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Summary of the study

Continuing Professional Development (CPD) of teachers is increasingly becoming a priority in most countries throughout the world. It is widely viewed as the most effective approach to prepare teachers adequately, and to improve their instructional and intervention practices, for when they enter the workforce (Fraser *et al* 2007). Despite the general acceptance of CPD programmes as essential to the improvement of education, reviews of professional development research constantly point out the ineffectiveness of most of these programmes (see Cohen and Hill, 1998 and 2000). Furthermore, many teachers express dissatisfaction with the professional development opportunities made available to them in schools and insist that the most effective development programmes they have experienced have been self-initiated (National Research Council, 2007). There is a consensus that many CPD programmes have yet to understand professional development from a teacher's perspective. This perspective acknowledges what drives teachers to enlist in these programmes and how such programmes can make a difference to them and their classrooms.

Therefore, this study seeks to return the emphasis of professional development to the teachers. The study explores the teachers' perspectives of CPD in general, the personal meaning of CPD, and its meaning in the context of their work. By interviewing the teachers who were part of the Mpumalanga Secondary Science Initiative (MSSI) project (a seven year science and mathematics professional development intervention), I explore: the teachers' opinions of the intervention; its meaning to them and their work; and its impact on their classroom practices and students for the duration of the intervention and beyond. In this study, I explore data from an extensive and longitudinal study of teachers who were part of the CPD programme in greater detail. In discussing my data, I propose that CPD, however well intentioned and executed, is received differently by each teacher as a result of their personal circumstances and investment in the programme. I

argue that the greater the unity between the personal circumstances and motivations of the teachers and those of the CPD intervention, the more likely the outcome will be meaningful for the participating teachers. In turn, the ability to sustain the benefits of the intervention will be enhanced.

Key words

Continuing professional development,

Teacher perspectives,

Classroom practices,

Continuing professional development programme.

CHAPTER 1

Title

Teachers' perspectives on continuing professional development: a case study of the Mpumalanga Secondary Science Initiative (MSSI) project

1. Introduction

Professional development is, according to Fletcher and Zuber-Skerritt (2007), a significant issue in all workplaces for dealing most effectively with the complexity of modern society. Unprecedented technological advancements in recent times mean that changing workplace demands and a need for current knowledge result in ongoing economic imperatives that professional development seeks to address. Professional development is therefore a costly part of what governments, professions, companies and individuals must do to most efficiently respond to contingencies and build platforms for sustainable growth in reaction to continuous change.

In education, continuing professional development (CPD) is increasingly becoming a priority in most countries throughout the world. It is widely viewed as the most effective approach to prepare teachers adequately, and improve their instructional and intervention practices, for when they enter the workforce (Fraser *et al* 2007). In other words, the CPD of teachers is one of the key factors in ensuring that education reforms, at any level, are effective. International evidence seems to suggest that the progress of educational reforms depends on the individual and collective capacity of teachers and its link with the school-wide promotion of the education of pupils (Stoll *et al* 2006). Building the capacity to do so is thus critical, and that is what CPD aims to achieve. Various authors concur that professional development is goal-oriented and argue that it needs to be

continuous, supported through a variety of techniques, and adapted to the specific needs of the students it affects (Little and Houston, 2003). Bates (2000) argues that CPD becomes effective when it is needed rather than when it is offered; this argument is based on the premise that a teacher may use the techniques learned in the programme at some point in the future. Successful CPD opportunities for teachers have significantly positive effects on the performance and learning of students (International Institute for Education Planning, IIEP 2003). Bolam (2000) also argues that professional development is an essential part of improving school performance. Since the goal of most education reforms is to improve student learning and teacher performance, the professional development of teachers will for the foreseeable future – continue to feature prominently in larger education reforms. Teachers are at the heart of such reforms for they must execute the demands of these reforms in the classrooms. High quality CPD is inevitably a central component in nearly every modern proposal for improving education.

Nowadays, teachers are expected to fulfil dual roles: teaching and engaging in continuous professional development of teaching and learning skills (Harwood and Clarke, 2006). To do so, they must receive high-quality professional development and be given time to implement what they learn through validated interventions (Deshler and Schumaker, 1993).

Many professional development programmes have been proposed, and all of these vary widely in their content and format. Most programmes however, share a common purpose: to alter the professional practices, beliefs, and understanding of school persons towards an articulated end (Guskey, 2002). CPD programmes are therefore viewed as systematic efforts to change the practices of teachers in the classroom, to change their attitudes and beliefs, and to change the learning outcomes of students. In her research, Borko (2004) provides evidence that intensive professional development programmes can help teachers to increase their knowledge and improve their teaching. While most

developed countries have an established history of professional development, in South Africa the skilling of the nation‘s workforce is relatively new and has major political, economic and social implications. As a result, the South African government has also adopted a range of programmes and approaches which are designed to support political stability, economic growth and educational development (Fletcher and Zuber-Skerrit, 2007).

Despite the general acceptance of CPD programmes as essential to the improvement of education, reviews of professional development research constantly point out the ineffectiveness of these programmes (see Cohen and Hill, 1998 & 2000; Kennedy, 1998; Wang *et al* 1999). Furthermore, many teachers express dissatisfaction with the professional development opportunities made available to them in schools and insist that the most effective development programmes they have experienced have been self-initiated (National Research Council, NRC 2007). A variety of factors undoubtedly contribute to this perceived ineffectiveness; these include the fact that a majority of the programmes fail to take into account two crucial factors: what motivates teachers to engage in professional development, and what processes take place which cause a change in teachers (Guskey, 1986). Worded differently, there is a consensus that many CPD programmes have yet to understand professional development from the teachers’ perspective. The key question from this perspective is what drives teachers to enlist in these programmes and how such programmes can make a difference to the teachers and their classrooms. Therefore, the present study seeks to correct this anomaly by returning the emphasis of research back to the teachers. The study explored teachers’ perspectives of CPD, and then focuses specifically on a science and mathematics initiative to develop teachers (called the Mpumalanga Secondary Science Initiative (MSSI) programme) and its influence on the teachers’ practices.

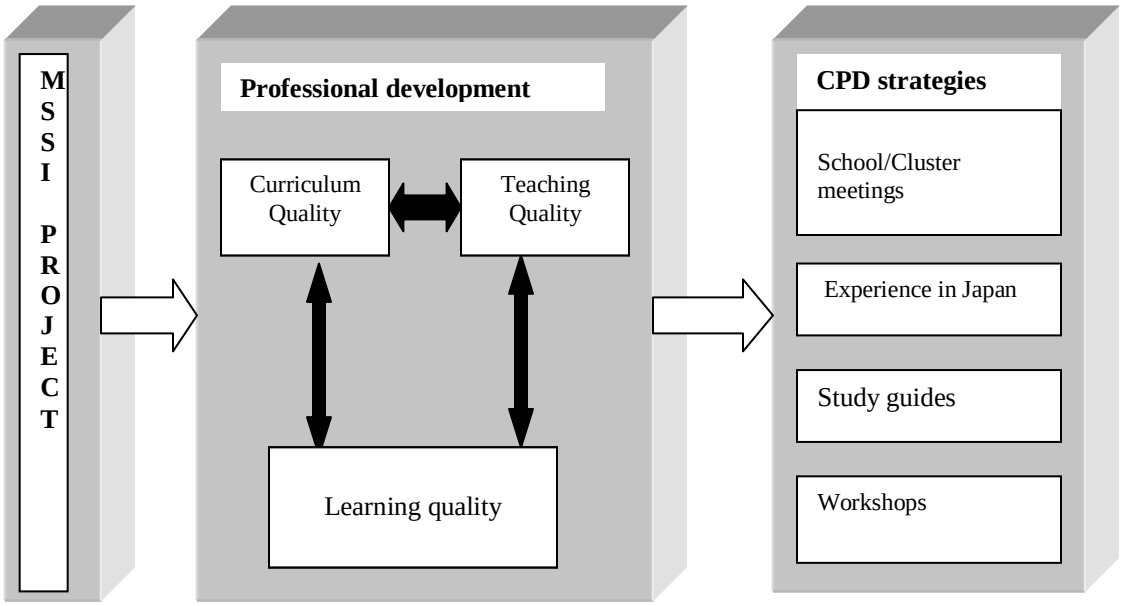
1.1 The Mpumalanga Secondary Science Initiative (MSSI) Project

According to Shaku (2000) the Mpumalanga Secondary Science Initiative (MSSI) was launched in 1999 as a province-wide initiative aimed specifically at promoting a more collaborative approach to teacher development in the province of Mpumalanga in South Africa. The project had two phases: the period from April 1999 – March 2003 was known as Phase 1 while the period from April 2003 – March 2006 was known as Phase 2. The MSSI project sought to improve the quality of teaching and learning in Mathematics and Natural Sciences by enhancing the knowledge and experience of the teachers. Coupled with this goal, the project promoted school-based or on-the-job in service training (INSET) which included the retraining of teachers in OBE (the 2005 curriculum).

The MSSI approach, initially involved the training of curriculum implementers (CIs) (sometimes called Subject Advisors), who were then expected to act as teacher trainers thereafter. The training of CIs was initially carried out with a five-week group-study in Japan. Upon their return, the group of CIs was expected to organise district-level workshops for Mathematics and Science Heads of Department (HoDs) in the secondary schools within the districts. The HODs would, in turn, convene training sessions for their colleagues in the schools. In the later stages of the project (Phase 2), however, the key stakeholders in the MSSI intervention opted for a slightly different approach to CPD in order to correct some of the perceived shortcomings of Phase 1. The MSSI in Phase 2 sought to bring the intervention much closer to the teachers and the classrooms. The new strategy of using teacher clusters (or networks) was intended to impact on the teachers' classroom practices more directly than had been the case in Phase 1. The entire project exposed the teachers to Japanese experiences and practices through the study missions in Japan and the interaction with Japanese experts; other experts from a local university also assisted the teachers during the teacher (cluster) workshops.

The MSSI was a large scale initiative of CPD for mathematics and natural science teachers; the district education officials were also sent to Japan to observe the local education administration practices. The underlying rationale for sending district managers there was for them to better understand and support the efforts of the teacher trainers. Locally, the University of Pretoria (UP) played a critical role in analysing (and learning from) the Japanese experience. It also introduced Curriculum 2005-thinking into the MSSI teacher retraining programme. As noted earlier, the programme targeted three major stakeholder groups: Firstly, the mathematics and science educators that teach both in secondary and primary schools in Mpumalanga. These educators were expected to form groups that are known as “teacher clusters” that would meet on a regular basis for professional development activities and sharing. Secondly, there were mathematics and science teachers who were entrusted with the role of leading other teachers in promoting cluster-based and school-based professional development activities in their circuits and schools. Such teacher leaders were referred to as Cluster Leaders (CLs). The cluster leaders have since been officially recognised by the Mpumalanga Department of Education (MDE) as teacher leaders who have the task of leading and facilitating cluster meetings in each school circuit. Thirdly, there were the General Education and Training (GET) and Further Education Training (FET) curriculum implementers (CIs) responsible for overseeing the implementation of mathematics and science in the various regions of the province. The CIs are subject specialists who are employed throughout the province to organise and support teacher professional development and other professional activities related to teaching and learning in schools.

Figure 1: **The Structure of the MSSI Programme**



By using the case of the MSSI programme, this study explores how the CPD was important to the teachers involved, what impact it had or did not have on their practices, and which CPD strategies contributed to the impact or lack thereof.

1.2 Formulation of the Problem

These are changing times for many education systems around the world and the new millennium has, for many societies, offered opportunities for serious and promising educational reforms. One of the key elements in most of these reforms is the CPD of teachers. The pressures on schools to improve their standards of achievement are unlikely to recede in the next few years (Harris and Muijs, 2003). However, the real challenge facing most schools is no longer how to improve, but rather, how to sustain their improvement (Harris and Muijs, 2003). Johnson and Donaldson (2007) contend that the emphasis on standards and accountability has placed extraordinary demands on schools to improve

instructional outcomes. Also, reform requires that teachers learn new roles and ways of teaching that translate into long-term developmental processes which require them to focus on changing their own practices. Similarly, in the wake of Apartheid, South Africa's most urgent and difficult project is to reconstruct all spheres of public life so as to establish conditions which enable a flourishing and peaceful democracy. A viable education system with committed, competent and confident teachers is a primary condition for accomplishing this goal (Pendlebury, 1998). To meet all of these demands, the professional development of teachers is now recognised as vital to enhancing the quality of teaching and learning in schools. As Gary Sykes argues about the American education system, CPD is for many countries the most serious unsolved problem in education (1996:465). Like all other professionals, teachers need to stay informed about new knowledge and technologies.

In many developing countries and some developed countries, there are a number of teachers who teach without any prior training or preparation in the field. Some have received a post-secondary education degree in a field other than teaching or education; some have only completed secondary education; and others have only completed primary education (Marcondes, 1999). Also in the context of South Africa, scholars have reported on the low literacy levels of teachers, stating for example that more than half of Grade Three teachers have the equivalent of Grade Six literacy (Olivier, 2007:9). Such reports, including that of the Ministerial Committee on Rural Education (2005), have noted a shortage of qualified and competent teachers and the limited access that teachers in rural schools have to CPD programmes. Most of these unqualified teachers need CPD not because they want to keep themselves informed of the newest trends or techniques, but primarily because they need to learn the most basic aspects of teaching. To add to this dilemma, Jita and Mokhele (2008) have observed that in South Africa, a new curriculum designed to encourage the learning of conceptually demanding subject matter has been introduced; while this new curriculum has provided the necessary impetus for change in some schools,

others have continued to struggle in their attempts to provide high quality instruction. For this reason, even qualified teachers would need CPD in order to teach the newly introduced curriculum. It is also worth noting that most new teachers report that they are not adequately prepared to meet the needs of their students and many experienced teachers also have to adapt to these new standards (The Finance Project and Public Education Network, 2000). It is against this background that in South Africa and elsewhere, national and provincial departments of education strive to provide more, and better, opportunities to advance the continuing professional development of teachers by working collaboratively with statutory and non-statutory bodies as well as stakeholders within the education system. It is as a result of this that, as argued by Jonhson *et al* (2000), notions of alternative strategies which enable teacher development are beginning to emerge in South Africa.

This study, therefore, is based on the following questions: if professional development is, as is often argued, so worthwhile and necessary for the growth and success of teachers, why is it so difficult and often contentious to have teachers enlist and attend many of the voluntary professional development programmes on offer? Why, in spite of attending many involuntary professional development sessions, have teachers' classroom practices – for the most part – remained unchanged? Teachers ought to say more about these issues.

