the way in which Mr William **E**ncouraged her to feel empowered by offering to help her whenever she is struggling; not only with natural science but also in other subject areas:

> *Ah... well, like I said you know, I felt in the meeting with this people, very positive. Mr William is very positive, very encouraging, and very open to helping; you know if you're stuck. Because he mentioned you know whatever you need to know in Natural Science and he even mentioned the other subjects as well, like Arts & Culture so people are really actually out to like to empower and to help you know.*

Hope also described how she experienced the way in which Mr William **N**urtured the mentoring relationship:

> *The way he explained everything to me, and he seem to be open. I just feel comfortable.*

Mac, a deputy principal, explained how Mr William regarded individual feedback and follow-up meetings with him as important. This gesture of the mentor teacher may be interpreted as a way in which a mentoring relationship can be nurtured:

> *Since I believe in him [the mentor]. I have sat down with Mr William and tried to get the feedback of what they discussed there [referring to an instance where he could not attend a meeting because of his other responsibilities].*

Three of the mentee teachers who actively participated in the ILLS project expressed in their interviews that their classroom practices were enhanced by newly acquired techniques and strategies demonstrated by the mentor teacher. For example, Grace felt that Mr William was assisting her with her **T**eaching by improving her natural science knowledge and teaching skills:

> *Ja, especially when I was given these learning areas I thought to myself ha! What am I going to do because I don't know anything. But yesterday Mr William said we are going to help... let's say you are going to prepare what our lesson, then you called them to come and listen when you present that lesson, that was really what I gain a lot, ja. I got confidence on that, to say even if I am not doing the correct thing in the classroom but if they come to help me, and then I will be the best teacher.*

Another participant, Zinzi described her learners' responses to her improved and "reformed" teaching strategies:

> *You can even go and ask them [the learners] about plant, jo... they are going to give you answers like yes.... ja, because.... I have observed something that if you teach them and they saw that thing, it remains in their mind.*

The continual effort of the mentor to **O**ffer support and mutual respect built a relationship of trust between the mentor and the teachers. This trust is also reflected in Hope's description of the support offered by Mr William:

He is a humble "somebody". Loving, always smiling. He is full of respect. Respect for everybody. Whether you are young or old, it's the same to Mr William. And everyone is welcome to him...But especially when I go there nê and borrow some textbook, okay I didn't know him much but I know he is one of the educators there, you know we meet I know those teachers I see them we just greet one another, so when they said this is the one who is teaching Natural Science, I say ho... I wonder if this guy is going to give me the book, so I explained to him. He was so open, he was so free, just ho Mam, come, I just show the books which I have the text books which I have, these are the textbooks. So if you don't have a problem, if you have a problem you can come if you don't understand. In fact I have a .. what is it.. .a trust.

Zinzi also explained how Mr William **R**esponded to their needs in the following manner:

That if you do have a problem... if we encounter any problem whether I am in class, just call me I am going to assist you. I will come to you, I will sacrifice my petrol, I will come to your place I am going to assist you.

Amos was more specific in his description of how Mr William responded to his need for particular resources:

He is teaching the secondary school. Mmm. They have that their old textbook with information like want some test maybe, information about let's say eco systems and for information I go to Mr Mashego. He will search for me the books that the having information about eco system. He has done that Mr Mashego. Even any topic. Mmmm. He is so helpful. He is so helpful really.

Other characteristics that are ascribed to Mr William as an "ideal" mentor by the participants in this study are the characteristics of providing guidance in the setting of *practical goals*, giving *guidance in lesson planning* and being *supportive* and *helpful* as he is always willing to share his knowledge as well as to provide them with resources if they needed it. Amos explained the experience he had with Mr William:

He is too helpful to us... especially with some of the textbooks. He is teaching the secondary school. Mmm... They have that old textbooks with information, like some test maybe, information about let's say eco systems and my textbooks is having not enough information I go to Mr William. He will search for me the books that the having information about eco system. He has done that for any topic. He is so helpful. He is so helpful really…

It was clear from the mentoring relationship in this study that the mentor had abundant influence on the attitudes and beliefs of the participant mentees. The unanimously positive responses of the mentees towards their mentor indicate that this specific mentoring relationship can initiate a positive change in behaviour concerning classroom activities and learner achievement. All the mentees indicated that they could find ways in which they balanced their instructional and behavioural beliefs in a mentoring relationship. The findings also indicate that Mr William deeply reflected on the process of mentoring before he entered the relationship with the mentees, as advocated by Wang (2001) as a crucial phase in the conceptualisation of the mentoring process.

4.5.3 Personal and professional development

In answering the critical research question: '*How and why does the mentoring process influence the mentees in terms of personal and professional development, if at all?*'I had to investigate the activities to which the mentees were exposed to and the way in which these activities influenced their perceptions on being mentored by a colleague who is regarded by others as "more knowledgeable" in terms of subject and pedagogical knowledge in natural science.

4.5.3.1 Activities

The activities of the ILLS programme were based on the Japanese Lesson Study Approach as described in Chapter 2 (see section 2.4.2). For this programme, the participants followed the three phases of a lesson study cycle as described by Jita (2011):

- *Planning* – groups of teachers came together to set specific goals and plan a lesson together with a mentor teacher.

- *Classroom Observation* – the teachers selected one of thementees to present the planned lesson in an actual classroom with learners, while other mentee teachers and the mentor observe the lesson and take notes for reflection.

- *Reflection and feedback* – The group of teachers gather again directly after the observed lesson for a reflection and feedback session in which the lesson can be redesigned, improved or represented to another group of learners, if necessary.

Observations, document-analysis and semi structured interviews revealed the following results based on the Lesson Study Cycle as described by Jita (2011).

- **Goal Setting and Planning (pre-observational meeting)**

Goal setting and planning are the critical underpinning of Japanese Lesson Study according to Lewis (2002) and during this phase the mentor establishes short term goals and also long-term goals such as behaviour, attitude or lifelong learning.

Mr William [the mentor] opened the planning meeting which I observed, with the setting of specific goals:

> *This programme is about teamwork, we have to empower each other ... every teacher here must become a master in his or her subject*.

To determine whether the mentees accomplished these goals, set up by the mentor and themselves, I found that most of the participants shared that they have gained more than what they expected–noticeable goals achieved such as *confidence* in presenting their lessons were reported by four of the mentees.

In the following section, I examined the data which illustrated certain of the gains mentioned by the teachers in the interviews. For example, Zinzi claimed:

I am too confident with my subject. Mmmm, as I said before that you can come to my class at any time. Any time. Give me a new topic. I am going to teach it. Without any problem, any fear. As an educator you must set a goal first that at the end of the year I want my learners to pass, with flying colours.

With such an optimistic mind-set in achieving her goals, Zinzi seems to indicate that the mentoring intervention might have a positive effect on her own learning of unfamiliar subject content knowledge.

Sheryl, one of the teachers who are teaching natural science outside her subject specialization, described that not only had she reached her goal to be confident in her content – and pedagogical knowledge and skills, but also her goal to be able to address the needs of the learners as a result of the planning of lessons together:

At that time with the Grade 6'es I have started with electricity you know. And uhm... and everything that they mentioned there you know, safety, what is a conductor, what is an insulator, and you know, all the different components and you know everything that they mention there, we kind of had started working on. You know and then of course I realised I am actually on the right track you know, doing the right thing for Grade 6 and I told the kids as well about this meeting that I attended. It gave me some confidence ja. The other teachers also told us what is going to come into the exams for the different grades, for Grade 4, 5 and 6 you know, and that was a big help because it kind of …gave us something to focus on. But I think the last time I went I really gained, because I could also focus on what the kids needed to know for the exams you know...

All the participants were appreciative of the planning meetings in which pre-observational templates were handed out to plan lessons together. During these planning sessions, the mentor discussed one particular topic separately for each grade, addressed issues experienced by the mentees related to the topic and allowed input from all the participants. All the teachers learned with and from each other as they identified and discussed various implementation strategies. Mac elaborated on the activities during the lesson planning session and is appreciative of his colleagues' input:

We sit down as a team and talk many things like eh how must we plan our work and the content that must be taught in that grade it must start here and end up here… then maybe Grade 7 starts here and end up here… and … the content up to Grade 9. Thereafter we set a date where we are going to look that a report is covered what we have discussed in the first meeting then we write that report, maybe try to encourage one another that we must cover 1-2-3, 1-2-3 but eh, internally at school

.

From the observational field notes I found that the input and support from colleagues seemed to be especially crucial, particularly the practical examples such as: "*How does light travel from an object to your eyes to enable vision?"* The mentor teacher illustrated this question with a practical example by using a burning candle as an object allowing input and advice from the participants. Another practical example mentioned by three of the interviewees as particularly valuable in their classes was the question: *"Why is sunlight necessary for the process of photosynthesis?*" Four of the participants mentioned the practical demonstration where one potted plant was put in direct sunlight and another potted plant in a cupboard for 24 hours to observe the need for sunlight in the process of photosynthesis.