Many professional development initiatives are rarely evaluated in a constructive manner. This lack of evaluation and accountability not only contributes to a lack of information about the effectiveness of professional development, but it also gives teachers no reason to take professional development seriously (Report on Teacher Professional Development, 2006). On the contrary, given the new understanding of professional development as an ongoing process of growth and learning, there are some cases which show that professional development programmes can be quite successful and that these experiences have a noticeable impact on the work of teachers, both in and out of the classroom. This

is especially true when considering that a significant number of teachers throughout the world are underprepared for their profession (International Institute for Educational Planning, IIEP 2003). Although there have been relatively few rigorous evaluations to date, there are some suggestive findings which indicate that professional development which meets the high-quality criteria as described by Hawley and Valli (2001) for example, may alter teacher learning and classroom practice (Porter *et al* 2000). These studies also suggest that such changes, in turn, may affect the academic performance of students (Cohen and Hill, 2000; Wenglinsky, 2002). However, much more empirical work is needed to address the question of whether, through the eyes and experiences of the teachers, the programmes have had an impact, or not, in their classroom practices, and whether particular programmes are more effective than others. Thus, my study seeks to collect and explore the opinions of the teachers who participated in one of these professional development programmes (the Mpumalanga Secondary Science Initiative (MSSI)) and determine whether it had any influence on their classroom practice.

Although much research is available on staff development models, few studies have examined the issue of professional development from the teacher's perspective (Singh and Shiffelette, 1996). The focus of this study is to explore the Mpumalanga Secondary Science Initiative through the eyes and experiences of the teachers. I use this approach in order to explore more deeply how MSSI influenced teachers, to understand the experiences these teachers had of the programme and to determine the impact, or lack thereof, on their practice.

In order to explore the perspectives of teachers on the MSSI project, the following critical questions will be addressed specifically:

1. What are the teacher's views of, and beliefs about, the MSSI as a CPD project?
2. What are their views of, and beliefs about, the CPD practices and

strategies used in MSSI?

3. How did the MSSI affect the classroom practices of the participating teachers, if at all?
4. How can the effect or lack thereof, be understood and explained from the perspectives of the teachers?

1.3 Aims and objectives

This study seeks to explore teachers' opinions on the MSSI project. More specifically, it aims to discover how teachers thought about their work before and during the project and how they think about it afterwards. It also seeks to examine the ways in which the teachers manifested their thoughts and beliefs in the classrooms. The construct of perspectives, which has its theoretical roots in the work of G.H. Mead and his concept of act (Mead, 1938), as cited in (Tabachnick *et al* 1985), refers to:

A coordinated set of ideas and actions a person uses in dealing with some problematic situation; a person's ordinary way of thinking and feeling about and acting in such a situation. These thoughts and actions are coordinated in the sense that the actions flow reasonably, from the actor's point of view, from the ideas contained in the perspective… and are seen by the actor as providing justification for acting as he does (Becker *et al*, 1961:34) in (Tabachnick *et al* 1985).

According to the definition given above, perspectives differ by varying attitudes since they involve actions and not merely dispositions to act. Also, perspectives are defined in relation to specific problematic situations and do not necessarily represent generalised beliefs or ideologies. Tabachnick *et al* (1985) have applied the construct of perspectives to student teaching and defined teacher perspectives as the ways in which teachers think about their work (e.g. purposes, goals, conceptions of children, curriculum) and the ways in which they manifest

these beliefs in the classroom.

Another example of the very early explorations of people's perspectives was done by Rokeach (1968) in a study where he defines perspectives as the personal attitudes, values and beliefs that help teachers interpret and justify their classroom decisions and actions (as cited in Bennett, 1995). Teacher perspectives take into account how situations within schools and classrooms are experienced; how these situations are interpreted given the different backgrounds, assumptions, beliefs, and previous experiences of the teachers; and how their interpretations are manifested (Goodman 1985:2).

In their study, Zeichner and Tabachnick (1985) used teacher perspectives to study the socialisation of pre-service teachers into the profession, and to describe the conditions of student teaching and the first year of teaching. Based upon a two-year study that explored the extent to which new teachers modified their teaching perspectives during their first year of teaching, they refute the commonly accepted belief that teachers lose their idealism during the first year of teaching. In subsequent research studies, the issue of perspectives has become much more complex as many scholars almost never define the concept of *Teacher's perspectives*; they seem to immediately engage with the issues concerned without understanding and defining the meaning of the concept itself. However, many of these scholars still view teacher's perspectives as what the teachers, as participants, think about the issues they have studied; they seem to focus on the opinions and beliefs of teachers. The conclusions of such studies are thus based on what the teachers think and do not include how they act. One example of this is the study by Okhee *et al* (2008). In their study they looked at the 5 year professional development intervention that was designed to improve the knowledge, beliefs and practices for teaching Science, English and Mathematics for English Language Learning (ELL) to students in urban schools. They conclude that the teachers believed that the intervention, including curriculum materials and teacher workshops, effectively improved the students'

acquisition of Science, English and Mathematics. Another example is of the study by Tichenor and Tichenor (2005) which examines what it means to be professional and to exhibit professionalism in the field of education. They go beyond the theoretical definition of teacher professionalism to explore what it means on a practical level. They specifically used focus-group interviews to ask in-service teachers what they believed were the basic qualities of professional teachers and which of these aspects they felt they exhibited. According to these teachers, professionalism is exhibited in many ways and encompasses both attitude and behaviour.

In this study I am informed by the views expressed in both early and later explorations that the term perspectives means personal attitudes, values, and beliefs that help teachers interpret their classroom decisions. The term also includes how such interpretations are manifested in their actions. The main objectives of this study are to explore:

- How the MSSI project's efforts influenced teachers' knowledge and skills.
- The effects or lack thereof on the teachers' classroom practices.
- What professional development strategies were useful for the teachers and why.
- The teachers' reasoning for why it is difficult to get teachers to attend professional development activities.
- How CPD may have an effect on teachers' classroom practices.

The foregoing objectives will be addressed through an investigation of the teachers' experiences of the MSSI. Unlike the evaluation of CPD projects, the teachers here will discuss in detail their own opinions and experiences of the successes and failures of the project as well as the effects on their classroom practices. It is important to consider the opinions of the teachers when dealing with professional development issues as they (the teachers) are the direct

beneficiaries. As will be discussed later in the chapter, educational reforms that do not include teachers and their professional development have tended to be unsuccessful.

1.4 Rational for the Inquiry

Many education systems worldwide have undergone major reforms over the last two decades or more (Pretorius, 2004) and a paradigm shift regarding the professional development of teachers has been gaining momentum. As a result of the complexities of teaching and learning within a climate of increasing accountability, this reform moves professional development beyond merely giving teachers new knowledge and skills (Vescio, Ross, and Adams, 2008). In their article on policies that support professional development, Darling-Hammond and McLaughlin (1995) note that;

> The vision of practice that underlies the nation's reform agenda requires most teachers to rethink their own practice, to construct new classroom roles and expectations about student outcomes and to teach in ways they have never taught before (p.597).

Darling-Hammond and McLaughlin continue by arguing that helping teachers to rethink their practice necessitates professional development which involves teachers in both teaching and learning and that this creates a new vision of what, when and how teachers should learn. As a result, some examples show that teachers in countries such as the USA and Japan have engaged in formal and informal professional development for decades.

However, professional development as a focus of study is a relatively recent phenomenon, with most policy changes and research occurring since the mid 1990s (Collinson and Ono, 2001). In South Africa, Fletcher and Skerritt (2007) have argued that the greatest challenge for the education system in the post-apartheid era has been to re-educate teachers and students on all levels. As with virtually all levels and forms of education in South Africa, the education of teachers has received the attention of policy-makers in recent years. The new policy on teacher education, the *Norms and Standards for Educators,* was published on 4 February 2000 and all new teacher education programmes now need to be designed in accordance with the regulations promulgated in this policy (Robinson, 2003). One of the key policy documents on teacher education in South Africa states:

> This policy for teacher education in South Africa is designed to develop a teaching profession ready and able to meet the needs of a democratic South Africa in the 21st century. It brings clarity and coherence to the complex but critical matrix of teacher education activities, from initial recruitment as a student teacher, throughout the professional career of a teacher. The overriding aim of the policy is to properly equip teachers to undertake their essential and demanding task, to enable them to continually enhance their professional competence and performance, and to raise the esteem in which they are held by the people of South Africa. (The National Policy Framework For Teacher Education and Development in South Africa, 2006:4)

1.5 Challenges facing Mathematics and Science Teachers in South Africa

The poor state of science and mathematics education in South Africa is well documented. Very few learners are graduating from the school system with high quality passes in mathematics and science in order to enter universities. Although education and training are being transformed in post-apartheid South Africa, the failure rate in mathematics remains unacceptably high (Steyn and Maree, 2003). According to Ntshwanti-Khumalo (2003), only 20% of all South African university students ever graduate and students in science and commerce exhibit the highest failure rates. In comparative terms, South African learners have performed badly in every major international assessment of science and mathematics (Reddy, 2005; Howie, 1997). One well-known international study in which South Africa participated, that compares countries worldwide, is the Trends in International Mathematics and Science Study (TIMSS). The TIMSS (1999) also ranks South Africa last in proficiency levels. About 69% of South African learners who took part in the study did not achieve the lower-quartile benchmark.

Several theories have been developed to try and explain this consistently below-par performance by South African learners. These theories either dismiss the international assessment instruments for being out of step with the South African curriculum and realities, blame problems of language and cultural biases, or cite the curriculum and other education changes in the country as the reason for these statistics. In 1995, the Human Sciences Research Council (HSRC) conducted a survey on mathematics and science among 15 000 South African students from more than 400 primary and secondary schools, as part of what was then called the Third International Mathematics and Science Study (now the TIMSS). Globally, more than half a million students in 45 countries participated in this project. The results of the achievement tests taken from the international reports on TIMSS (TIMSS, 1999) reflected the following:

- South Africa's scores were very low in comparison to those of other participating counties.
- South Africa's results did not display any areas in science and mathematics in which students performed well.
- South Africa's results indicated the lowest overall improvement.
- South Africa students possessed generally inadequate problem-solving techniques.
- South African students generally had difficulty in constructing their own answers.

Since 1994 there has been considerable policy-related analysis of and intervention in, the science and mathematics education system in an attempt to improve it (DoE, 2000; DoE 2001; GDE 2003). Yet, more than ten years after our first democratic election, South Africa is still grappling with poor performance in mathematics and science, and how to change this situation (Reddy *et.al*, 2006). In addition, Jita and Ndlalane (2005) note that much has been said about this inadequacy especially with regard to the teachers of these subjects (in South Africa and other developing countries), but that very little has been done to address the problem.

In an attempt to intervene, the new government of South Africa has embarked on several notable initiatives to address the problem, including the development of a Mathematics, Science and Technology National Strategy (Department of Education, 2001), and altering the curriculum into the Outcomes Based Education (OBE) model of learning (Department of Education, 1997). Despite all of these initiatives, most teachers in the country are lacking both the subject knowledge and the pedagogical content knowledge of mathematics and science. It is as a result of these problems that South Africa has adopted and developed various teacher professional development programmes, such as the MSSI, to update teacher skills and provide professional support. This research seeks to

explore the perspectives of teachers on professional development programmes and in particular the MSSI project, one of the initiatives that sought to solve the problems related to teaching mathematics and science in Mpumalanga.

Several interests, both scholarly and personal, have led to this investigation. I have worked as a secondary teacher for a couple of years in Lesotho and have observed that regardless of the many professional development activities that I participated in, my classroom practices have barely improved. The majority of teachers still find it hard to change their classroom practices. Given my own experiences and struggles, I have found it interesting to explore the perspectives that teachers have of CPD in order to understand it from the side of the participating teachers. I wish to discover how professional development programmes, in general, make a difference (if at all) to the teachers and their classroom practices.

In recent times, I have also had the opportunity to work on the Mpumalanga Secondary Science Initiative (MSSI) project for a couple of years. In the MSSI, I worked with the team which designed the study guides and which facilitated workshops for teachers, cluster leaders and curriculum implementers (subject advisers). I also became involved in many other activities in the project, as described earlier. Given my own experiences of working with teachers, I have become interested in exploring how effective and useful, if at all, the MSSI project has been to the classroom practices of the teachers who participated in the project. I am particularly interested in exploring the perspectives of the teachers and not what the project implementers consider its successes. On a broader level, this study seeks to improve the awareness of what the teachers did in the project and determine how it was done, what strategies and models were used, and finally how all the MSSI activities impacted on their classroom practices, if at all. Hence, this study seeks to eventually determine what the best professional development strategy is to foster effective classroom practices (from the point of view of the participating teachers).

My belief is that by understanding teacher's experiences of, and perspectives on continuing professional development, South African educationists will better understand how to support teachers in their growth and development. Similarly, at a more theoretical level, such an understanding will not only improve the teachers' (and hopefully learners') performance, but also make a contribution to the literature on professional development.

1.6 Outline of the thesis

This thesis is divided into five chapters.

Chapter 1

This chapter provides the background rationale, aims and objectives of the study. A detailed outline of the research problem is also presented.

Chapter 2

The chapter discusses the relevant definitions and furnishes a theoretical framework for the concept of teacher professional development. The different models and practices of teacher professional development and the ways in which they are used in different countries are also explored in this chapter.

Chapter 3

In this chapter, the methodology that was used to carry out the research is presented. Specifically, the approach, design, instruments, sampling procedures and data collection method are analysed.

Chapter 4

Chapter 4 documents the qualitative analysis of the data collected in Mpumalanga with, and presents detailed case studies of, the teachers who participated in the study. The case studies will offer a thick descriptive summary of the data and outline the major themes evident in the analysis.

Chapter 5

This chapter provides the findings and conclusions, and also discusses their implications for both policy and practice. In this chapter I also explore the relevance of the findings and conclusions to the study of teacher professional development in general, but also to teacher professional development in South Africa and other developing countries.

CHAPTER 2

2. Literature Review

2.1. Introduction –Professional development

This study seeks to understand the teachers' perspectives on Continuing Professional Development (CPD) programmes. By using the case of the Mpumalanga Secondary Science Initiative (MSSI) project, the study will explore how the MSSI project was important to the participating teachers and what impact it has, or has not, had on their practices. It also seeks to establish which particular professional development strategies have resulted in improvements.

To understand continuing professional development from the teacher's perspectives, I begin my literature review by examining what teacher professional development involves, which different models exist and the conditions of their implementation, and why it is important to investigate and understand CPD, especially from the perspectives of the recipient teachers.

Many countries are experiencing vociferous calls to improve teacher quality by enhancing their teachers' knowledge of the subjects they teach and their pedagogical strategies and understanding (Darling-Hammond and Baratz-Snowden, 2005). South Africa is no exception to this trend. In the United States of America (USA) professional development is regarded as the cornerstone of the implementation of standards-based reform (Committee on Science and Mathematics Teacher Preparation, 2001). The latter is the latest attempt in the USA's efforts to foster teacher improvements and change. Many researchers have come to an agreement about what constitutes high-quality professional development. Such agreements are manifested in the standards that are developed by professional organisations such as the National Staff Development Council, the American Federation of Teachers, and the National Institute for

Science Education (Corcoran, McVay, and Riordan, 2003). The standards of continuing professional development tend to focus on a variety of matters that have the potential to make CPD effective and useful. The importance of significant amounts of content information in professional development is, for example, included in many standard lists regarding professional development (Kent and Lingman, 2000). Other standards focus on the delivery methods for professional development (Correnti, 2007). Many of the standards regarding these delivery methods seem to point to the greater role that participating teachers have in the success of CPD. For this reason, among others, the need to understand teachers' motivations, perspectives and practices with respect to CPD has thus become more urgent.