Rachel, amongst others, mentioned the difficulty she has experienced in the planning of lessons before she participated in the mentorship programme, she elaborated about a range of ways her colleagues helped her during lesson planning sessions:

Yes. The difficult thing is the preparation. And if you don't know how to prepare you get stuck at the start, but if you attend again and again, helping one another, the preparation will be easier. Now we don't have a problem in planning because if you struggling with your work schedule you know that next time, when I attend the workshop, everything will be explained.

It is clear that the lesson planning meetings between the mentees creates the opportunity for ideas that represent the perspectives of all members of the group to

emerge and give the teachers an opportunity to compare and connect what is being learned from the various study lessons conducted by the group.

For example, Amos, as well as some of the other mentees, expressed his appreciation of doing lesson planning on one topic for different grades and commented on how these activities improved his content knowledge:

> *We got more knowledge. That say if it if it you have a topic of energy, you must first know what do I want the learners to know from that topic. Don't I teach for the sake of teaching? Then you plan according, but in this, this programme, it says you must know what to teach, even the different grades. Say grade 4, if I teach energy I must teach 1, 2, and 3. This knowledge will be more abstract but I must teach this one for the grade 4 learners. Grade 5, this, grade 6 this, with other learners I will come here and prepare my lesson... I will teach anything about energy.*

The need for expert teachers' advice during the lesson planning sessions also precipitated as a central issue which needs to be addressed to improve natural science teachers' lack in content knowledge and skills. In analysing the qualifications and backgrounds of the participants I found that only two of them obtained their qualifications from universities. The rest of the participants were educated from Colleges of Education (CoE) during the apartheid years (before 1994). The admission requirements and performance standards of these CoE's during those days were known to be well below those of universities and colleges where it was expected of students to be specialists in their fields (Jita,2011). This lack in adequate training as well as natural science teachers teaching outside their subject specialisation may have contributed to the need for expert advice. These findings emphasise that mathematics and science teachers, in rural areas specifically, need development programmes that focus on the development of both subject content knowledge and pedagogical content knowledge.

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It became clear that these findings are in accordance with the suggestion of Gomez Zwiep and Benken (2012), that when embedded within an effective professional development context, content knowledge can be a critical vehicle through which

change can be made in teachers' understandings and perceptions of mathematics and science.

This study also confirmed that active participation in prior activities such as the planning of lessons with the assistance of a knowledgeable mentor, concerning subject content knowledge and pedagogical knowledge, has made it possible for the participants to develop positive attitudes towards reflective practice. It also confirms a greater willingness to continue 'learning and enquiring into the teaching practice and certain sensitivity required in order to accept constructive criticism' as supported by Garcia (2011:146).

- **Classroom Observations**

The second stage of the ILLS programme is where a selected teacher presents the planned lesson in a classroom with his or her own learners, while the other teachers observe and take notes for reflection and feedback. All observers are provided with an observational template to make comprehensive notes. Observers do not interact with nor "help" the learners or the teacher during the lesson as thepurpose ofthe observations is to focus on the learning outcomes achieved by the learners and the strategies employed by the teacher to enable development in both SCK and PCK.

The teachers suggested that the mentor and the other observers should focus ontheir lessons to realise what their strengths and weaknesses are in order to support them with instructional improvement. The findings from the interviews indicate that five of the participants experienced the observational phase as positive and non-threatening as it occurs in familiar settings with their own learners. Some of the responses showed their willingness to accept advice from different teachers and the appreciation of constructive criticism. Rachel explained:

> *Because you can't work without criticising. You never know where did you go wrong or done right. So, it is wise to be observant. No matter sometimes we are not used to but it would be wise. It is positive because they are going to develop me.... They will see my weaknesses. Yes. They will strengthen my weaknesses.*

Although all the participants indicated that they have implemented the modelled lesson plans, one of them, Hope, felt that she is the one who knows her learners best and adjusted the planned lessons according to their particular needs:

> *Yes, I implemented it. Because I cannot implement it exactly that way. You cannot take someone's idea exactly as it is and then implement.... according to the way you understand and the way your kids will understand, because it is me who knows my kids it's not him [the mentor].*

Rogan(2007).supports this finding by suggesting that experienced teachers do not usually make drastic changes. Instead, they progressively put the ideas that seem to them to be important and at the same time attainable into practice.

Grace was the only participant who expressed her discomfort with the number of teachers who wanted to observe her planned lesson:

> *Yes, like we said that we are going to prepare and ask them to when you present the lesson, but I wish that not everyone or let's say I am teaching Grade 6, not all the Grade 6 teachers must come and when I present my lesson, at least the two mentor maybe and two teachers can come to help me, but not the whole group of teachers.*

It is however not uncommon for experienced teachers to feel threatened by being observed by other teachers. Creating a non-threatening, supportive atmosphere is the foundation for an effective colleague-to-colleague relationship (Zachary, 2000).

- **The post-lesson discussion (reflection and feedback)**

In the final stage of the lesson study cycle – after a mentee has presented the lesson – the mentor, the mentee teacher and all of the observers discussed the lesson. The focus of the discussion is not personal, but is about the lesson itself, and in particular about the learning that has taken place and the ways in which the lesson might be improved. This reflection and feedback session with the guidance

and leadership of the mentor teacher, is in accordance with a study done by Orland – Barack and Hasin (2010) in which exemplary mentor teachers and their mentees perceived good mentoring practices as: organisational skills, interpersonal relationships, integration of theory and practice, challenge, modelling and reflexivity.

Amos experienced the reflection meetings according to the abovementioned good mentoring practice:

> *But this one say you must know what to teach about energy and when you come together you teach something that is same thing. Something we have all prepared. If this fails, it means all of us have failed; we must come back and reflect what was the problem. The lesson, because we get the lesson together, is there may be the one teacher didn't do it correctly, maybe our lesson was too long or what the programme taught us, here we do observe each other, to see how or whether the lesson did achieve its goals or what. That is what this programme taught us: the content of the subject. What they need to know. not just only what to learn but how to learn it.*

The response from Amos is in line with a study done by Clark (1995) which shows that programmes designed to promote experienced science teachers' reflection on their practices do result in teachers developing a more complex view of teaching practices, and thus they show improvement in their teaching.

Another participant, Rachel, explained how she experienced the reflection meetings with the mentor and emphasised how these reflections helped her improving her attitude and beliefs towards natural science:

> *I like this project. This process, because I am going to be developed. I am going to correct my mistakes; I am going to teach with love. Sometimes now we... never sometimes, now we hate teaching because we said teaching has got a lot of work, but if I attend this project, maybe the work will be less because I will get more understanding.*

The importance of discussions between the teachers in a reflection meeting (post-observational) is evident in Mac's observation:

> *They sit down and discuss these issues. That can really work and take some decisions you know, and make a follow up on this. Ja, follow up is important... I think follow up is important.*

The structure of the ILLS project – the way in which the observation and reflection meetings were scheduled by the mentor – prompted both immediate reflection on action and deeper reflection that could have provided new insights and perspectives to the mentees. Amos's response supports this finding:

> *Because what they taught us you say firstly the teacher must reflect inside or say listen, what went wrong, what went good, what must be done, what must be improved, firstly he, first the teacher he must reflect on his own, say before maybe then the other maybe colleagues maybe can say something about that lesson you would say, okay, how did this... lesson, you say, what went where? They say what went wrong? Mmm... Areas of improvement, something like that. You say. Then before we can make some input. The teacher must reflect. But the way I from my experience, ja, they they feel good about it. They feel good because they say we are not here to maybe find some fault, be free, because why here this programmes is for people.... teachers. So if you can see your mistake then..... it will be helped. So, so far they feel good about this programme and even the reflection.*

From the minutes of a previous reflection meeting between the mentor and mentees (document analysis) I also noted their struggles to determine if their personal experiences reflected science inquiry. For example, they asked the mentor for guidance and he reminded them of the lesson planning discussions and the activities in a textbook, indicating the gradual process of incorporating new ideas with their existing conceptions of teaching science.

It became evident that the activities to which the mentees were exposed to positively contributed to their personal and professional growth. All the mentee

teachers reported having had their individual knowledge, skills, and attitudes enhanced through the process of discussion, observation and reflection. I also noted from the observational field notes that the interactions and activities allowed teachers to link new concepts to their existing classroom practices for example, the experiment of photosynthesis and the influence of light on the growth of plants.

Darling Hammond and McLaughlin (1995:597) advocate that professional development also means 'providing occasions for teachers to reflect critically on their practice and to fashion new knowledge and beliefs about content, pedagogy, and learners.' This study indicates that the ILLS project provided opportunities for the mentees to critically reflect on their classroom practices and as a result experienced professional growth.

4.5.3.2 Collaboration

The most distinct theme that emerged from this mentoring relationship was that the teachers wanted the opportunity to collaborate with their colleagues and felt that this mentoring programme was a valued method of professional development. In the following examples the participants elaborated on what they have gained from this collaborative mentoring relationship. Sheryl explained how she was encouraged:

> *In the first place it is just getting together already just encourages. It is just already an encouragement you know. You meet all these people that are doing the same thing, you know, the same situation and we want to give the children the best you know, so ja. Already that and of course you have people that know quite a bit about the subject and they you know... they kind of encourage you and ja. I think it really just all helps you know. because we are meeting, we are talking, we are learning from each other, we know there is help somewhere for me to ... if you're stuck, you know.*

Zinzi appreciated the multiple strategies and skills she has obtained from different people during the collaborative meetings:

Because when we were in that meeting, people come with different ideas. They come with different ideas, different strategies, and different approaches of that particular school topic. They give as ideas how to handle this – so it becomes simpler for us to do it in our classes. Sometimes you can think of two or three activities but now you find yourself being having five activities that you are going to do in class, because of the project.

The mentees also stressed that sharing ideas and asking questions to the teachers from different schools, enhanced their positive mentoring experiences. In fact, the literature suggests the fundamental strategy for promotion of educational reform is an increase in teacher collaboration, 'Teachers, working in professional learning communities who share expertise, are more likely to improve student learning than teachers working alone. Built into this notion is the idea that practitioner expertise and collaboration matter and that school cultures need to be reimagined and reconfigured so that both can flourish' (Wood, 2007:711).

The importance of social learning in professional development activities has been emphasised in numerous theories related to human behaviour as discussed in chapter 2. This particular mentoring relationship is built on collaboration; not only between the mentor teacher and the mentee but also amongst peer educators from neighbouring schools. The findings of this study are in line with Bandura's perspectives on collective efficacies: 'People's shared belief in their collective power to produce desired results is a key ingredient of collective agency. Group attainments are the product not only of the shared intentions, knowledge, and skills of its members, but also of the interactive, coordinated, and synergistic dynamics of their transactions. The findings taken as a whole show that the stronger the perceived collective efficacy, the higher the groups' aspirations and motivational investment in their undertakings, the stronger their staying power in the face of impediments and setbacks, the higher their morale and resilience to stressors, and the greater their performance accomplishments' *(*Bandura, 2001:1).

However, the most significant form of help was from colleagues who were specialists in the area. In his explanation of his experience of collaboration with the

other teachers and how it added to his professional development as well as the influence of being surrounded by subject experts, Amos stated:

> *They like it because it is helping, because other topics they may struggle with, they help ... as teachers there are those who are good in biology and who are good in science. So we are helping each other. So if it would be that, the more give some input that teacher is being developed how to go about this lesson.*

Grace expressed her need to have opportunities to discuss subject related issues with other colleagues in the following manner:

> *You know I was very excited I am not going to lie to you. I was very excited because if you are in group you ask many questions and you get many clarity.*

Daresh (2003) also points out that mentoring may reduce isolation and can build a collegial network among professional colleagues (see section 2.5.2). The findings in this study on the collaborative nature of the activities the mentees were exposed to, supports this particular mentoring characteristic according to Daresh.

4.5.3.3 Change

The extent to which the mentee teachers in this study have changed in the sense defined by the interconnected model of change, according to Clarke and Hollingsworth (2002), is difficult to determine due to the limited number of scheduled mentorship sessions during the time of this study. Secondly, since teachers must respond to their students' needs, they must often change what they do in the classroom. As a result, professional development may appear different for different teachers (Easton, 2008). However, it seems that this investigated mentorship intervention for in-service primary school natural science teachers contributed to positive changes, in particular changes in the domains of pedagogical content knowledge and attitude.

For example, Zinzi experienced an improvement in her classroom practice since she has become involved in this mentorship programme:

It is important because before we didn't have a mentor where I was encountering a lot, as far as Natural Science is concerned, but now because I have a mentor, everything is simple because most of the things he explains to us to how to approach everything, how to do experiments like this and that topic it simple, very simple.

I found that the mentees were willing to change in terms of their personal qualities and dispositions, including characteristics, as described by Lewis (2009:9), such as curiosity, personal identity as a learner and as a researcher of practice, motivation to improve and the belief that changes in one's instruction can bring about improvements in student learning:

Sheryl:

Change yes. It's always difficult to change. But you need to move with the times ja. You need to move with the times, you can't get stuck with the old days. Be open to change, I suppose. Be open to change.

Grace :

And when you come back you can even explain to your colleague. Not even in Natural Science, in other learning areas. It was... I was very excited.

Mac :

Because I want to change, you know, things are changing. Like now ... So, change happens so you must also change your mind.

Zinzi commented, in explaining how participation in the mentorship programme had shifted her view of natural science instruction:

What is going to happen to the plants that don't get sunlight? I use it as an experiment to my grade 6 class. They enjoy it a lot. You can even go and ask them about plant, jo... they are going to give you answers like yes.... ja, because.... I have observed something that if you teach them and they saw that thing, it remains in their mind. I divided them into four groups in two rows because the four rows, so I divide them into four groups in my class. It becomes

simpler for me to use in class... Before we were complaining about overcrowding now you didn't even see the overcrowded class.

These findings also strongly resonates with Guskey's (2002:383) re-iteration of his Model of Teacher Change where he states that, 'improvements typically result from changes teachers have made in their classroom practices – a new instructional approach, the use of materials or curricula, or simply a modification in teaching procedures or classroom format.'

The improvement in the mentees' subject content knowledge was described as: 'very helpful, I understand the environment better and the learners enjoy my classes more, it gave me some confidence.' Grace responded as follows:

You know, I don't know what to say. You know this mentorship is really a good project because like myself I didn't have the idea about the learning area I am going to teach, but due to this mentorship it was very easy to cope.

It became clear that as the participants gained more experience with other teaching strategies, curriculum material, and resources that were made available during their planning sessions with the mentor, teacher efficacy began to develop. Amos particularised the change he experienced in terms of personal development:

Ja, it improved because ja, now eh it makes me not selfish. Ja. Because it helped me to share information with other people and make me feel confident to go and ask information from other people. I think it is a just open my mind this programme.

Personal self-efficacy beliefs as described by Bandura (1997) also play a role in teacher outcomes (see section 2.3.1). It became clear from the findings in this study, that the participant teachers feel more efficacious when they achieve real success with their students. For example, the feedback to these teachers when their pupils responded positively to their classroom practice encouraged and motivated them to develop even more. Zinzi illustrated this belief with a practical example:

We cut three 2 litres then we put the three types of soil in each, and then we pour water, so observe how water is absorbed. Is it quickly, slowly, then we do it practically outside, they observe it they come with different types of soil, yes, the learn it, then they come with their 2 litres so it is like that. So we leave it there just for a night then the following day we come and observe, then we can see that ooh, clay soil absorb water very slowly. And the water is still there on top. Researcher: 'Did you enjoy it?' Zinzi: 'A lot. A lot, as the pupils enjoyed it. Previous year, I was doing in my own way'.

Daresh (2003:7) asserts that when applied to experienced teachers, mentoring can be a way for professionals to develop a sense of renewed enthusiasm for their jobs and enhanced commitment for the profession of education. Sheryl confirmed her sense of personal accomplishment with this remark:

And I have to tell you something Adri, I was so pleasantly surprised, one of the learners came up to me and she said Mam, I have to tell you something, she says, I always struggled with NS but I must say the way you have been explaining it it makes me understand it so much better. Thank you. And I was really really pleasantly surprised by that you know

Although I could not determine any change in the mentees' *perceptions* and *beliefs* towards teaching and learning in this study, I found that their instructional classroom activities and attitudes have changed from feelings of insecurity to confidence in the presenting of subject content.

4.5.4 Time

Teachers voiced their concern that there was not enough time assigned in their schedules to discuss and plan with colleagues from neighbouring schools as frequently as they would consider necessary. The limited time may therefore be seen as a hindering factor in the effective implementation of the ILLS project and it also seemed to impact negatively on the lesson planning meetings.

4.5.4.1 Introduction and implementation of the ILLS Project

Six of the participants complained about the timing of the ILLS project and how it affected their planning and commitment towards this project. The mentor teacher scheduled the meetings by informing the district office and they then distributed circulars to the relevant schools. According to some they were not timeously informed by the district office, or the meetings were scheduled during the exam time. Rachel explained and offered her advice related to the short period of time in which they received circulars: 'So that is why we were left behind. So maybe if they can send us some sms, if it's not difficult for them, because the circuit sometimes they release the circular late.'

Grace, for example, voiced a concern, that was also pointed out by many of the other participants, relating to the scheduling of the meetings and how it influenced their commitment to the mentoring programme.

> *The timing is not good for teachers. Because there are two days when we reopen we need to prepare files and put your things in order, then issue books, you see, you need to know that every children the learners got their books. That I think the attendance may be very poor again.*

Hope presented another explanation for the poor timing of the implementation of the ILLS project and offered a solution to get the information about the meetings well in advance:

> *Even the Department is involved because we were supposed to ... you know the final exams, the last date of exam was last week Friday. And they wanted the schedules and the summit results Monday, a day before yesterday. You cannot let the kids write the exam on Friday, you mark the whole weekend then on Monday they say, here you are. I think they also notice that the way that circular they did is not correct. Talking to the circuit which means some of the teachers did not get the circulars in time. Some they didn't get it at all, so I think he must also have enough time before... it must... when he sent the circulars it must have a time, not maybe five days or four days before the meeting, so that even if I*

didn't receive the circular but if it is going to, I get the circular 10 days, 12 days before, even if I didn't get the circular, I will hear someone saying ah... I understand there will be a meeting.