The need for relevant professional development has never been as essential as it is today; this is because of state mandates which require teachers to be highly qualified, and the need for an increase in student achievement (Benton and Benton, 2008). Simultaneously, many countries are engaged in major educational reforms in order to meet the needs of their economy and society. Governments have also begun to acknowledge the fact that teachers are crucial to the education system if any changes are to be effective (Hargreaves, 1995). Bredeson (2002) emphasises this view when he considers teacher professional development to be critical to the successful implementation of the various educational reform initiatives. The professional development of teachers should thus be afforded a high priority if reform and restructuring initiatives are to be successful. Aside from the individual satisfaction or financial gain that teachers may obtain as a result of participating in professional development opportunities, the process of professional development has a significantly positive impact on teachers' beliefs and practices, students' learning, and the implementation of educational reforms (Villegas-Reimers, 2003). Villegas-Reimers also notes that teachers need professional development opportunities, not only because these opportunities promote the recognition of their work as professionals, but also because – as is the case for all professionals in any field – new opportunities for

growth, exploration, learning, and development are always welcome. As a consequence of the lack of effective classroom practices and related theoretical debates, especially in South Africa, many new approaches to professional development have begun to emerge (Jita and Ndlalane, 2009). Such approaches include professional development programmes that have been implemented, and that are still being implemented, in many countries to assist teachers in improving their classroom practices.

For many years the only form of professional development available to teachers was staff development or in-service training which usually consisted of workshops or short-term courses that would offer teachers new information on a particular aspect of their work (Villegas-Reimers, 2003). While this was often the only type of training teachers would receive, it was usually also unrelated to the teachers' work in the classroom. Only in the past few years has the professional development of teachers been considered a long-term process which includes regular opportunities and experiences planned systematically to promote growth and development in the profession. This shift has been so dramatic that many have referred to it as: the 'new image' of teacher learning; a 'new model' of teacher education; a 'revolution' in teacher education; and even a 'new paradigm' of professional development (Cochran-Smith and Lytle, 2001; Walling and Lewis, 2000).

There are many different interpretations of the concept of professional development and each author often uses a different term when referring to this concept. Professional development is defined as the development of a person in his or her professional role. To be more specific, Glatthorn (1995) defines teacher professional development as the professional growth a teacher achieves as a result of gaining increased experience, and as the systematic examination of his or her teaching. Viewed differently by Ganser (2000), professional development includes formal experiences such as attending workshops, professional meetings and mentoring, and informal experiences such as reading

professional publications and watching television documentaries related to an academic discipline. For Ganser, what seems to be more important when looking at professional development is that one must examine the content of the experience, the process by which the professional development occurs, and the context in which it takes place (Ganser, 2000). On the other hand, some scholars view professional development as a process of culture-building and not merely skills-training (Cochran-Smith and Lytle, 2001). In this view, of professional development as culture building, it is clear that CPD and its impact will be affected by its coherence with the school programme (King and Newmann, 2000).

There has recently been a significant increase in the level of interest and support that teachers throughout the world are receiving in their professional development. Evidence of this, as cited by Villegas-Reimers (2003), is listed below:

- Extensive literature regarding professional development is available. This includes documents, essays and research reports on models and practices of professional development.
- International and national donor agencies have commissioned studies so that they can learn how to support such development more effectively.
- Many national and international organisations have supported the implementation of initiatives which aim to improve the professional skills and knowledge of teachers.

- Most educational reforms currently being designed and/or implemented include a component of teacher professional development as one of the key elements in the process of change.

Anamuah-Mensah, et al. (2008), Dembele, (2004) and Lewin *et al* (2003) all state that the issues of teacher education and the quality of professional development that have emerged from studies in Africa illustrate a number of ongoing concerns:

- The importance of identifying the good and useful aspects of practice and combining those with initial teacher education and continuing professional development.

- The expense of teacher education models and the under-developed and under-explored relationship between schools and trainees.

- The role of relevant experience, learning styles or motivation.

- The need to pay more attention to the affective side, and the role of the school in training newly qualified teachers.

There is a general agreement that learning to teach is a lifelong process. This notion of professional learning for teachers as continuous has been emphasised by several researchers such as Zeichner and Noffke (2001). Providing meaningful professional development for in-service teachers is seen as central to this goal. The meaning of in-service education is changing and it varies from country to country depending on the level of preparation teachers receive prior to entering the profession (Villegas-Reimers, 2003). Bolam (1982:3) notes that, for most, if not all developed countries, in-service education and training includes:

> those education and training activities engaged in by primary and secondary-school teachers and principals, following their initial professional certification, and intended mainly or exclusively to improve their professional knowledge, skills and attitudes in order that they can educate children more effectively

Studies on the effects of collaborative action research have found that experienced (in-service) teachers become more reflective, critical, and analytical about their teaching behaviours in the classroom when they engage in collaborative research (Rainey, 2000; Smith, 2005; McDonough, 2006). However, in most parts of the world the majority of in-service programmes are too short, too unrelated to the needs of teachers, and too ineffective at teaching knowledge (Villegas-Reimers, 2003). In addition, Atay (2007) argues that current In-Service Education and Training programmes (INSET) are often unsatisfactory because they do not allow teachers to be actively involved in their development or reflect on their teaching experiences.

Emanating from the different perspectives and philosophies on CPD, a number of types and models of teacher professional development have been developed and implemented in different countries. The goal has been to promote and support the professional development of teachers from the beginning of their careers until they retire. In the sections that follow, I examine some of the most prominent types of CPD in recent literature. These models include: professional development schools, distance education, teacher networks or school networks, workshops, seminars, courses, university-school partnerships, observations of excellent practice, and the “training of trainers" models. This raises an important question for those creating professional development programmes: which one of these models is most likely to lead to the desired goals? It is important to point out at this stage that the models are described separately here for clarity and

distinction, but that most professional-development initiatives use a combination of models simultaneously, and that these combinations vary from setting to setting.

For clarity, I adopt Villegas-Reimers' (2003) scheme of grouping the models into two sections. The first section describes models that require and imply certain organisational or inter-institutional partnerships in order to be effective. The second group describes those that can be implemented on a smaller scale (a school or classroom). Many of those in the second group have been identified as techniques of professional development rather than models. In fact, many of the models in the first group use the techniques listed in the second group:

1. **Organisational partnership models**

- Professional development schools
- University-school partnerships
- Schools' network
- Teachers' network
- Distance education

2. **Small group or individual models**

- Workshops, seminars, courses
- Observation of excellent practice
- Portfolio
- Cascade model
- Coaching/mentoring

2.2 Organisational partnership models

2.2.1 Professional development schools

Professional development schools are partnerships between teachers, administrators and university faculty members which are created to improve the teaching and learning of their respective students and teachers. These partnerships also serve the purpose of uniting educational theory and practice (Villegas-Reimers, 2003). This model involves and requires institutional support (Wise, 2000), and is one model that does provide professional development for teachers from the beginning to the end of their careers (Koehnecke, 2001). Even though this kind of model varies from setting to setting, according to Frankes *et al* (1998), they all share the common goal of providing professional development experiences for both pre-service and in-service teachers and of raising the standards of education and schools. This model is however, not used very much in developing countries, including South Africa.

2.2.2 University-School Partnership

Partnerships also exist between universities and schools. These partnerships are like networks because “they connect practitioners who share common interests and concerns about education” (Miller, 2001). According to Miller (2001), relationships between schools and universities have four core aims:

- To establish firm bases in the spheres of school and university.
- To cross institutional boundaries in order to respond to the needs of these fields.
- To ensure inclusive decision-making.
- To create new values for educator development.

According to Moon (2002), universities now play a major role in the education and training of teachers and many have done so for a long time. Makerere University has been involved with teachers since it first opened in 1922. In much of east and central Africa, newer institutions have also made teacher training a priority. Examples of this are the Universities of Sudan and Tanzania which are upgrading the qualifications of hundreds of thousands of teachers.

A number of university-school partnerships have been successful in promoting teachers' professional development. In most of the reported cases, the schools and universities that are in partnership are often located in the same geographical area. There have been exceptions to this trend, with some partnerships crossing national boundaries. The nature of the university-school relationship varies from one teacher training institution to another. In the case of a university located in a small town such as the one referred to by Wilmot (2004), the relationship is informal. They thus have a de facto contract based on the collegiality and goodwill between the university education department and the local schools. In other cases in South Africa, formal contracts have been established through the learnership model which offers attractive financial benefits for schools. These payments are made to the schools by Sector Education and Training Authorities (SETAs).

In her example, Villagas Reimers (2003) notes that a small project in South Africa has brought together science advisers from the Western Cape Education Department and science teachers from both King's College in London, and the Peninsula Technikon (now the Cape Peninsula University of Technology) in Bellville. In this project, described in detail by Johnson *at al* (2000), groups of science teachers in South Africa who have worked in very poor conditions for many years, have come together for different forms of professional development, including: coaching, group discussions, and group work based on the 2005 curriculum. As described by Monk and Hodges (2000), this project can be viewed as "modest", yet effective in improving teachers' knowledge and skills related to teaching science. In their conclusion, Johnson *et al* (2000) assert that the

teachers who participate in all of these activities gradually change their pedagogical content knowledge. This is because they become more familiar with, or see new possibilities in the topic, and simultaneously develop the skills with which they can help students to learn more effectively. Importantly, the topics dealt with in this project were those related to South Africa's 2005 curriculum and not some arbitrary topics selected by outsiders.

Another interesting case cited by Villegas Reimers (2003) is a partnership developed between a university in the USA, a university in Chile, and a school district in Chile. In this programme, university faculty members from both countries prepared and implemented a course on how to improve the knowledge and the skills of science teachers in Chile. All those involved (teachers and university staff) reported that the experience was positive and felt that it had effectively promoted their professional development.

In a summary, Moon (2008) suggests a few criteria that ought to characterise the work of universities with school teachers: universities need to be flexible in whatever they offer teachers, whether they better their qualifications or provide intellectual sustenance to enhance knowledge, skills and understanding; more universities need to adopt a distributed approach to their activities. To do so, they must fulfil their social responsibilities in many more formal and informal sites; universities must embrace the increasingly technological forms of communication now available; and they must remain at the forefront of innovation. While these criteria are interrelated, the importance of addressing the crisis of teacher education and training, and the capacity to innovate, are a question of attitudes as well as processes. Finally, if universities are to help improve education systems, then they need to become much better at forming partnerships. For universities to work successfully with teachers they need well developed partnerships with the other stakeholder institutions.

2.2.3 Teacher - networks

According to Delport and Makaye (2009) the collaboration between schools to improve teaching and learning can take various forms. In the United Kingdom and other European countries, networks, federations and clusters are regarded as related concepts despite the fact that each concept has its own nuances and implications. Networks for instance, generally operate on an informal and voluntary basis. They are loose and fairly widespread partnerships between schools, or school teachers. The primary aim of a network is to exchange ideas or provide mutual support (p.98). In other countries and contexts, teacher networks are also referred to as clusters or communities of learning. As described by Jita and Ndlalane (2009), teacher clusters represent a recent experiment in the field of teacher professional development in South Africa. These scholars also note that increasingly, teacher clusters are being used as a substitute for the traditional approaches to professional development which help teachers to increase their professional knowledge and improve their classroom practices. Several researchers (Muijs 2008; Marneweck 2002; Dittmar Mendelsohn and Ward, 2002; Madungwe, Mavesera, Moyana and Seremwe, 2000) agree that cluster membership offers several advantages that include: enhancing a school's general performance as it builds strong teacher communities; improving the exchange and sharing of expertise as members learn and solve problems collaboratively; fostering relationships between previously isolated schools; and promoting collegiality.

Scholars, who study teacher - networks further contend that clusters promote decentralised decision-making, help disadvantaged communities, increase participation in development, support isolated teachers, and improve social equity (Villegas-Reimers, 2003). Professional learning communities are founded on a constructive dialogue among teachers and on-going face to face contact regarding the core work of schools. Such dialogues can include: developing a consensus on the school mission; the shared planning of instruction and educational programmes; talking about teaching and learning through the study

of classroom videotapes; and observing one another's teaching (Stodolsky *et al* 2008).

Teacher - networks bring teachers together to address the problems which they experience at work and thus promote professional development as individuals and as groups (Villegas-Reimers, 2003). In support of this view, Huberman (2001) asserts the importance of using teacher networks as a means of providing support for teachers. A network can either be relatively informal (regular meetings between teachers) or it can be formalised by institutionalising the relationships, communication and dialogue (Lieberman, 1999). In support of using teacher networks to foster teacher development, Huberman (2001) presents a model that assembles teachers from different schools (see school networks) who share a common level of proficiency in a discipline, subject matter or activity, to work on that discipline. He also presents strong arguments for the importance of having these networks managed by the teachers themselves, and for the networks to communicate, address issues, observe each other's work, and bring in experts from other fields.

In their example, Palincsar *et al* (1998) describe teacher networks as communities of practice. In one of their cases, 18 teachers from 14 schools formed a community of practice to improve their science teaching by joining reflection groups, bringing together professionals with different expertises, and emphasising the intellectual activities necessary for excellent teaching (including planning, and reflecting on one's teaching). In their research into teachers in congregational schools, Stodolsky *et al* (2008) found that teachers bring a variety of educational backgrounds with them to these networks. Some were certified teachers or had taught in other settings, whereas others had no teaching experience; thus the knowledge among the teachers was highly variable.

In South Africa, Gray (1999) reports on a project in KwaZulu-Natal which assembled rural primary school science teachers to exchange ideas at regular

meetings and provide basic equipment for their schools. This was similar to the case of the MSSI project in South Africa, which formed clusters with the teachers from neighbouring schools (Jita *et al* 2008). In the latter case, the teachers who participated met several times and engaged in different professional development activities. Each cluster selected a leader with the approval of the official subject supervisor from the Mpumalanga Department of Education (MDE), viz. the curriculum implementers. New leaders were elected occasionally.

Research has also revealed that teachers who are part of clusters experience less stress and difficulty when implementing a new curriculum (Muijs, 2008, p.63). Muijs argues that schools, particularly in disadvantaged communities, benefit from the collaborations as teachers are exchanged, resources are combined and leadership is shared (2008:64). It is therefore imperative that a group of teachers in a school or community carry out joint work that serves student learning. Researchers have thus argued that the clustering of teachers, as a type of formal school collaboration, can and should be considered a strategy to improve schooling in South Africa, as it may well enhance teacher professional development (Muijs, 2008).