In general, all the participants agreed that the timing of implementation of the ILLS project was not appropriate. This supports Guskey's (2003) notion that the important criteria in considering effective professional development, is the purpose, structure, and organisation of time of the professional learning intervention.

4.5.4.2 Planning of lessons

Time, with regards to the planning of the lessons in the ILLS project, also emerged as a theme. For instance, in the planning stage the teachers related strategies for learning new SCK and PCK, such as discussing practical experiments and planning lessons on a pre-observational template, which, of course, makes lesson planning a very time-consuming activity.

However, one mentee described her experience of a lesson planning session with the mentor teacher as follows:

I was not expecting this. I thought wow, what is going to happen? But definitely 4 o'clock it was a short time for me because we were preparing something that was going to be useful to me. That is why even now you can come to my class at any time I can do miracles for you with my learners.

Villegas-Reimers (2003) highlights the importance of time management in professional development programmes and claims that the depth of knowledge and practice has increased over the past few years. Consequently, 'teachers, researchers and policymakers consistently indicate the greatest challenge to implementing effective professional development is lack of time' (Villegas-Reimers, 2003:125).

Although it needs to be acknowledged that this mentoring support seems to be time-consuming for all parties, the expertise that one teacher might offer another, in

some ways, removes much of the need to spend time searching through textbooks or teaching schemes. The on-site professional development opportunities through mentoring seemed to provide the teachers with the time to participate in learning activities and at the same time attend to the professional and personal needs of the teachers.

4.5.5 Curriculum and policy issues

4.5.5.1 Change in Curriculum

The epistemological shift in the science education curriculum in South Africa from science as a "product" to science as a "process" has changed the "knowledges" for teaching science (Miranda & Adler, 2010). Several studies report on South African teachers' difficulties in implementing aspects of new curriculum (e.g. Kriek & Basson, 2008; Miranda & Adler, 2010). Similar challenges were experienced by the mentees in this study as the natural science curriculum has changed several times in the present decade. One needs to understand that the profile of implementation in a school depends on outside support as well as factors which contribute to the school's capacity for innovation. In this particular rural context, the participants shared their frustrations:

Rachel:

> *I started with Molteno, then the other ones, RCS, NCS and the OBE and now, CAPS… So according to me it's (the lesson planning meeting with the mentor) where I am going to get the more knowledge about how to plan, because that is I am still struggling as the curriculum changes. I am still struggling with the planning and to go through the work schedule, some of the things here and there they are difficult for me and another thing some of the things that are I am not quite sure is the learning outcomes how to go through the learning outcomes and the assessment.*

In asking the interviewees on their expectations of CAPS, the response of one of the participants summarises the feelings of a few others:

We just worked too hard, too many changes, the Government doesn't know whether they coming or going, they put pressure on the teachers, and I mean still things did not work for the kids you know. CAPS I don't know too much about CAPS. What is CAPS? Because I know the foundation phase, they went for that training.

4.5.5.2 Curriculum Implementation

Research with in-service teachers has shown that, while teachers may agree with the objectives or innovations of curricular reforms, they will not put them into practise in their classrooms when the prospect causes them to feel insecure or that their roles and identities as teachers are emotionally challenged (Hargreaves, 1998). Given the existing concerns about teachers' confidence and knowledge in science and inadequate support from their professional environment in South Africa, there is a substantial need for professional growth which is fundamental in successfully implementing the science curriculum (Miranda & Adler, 2010).

Two dominant issues, which resulted in the inadequate implementation of new curricula, were highlighted by the participants in this study:

- Departmental guidance
- Lack of resources

Departmental guidance

District officials, responsible for organising professional development intervention initiatives for the teachers are known as curriculum implementers (CI's) or subject advisors. Teachers in this study, however questioned the subject advisors' content knowledge in the natural science learning area. They perceived some of them as not being knowledgeable in the subject or in classroom practice. Teachers also disclosed that when they had questions about what was presented in workshops, the subject advisors rarely provided them with adequate answers. In voicing their frustrations, some teachers like Grace said:

The expert teacher will be the best. Because the CI sometimes they they just read the books ne. They don't teach. They don't know the real situation in the classroom. But a teacher is there in the classroom.

All the participant teachers expected support from the district officials and four of them acknowledged that the CI's are trying to support them, but they also feel that too much emphasis is placed on the leadership positions of the CI's. Sheryl illustrated her preference for being guided by her peers:

Right. I think it is so much easier when it's kind of your colleague more kind of on your level. Because the minute you see a CI, especially like the old days, obviously they kind of... also had a paradigm shift in you know.. in the old days they used to be terrifying. You hear .. you used to call them inspectors in those days...It used to be very very stressful. But this whole thing with a cluster meeting, it is so much less pressure on you as a you know, your colleague is kind of at the same level as you are, he is not there to come and force down things and you know, you are open to speaking to each other, you know, so ja. It's kind of less stressful.

It became clear from the responses of these participants that they experienced their relationships with their CI's as hierarchical and assessment driven. The mentoring relationship with Mr William and their peers, on the other hand is described as mutually supportive and less threatening. For example, Rachel experienced similar feelings and additionally expressed her feelings for being assessed by the CI's:

I can say there is a vast difference between the previous one and this one because the previous one, only the CI's that were just explaining and they don't know even themselves the work, they are not sure. So they want us to come out with something that we don't know. So this one I am thinking it will be better because we we meet together we plan together, we share some ideas together, so that is then easy when you come to the classroom because you have contributed something, you are not just listening. They say go and do this and this and that. You are not afraid to be with your colleagues maybe to ask someof the things you didn't know. You know always the CI sometimes sometimes we

feel shy to confront them... rather than the CI's who is just always afraid maybe they will write the bad report with you, something like that, can you see that.

Participants also expressed their concerns about the training received by the CI's and emphasised that more training and preparation is needed for successful curriculum implementation. One of the participants expressed her concerns:

You know, because even this OBE I don't know maybe it was the teachers or ... because when we look at the kids, the group of learners that did OBE, you know they have met some challenge problem at the university as a teacher. Because...There is a gap. Because it was also some of the teachers couldn't understand this thing. What is task... special here. It was cut and paste cut and paste cut and paste, and even the CI's they were not that much clear. When they come and introduced it you know, they introduced it like this. But as time goes on,, you say I don't know, our kids are not doing... well just... it primary, foundation cut and paste cut and paste cut and paste... then even if they even if they even you know...

One of the mentees however felt positive towards CAPS; as she did receive some support from the CI's:

You know this CAPS, they are not like the previous, this CAPS I think they are they got, they give us guidance. The one who creates CAPS. This CAPS got everything, everything. Even if there is not the full lesson plan but a little bit they highlight what to do. Okay, so it is definitely more understandable than this previous one… [Referring to the RNCS]

Lack of resources

From the profile of the participants and the context as previously described in this chapter (section 4.2) it is inevitable that the teachers will experience a lack of necessary resources such as adequately equipped laboratories, textbooks or other learning materials as required to effectively implement the intended curriculum. Special mention should be made here about the quality and availability of

textbooks. One of the participants, Amos, questioned the appropriate selection of textbooks for natural science:

> *Mmm. ... the problem, I don't know that our learning materials that the material had enough info ... there are lot of pictures... our textbook are having activities but information is very less. That made a teacher to struggle because if a topic here ... (inaudible) what must he do, but... if it had more information for the textbooks.*

Hope was more specific and indicated the need for textbooks not only for herself, but for all her learners:

> *When I go and ask for textbooks it is because I don't have enough learning material here... to teach the kids because some of the information is there in their textbooks, so I wanted it so that when I drew a lesson plan, when I teach the kids, I must also refer... in fact they are sort of referrals, I am going to refer on those books, when I do my lesson plan, when I teach the learners, those are the books where I am going to refer to gain more information for the learners. I wanted those books so that I may refer from that.*

Taken from Bandura's Social Cognitive Theory (1986), the responses of the mentees are viewed as thoroughly integrated with the environment within which they are learning. The learner's (in this study, the mentee's) cognitive responses, behaviour, and environment all work together to create learning. (see section 2.3.1).

4.6 SUMMARY

This chapter presented data analysis and representation procedures of the findings of a single case study. I started with a description of the case and its settings in this study– the experiences of primary school natural science teachers in a rural district in Mpumalanga. The chapter then proceeded with the presentation of the qualitative results collected from semi-structured interviews, including observational notes and document analysis. Dominant themes emerged from the data analysis process that revealed the experiences of the in-service teachers in a mentoring relationship.

These findings not only included their professional environment and support structures, their beliefs and attitudes towards teaching and learning but also how it affected their relationship with the mentor. The findings additionally include the activities which the participant teachers were exposed to, how they made sense of these experiences, as well as the way in which the mentoring relationship impacted on their personal and professional development. The findings also revealed the challenges or difficulties that the participants experienced in dealing with the implementation of new curricula. The next chapter presents the conclusions, recommendations, and limitations of the study.

CHAPTER 5
SUMMARY OF THE FINDINGS, CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS

5.1 INTRODUCTION

This chapter presents a summary of the findings, conclusions, limitations, and recommendations based on the results of the research. The objectives of this study were to explore and describe mentoring as a valuable tool in providing natural science teachers with a viable mechanism of support designed to meet their professional developmental needs.