2.2.4 Schools' network

The popularity of the network approach to school improvement is apparent in the myriad ways in which the term 'network' is used. The most common form of a network in education is a professional network that seeks to promote communication between educators. There have been several projects which have included the creation of school networks to support teachers' professional development, improve schools and reform education (Villegas-Reimers, 2003). A growing number of school districts are embracing network structures as an alternative method of reform that improves schools without the negative effects of radical restructuring.

This model developed from the notion that schools should and could work together to improve the educational system quickly. Supporting what came to be

known as the Annenberg Challenge was the concept of creating school networks. Reformers envisaged networks as organisational structures that would "encourage member schools to learn from and support one another" and be "a vehicle for both strengthening and accelerating progress within individual schools, creating a critical mass of restructured schools and exercising accountability across schools" (Cervone, 1994). In this model, schools come together voluntarily to create school families in order to access additional resources. In agreement with this notion, Robertson and Acar (1999) argue that teachers who participate in professional development networks do so voluntarily to advance their careers. The networks achieve this by bringing teachers together to learn new skills, find out about job opportunities, and share common beliefs that form a normative foundation for their collective action. In their example, Smith and Wohlstetter (2001) describe the Los Angeles Annenberg Metropolitan Project (LAAMP) which received $53 million from a funder. During the 5-year life span of the project, 27 networks of schools, termed 'school families' were funded. The project was intended to encourage collaboration between grades, schools and disciplines. Through such collaboration, participants (parents and teachers) committed themselves to making schools work better for students, and to sharing information about the curriculum, instruction, and students. This was, in the mind of the reformers, also viewed as essential for spreading innovation beyond a single school. These school families were envisioned as groups with consistent expectations, modes of teaching and assessment. Thus social norms could be developed to enhance the students' achievements at every point in their development within the Los Angeles Annenberg Metropolitan Project. School networks are related to and often used with the teacher networks discussed earlier.

2.2.5 Distance Education

Distance education has become a very popular method for fulfilling course requirements or professional development for teachers. The most commonly cited benefit of distance education is the time flexibility it allows the participant (Annetta and Shymansky, 2008). Different countries have implemented distance education programmes to support teachers' professional development; it uses a variety of media, such as radio, television, telephone, written and recorded material and electronic communication (Miller, Smith and Tilstone, 1998). Distance education is defined by Perraton (1995) as;

> An educational process in which a significant proportion of the teaching is conducted by someone removed in space and/or time from the learner (p.25).

Weinberger (2000) reports that more than half of the universities in the United Kingdom are involved in distance education, by offering postgraduate courses in that format. After studying the processes to complete a full Masters of Education (MEd) degree through a distance education programme, Weinberger reports very positive effects on the teachers' professional development. However, the literature offers no studies that assess the effectiveness of the use of distance education to support teacher professional development. There is very little evidence to support the claim that teacher education by means of distance education leads to improved classroom practice. On the other hand, Broady (1995) notes that a few studies conducted in developing countries reflect mixed results: (1) distance education does not address practice, and student teachers must still complete a practicum before they graduate; and (2) case studies in developed countries have shown that students who complete their teacher training at least partially by means of distance education, develop self-confidence and the ability to learn on their own (a skill that is beneficial in their profession).

In the next section, the discussion focuses on small or individual models, or what many researchers refer to as the techniques for teacher professional development.

2.3 Individual Models or Techniques of Professional Development

2.3.1 Teacher workshops

One of the most common forms of professional development is the typical in-service staff training which uses workshops, seminars and courses. In South Africa, state-initiated transformation requirements, together with the enormous amount of under-qualified teachers trained during the apartheid era, have resulted in an increase of in-service teacher training courses offered by university education departments. The provincial education departments, such as the Gauteng Department of Education (GDE), have taken on the responsibility of presenting continuous professional development (CPD) workshops to assist teachers in the General Education Band (GEB) to improve their skills. However, the changes have been so widespread that it has been impossible to train all teachers adequately with the regular support services of the Education Department. Consequently, the Department of Education decided to contract teacher training institutions to assist with the process of CPD (Lessing and De Witt, 2007). These institutions are similar to the former Pretoria Teacher's Training College (now University of Pretoria) which was contracted to improve the subject knowledge and skills of Gauteng teachers in outcomes-based education. The training was presented as a workshop over six Saturdays, and covered mathematics, language development, reading and spelling, and learner assessment.

In their research, Cutler and Ruopp (1999) also describe a workshop-style initiative in which the staff at the Education Development Centre in the USA designed and implemented a programme of professional development entitled the 'Middle School Mathematics Project'. Cutler and Ruopp note that as part of the project, middle school mathematics teachers from the Boston area of the

USA met twice a month for two years to attend half-day workshops that addressed issues related to teaching mathematics; some of these workshops were content-based, while others focused on pedagogical knowledge and practice. The teachers involved consider the workshops to have been very valuable as their practices in the classroom improved. In an effort to understand the teachers' opinions on the value of the workshops (particularly with regard to CPD, personal development and improving their teaching approach), Cutler and Ruopp learned that teachers found the CPD workshops important with regard to: personal and skills development, support, providing new information, confidence, and changing teaching habits. Almost 90% of the teachers viewed the provision of knowledge as one of the positive aspects of the CPD workshops. However, many researchers are critical of the workshops and believe most of them to be single experiences which are fragmented, incoherent, decontextualised and isolated from the real classroom environment (Collinson and Ono, 2001; Villegas-Reimers, 2003; OECD, 2005) .

Fullan (1991:315) argues that:

> Nothing has promised so much and has been so frustratingly wasteful as the thousands of workshops and conferences that led to no significant change in practice when the teachers returned to their classroom.

The same dissatisfaction is observed in the research on professional development of teachers in developing countries (Villegas-Reimers, 2003; Leu, 2004; MacNeil, 2004). One of the findings of the review committee on the implementation of Curriculum 2005 was that "there is virtually no ongoing support and development when teachers are back on site after receiving orientation and training at workshops (Review Committee on Curriculum 2005, 2000:61). Research has also shown that very few teachers actually participate in high-

quality professional development because the predominant mode of professional development for the majority of teachers is still “one-shot” workshops which are often not focused on subject matter (Garet *et al* 2001).

Lessing and Witt (2007) also contend that the teachers who attended OBE workshops in South Africa had a negative attitude towards most of these presentations because they did not supply enough applicable knowledge and skills for use in their classrooms, or for addressing the problems they experience in their work environment. Because these workshops were presented on weekends, some teachers felt that they had to sacrifice too much time and that it was too much effort in comparison to what they had gained. The expectation that they would have an understanding of outcomes-based education and be able support learners with learning difficulties in an inclusive classroom had not been met. Similar results were obtained in a study by Swart, Engelbrecht, Eloff and Pettipher (2002:183) in which teachers had a negative attitude towards in-service training (a form of CPD) as they felt that they had not acquired the knowledge or skills which would allow them to appropriately address the diversity in their classrooms. However, given the new understanding of professional development as an ongoing process of growth and learning, there are cases that show that workshops, seminars and courses, when accompanied by other types of professional development, can be successful.

2.3.2 Observation of excellent practice

A number of professional development programmes offer teachers the opportunity to observe colleagues who have been recognised for their expertise and excellence in teaching. Teachers therefore have the opportunity to learn from the knowledge, skills and attitudes that excellent teachers implement in the classroom (Villegas-Reimers, 2003). In his example of this model, Villegas-Reimers (2003) refers to the Teachers International Professional Development Programme, implemented by the British council, which sponsors British teachers to visit schools in a variety of countries. This is done in order for British teachers

to observe, first-hand, new aspects of teaching, so that they can share their experiences with other teachers in their schools and communities.

A similar programme also referred to by Villegas-Reimers (2003) is the United Kingdom/Australia fellowship scheme for teachers of Science. This programme, funded by the governments of both the UK and Australia, provides funding for a handful of teachers from one of these countries to travel to the other country and observe practice, participate in research projects, attend workshops and enter discussions with other teachers (Robottom and Walker, 1995). This programme has been very successful in promoting teachers' professional development. In the South Africa the MSSI project in Mpumalanga, as cited by Ono and Ferreira (2010), sought to improve the quality of mathematics and science education by enhancing the teaching skills of in-service teachers. More specifically, although this was not stated in the project document, it aimed to institutionalise 'lesson study', a form of school-based continuing professional development wherein a teacher conducts a study lesson, which is observed by other teachers. The observers listen attentively to all contributions made by the learners and document any important remarks and behaviours of the teacher and learners that are related to achieving the lesson outcomes. On a more informal level, there are a number of programmes – including both pre-service and in-service – that offer opportunities for less experienced teachers to shadow and observe master teachers doing their job.

2.3.3 Portfolios

In the past few years, portfolios have gained increasing support in education from students, teachers, and school administrators for a variety of reasons. Portfolios were initially introduced to address a variety of student assessment concerns regarding the authenticity of tasks, learning over time, and the application of knowledge. In addition, portfolios reflected and integrated many current theoretical perspectives on teaching and learning such as constructivism, scaffolding, and peer coaching (McLaughlin and Vogt, 1998).

A portfolio, as defined by Riggs and Sandlin, (2000) is a collection of items gathered over a certain period of time to illustrate different aspect of a person's work, professional growth and abilities. However, in teaching, a portfolio is usually a tool used to engage teachers and students in discussions about topics related to teaching and learning (Villegas-Reimers, 2003). A teaching portfolio is a purposeful collection of evidence assembled by a teacher consisting of descriptions, documents, examples of good teaching, and moreover, a teacher's thoughts on their educational practice (including illustrations of its complexity) The use of portfolios in the teaching profession began during the late 1980s in the work of the Teacher Assessment Project at Stanford (Wolf, 1991). According to Wolf (1991, p.130), as an alternative form to assessment, portfolios represented a way to define, display, and store "evidence of a teacher's knowledge and skills that is based on multiple sources of evidence collected over time in authentic settings" (in Delandshere and Arens, 2003). There are three forms of portfolios that are normally used by educators: (1) An employment portfolio; (2) an assessment portfolio (as a way of assessing their competence and outcomes); and (3) a learning portfolio (a collection of items that help teachers to think about, and describe learning outcomes (Diets, 1999).

These three forms of portfolio, according to Frederic, McMahon and Shaw (2000) and Lally (2000) are referred to as evaluation, assessment and employment portfolios; teachers use both their evaluation and employment portfolios mainly to discuss their best work. They are advised to do this so that their educational skills can be demonstrated. A development portfolio, which is also referred to as a learning portfolio, focuses on a teacher's process of reflection when they compile a teaching portfolio. Teachers should try to improve their teaching practice with the aid of a development portfolio (Lally, 2000). Portfolios seem to be a preferred method of assessment for making decisions about teaching. Many teacher education programmes require prospective teachers to develop portfolios to prepare them for licensing or relicensing. In parallel with teachers' use of portfolios, many schools have begun using them as part of their pre-service programmes with teachers in order to facilitate self-reflection, document growth

on performance-based tasks, and promote a sense of professional efficacy (Tucker *et al* 2003).

One of the strengths of a portfolio identified by educationists is that it allows individual learners to express themselves. Through a portfolio, they argue, candidates have an opportunity to be the focal point, work at their own pace, and cover content of their choice. In this way the learner is in control and feels more valued (Brown and Knight, 1999). In their research, De Rijdt *et al* (2006) found that due to the use of portfolios, the respondents were compelled to reflect on their own teaching, to actualise the learning content, to improve their course materials and to search for alternative educational methods, etcetera. In a qualitative case study of two elementary schools in Fresno, California, that implemented teacher portfolio evaluation, Stone and Mata (1996) interviewed and surveyed participants about their perceptions of portfolio-based teacher evaluation. The coding categories that emerged from their thematic analysis noted numerous potential benefits which included the following:

- "More authentic, personal, and realistic". Both teachers and administrators found the process more of a reflection of the practices in the classroom.
- "Captures the whole picture". Teachers see this as a better way to look at a teacher's programme in its entirety.
- "Felt good about it." Teachers felt reinforced and supported by the process.
- "Constructive criticism was part of the conversation".
- .Administrators encouraged analysis, reflection, and self-evaluation.
- "Made me look at what I'm doing more critically"; "Portfolio conference promoted professional development" (Stone and Mata, 1996:8-9)

In perhaps the most comprehensive study to date on portfolios, Bond, Smith, Baker, and Hattie (2000) examined the validity of the National Board for Professional Teaching Standards' (NBPTS) portfolio based teacher assessment process. The NBPTS has established standards for the advanced certification of teachers in 20 different fields and has certified more than 10,000 teachers (Harman, 2001). In its certification process, the NBPTS has relied heavily on a portfolio evaluation system since its inception in 1987 (NBPTS, 1991). In their study, Bond *et al* (2000) investigated whether "National Board Certified teachers and their non-certified counterparts can be distinguished on the basis of the quality of work produced by their students" (p.viii).

The researchers reviewed instructional lesson plans, made observational visits to the classrooms, and analysed samples of the work of 65 teachers' students. Their findings indicated that the National Board Certified teachers in this sample obtained higher mean scores on 13 "attributes of expert teaching that have emerged from the ever-expanding body of research on teaching and learning" (Bond *et al* 2000:ix) than the noncertified teachers; the study also found statistically significant differences between 11 of the 13 attributes. The students of National Board Certified teachers also exhibited differences in comparison to those of the noncertified teachers. In their submitted work, the students demonstrated "an understanding of the concept targeted in the instruction that [was] more integrated, more coherent, and [had] a higher level of instruction than understanding achieved by other students" (Bond *et al* 2000).

This comprehensive construct validation study supported the premise that the portfolio-based assessment system could distinguish between experienced and inexperienced teachers and thus address one accountability purpose for teacher evaluation (Tucker *et al* 2003). Although there is encouraging news regarding the application of portfolios for the accountability and professional growth of teacher evaluation, research regarding the effectiveness of portfolios as a measure of teacher quality is limited, particularly regarding issues such as utility, validity, and reliability (*ibid*). Borko *et al* (1997) made a case for the use of teacher portfolios

more than a decade ago. Tucker *et al* (2003:255) also cautioned that It remains to be seen whether, in any conditions, the school teacher's portfolio can be useful either for schoolteachers or for their administrators.

In agreement with this Tisani (2006) adds that there are also some contradictions in some of the claims that are made about portfolio assessment, such as discrepancies between the theoretical claims and practice. For example, claims of greater learner control in the assessment process are compromised by the fact that the whole process is still summative and the assessor still passes final judgment. The unpredictability of portfolio assessment can lead to puzzling complexities or unexpected surprises for both the assessor and assessed (Biggs, 2003). In South Africa, Tisani (2008) cites an example of the professional development of academic staff at a South African university. The account deals with an initiative to develop academics into assessors and accredit them as such after they have completed a relevant module and have met its requirements. The module was to be assessed through a portfolio. In her conclusion, Tisani (2008) argues that many of the respondents did not produce a portfolio; they attributed their unfamiliarity with the use of portfolios as the main reason for doing so and most probably found it 'an alien form of discourse'. Some of the respondents even questioned the appropriateness and efficacy of portfolio assessment and highlighted the logistical issues as barriers to their learning.