The findings and conclusions presented in this chapter therefore serve to answer the main research question, namely: *What are the experiences of in-service primary school natural science teachers as mentees in a mentoring relationship, which forms part of a professional development programme in Mpumalanga?*

Accordingly, this final chapter focuses on the following:

- summary of the research findings and conclusions
- recommendations derived from this study
- limitations that reflect the shortcomings of this study
- a brief conclusion that summarises the study as a whole

5.2 SUMMARY AND CONCLUSIONS OF THE RESEARCH FINDINGS

In order to provide a logical sequence to this section, I have aligned the headings to the critical research questions that emerged from the main research question as set out in chapter one (see section 1.5). This approach also provides a framework for the discussion of the conclusions drawn from the findings of the empirical study and the literature review.

5.2.1 How do mentees in a mentorship programme (in this study, the ILLS project) experience the relationship with their mentor?

The first critical research question aimed to explore and describe how veteran natural science teachers experienced a professional development programme, in which they were guided by a mentor teacher. The literature review and the empirical study provided me with relevant information to come to an understanding of the way in which certain factors influence the experiences of natural science teachers as mentees in a mentoring relationship:

5.2.1.1 School context

The literature review has described the important role of the contextual environment on the personal and professional development of teachers. Fullan (1987), for example, highlights crucial factors for successful teacher professional development: the role of leadership at school level, the organisational culture at school level and the role of external agencies, especially at the local and regional level. The external domain (ED, sources of information, stimulus or support, such as in-service sessions, and conversations with colleagues) of a teacher's world as described by Clarke and Hollingsworth (2002:950) is therefore addressed by this research question (see section 2.3.2).

The empirical investigation identified the abovementioned crucial factors and indicated in which way the context of a school plays a defining role in the experiences of the mentees in this particular mentoring programme (ILLS Project). The mentees' responses from the interviews and observations, supported the important role of the social conditions such as the support of their community, support from their colleagues and school leadership, and the district officials in these teachers' perceptions of professional development processes.

At least two of the participants in this study related the inadequate involvement of the parents in their community to the fact that the schools are in rural areas and that many of their learners are orphans. Despite the inadequate support from the community, the participating teachers in this study seemed driven and motivated to

improve their instructional practices to the benefit of their community (see section 4.5.1.1).

Tillman (2005) suggests that administrators – school management and district officials – are central to the success of a mentoring program. This was also the view of the mentees in this study. They acknowledged the importance of leadership from the principal and support from their colleagues in professional development interventions. The high turnover rate and shortages of skilled natural science teachers were prominent barriers experienced by the mentees in this study. Johnson, et al. (2012) strongly suggests that the high turnover rates of teachers in schools with low income are driven largely by teachers fleeing "dysfunctional and unsupportive" work environments in the schools. Participants in this study also experienced the high turnover rate of science teachers in their schools as extremely frustrating; especially the way in which the school leadership addresses this problem. The frequent substitution of qualified science teachers with teachers who did not specialise in natural science education emerged as a challenge to school leadership, and needs to be addressed as it can have serious implications for the schools' ability to provide quality instruction (see section 4.5.1.2).

This study also revealed that administrators, at the district level, could either help or hinder a teacher's ability to change instructional practices. Teachers who experienced adequate communication and support from the district officials appeared to implement positive changes concerning their classroom practices. The pilot study with the mathematics teachers indicated that the district officials sufficiently informed them of the mentorship programme (ILLS project). In contrast, the majority of natural science teachers had not been informed sufficiently by the curriculum implementers about the mentoring programme, and as a result, they expressed their insecurities and concerns about the ILLS project. The comments of the mentees also suggest that the district officials are responsible for prioritising and implementing quality professional developmental interventions to support their professional growth.

In short, the findings as they relate to school context, led me to conclude that the conditions of teachers' work matter a great deal. Assistance through support and

encouragement allows the mentees to build skills and confidence while helping to empower them in the process of improving their personal and professional knowledge and skills. Without the active support from the community, school leadership and district officials, the positive experiences of the mentor-mentee relationship are less likely. This is an important reminder that teacher improvement and professional growth does not unilaterally unfold, but is reciprocally influenced by a stimulating and supportive environment (Bandura, 1986).

5.2.1.2 Relationship with the mentor

The participating mentees in this study, overall, indicated that they had positive relationships with the mentor teacher. The study revealed several ways in which the mentor, Mr William, contributed to the personal and professional development of the mentees. More specifically, he displayed all the qualities needed to be a successful and effective mentor, as described by Clutterbuck (1991) and Wang (2001), (see section 4.5.2.). I found that the mentees not only regarded their mentor teacher as knowledgeable and skilled in terms of his instructional abilities in science education, but also as a person who supports and encourages them. Gathering from the mentees' responses, I can conclude that these teachers view Mr William as a mentor who displayed a variety of mentoring skills; such as his ability to welcome different mentees from different contexts, his approachability, and his willingness to provide support (see section 4.1.2). More specifically, the mentor modelled, analysed, and deeply reflected upon mentoring; and what it entails to be an effective mentor (Wang & Paine, 2001).

To conclude, the mentees in this study experienced their relationship with the mentor teacher as "non-threatening", "supportive", and "encouraging". Their willingness to participate in the mentoring programme and their need to change their instructional practices to the benefit of the learners in natural science provides evidence that they experienced the mentoring relationship as valuable in their objectives to succeed.

5.2.2 In what activities did the mentees participate during the mentoring programme, with the guidance and support of a mentor from a neighbouring school?

This critical research question relates to the content of teacher professional development programmes, as addressed in several studies (see section 2.4.2). Gomes Zwiep and Benken (2012) for example, suggest that the focus of high quality professional development for mathematics and science teachers in particular, should emphasise the relevance and importance of subject content.

In this study, I explored teacher learning, while simultaneously examining the role that content domain plays in the manner in which teachers approach learning. The findings relate to teachers' learning of natural science content, how their perceptions of teaching and learning of this subject developed through content rich learning experiences.

In addressing content rich learning experiences, the validated model of Japanese Lesson Study offered a framework for development in the teachers' understandings of natural science (see section 2.4.2). The mentor teacher in this study underwent training to develop and implement a clear and consistent focus throughout the different stages of the Lesson Study approach and employed forms of mentoring, which aligned with the kind of teaching reformers advocate (Feiman-Nemser, 2001). The ILLS project also aimed to provide the mentee teachers with skills to improve their subject content knowledge as it aligns with the nature of the subject, (see section 4.5.3.1).

A discussion of the three phases of the ILLS programme, in which the activities during this mentoring process occurred, follows:

5.2.2.1 Lesson planning

The mentees in this study indicated that their skills regarding the understanding of subject matter have improved by having a knowledgeable mentor teacher who assisted them. It was evident from the responses of the mentees that they

experienced problems in lesson planning before they participated in this study. According to them, these planning sessions with their colleagues and mentor managed to enhance their content knowledge of science. It is noticeable that the participants experienced the activities; especially the experiments on the types of soil and the effect of sunlight on the growth of plants, as “hands-on” activities which helped them in practicing the new teaching strategies. The majority of mentees also indicated that the lesson planning sessions with knowledgeable subject teachers provided them with new teaching strategies, which they introduced to their learners with confidence and renewed enthusiasm.

5.2.2.2 Observation

The lesson study approach provided the mentees with the opportunity to observe each other’s implementation of a pre-planned lesson within their own classroom settings. From the interviews and observations it became apparent that the mentees seemed to be hesitant and insecure to be observed by other colleagues at first, but this perception seemed to fade the more they got involved in the planning sessions and the post-observational discussions. This case study therefore revealed that the more the mentees got involved in shared dialogue practices and discussing conceptions, subject related concerns and suggestions, the better they were able to accept positive criticism and to work on the continuous improvement of their instructional skills. It was also evident from the observational templates that the leadership and presence of the mentor teacher contributed to the positive experiences of the mentees in this professional development initiative. The mentor teacher, Mr William acknowledged, respected, and familiarised himself with the mentees’ expertise and context in order to build a relationship that removed the evaluative focus for the teachers (Pegg, et al. 2010). The teachers in this study generally felt comfortable with the presence of Mr William and the other mentee teachers in their classrooms; because they knew that it was not an evaluation.

5.2.2.3 Reflection

Literature reviews on the effects of reflective thinking programmes on teacher thought and classroom performance is contradictory and “rather disappointing”

according to Antoniou, Kyriakides and Creemers (2011:16) as there is no quantifiable evidence of how reflection can contribute to learner achievement. On the other hand, scholars on effective mentoring, Fraser (1998), Feiman-Nemser (2001) and Wang (2001) encourage and support reflection as it promotes "learning". Fraser (1998:64) describes the purpose of reflection in a mentoring relationship as 'to find the path with an open view ahead, pointing toward further refinement of the protégé's repertoire.'

From the observational templates and feedback meetings directly after the presentation of the pre-planned lesson in this study, I found that the mentees experienced that reflection, as part of the mentoring experience, contributed to their improved classroom strategies. The data indicated that the mentees had the opportunity to analyse and provide each other with feedback on "what worked and what did not work" after the lesson presentation.