2.3.4 The training of trainer's model or the cascade model

In this model, a first generation of teachers is trained or educated on a particular topic, aspect of teaching or subject matter, and once proficient, become the educators of the second generation (Griffin, 1999). Ono and Ferreira (2010) argue that the cascade or multiplier approach is often used to transmit the knowledge or information from the upper to the lower groups of teachers. This entails training the trainer to ensure that knowledge is transferred from experts and specialists to the teachers. In many developing countries the cascade approach is popular for reaching many participants in a short period of time (Leu,

2004). The advantages of this training model are that it allows training to take place in stages so that progress can be monitored and, as more teachers receive training, information can be disseminated quickly and to an even larger number of teachers. In theory, cascade training is cost-effective as those who have been trained can then train others, thus minimising expenses (Ono and Ferreira, 2010).

In his example, Prescott (2000) describes the School-Attuned Project, in which a small number of teachers were taught, through case studies, how to identify and diagnose eight areas of brain functioning. In his conclusion, Prescott contends that these teachers, in turn, taught their colleagues to complete the same assessment. This project had very positive effects on the teachers, the learners and learners' families. In South Africa, this model was initially used as an advocacy strategy by the Department of Education to provide CPTD to teachers to enable them to implement the new national curriculum (Engelbrecht *et al* 2007). The other example cited by Jita *et al* (2008) is the MSSI project where one of the approaches to training and development was to have university experts first train the curriculum implementers who then presented it, in turn, to the cluster leaders. The cluster leaders then trained the teachers at school level. The knowledge can be seen to have cascaded from a few experts on an upper level, all the way down to a large community of school teachers,

The cascade model has however, been widely criticised as an inadequate model for delivering effective training (Khulisa, 1999; HSRC, 2000). When the intended message is transmitted to the next level, the chances of crucial information being misinterpreted are high (Fiske and Ladd, 2004). The approach failed to prepare either officials or school-based teachers for the complexity of the implementation of the new national curriculum. Ono and Ferreira (2010) documented how teachers frequently complained that even the district trainers themselves did not always understand the curriculum. The result was the "watering down and/or misinterpretation of crucial information" (Fiske and Ladd, 2004:162). Robinson (2002) and Graven (2002) also discuss the dissatisfaction with the cascade

model that introduced teachers to the new curriculum in South Africa. Robinson (2002) argues that this model offers training, but with little or no follow-up support structures for teachers who have to deal with the long-term implementation of the new reforms. This concern coincides with the apprehension that a serious challenge facing South African education in general is the lack of any successful translation of new curriculum reforms into classroom practice. This is despite the wide use of professional development to help teachers understand the new reforms (Rogan and Grayson 2003).

2.3.5 Coaching/mentoring

A review of research on teacher coaching suggests that when teachers are provided with the opportunity to meet with peer coaches or expert coaches to discuss implementation, they are more likely to implement strategies and to adopt strategies that are relevant to their needs (Joyce and Showers, 2002). Mentoring has become one of the most common methods to help new teachers and research shows that as a model, it is popular with both mentors and beginner teachers (Ballantyne and Hansford, 1995). Mentoring/coaching is defined by Harwell-Kee (1999) as a process by which a colleague, who is a critical listener/observer, asks questions, makes observations and offers suggestions that help a teacher to develop, reflect upon, and execute different skills.

This process provides opportunities and structure for teachers' professional development. Mentoring is a form of coaching that tends to be short-term (for beginner teachers or teachers new to a school or education system) but which can also be ongoing and long-term (Holloway, 2001). Coaching is a learned skill and therefore coaches and mentors also need to be trained. A mentor provides a newcomer with support, direction, feedback, problem solving guidance, and a network of colleagues who share resources, insights, practices and materials (Robbins, 1999). Mentoring is one form of professional development that affects

both new teachers who are being mentored, and experienced teachers who serve as mentors. According to Ballantyne and Hansford (1995), mentors have many tasks to execute: sharing information, providing access to resources, being a role model, counselling, coaching, encouraging reflection, providing career advice and supporting new teachers. In their research carried out in Australia, Ballantyne and Hansford (1995) report that the effects of 'buddy mentoring' (having a companion teacher) are very positive, but not sufficient. New teachers need access to other mentoring resources, such as specialists, consultant teachers, faculty from teacher-preparation institutions, and other resources. One of the examples from South Africa that is discussed by Wilmot (2004) is the situation in which a university tutor identifies and approaches experienced teachers to act as tutors. Generally, teachers recognise the pedagogical benefits of mentoring Postgraduate Certificate in Education (PGCE) students who have fresh, innovative ideas and a thorough knowledge of curriculum changes. In other examples of mentoring as a form of professional development, Hawkey (1998) examined how two different mentoring styles (one that focuses on providing multiple opportunities for the student teachers to learn and one that focuses on particular teaching experiences of student teacher) affected the learning process of their students. Both were found to be effective, and when the style matched that of the student teacher, the experience was positive. In addition, Holloway (2001) reports on some studies that show that mentors who have received some form of mentor training are often more effective in their roles.

The amount of literature based on teacher professional development is vast. There have been hundreds of articles published in scholarly journals over the past five years, and thousands more in the years before that. There are also thousands of observations and anecdotes published on the internet regarding CPD. Unfortunately, a surprisingly small amount of this literature measures one of the most important reasons for professional development: change in teaching practice *(*DiCerbo and Duran, 2006). One of the few examples that does this is a study by Jeanpierre *et al* (2005) who detail their efforts to increase science

teachers' use of inquiry-based techniques in the classroom. They conducted two-week long institutes for teachers during which scientists provided instruction on inquiry. The teachers were given time to practise the inquiry methods themselves on difficult science content (field ecology). The evaluation, which included quantitative and qualitative measurement, indicated that the use of difficult science content in professional development is important in changing teacher behaviour. The quantitative measures indicated that instructors gain content knowledge over the course of an institute. In qualitative interviews conducted after a semester of teaching, teachers indicated that their increased content knowledge made them more comfortable with sharing the content, and thus more willing to engage their students in inquiry-based learning.

Jita and Ndlalane (2009) contend that the answer to the question of what it takes to change teachers' classroom practices remains elusive for South Africa in spite of all of the effort and enthusiasm for teacher professional development. Very little appears to have changed in teachers' classroom practices (Jansen, 1999). My study therefore, seeks to add insights into the field and improve professional development and thus improve classroom practices. The study aims to explore teachers' perspectives on continuing professional development and how they translate their training to classroom practice.

This study takes place against a backdrop of numerous others which have found many of the approaches to teacher development to have minimal influence on changing teachers' knowledge and classroom practice (Fullan, 2001). The main problem with such studies however, is that many of the evaluations of the staff development programmes begin and end with an assessment of the individual's reactions to workshops and courses. In such cases, little is revealed about the acquisition of new knowledge and skills and how these affect a teacher's daily practice (Guskey, 2000) I therefore find it relevant to explore the teachers' perspectives of the MSSI and its influence on their classroom practices as the results may contribute to literature which looks at the impact of professional development programmes and their affects on teachers' practice. My reason for

specifically focusing on teachers' perspectives is that professional development initiatives that have been made part of official structures and policies have done so without the involvement of teachers and have been unsuccessful. This is because in South Africa continuing professional development, the teacher is often viewed as a technician. CPD is directed at institutions and systems, and the entire process is based on assumptions of teacher deficit in terms of knowledge and skills (Christie *et al* 2004).

As Sayed (2004) asserts, the weakness in many continuing professional development programmes is that they position teachers as clients that need 'fixing'. In support of this finding, Morris, Chan and Ling (2000) report on the Target Oriented Curriculum (TOC), an educational reform of primary schools in Hong Kong which was introduced in the 1990s, and which the authors consider unsuccessful. According to their account, the curriculum reform was designed by policy-makers with little, if any, input from teachers.

The schools and the public in general, responded negatively to the proposed changes as they were complex, impractical, and did not accommodate the needs of certain schools. Recent views on professional development frequently emphasise the importance of having teachers assert their needs and develop opportunities for their own professional development (National Centre for Education Statistics (NCES) 2006). Similarly, in South Africa, a report commissioned by the National Department of Education to review the implementation of Curriculum 2005 also affirms the importance of the involvement of teachers in the development of the curriculum, noting that there was a will amongst teachers to implement new ideas and to put a new curriculum into practice. The report concludes that irrespective of teachers' level of understanding, the positive attitude of teachers is an important prerequisite for further professional development (Review Committee on Curriculum 2005, 2000:77).

There is extensive literature about the educational reforms that took place in England and Wales in the 1990s, and still, more than 10 years later, there are research studies regarding the reforms. Many of these studies testify how teachers felt omitted from the reforms and resent them as they perceive the changes to be a hindrance which creates confusion, a heavier workload and a lack of respect for their work (Day, 2000). Similar reactions are found among Norwegian teachers, who were reported to feel that a new policy on working hours had become an "instrument of control which could transform Norwegian teachers into mere obedient and loyal civil servants" (Klette, 2000:146). Van Driel *et al* (2001) also mention that the disappointing results of some science teaching reforms and professional development programmes in a number of countries are due to a failure to acknowledge the, beliefs, attitudes and knowledge of teachers when planning changes.

Robinson (2003) also points out that the new South African legislation on teacher education means that teacher educators have been compelled to re-conceptualise and re-design their programmes. She, however, argues that the process by which teacher educators make sense of this task has not been adequately considered at either the conceptual or policy implementation level. The relationship between the policy process for teacher education and what is happening with providers, programmes and students has not yet been explored (Parker, 2001). Reforms such as this are common around the world as they are usually designed with the notion that teachers act as obstacles rather than the most important agents of educational reform. Thus, their opinions are not considered when planning reforms or programmes of professional development (Pierce and Hunsaker, 1996).

In addition, Chapman (1997) develops this notion of personal engagement in a very interesting set of propositions about why teachers appear to resist seemingly effective innovations. Chapman's first proposition is that often teachers do not see a problem. Thus many innovations are designed to fix problems that teachers don't recognise to exist, or if they are seen to exist, are

not perceived as problems that teachers feel they can do anything about. As he puts it:

> Change occurs most rapidly when people want to change; when they see some benefits in doing so…..New reform programmes demand that (teachers) try new teaching behaviours, use different instructional materials, employ different testing procedures or submit themselves to different types of instructional supervision, all in response to the problem that teachers may not see as existing (Chapman 1997:84)

Chapman's second proposition holds that "proposed innovations may run counter to teachers' beliefs about what constitute effective teaching" (1997:86). As Robinson (2003) argues, training teachers is a waste of resources if the beliefs of teachers are in conflict with this training and what it is trying to implement.

Contemporary views of professional development frequently emphasise the importance of involving teachers in defining their needs and developing opportunities for their own professional development (National Centre for Education Statistics NCES 2006). Almost all the literature dealing with innovation, according to Robinson (2003), speaks of the importance of the personal engagement of those involved in any reform process. In his argument, Fullan (1991:32) notes the importance of recognising the subjective meaning of educational change. He contends that, when complex change is involved, people do not and cannot change by being told to do so (Fullan, 1993:24). It is in response to this that I strongly believe that it is imperative to realise the importance of involving teachers in decision-making in order for professional development to be effective in educational reform and teacher professional development. For these reasons, my study aims at exploring teachers'

experiences and perspectives on the MSSI project, a large-scale continuing professional development project in South Africa.

2.4 Professional Development in Africa

The improvement of education in developing countries is presently a priority of policymakers and educators alike. Feiter, Vonk and Akker (1995) explain that teachers should be the subject of focus as they are central in the process of improving education. In support of this idea, Feiman-Nemser (2001:1014) argues that after decades of school reform in the USA, there is a growing consensus that the quality of American schools depends on the quality of its teachers. If a country wants its schools to teach students more effectively, it has to offer more powerful learning opportunities to teachers. Unless teachers are given access to serious and sustained learning opportunities at every stage in their career, they are unlikely to have their students meet the demanding new standards of learning or to participate in solving educational problems. Moon and Dladla (2002) suggest that school-based training is essential. Unqualified and underqualified teachers clearly need training; qualified teachers need career-long opportunities, particularly in order to aid their understanding of how to implement the new curriculum policies being pursued by most countries.

The report of the Commission for Africa (2005) made investments in teacher training a major recommendation and indicates that “[t]he push to achieve EFA will certainly never succeed without substantial investment in teacher recruitment, training, retention and professional development”. Other reports, as noted by Moon (2007), have pointed to the large numbers of unqualified teachers in schools and the difficulty of attracting new recruits. A survey of eleven eastern and southern African countries indicated that a third of existing primary school teachers are untrained (UNESCO 2000). Lastly, there is also evidence showing that the shortfall in trained teachers has risen and will become greater if the expansion to meet EFA targets continues (Lewin, 2002).

Despite this, little detailed information is available on how to accomplish teacher development. In-service teacher development is generally considered a prime area for intervention (Feiter, Vonk and Akker, 1995). The problem, according to Fuller and Clarke (1994), however, is that there are few studies that document its effectiveness and give directions for choosing implementation strategies. My aim in this study is to explore teachers' own perspectives of the issues of professional development and thus investigate what they believe are the best strategies to improve their classroom practices. I hope to contribute to the knowledge of effective teacher professional development in Africa, and specifically in South Africa. A challenge in this study however, is the lack of empirical research that has been conducted on this topic, especially in Africa. A few studies have completed more detailed research on this topic, but these involve specific countries. According to Dembele and Miaro (2003), "the first major reviews of the literature on teaching effectiveness and teacher education in developing countries were carried out at the end of the seventies" and involved countries of different developing regions, namely Africa (Egypt, Kenya, Uganda), the Middle East (Iraq), Asia (India, Malaysia, Philippines), and Latin America (Brazil, Chile, Paraguay). One of the questions addressed in these reviews was whether teacher training makes any difference or not.

According to Dembele and Miaro (2003) most studies agree that teacher education does make a difference in developing countries, including Africa. They conclude, however, that such a general positive response is in fact an over generalisation of findings because not all training programmes benefit teachers, and not all trained teachers nor all schools, have a positive effect on student learning. In addition to this argument, Husen *et al* (in Dembele and Miaro 2003:21) also indicate that out of 11 studies on teacher training, six show a positive effect, three discovered no effect and two a negative effect. Research in Botswana found that the classroom practices of teachers with more pre-service preparation were not very different to the practices of teachers with less preparation.