A significant contribution of this study is its ability to reveal the importance of the structuring and operation of mentoring activities within a well-organised programme such as the ILLS project. The mentees in this study fully utilised the opportunities, created by the mentor teacher, to improve their SCK and PCK, and in so doing, were motivated to reform their instructional practices. This study addressed the domain of practice (DP, professional experimentation), based on Clarke and Hollingsworth's (2002) model of change in the professional development of teachers, (see section 2.3.2), since the teachers were allowed to give input and they were encouraged to address their own professional needs.

5.2.3 How do the mentees make sense of their experiences of mentoring?

This research question aims to address the personal domain (PD, teacher knowledge, beliefs and attitudes), and the domain of practice (CD, professional experimentation) based on Clarke and Hollingsworth's Interconnected model (2002:950). The mentees in this study participated in content-rich activities (CD) during the lesson planning meetings, and they have tried to make sense (PD) of these activities by finding ways to modify existing classroom practices.

The findings of this study reveal that the mentoring experiences did not change the perceptions of the mentees with respect to teaching and learning, i.e. what they have perceived as “being a good teacher”. Participants held varied and fixed knowledge and beliefs on what they perceive as good teaching practices. Some of the mentees expressed their perceptions based on emotional beliefs such as ‘I have to show the learners love, to treat them equally...’ and others on instructional beliefs for example: ‘I need to listen to other peoples’ advice to improve my classroom practice.’ One may assume that these fixed beliefs of the mentees related to the fact that they are experienced teachers with an average of more than 20 years of teaching experience. These findings are in line with many studies that suggest that changing teacher perceptions is hard to achieve (Goodrum, et al. 1992; Sharon, 1987). Jita (2004) also emphasises the need to consider the teacher’s biographies or identities as a critical factor in his account on the challenges some science teachers experience in implementing change in their classroom practice. He argues that implementing change in instructional practice is a complex process linked to the teacher’s prior experiences and identities toward teaching and learning science. For transformative classroom practices, a teacher should consciously reflect and (re)interpret his/her biographical experiences with a ‘strong will, a consistent vision of change, and plenty of cultural, professional and educational resources.’ (Jita, 2004:26).

Despite the issue of teachers’ perceptions and identities concerning teaching and learning, apparently not been modified in this study, those teachers employing the Japanese Lesson Study approach did manage to improve their skills in lesson planning. This finding suggests that it might not always be the case that we change teaching practice by first improving teacher perceptions. The reverse also might be true; that the teaching practices change first and then the perceptions. The present study therefore, suggests the need for further research to clarify this issue of the relationship between teachers’ perceptions and teaching practices.

Participants’ responses, however, indicate that there were significant shifts in their confidence and attitudes about teaching natural science. The mentees entered with uncertain views about their understanding of the subject they teach; but as the mentoring programme progressed, and participants had opportunities to get

involved in several activities; their confidence related to these understandings had shown a significant increase.

Furthermore, this study suggests that providing teachers with relevant content and numerous opportunities in a mentoring relationship to experience the expected learning can be a critical vehicle through which patterns of change can occur in teachers' understanding and perceptions of science. The mentees also commented that this project (ILLS project) is particularly different from one-day workshops in which they have participated in the past, where they learned new content and instructional strategies but did not fully implement changes. All the teachers in this study expressed the need for a sustained mentoring relationship in which continuous support will enable them to be successful in the implementation of the lessons they have planned.

To summarise: this study provided information which revealed that the personal domain regarding teachers' perceptions of teaching (or what they perceived as being a good teacher) did not change, but the domain of practice was definitely affected by the activities and collaboration they experienced during the mentoring relationship (see section 2.3.1).

5.2.4 How and why does the mentoring process influence the mentees in terms of personal and professional development, if at all?

Bandura's Theory of Triadic Reciprocal Determinism (1986), which is grounded in social constructivism, provided me with a theoretical framework that enabled me to elucidate regarding this question (see section 2.3.1).The findings in this study are in line with the interaction of the three domains on human agency (learning): the environmental, personal, and behavioural domain. A discussion of major findings, as it emerged from the study, follows in relation to the interaction between the three domains, according to Bandura (1986).

5.2.4.1 Environmental events (External domain)

Effective professional development is rooted in teachers' specific professional contexts and influenced by factors such as characteristics of the school culture and its population, available time, and local support for professional development (Little, 2006).

a) Leadership support

The mentees in this study indicated that the support from school management and colleagues contributed to their participation in this professional development intervention (ILLS Project). However, it appears that there is still a lack of communication and co-ordination of professional development programmes within the district office. The perceived inadequate communication and ineffective workshops, organised by some of the district officials, in particular natural science education, seems to be a challenge (see section 4.5.5.2).

b) Lack of resources

Several mentees reported on the lack of subject specific textbooks and inadequate chemical supplies, but as the mentoring programme progressed, they seemed to have focussed more on other issues such as lack of time or the next lesson planning sessions. This might be an indication that there could have been a change in instructional strategies, due to the support they received in the mentoring relationship (see section 4.5.5.2).

c) Time

Time is perceived as a general challenge in the implementation of any professional development programme. Steyn (2005) describes time as essential to the success of a professional development intervention and suggests that staff themselves should determine the appropriate time for professional development. Steyn (2005: 267) also cites Collinson: 'To treat time as a linear, uniform concept may lead to misdirected professional development efforts and a lack of meaningful educator

participation'. This viewpoint is in accordance with the findings in this study in the sense that many of the participants could not attend planning sessions or observe modelled classes due to time constraints (see section 4.5.4), and as a result, delayed the professional development process.

In this case study, the ILLS project provided both new information and new strategies for the teachers studied. The teaching strategies modelled in the lesson planning sessions represented external changes in the experiences available to the teachers.

5.2.4.2 Personal domain (cognitive factors)

All the teachers in this study appreciated the value of sharing teaching ideas, participating in hands-on activities guided by subject experts. Key aspects of the mentoring relationship to support these experiences included the focus on both pedagogical and content knowledge, provided by the mentor as an expert science teacher and the experienced teachers (Pegg, et al. 2010).

a) Activities

The use of collaborative group work of a variety of scientific investigations prompted by a task specifically linked to their own context, and the use of reflection were all forms of professional experimentation for these teachers (see section 5.2.2).

b) Collaboration

Collaboration emerged as a key factor in the professional growth of the mentees in this study. Teachers recognised that planning with their colleagues and participating in activities that are relevant to their classroom practice were important characteristics of their effective professional development experiences. Collaboration in this mentoring relationship seems to be structured and purposefully coordinated by the mentor teacher, Mr William, as he provided opportunities for these teachers to also bring their existing knowledge into the relationship (see section 5.2.4.2).

I also found that many of the mentee teachers not only required understanding of natural science content but also needed to build a collegial network among professional colleagues to enhance their professional growth. It seems as if the collaborative nature of this mentoring programme reduced the teachers' feeling of isolation and as an outcome contributed to their professional development.

In this context, mentoring can have a very useful role in helping natural science teachers to clarify and discuss key notions of teaching and learning a specific topic, thus contributing to the teachers' professional practical knowledge about teaching certain subject matter in a reformed way.

5.2.4.3 Behavioural domain

Findings in this study provide evidence that mentoring supports the development of and refocusing on important teacher behaviour such as self-reflection about their professional roles and practices, and social skills (referring to colleagues) development. These findings are also in line with Bandura's (1997) ''academic self-efficacy" definition, as discussed in Chapter 2 (see section 2.3.1). In particular, teachers' self-efficacy beliefs affected their choices of science-related activities, their efforts to perform tasks successfully, and their persistence and resilience to overcome obstacles. As one engages in tasks and activities and interprets one's previous performance, one develops beliefs about the ability to do subsequent tasks and activities (Bandura, 1997).

a) Beliefs and attitudes

Change in teacher beliefs and attitudes were evident in the value that the mentees have attached to the new teaching strategies they have learned (see section 5.2.3), and as a result, contributed to their personal and professional development.

b) Choice

Participation of the mentees in the ILLS Project and in this study was on a voluntary basis. The commitment of the mentees towards this intervention programme might

indicate that they experienced the mentoring process as contributing to their professional development. The question, 'How does this mentoring process compare with other development initiatives?' produced the following statements from the participants, indicating the importance of choice in professional development programmes: 'In some other workshops they give you the work schedule. Then you are going to do at your different schools but here we are going to sit together and plan together. I think that is the best thing' and 'We got more knowledge, we plan together and we also give input.' Bantwini (2012) appeals to districts in South Africa to re-define professional development and its purpose and involve teachers in the planning and facilitation of its activities. He argues, 'such involvement will enact a buy-in strategy that will make teachers realise the value in their education and in their classroom experiences and knowledge' (Bantwini, 2012:12).

c) Curriculum and policy issues

Another key finding pertains to curriculum reform as well as teacher learning within this reform. The perception is that teachers have the desire to innovate and improve their practices, but insecurity brought about by the implementation of new processes can hamper them, because either they have no training in the subject or in some cases, they need to see that others can do it before they try it themselves. This emphasises the importance of having guidance in a mentoring relationship for the successful implementation of a reformed curriculum.

d) Change in practice

A number of researchers have also noted the growth of veteran teachers' self-esteem as they engage in mentoring (Feiman-Nemser, 2001; Lai, 2010). Findings in this study support this notion from the mentees in that mentoring has enabled them to enhance their own professional skills, as they had opportunities for self-reflection and self-evaluation of their existing practices. Gathered from the interviews, the mentees have experienced a renewed energy for teaching and gained confidence in their own skills to teach natural science. One mentee in this study reported the effect of her improved instruction on the learners:

I have observed something that if you teach them, [the learners] and they saw that thing, it remains in their minds. Because you know that if I encounter a problem in this lesson, I know how whom to contact so that he or she can give me help. That's the thing. So it makes simpler for us, you get inside the class, you know that I am going to deliver something and I know that they [the learners] are going to understand.

Clarke and Hollingsworth (2002), mention that change is firmly tied to the teachers' existing value system and to the inferences the teacher draws from the practices of the classroom. Thus behavioural factors can vary:, for one teacher an 'increase in student-to-student talk may be constructed as a positive outcome of a new teaching strategy; for another teacher the same overt phenomenon may be interpreted as a sign of loss of control and an indication of the failure of the new strategy' (Clarke & Hollingsworth, 2002:951).

To summarise the findings of this study as I have discussed it: I have addressed all three of the domains of learning according to Bandura's Social Cognitive Theory (1986). Figure 5.1 describes the reciprocal nature off these three domains addressed in this empirical study.

Consistent with the social cognitive perspective, this study reveals that the effects of the mentees' physical environment (for example, a supportive school culture) interacted reciprocally with the cognitive environment (for example, the collaborative activities) which in turn reciprocally influenced their behaviour (for example, improvement in classroom practise). In the context of this mentoring relationship, I can conclude that the mentees experienced a measure of personal and professional growth due to the interactions identified in all three of Bandura's (1986) domains pertaining to learning.

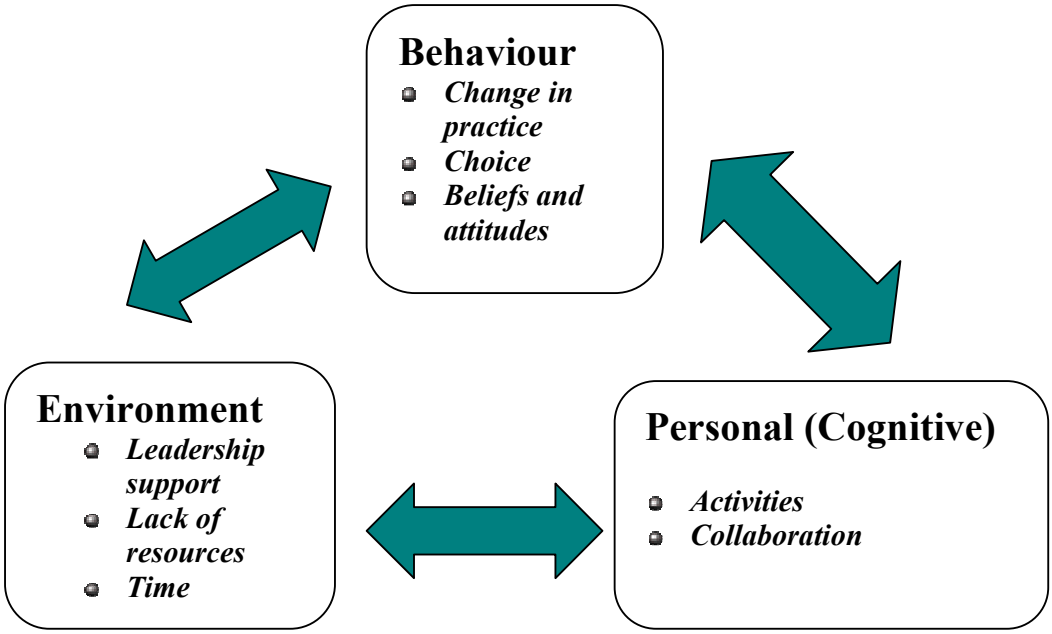

Figure 5.1: Findings of this study as it relates to Bandura's Learning Theory of Triadic Reciprocal Determinism (1986)

The research literature and the empirical study clearly demonstrate that mentoring, as a professional developmental experience, is complex and highly specific to the context, situation, and person. The conclusion can therefore be drawn that CPD goes beyond the acquisition of instructional strategies and content knowledge; it implies that professional development strategies, should be organised in ways that closely align to teachers' professional practice and their school culture as displayed by this research.

This study strongly suggest that if education in South Africa is to provide quality teaching for all learners, then the schools must become places that support the professional development of teachers in investing in sustained developmental initiatives as illustrated in this case study.

With this research, I intended to show that providing teachers with development programmes rendering to the needs of the mentees, can contribute to their personal and professional growth. For example, needs such as the continued support from

school leadership, delivery of necessary resources such as subject related textbooks as well as better-equipped laboratories.

Based on this study, most teachers who have participated in the ILLS project realise the positive benefits they gained because of participation in a structured mentoring programme. Many teachers reported having had their individual knowledge, skills, and attitudes enhanced through the process of mentoring.

This study contributes to the understanding of teacher learning and change, the commonalities and differences in perceptions of the learning of science as experienced by veteran teachers. All in all, in the words of Johnson (2009:10), this study portrays mentoring as a 'safe haven where mentors and mentees are able to develop flexible identities and thus become adaptive "learners" who are able to master the skills and strategies to plan, manage, carry out, and assess the activities of teaching and learning while at the same time adapting and adjusting to the complexities that are embedded in those activities in order to make sound instructional decisions within the contexts in which they teach'.

5.3 RECOMMENDATIONS

5.3.1 Suggestions for Further Research

- The findings of this study indicated that having a neighbouring or on-site mentor had a positive effect on professional development in this district. Future research could investigate the characteristics of instructional leaders and mentor teachers who are able to provide effective professional learning opportunities on-site.

- This exploratory research can also be complemented by some advanced hypothesis testing research. Although this study has contributed to insights on the experiences of a small group of teachers in a closed system, undoubtedly, more research needs to be done to test specific hypotheses about the role of mentorship as a professional development tool for experienced teachers in a more quantifiable mode. For instance, the effect of mentorship programmes both

in the short term and in the long term, or as experienced by a larger group of teachers in different school contexts, needs to be explored.

- Additional studies are important to confirm or reject any generalization of mentorship as an effective tool to other teacher professional development contexts. Further research in other contexts would provide information about contextual influences in science teachers' CPD programmes.

- I also recommend additional teacher professional development research, related to mentoring relationships which explores existing teacher beliefs, and teaching practice in reformed minded ways.

- Empirical research that provides insight into organisational challenges related to the development of a mentoring culture in schools; particularly in schools lacking in materials and technological resources, or shortages in qualified natural science teachers, needs to be further explored.

5.3.2 Suggestions for Practice

- This study suggests that the high turnover rate of qualified natural science teachers is a problem in this particular district. When implementing a CPD programme in a district or at a school site, it is essential that the school leaders place these programmes as a priority and create supportive contexts, such as releasing teachers to observe each other and provide them with protected time.

- Another suggestion is for relevant stakeholders to consider the practice of utilizing mentor teachers, in critical subject areas such as mathematics and science, outside the classroom as full-time mentors and create new career opportunities for these expert teachers.

- Besides creating new incentives and career opportunities for experienced teachers, assigning mentor teachers can help in-service science teachers who are struggling to implement demands of reformed education. Furthermore,

mentorship as a professional development tool, can change the whole backdrop of low achievement in critical subject areas such as mathematics and science education in South Africa.

- Of all aspects of professional development, sustaining positive change is perhaps the most neglected. 'It is clear that, to be successful, professional development must be seen as a process, not an event' (Guskey, 2002:388). The mentoring process is time-consuming and can easily be neglected. It is therefore necessary to invest in mentoring and sustain this professional development initiative. In short, programmes aiming at the development of teachers' CPD, like mentoring, should be based on constructivist and situated theories, adapted to their local contexts and the needs of the teachers and their learners, in order for them to contribute to these goals.

5.4 LIMITATIONS

Limitations of the research are discussed with regard to the literature review and the empirical study.

A limited amount of literature is available on the nature of the mentoring relationship between a mentor teacher and experienced teachers as mentees. Most of the literature on mentorship covers aspects on the mentoring relationships of novice- or student teachers and not in-service teachers.

In terms of this empirical study, the sample size of one mentor and seven mentees was not big enough to generalise the results to refer to a larger group of teachers. The sample was also not diverse enough to look at other aspects such as culture or gender that might have impacted on the quality of the mentoring relationship.

Limitations concerning the entry into the field were also a challenge as most of the participants in this particular district were part of a dispute between their union and the district officials. As a result, I was urged to limit the mentees to only seven. Due to inadequate communication between some of the teachers and the district officials most of the natural science teachers did not participate in the ILLS project.

In terms of time, the ILLS project was implemented in April 2011, during which examinations and tests were scheduled by schools and as a result, many planning sessions had to be rescheduled. Observational and reflection meetings were also limited as the participants also voiced administrative duties, as one of the reasons for not fully implementing this particular mentorship intervention. If the mentees had spent more time on the activities and collaborative meetings, it could have contributed to the depth of the qualitative information I had to analyse in this study.