Researchers in South Africa, Nigeria and Kenya have also noted the difficulty of moving secondary teachers from a teacher-centred to a student-centred classroom approach. Part of the reason for the teachers' resistance to new methods is the change that these methods imply to the culturally accepted relationship between teachers and students. In fairly recent literature Akyeampong and Lewin (2002) analysed the attitudes of student teachers. Their data, based on primary and junior secondary teachers in Ghana, provide little evidence that teacher education is having a lasting impact on teacher behaviour. In their study, teachers beginning training were less likely to believe that caning is necessary in maintaining discipline than those finishing the course or those newly qualified.

In their research, Moon and Dladla (2002) list some of the obstacles that impede the successful development of new types of teacher training. Moon and Dladla then outline these issues as follows: (1) there is an erroneous perception that school-based teacher education can be equated to old-fashioned distance education (correspondence courses that provided a cheap means of training across much of the region, and in some respects still do); (2) as institutions and countries have begun accepting that school-based models must be devised, there has been far too heavy a reliance on the models and structures used in traditional pre-service teacher training courses. It is logically impossible, for example, to take a ten-credit college course and try to translate it into a school-based model; (3) the lock-step equation of 'one year's full-time study must equal two years part-time study' seriously inhibits the new forms of school-based training that must be introduced in the coming decade. The upgrading of qualifications from certificate level is being planned to extend to over six years; (4) programmes are designed in such a way that large sections seem irrelevant to teachers. Teaching educational theory or subject knowledge without making it meaningful to the daily tasks of teachers is wasteful; (5) in most countries policies do little to balance time and resources between pre-service training and ongoing continuing professional development.

Some of the studies on continuing professional development that were conducted in Mpumalanga include that of Pandey (2010). He specifically evaluated the science teacher development project which was undertaken in the rural areas of Mpumalanga; the impacts, achievements and failures of the study were evaluated, and in conclusion, Pandey noted that the project did contribute to improved teaching, and in many cases more than expected (2010). Another study about teacher professional development was conducted by Ndlalane (2006), who investigated teacher clusters and the opportunity that these clusters provide science teachers: to collaborate and share their knowledge and classroom practices. The study analyses a professional development intervention on science and mathematics in Mpumalanga. Ndlalane concludes that teacher clusters are better at changing the classroom practice of science teachers by allowing them to focus specifically on their content knowledge, pedagogical content knowledge and the interactions between the two.

2.5 Concluding Remarks

In conclusion one can see that despite the amount of the literature, relatively little research has been conducted which deals with the opinions that teachers have on professional development programmes. Thus teachers' perspectives on professional development are not well represented or understood. As noted by Singh and Shiffelette (1996), to have an effective teaching cadre, not only is it necessary to recruit competent teachers who meet high educational standards and who demonstrate an aptitude for teaching, but it is also necessary to have these teachers continually striving to become better at their job. This study intends to provide insights on how to develop effective professional development programmes for teachers. Teacher professional development is an area that requires the critical attention of researchers, not only in South Africa, but also in the many African countries which have similar problems.

The study illustrates the conclusions drawn by both Morrow (2007) and Christie *et al* (2007), that deliberate intervention strategies are required to improve teaching in South Africa.

2.6 Conceptual Framework

As my review has demonstrated, a considerable body of literature has emerged on professional development, teacher learning, and teacher change in the past 50 years. The literature contains much material which includes case studies of classroom teaching, evaluations of programmes designed to improve teaching and learning, and surveys of teachers about their pre-service and in-service professional development experiences (Borko, 2004). From all of this literature, Desimone *et al* (2006) note that meaningful insights into 'high-quality' professional development have emerged – qualities of professional development that make it effective at increasing teachers' knowledge and skills, changing teaching practice, and improving student achievement. In addition, there is a considerable amount of literature describing 'best practices' in professional development which have been developed from the experiences of experts. These practices include: a focus on content and how students learn content; in-depth, active learning opportunities; links to high standards; opportunities for teachers to engage in leadership roles; extended duration; and the collective participation of groups of teachers from the same school, grade or department (Desimone, 2002). Some studies conducted over the past decade suggest that professional development experiences that share all (or most) of these characteristics can exert a substantially positive influence on teachers' classroom practice and student achievement. (Birman *et al* 2000 and Garet *et al* 2001). Recent research reflects a consensus that at least some of the characteristics of professional development are critical to increasing teacher knowledge and skills, and improving their practice; these in turn do a great deal to improve student achievement.

Wilson and Berne (1999) argue that, consistent with literature describing best practice, recent large-scale studies have shown that high quality professional development programmes include: (a) content focus; (b) active learning; (c) coherence; (d) duration; and (e) collective participation. Garet (2001) also includes 'form of activity' as one of these facets. Before explaining briefly what each entails, it is necessary to recognise that the analysis of these characteristics of professional development focuses on structural features: characteristics of the structure or design of professional development activities such as the form of activity, the duration, and the collective participation; and core features: dimensions of the substance or core of the professional development experience such as content focus, active learning and coherence.

The form of the activity is a reform type, such as a study group or network. This is in contrast to a traditional workshop or conference. **The duration of activity** includes the total number of contact hours that participants spend on the activity, as well as the span of time over which the activity takes place and the degree to which the activity emphasises the collective participation of groups of teachers from the same school, department, or grade level, as opposed to the participation of individual teachers from many schools. The three characteristics that make up the substance of the professional development activity include active learning, coherence and content focus. **Active learning** is the extent to which the activity offers opportunities for the teachers to become actively engaged in the meaningful analysis of teaching and learning. Active learning can take a number of forms, including observing expert teachers or the interactive feedback and discussion after being observed; reviewing student work in the topic areas covered; and leading discussions. The degree to which the activity promotes **coherence** in teachers' professional development, by incorporating experiences that are consistent with teachers' goals, aligned with state standards and assessments, and encourage continuing professional communication among teachers. The extent to which teacher learning is consistent with teachers' knowledge and beliefs is another important aspect of coherence. The last aspect

of coherence is the degree to which the activity has content focus – that is, the degree to which the activity is focused on improving and deepening teachers' content knowledge. The latter describes the link between activities that focus on subject matter content and how students learn that content with increases in teacher knowledge and skills, improvements in practice, and, to a more limited extent, increases in student achievement (Desimone, 2009). In the following section the framing by Garet, *et al* (2001) is employed to explain in some greater detail both the structural and core features:

2.6.1 Form of activity

The most common type of professional development, and the form most criticised in the literature, is the workshop. A workshop is a structured approach to professional development that takes place outside of a teacher's classroom. It generally involves a leader (or leaders) with special expertise and participants who attend sessions at scheduled times – often after school, on weekends, or during the summer (Loucks-Horsley *et al* 1998:42-43). Institutes, courses, and conferences are other traditional forms of professional development that display many of the features of workshops in that they also tend to take place externally and involve a leader or leaders with special expertise and participants who attend at a specific time. This is generally a very common form of professional development in South Africa, but is widely criticised as being ineffective in providing teachers with sufficient time, activities, or the content necessary for increasing teacher's knowledge and improving their classroom practice. As a result, there is growing interest in the reform type of professional development, such as study groups or mentoring and coaching. These reform types differ from traditional professional development in several aspects. In particular, reform activities often take place during the regular school day. In fact, some reform activities, such as mentoring and coaching, take place, at least in part, during the process of classroom instruction or during the regular schedule of the teachers.

2.6.2 Duration

Much of the literature on teacher learning and professional development calls for professional development that is sustained over time. The duration of these development activities is important in two ways: firstly, longer activities allow in-depth discussions of content, student conceptions and misconceptions, and pedagogical strategies. Secondly, activities that extend over time allow teachers to practice their new skills in the classroom and obtain feedback on their teaching. As an example, in their Teacher Activity Survey, Garet *et al* (2001) asked the teachers about two aspects of duration: the total number of contact hours spent in the professional development activity, including all the components of the activity, and the period of time, in days, weeks, and months, over which the activity was spread. The responses to these two questions allowed the researchers to obtain a much broader sense of the role that duration plays in teacher professional development.

2.6.3 Collective participation

There is a growing interest in professional development that is designed for groups of teachers from the same school, department or grade level. This type offers a number of potential advantages. Firstly, teachers who work together are more likely to discuss the concepts, skills, and problems that they encounter during their professional development experiences. Secondly, teachers who are from the same school, department, or grade are likely to share common curriculum materials, course offerings, and assessment requirements. By engaging in professional development together, they may be able to integrate what they learn with other aspects of their instructional context. Thirdly, teachers who teach the same students can discuss students' needs with regard to specific classes or grades. And finally, by focusing on a group of teachers from the same school (in which some teachers may be new), professional development may help sustain changes in practice.

This technique is thus one way of building sustainability into the framework of a professional development programme.

2.6.4 Content focus

Available research suggests that content covered during professional development activities may vary along at least four dimensions. Firstly, activities vary in the emphasis they give to the subject matter that teachers are expected to teach and the teaching methods they are expected to employ. Some activities are intended primarily to improve teachers' knowledge of subject-matter content; some are designed to improve aspects of teaching practice, such as classroom management, lesson planning, or grouping methods; and some are intended to improve their content knowledge and teaching practices in specific subjects, such as teaching multi-digit addition in elementary mathematics or forces and motion in physics. Activities also vary in the specificity of the changes to teaching practice that are encouraged. Some activities focus on helping teachers use particular curriculum materials (new textbooks, science kits, or curriculum replacement units) or prescribed teaching strategies (specific student questioning strategies). These are important aspects to build into a study of professional development.

2.6.5 Active learning

This core feature of professional development concerns the opportunities that the professional development activity gives teachers to become actively engaged in meaningful discussions, planning, and practices. Opportunities for active learning can take a number of forms and include the opportunity to observe expert teachers and to be observed while teaching, to plan how new curriculum materials and new teaching methods will be used in the classroom, to review student work in the subject being covered, and to lead discussions and engage in the written work. *Observation and being observed* are important elements of

active learning and allow teachers to observe expert teachers,, or be observed in their own classroom (after which they receive feedback).

These opportunities can take a variety of forms, and include giving feedback on videotaped lessons and causing teachers to visit each other's classrooms to observe lessons. Active learning can also have activity leaders, lead teachers, mentors, and coaches observe teachers in the classroom and thereafter discuss the goals of a lesson, the tasks employed, the teaching strategies, and student learning. *Planning classroom implementation* is another element of active learning which involves linking the ideas introduced during professional development experiences to the teachers' work. The introduction of new approaches may result in different implications depending on the curriculum in place in a teacher's school, the specific textbooks used by a teacher, and the required assessments in the teacher's district. Also, the characteristics of the students in the teacher's classroom, including the material they learned in previous grades and their expectations for the classroom instruction, may affect the implementation of new teaching approaches. *Reviewing student work*, a third element of active learning, involves the examination and review of students' work. By examining students' written responses to problems, for example, teachers may gain an understanding of their assumptions, reasoning and solution strategies. Also, examining and discussing examples of students' work may assist teachers to develop skills in diagnosing student problems and designing lessons at an appropriate level of difficulty. Apart from opportunities to observe teaching, plan classroom implementation, and review student work, professional development activities may also offer teachers the opportunity to give presentations, lead discussions, and produce written work (presenting, leading and writing). Active participation of this kind may improve outcomes by permitting teachers to delve more deeply into the substantive issues that are introduced.

2.6.6 Coherence

A third core feature of professional development concerns the extent to which professional development activities are perceived by teachers to be a part of a coherent programme of teacher learning. As mentioned, professional development is frequently criticised on the ground that the activities are disconnected from one another and thus do not form part of a coherent programme of teacher learning and development. A professional development activity is more likely to be effective in improving teachers' knowledge and skills if it forms part of a wider set of activities.

Given the number, quality, and diversity of studies that provide support for the features of professional development, Desimone (2009) concludes that a consensus has been reached that these core features play an important role in determining the effectiveness of professional development. There is an emerging agreement that they are the "features of professional development worth testing", and as such, they should be included in impact studies of professional development (Wayne *et al* 2008:472). Their systematic inclusion in effectiveness studies will allow researchers to take the next step in understanding the importance of these features in improving student achievement (Wayne *et al* 2008).

Research on teacher learning has also consistently shown the usefulness of focusing on measuring the features of learning rather than the structure of activity (Wayne *et al* 2008; Desimone, 2009; Porter *et al* 2002; Garet *et al* 2001). Desimone (2009) argues that "there is enough empirical evidence to suggest that there is in fact a consensus on a core set of features". Very recent studies are already including this set of core features as critical components of effective professional development (Johnson, Kahle, and Fargo, 2007). In her example, Desimone (2009) speaks about education policy documents that have begun to reflect this consensus on critical features of professional development. The No

Child Left Behind Act of 2001 in the United States of America (USA) describes "high-quality" professional development as activities that "improve and increase teachers' knowledge of the academic subjects the teachers teach (content focus) and that are… sustained [and] intensive" (duration) and that are "are aligned with, and directly related to state academic content standards, student academic achievement standards, and assessments" (coherence). Desimone goes on to discuss the Teaching Commission (2004) report entitled *Teaching at Risk: A Call to Action* that also emphasises coherence (alignment) and collective participation (collaboration):

> Professional development should be aligned with state and district goals and standards for student learning… and should involve opportunities for collaboration so that teachers can learn from each other (p.49).

In summary, the core features of professional development activities (content knowledge; opportunities for active learning; and coherence with other learning activities) could be expected to exert a significantly positive effect on teachers' knowledge, skills and classroom practice. It is primarily through these core features that the following structural features significantly affect teacher learning: (a) the form of the activity (workshops or study groups); (b) collective participation of teachers from the same school, grade, or subject and (c) the duration of the activity (Garet *et al* 2001). Desimone *et al* (2009) found that the six features of professional development, discussed earlier, were related to the increase in teachers' knowledge, skills and changes in teaching practice as reported by the teachers themselves. The core features (content focus, active learning and coherence) worked through the structural features (active learning, duration, and collective participation). Thus, reform-type activities such as study groups or mentoring and coaching, in contrast to a traditional workshops or conferences, were more likely to exhibit collective participation and a longer

duration; activities with collective participation and a longer duration were more likely to have active learning opportunities, coherence and content focus and these activities in turn were influential in how successfully the experience improved knowledge, skills and teaching practice. The present study is designed in part, to test these claims and findings of the MSSI project in South Africa.

According to Desimone (2009), there are at least two central components of a conceptual framework for studying teachers' professional development. One is recognising a set of critical features that define effective professional development, as discussed above, and the second is establishing an operational theory of how professional development improves teacher and student outcomes. The model represents interactive, non-recursive relationships between the critical features of professional development, teacher knowledge and beliefs, classroom practice, and student outcomes. As illustrated in the figure below, a core theory of action for professional development would most likely follow these steps:

1. Teachers experience effective professional development.
2. The professional development increases teachers' knowledge and skills and/or changes their attitudes and beliefs.
3. Teachers use their knowledge and skills, attitudes, and beliefs to improve their instruction or their approach to pedagogy, or both.
4. The new instructional practices result in increased student learning.

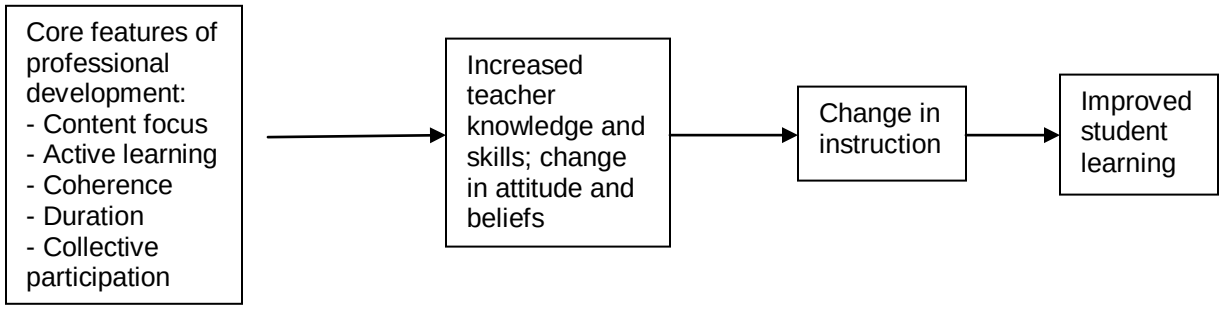


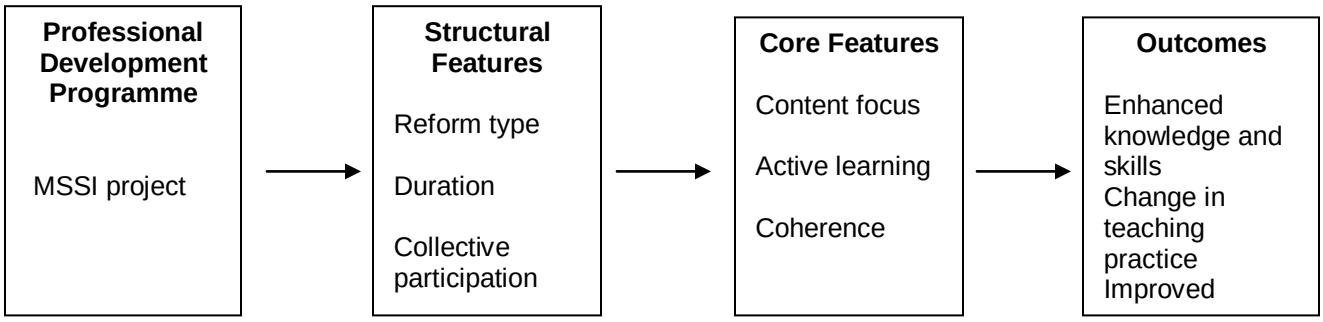
Figure 2: A 'Theory of Action' for Continuing Professional Development of Teachers (Adapted from Desimone 2009:185)

What attracts teachers to professional development is the belief that it will expand their knowledge and skills, contribute to their growth, and improve their teaching (Gusky, 2002). Many professional development programmes fail to consider the process of teacher change, although activities are frequently designed to alter teachers' attitudes, beliefs, and perceptions. Professional development leaders, for example, often attempt to modify teachers' beliefs about certain aspects of teaching or the desirability of a particular curriculum or instructional innovation. They presume that these changes will lead to specific changes in their classroom behaviours and practices, which in turn will result in improved student learning. In agreement with this view, Desimone (2009) notes that this is the framework that suggests a sequence of events-from learning activities to changes in knowledge, beliefs and attitudes, to changes in practice, to student improvements, as a result it could serve as a guide for when to measure what. This model allows for the testing of both a theory of teacher change (that professional development alters teacher knowledge, beliefs, and practice) and a theory of instruction (that changed practice influences student achievement), both of which are necessary to enhance our understanding of how professional development works (Wayne *et al* 2008). Studies that are designed to test both a theory of instruction and theory of teacher change have more potential to improve our understanding of how to design professional

development that improves practice. In this study I therefore propose an operational theory of teacher learning that will frame my research. I will employ the professional development framework developed by Desimone (described above), in order to understand teachers' perspectives on continuing professional development.

Using the case of the Mpumalanga Secondary Science Initiative (MSSI) project, I will however, modify the model in the following manner:

Figure 3: Modified theory of action for Continuing Professional Development of teachers



In this model, I have characterised professional development activities in terms of structural and core features (as illustrated above). I look at three structural features (reform type, duration and collective participation) as structural elements that set the context in which a professional development activity takes place. I also view three core features (content focus, active learning and coherence) as characteristics of the professional development processes and experiences that take place during an activity. Looking at this framework, I anticipate the structural features of professional development to play an important role in determining the core of the professional development experienced by teachers. I also expect the core features of the professional development to contribute to teacher outcomes which include improved knowledge, skills and teaching practice.

In their study on effects of different characteristics of professional development on teachers' learning, Garet *et al* (2001) discovered that the type of activity exerts an important influence on duration: reform activities tend to span longer periods and involve greater numbers of contact hours than traditional activities. Their results also show that the type of activity has a modest yet direct ability to enhance knowledge and skills. This indicates that reform activities result in slightly more positive outcomes when all the design features and quality characteristics in the model are included.

2.7 Theoretical framework

2.7.1 Critical Theory

My study begins with the idea that teachers are the key actors in CPD and should be directly involved in educational reforms. As a result, this study is carried out using critical theory, which, as defined by Beverly Gordon (1995:190), seeks to understand the origins and operation of repressive social structures. Critical theory is the critique of domination. It focuses on the oppression of society, casts doubt on scientific rationality, and implies that present configurations do not have to be as they are.

The term concept of critical theory has existed for nearly a century and was first coined by the philosophers of the Frankfurt School in the 1930s. Critical theory challenges the biased nature of all knowledge, specifically knowledge that is transmitted via dominant institutions such as schools and the media (Morrel, 2009). Critical theory focuses on the oppression of the individual, the group, and of society by self-imposed or external influences. In order to emancipate people from all levels of oppression, people must engage in a critique of the personal, situational, and historical forces which cause oppression (Peca, 2000). Critical theory is therefore presented as the highest level of knowledge acquisition

because it focuses on power; this is significant as social power is seen as the basis for inequality in society (p.3). Not only do critical theorists attempt to discover why oppressive structures exist and critique their effects, but they also explore the ways in which we can transform our society. In this sense, critical theory is not simply a critique of social structures; it is an analysis of power relations (Lynn *et al* 2006). Critical theorists ask questions about power, such as what constitutes power, who holds it, and in what ways is it utilised to benefit those already in power (Morrel, 2009). These ideas have been considered in various ways by sociologists and theorists throughout the 20th century who have attempted to explain the reproduction of social, racial, gender and educational inequality.

The goal of critical theory, according to Popkewitz (in Peca, 2000:6) is to change the world rather than describe it. To engage in the dialectical process causes an increased awareness of reality and from this, change may occur. Such change is not seen as serendipitous, but rather as leading to the emancipation of humankind because the dialectical process enables human beings to distinguish between the real and the ideal, and move toward the ideal. The present study looks specifically at the views of teachers and which professional development model they believe is best at improving their classroom practices. I am particularly interested in how teachers' opinions can influence educational research and policy. Teachers are also key figures in education, and as intellectuals they deserve to have some influence in addressing oppressive conditions in classrooms as well as schools (Giroux 2003). Critical theory is therefore important in framing this study because those most affected (the teachers) should be involved in framing the problems and evaluating the various proposals for addressing them. Teachers' opinions should be considered as they are involved in doing, rather than for interventions to rely solely on the perspectives and analyses of the developers of professional development programmes.

A number of studies have been conducted using critical theory, which specifically focus on the opinions of teachers. One of which was conducted by Margaret Probyn (2001). She investigated teachers' opinions on learning and teaching through the medium of English as an additional language in South Africa, specifically in township schools. The lessons of five excellent teachers, teaching mathematics, accounting, science, business economics and history in English as an additional language (EAL), were videotaped. The teachers were interviewed about their perceptions of teaching in EAL and the video recordings provided the basis for stimulated recall as they reflected on their classroom practice.

This research points tentatively towards a number of broad themes. Firstly, the research identifies that the stress which teachers and students experience as a result of teaching and learning in a language with which they are not able to communicate freely, has a negative effect on learning. Secondly, the research establishes that teachers are able to execute a wide range of teaching strategies to mediate students' cognitive and affective needs; most notably, a skilful code-switching between English and Xhosa (their common mother tongue). Thirdly, it is determined that the effect of the reflection process on practice appears to be a fruitful one, both in terms of eliciting a rich and detailed account of teachers' perceptions and practice, and as a developmental process for the teachers concerned (Probyn, 2001:249).

CHAPTER 3

3. Research Methodology

3.1 Introduction

This chapter describes and justifies the methods chosen to conduct research that examines the teachers' perspectives of continuing professional development. The methodology of the study is presented; it covers the following issues:

- The approach and the design of the study.
- The different data collection instruments used and the reasons for using them.
- Data collection and analysis.
- Validity, reliability and research ethics.

To recapitulate, the study explores teachers' perspectives of CPD and focuses on the Mpumalanga Secondary Science Initiative (MSSI) programme and its influence on the participating teachers' practices. To guide the study, the following critical questions were addressed:

- What are the teachers' views and beliefs regarding the MSSI as a project for CPD?
- What are their views and beliefs about the CPD practices and strategies used in the MSSI?
- How did the MSSI affect their classroom practices, if at all?
- How can the effect or lack thereof be understood and explained from the perspective of the teachers?

3.2 Research Approach

To address the critical questions of this study, I opted for a qualitative research approach. Such an approach provides a number of distinct advantages for a study such as this. Creswell *et al* (2010:50) describe qualitative research as a research approach that attempts to collect rich descriptive data on a particular phenomenon with the intention of developing an understanding of that phenomenon. It focuses on how individuals and groups view and understand the world and construct meaning out of their experiences (Creswell *et al* 2010:50). In studying teachers' perspectives, it is their experiences of this CPD project and the meanings ascribed to those experiences that I am particularly interested in. The MSSI provided the context, or the "world" in the terminology used by Creswell *et al*, in which the teachers' constructions of meaning and understandings could be described and interpreted.

Qualitative research methods are more suited to improving the understanding of human behaviour and experience, especially in more complex systems of integrated life processes (McMillan and Schumacher, 2001:16). It is through this research approach that I have attempted to understand specifically what teachers think of the continuing professional development programme, as well as how it affected their classroom practices. The research methodology allowed me to understand the processes involved in the MSSI and the social contexts within which the particular beliefs, attitudes and practices of the teachers were developed. Qualitative research studies people or systems by interacting with and observing the participants in their natural setting (Creswell *et al* 2010). Having been one of the instructors in some of the MSSI programmes myself; this study allows me to reflect on the entire MSSI experience, with the aid of the opinions of the participants. This approach is therefore relevant and helpful in understanding and exploring teachers' opinions and experiences of the MSSI project. Qualitative methods provide insight into how people make sense of their experience which is not easily achieved with other methods (Raid, 2004). As a

result, as indicated I have sought to explore, in-depth, the perspectives of the Mpumalanga teachers on continuing professional development and particularly of the MSSI project. I have collected detailed stories of their experiences, as well as the contextual understandings of what the teachers think is effective, or ineffective, with regard to their continuing professional development.

3.3 Research design

A research design is a summary of the various procedures that a researcher employs to collect, analyse, interpret, and present his/her research data. Research designs are important because they guide the methods and decisions that researchers must make during their studies, and set the logic which they use to interpret their findings (Creswell and Clark, 2007:58). In the case of Macmillan and Schumacher's study, the research design describes the procedures for conducting the study, including when, from whom, and under what conditions the data will be obtained (2010:20). This study looks at the MSSI as a case of continuing professional development in South Africa, and analyses the opinions that the participating teachers have of it. The research is broadly about CPD, and particularly about CPD in South Africa and thus the teachers who participated in the MSSI project provides the case study material.

I opted for a case study design as it enables the researcher to gain greater insight and understanding of the dynamics of a specific situation (Creswell *et al* 2010:76). A case study is defined as a design that examines a bounded system, or a case, over time, which employs multiple sources of data found in the setting (Macmillan and Schumacher, 2010:24). The case may be a programme, an event, an activity, or a set of individuals bounded in time and place. A case study provides a unique example of real people in a real situation (Cohen and Manion, 2007:253).

In this research, the case study is an in-depth examination of the extensive involvement of teachers in the MSSI project. I chose this design because it also allows for a multiple-perspectives analysis in which the researcher considers not just the opinion and perspective of one or two participants in a situation, but also the views of the other relevant groups of actors, and the interaction between them. It allows the powerless and oppressed, like children or marginalised groups, to voice their opinions (Creswell *et al* 2010: 74). In addition, Henning *et al* (2004:11) argue that through case studies, researchers hope to gain an in-depth understanding of situations. A case study design thus allows a greater understanding of teachers' views and experiences of continuing professional development, and more specifically, of the MSSI project.

As discussed earlier, my study is influenced by the theoretical ideas of the critical theorists. Thus I am interested in hearing and then voicing the opinions that the teachers have of the MSSI. I have read many reports and scholarly reviews of the MSSI and have participated in several of the project's review meetings. I know the many stories about the MSSI. However, all of this says very little about how the teachers experienced the project, particularly from their own perspectives. As Smith asserts, a case study design allows for the collection and presentation of detailed information about a particular participant or small group of participants (2003). Merriam (2009:43-44) identifies and explains three main characteristics of case studies: particularistic, descriptive, and heuristic. Particularistic means that a case study focuses on a particular situation, event, programme, or phenomenon. The case itself is important for what it reveals about the phenomenon and for what it might represent. Descriptive signifies that the end product of a case study is a rich, "thick" description of the phenomenon under scrutiny, while heuristic indicates that the case study illuminates the readers' understanding of the given phenomenon. It can bring about the discovery of new meaning, extend the readers' experience, or confirm what is known.

Case studies are therefore not representative. They are often selected to extensively explore particular issues, especially when it would have been difficult to separate the variables involved in the phenomenon under study. In spite of not being representative, case studies can allow for theoretical generalisations as opposed to generalising the entire population. Yin (2003) for example, discusses the concept of analytical generalisation, wherein a researcher seeks to generalise a particular set of results to some broader theory. Denzin and Lincoln (2000) also address generalisation within case study designs. In their opinion, such studies can be generalised somewhat by looking at multiple actors in multiple settings.

The main point of my study, however, is not to generalise the results of the study to the entire population of Mpumalanga science and mathematics teachers, or to all of the teachers that participated in the MSSI CPD project. The main aim is to develop an understanding of what it meant to be a participant in the CPD project, and what the project meant to each of the participants. It is through an accumulation of the individual opinions of the various participants that knowledge can be built about what it means to be a participant in a CPD intervention. Thus the teachers' stories can be told, and will be heard.