At the time of the interviews, the learners had to write external departmental assessment examinations, and the teachers were pressured with the marking of these scripts and the year marks to be submitted to the district office. This also added to the limitation in the number of interviewees who participated in the study.

5.5 CONCLUSION

Even though I cannot make definitive assumptions and conclusions on the mentees' professional growth based on this single case study, I can draw several lessons from the mentees' experiences in this research.

First, the support of the community, school leadership and district officials, is a crucial factor in a mentoring relationship, which promotes the development of skills of teachers to improve their instructional practices. Teachers are essential stakeholders in any process of educational change and to enhance their competency in critical subject areas such as mathematics and science, various professional development opportunities and continuous support must be made available to them.

Second, the importance of the selection of the mentor teacher in any mentoring relationship needs to be carefully considered. A competent and successful mentor sees his or her goal as supporting teachers while building trusting relationships and in the process they refrain from being evaluative or judgmental. Teachers are however responsible for their individual professional growth, but the support of a mentor can be instrumental in their development.

Third, the sensible structuring and organising of activities for any intervention programme to be successful, is a necessity. The strategies, techniques, and activities used during the mentoring process engage teachers in becoming reflective practitioners and consequently support their professional development and personal growth. When mentors and mentees help one another to adapt renewed ideas, and engage in collaborative activities, which can contribute to an improvement in classroom practices, the learners (students) are likely to benefit. Further research still has to explore this possible relationship further.

Taking all the above mentioned factors into consideration, the mentoring process therefore carries with it the potential to enhance professional and personal learning, for the whole of the educational community. Based on the benefits obtained by the natural science teachers in this study who became involved in this strategy of professional learning for veteran teachers, it seems likely that mentoring may hold the answer to many of the problems that face our profession nowadays, such as the curriculum reforms and shortages of qualified science teachers.

In this qualitative study, I aimed at making explicit the theoretical underpinnings of and current understandings about teacher learning in the context of mentoring relationships. In attempting to do so, I touched on issues of learning and change in a teachers “world”. I thus argue that in-service teachers are learners, and therefore mentoring has the ability to play an important role in their continuous professional growth.

To conclude, I assert that CPD of experienced teachers goes beyond the acquisition of instructional strategies and techniques, but includes an understanding of how to develop insights in specific subject matter, within social settings such as a mentoring relationship. Hence, mentoring as a strategy for life-long teacher learning and growth can become a useful tool, which allows communities of teachers, mentors and learners to change the classroom and thereby hold the promise of learner achievement in mathematics and science in South Africa.

The overall results of this study clarified the argument of Daresh (2003:7), that mentoring is a powerful device that may help teachers develop new insights into the

profession, ‘this is true whether talking about experienced or new teachers.’ In the words of Clutterbuck (1991:104):

> *Old stagers can benefit from mentors too; mentoring should not be seen solely for young, relatively new recruits.*

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APPENDIX 1
LETTER TO THE REGIONAL DIRECTOR

Constantiapark
Pretoria

9 September 2011

The Regional Director
Ehlanzeni Region
Mpumalanga Department of Education

Re: Application for conducting research in the Ehlanzeni Region

Dear Sir

I hereby apply for permission to conduct research in the Ehlanzeni Region. The focus of this study is to explore and understand teachers' experiences and perspectives in a mentoring relationship. These teachers are being mentored by educators who are regarded as skilled mentors who participated in the Instructional Leadership for Teacher Development through Lesson Study (ILLS project), under the leaderships of Prof. L. C. Jita and Ms. M. L. Mokhele from the University of South Africa (UNISA).

I request your permission to perform observations and interviews with:

- Teachers who participated in the ILLS project
- Only mathematics, science or life science teachers

The normal school program **will not** be interrupted as I will only be doing research during arranged meetings by the mentor and his/her group of mentees.

It is expected and hoped that this study will contribute to the literature on mentorship as an effective tool for Teacher Professional Development in these critical subject areas.

Thank you for the consideration and kind cooperation on Teacher Development.
Your favourable response will be highly appreciated.

Kind Regards

Adri van der Nest
MEd candidate (UNISA)

Contact details: cell number (included)
home number (included)
e-mail address (included)
fax number (included)

Signature of approval

REGIONAL DIRECTOR:Ehlanzeni Region

APPENDIX 2
INFORMED CONSENT FORM

Dear Sir/Madam

Thank you for your time and the opportunity to invite you to participate in a research project. This research forms part of the ILLS project in which you are already involved as participants.

The research I want to conduct forms part of a MEd study entitled:

"Teacher Mentorship as Professional Development: *Experiences of two Mpumalanga primary school Science Teachers as mentees.*"

The focus of this study would be aimed at exploring; describing and understanding the experiences of the mentees during this process of mentoring.

Your participation in this research project is voluntary and confidential. You will not be asked to reveal any information that will allow your identity to be established. If you are willing to participate in this study, please sign this letter as a declaration of your consent i.e. that you participate in this project willingly and that you understand that you may withdraw from the research project at any time. Under no circumstances will the identity of participants be made known to others.

Your permission is further requested for me to audiotape and use digital voice recorders as part of the observations during your meetings as a cluster.

I appreciate your cooperation and time you have put aside to support me in this important project.

Yours sincerely

Adri van der Nest

Participant's signature.....

Date.....

Researcher's signature.....

Date.....

APPENDIX 3

LETTER TO THE SCHOOL PRINCIPALS FOR CONDUCTING THE RESEARCH

10 September 2011

The Principal

Dear Sir/ Madam

RE: **APPLICATION FOR CONDUCTING RESEARCH AT YOUR SCHOOL**

I hereby apply for permission to conduct research at your school. The aim of this study is to explore in-service teachers' perspectives on mentorship as a form of continuous professional development. The study will focus only on Science teachers who are participating in the ILLS project. It is hoped that the study will make a meaningful contribution to the literature and policies on mentorship regarding Teacher Professional Development in the critical subject areas such as Science and Mathematics.

The results of the study will be shared with the school after the research has been conducted.

I further request your permission to conduct interviews and observations with:

- Science teachers who participated in the ILLS project

The normal school program **will not** be interrupted. As the observations will be done during the pre-scheduled cluster meetings and the interviews will be individually conducted, not during class time.

Thank you for your kind cooperation. Your favourable response will be appreciated.

Kind Regards

Me. Adri van der Nest

MEd candidate (University of South Africa)

Contact details: cell Number (included)

Home number (included)

APPENDIX 4
INTERVIEW PROTOCOL

INTERVIEW PROTOCOL

Teacher Mentorship as Professional Development: *Experiences of Primary School Natural Science Teachers as Mentees in Mpumalanga*

The study explores in - service teachers' perspectives and experiences of a mentoring relationship, and explores its meaning for them personally and in the context of their work.

By observing and interviewing a group of teachers, who were part of a science and mathematics professional development initiative by UNISA (the ILLS project), I explored the conceptions of the teachers, who are being mentored by other teachers (mentors), and its meaning for them personally and their work during this mentoring relationship.

Questions:

1. *Name and background* -How long have you been teaching...? [Probes: Where? Which grades? What subjects?]

2. *Present work experience*. How long have you taught at your present school? [Probes: which subjects? if not covered in question 1 above]

3. How is it like to teach at school X?
[Probe: why do you say X]

4. *I wish to focus a little bit on your involvement in the mentorship project:*

You participated in the ILLS project, How were you selected? [Probes: How were you informed? What was the process?] [How did you feel when you were selected to get involved? Why did you feel this way?]

5. How many meetings have you attended since April 2011? Describe **what** you all do during the mentoring sessions. [Probe: Did all the teachers in your specific group work together, if at all? [Examples]

6. Let's take one meeting and talk about it: *What did you do exactly during this whole meeting?* [Describe some of your **activities**?]. Did you enjoy doing those? [Why?]

7. Tell me more about the interesting topics in your subject area that you covered during the mentoring which you have taken back to your classroom. [Probes: Why did you find these important? Describe **how** you took them **back to your classroom** – what exactly did you do?]

8. Let's talk now about your **perceptions** of the mentoring process itself. What do you think of it so far? [Probes: what have you gained from it so far? Describe for me the relationship between you and your mentor? What are the **two** things that you would say you **like** about the mentoring process itself? (Why?). What are the two things that you **do not** necessarily **like** about it so far? (Why?)].

9. What did you **dislike/not like** about the mentorship program? You may mention anything that comes to mind. Please explain your answer and give any **suggestions** on how you would change it?

10. How would you **compare** this specific mentorship programme with professional development interventions such as workshops, cluster meetings etc. that you may have attended previously? [Probes: Do you feel different about this programme? How? Why?]

11. Let us talk about your **mentor**. Are you more comfortable and relaxed in the presence of your mentor than before you started the mentoring programme? *Do you think participating in the mentoring program contributed to your feeling that you may/may not have **reached the goals** as set up by the mentor during this period?*[Probe: Why do you feel this way?]

12. One final Question: *What are your perceptions of a 'good' teacher?*