3.4 Sampling procedure

Sampling involves selecting units of analysis (people, groups, artefacts, settings) in a manner that maximises the researcher's ability to answer his/her research questions (Tashakkori and Teddlie, 2003:715). In this study, I use purposive sampling to identify particular groups of teachers that participated in the two phases of the MSSI. Purposive sampling is defined by Creswell *et al* (2010:79) as the sampling approach whereby participants are selected because of the data they hold, or represent; this data is needed for the study and thus the sampling decisions are made for the explicit purpose of obtaining the richest possible source of information to answer the research questions.

For this study, I needed participants who have had a complete experience of the MSSI project in order to broaden my knowledge of the different aspects and components of the entire intervention. The purposive sampling approach is supported by Denzin and Lincoln's (2000:370) assertion that "Many qualitative researchers employ purposive and not random sampling methods as they seek out groups, settings and individuals where processes being studied are most likely to occur". I take further guidance from Macmillan and Schumacher (2010:138) who assert that in purposive sampling, the researcher selects particular elements from the population that will be representative or informative about the topic of interest, on the basis of the researcher's knowledge of the population; a judgement is made about which subjects should be selected to provide the best information to address the purpose of the research. In this study, I therefore purposefully selected participants: the teachers who participated in the various phases of the MSSI project. When sampling for this study, I considered certain specific characteristics of the sample. I selected schools based on at least five key characteristics:

- I chose Mpumalanga schools because Mpumalanga is the only province that participated in the MSSI project and therefore, the schools naturally had to be in that province.
- I narrowed down my selection to one region of the province, the Ehlanzeni region. This is a region with many schools that participated in both phases of the MSSI from its piloting in 1999, through to its last phases in approximately 2008. While many of the activities of the project were completed in 2006, the remainder of the project continued until 2008 with fewer participants. This region was also selected because it houses an ethnically and socio-economically diverse population. The MSSI was committed to improving mathematics and science education for all students in Mpumalanga, especially those from previously marginalised groups and schools.

- I only selected schools that participated in both phases of the project.
- I deliberately chose only mathematics and science teachers in each of the schools as only these teachers participated in the MSSI project.
- I selected secondary schools which implemented the General Education and Training (GET) band. The project initially targeted the GET band teachers (Grades 7-9).

I therefore purposefully identified the schools that participated in the MSSI project in one region of the Mpumalanga province as my population in the study. A sample of 7 schools was selected, from which I chose one mathematics and/or science teacher who participated in the MSSI project from each school. A very important consideration was the size of the sample. This question is usually not easy to answer as there are a number of factors to consider (Creswell *et al* 2010:178). The size of a sample is related to the purpose, the research problem, the major data collection strategy, and the availability of information (McMillan and Schumacher 2010:328).

In constructing my sampling frame, I then considered, first and foremost, the purpose of the study: The choice of 7 teachers was based on the fact that I wanted to conduct a case study that would be descriptive and exploratory. From the literature I have surveyed (in Chapter Two), the present study is in many ways new and unfamiliar in South Africa. Not many researchers have explored and written about teachers' perspectives in the manner that I intend – particularly from a critical theory perspective. As an exploratory study, I did not need too many participants that could overwhelm the study. Ideally, qualitative research study involves just a few respondents, so that a phenomenon can easily be understood and described (Shulze, 2003:12).

I then considered my primary data collection strategy: qualitative researchers are guided by circumstances. For instance, a study may have a small sample size, but the researcher may be continually returning to the same situation or the same

informants, seeking clarification and the confirmation of issues. For the purpose of this study, I interviewed the participants several times over a 3-month period of data collection; I also conducted several follow-up telephone interviews to solve some of the issues that emerged during the analysis of the data.

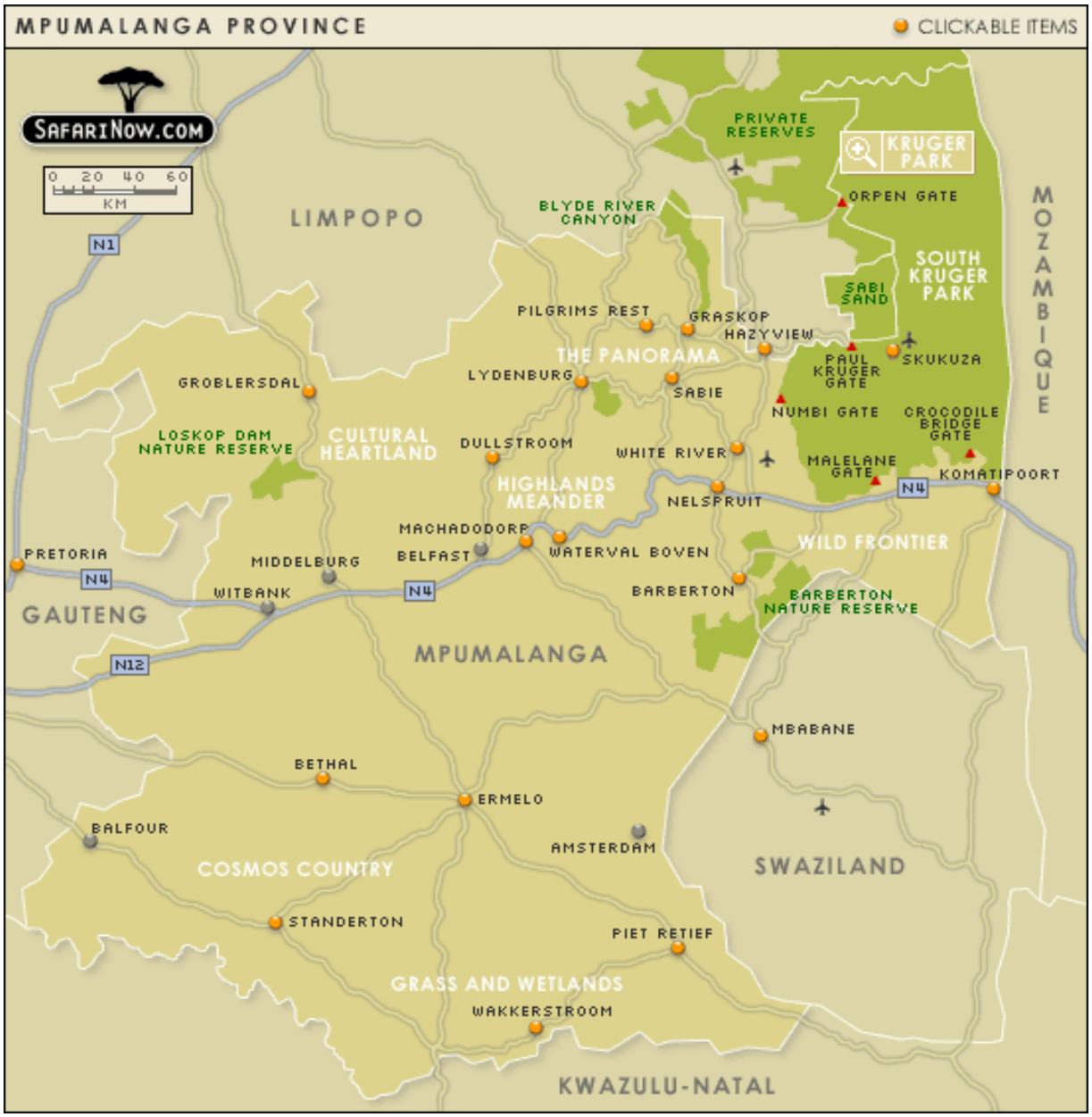
Finally, I considered the availability of the informants: some informants are scarce and difficult to locate while others are relatively easy to identify and locate. In the case of my study, the major activities of the MSSI project ended in 2006, which complicated the task of investigating a project which had been completed approximately four years earlier; this also made locating and identifying the participants very difficult. I had to enquire at a regional office and was finally referred to the person who directly dealt with the MSSI project; I was then given the phone numbers of the participating teachers. This too was problematic as some of the teachers were not traceable and some were not even in the teaching profession any longer. Table 1 below describes the sample characteristics for this study.

Table 1: Sample characteristics

Teacher	A	B	C	D	E	F	G
Teaching Experience	22 yrs	17 yrs	11 yrs	14 yrs	21 yrs	23 yrs	16 yrs
Current Position	Principal	HOD	Educator	Educator	Educator	Educator	Educator
Teaching Subjects	Natural science	Physical science & maths	Natural science	Natural science and physical science	maths	Natural science and life sciences	Natural science and geography
Grades	8	10,11,12	8,9	10,11	9	9,10,11, 12	9,10,11
Experience in MSSI project	5 yrs	7 yrs	5 yrs	7 yrs	5 yrs	7 yrs	7 yrs

In general, sampled teachers exhibit varied experience and other defining features that are characteristic of the population of teachers in Mpumalanga and elsewhere. For example, the table suggests that at the inception of the MSSI approximately 10 years ago, the sample teachers would have ranged from 11 years of teaching experience (Teacher C) through to 23 years of experience (Teacher F). The variation from novice to veteran teachers within the sample population is representative of science and mathematics teachers in Mpumalanga and elsewhere.

Figure 4: Map of Mpumalanga



Source: http://www.asexplorer.co.za/south-africa/map/mpumalanga -map.asp

Mpumalanga is one of the nine provinces of South Africa. It is located in the east of the country, and borders on both Swaziland and Mozambique. It is a fairly rural province with pockets of heavy mining and agriculture. Educationally, the

province has been struggling significantly with its national matriculation results and has been placed last in this regard for several years in succession. Owing to the poor performance of its learners in mathematics and science, the HSRC media briefs of 1998 state that “primary and secondary education in Mpumalanga is not in a good condition”. Only 47% of grade 12 learners in Mpumalanga passed their matric examination in 1996, which placed the province eighth in the country generally, and eighth for mathematics and physical science.

The Longitudinal Survey of Scholastic Achievement which aims to provide information on the level of knowledge and understanding of mathematics and science at grade 9 level confirms that, compared to other provinces, Mpumalanga has the third lowest average for mathematics, science and English. The results of the Third International Mathematics and Science Survey (TIMSS) also confirm that learners from Mpumalanga scored below the national average for both mathematics and science at the Grade 7 and Grade 8 level.

Another example is that of the TIMSS-R 1999, the research that was conducted by education researchers from the Human Sciences Research Council between 1997 and 1999. The following tables illustrate the results for both mathematics and science in the nine provinces of South Africa. These results are what prompted the Mpumalanga Secondary Science Initiative project intervention.

Table 2: Inter-provincial results for Mathematics

Province	Mean score
Eastern Cape	256
Free State	276
Gauteng	318
KwaZulu Natal	292
Mpumalanga	253
North West	267
Northern Cape	318
Limpopo	226
Western Cape	381
South Africa	275

As illustrated in the table above, Mpumalanga was the province with the second lowest score for mathematics with a score of 253.

Table 3: **Inter-provincial results for Science**

Province	Mean score
Eastern Cape	206
Free State	255
Gauteng	312
KwaZulu Natal	258
Mpumalanga	232
North West	235
Northern Cape	283
Limpopo	169
Western Cape	393
South Africa	243

In science, Mpumalanga was the third lowest with a score of 232.

The Department of Education (MDE) with the MSSI project therefore targeted mathematics and science as a priority and hence began the Mpumalanga Secondary Science Initiative (MSSI) project in the province.

3.5 Data Collection Process

The data in this study were collected to address the research questions mentioned earlier in the chapter; the process involved mostly unstructured interviews and the collection of relevant project documents. The reason for the use of interviews in this study is to be able to obtain information on how individuals conceive of their world and how they explain or make sense of the important events in their lives (McMillan and Schumacher, 2010). Interviews are therefore well suited for this study as I seek to explore the perspectives of teachers on continuing professional development and specifically the MSSI project. To collect the data, I visited each of the seven schools and conducted prolonged interviews with each of the participants. The fieldwork for the study was done between August and October 2010. During this time, at least two visits were made to each of the seven schools and seven teachers were interviewed. The interviews provided me with more detailed qualitative data used to develop the case studies, which are described in Chapter 4.

The other strategy that is used is document analysis. As Creswell *et al* (2010) assert, it is important to distinguish clearly between the literature review of the study and using documents as part of the data gathering strategy. I collected documents that have assisted me in gaining greater insight and more detailed information about the MSSI project (See more details on the next page).

3.5.1 Instruments used

3.5.2 Semi-structured interviews

An interview is a two-way conversation in which the interviewer asks the participant questions to collect data and to learn about the ideas, beliefs views, opinions and behaviours of the participant in order to see the world through the eyes of the participant (Creswell *et al* 2010). In this study, I used semi-structured interviews. An unstructured interview is an open-ended, in-depth interview that is designed to obtain detailed data from a participant using follow-up questions (Bryman, 2004:319-321). A semi-structured interview on the other hand is a method of understanding the complex behaviours of people without imposing any prior categorisation which could limit the field of enquiry (Punch, 1998). These interviews often take the form of a conversation which intends to explore a participant's views, ideas, beliefs and attitudes about certain events or phenomena. The participating teachers in this study were asked to provide detailed information about their views on continuing professional development, the MSSI project and how it changed their classroom practices, if at all. The semi-structured interview form was therefore more appropriate to this research.

I thus conducted semi-structured interviews with the help of a protocol of pre-determined categories of questions (included in the appendix); with all the seven of the mathematics and/or science teachers who participated in the MSSI project. I did this in order to establish their general views on professional development and the MSSI project in particular. The interviews provided information about the teachers' educational backgrounds, their teaching practices and their involvement in the professional development programmes. Interviews were also used in this study to get a clear sense of the impact of the MSSI project on the teachers' classroom practices.

Finally, the semi-structured interviews allowed me to probe more deeply and explore responses that may have had significance to the research topic but were not necessarily in the original questions. The semi-structured approach helped to raise the issues on the interview protocol, but also allowed for the flow of data to be determined by the responses of the participants during the conversations. It felt, in a sense, like a loosely structured conversation rather than a semi-structured conversation.

3.5.3 Document analysis

Content analysis is, according to Krippendorp (2004: xiii), potentially one of the most important research techniques in the social sciences. The content analyst views data as representations not of physical events, but texts, images, and expressions that are created to be seen, read, interpreted, and acted on for their meanings. Content analysis is therefore defined as the process of summarising and reporting written data, the main contents of the data and their messages (Cohen, Manion and Morrison, 2007). It is a research technique for making replicable and valid inferences from texts (or other meaningful matter). It can be conducted with any written material, from documents to interview transcripts, media products and personal interviews (Krippendorp, 2004:18). In this study, not only did I use semi-structured interviews, but also a collection of official documents that were produced during the MSSI project. McMillan and Schumacher (2010) also note that official documents are abundant in organisations and take many forms, from memos, minutes of meetings, working papers, reports and drafts of proposals, and informal documents; these can all provide a detailed internal perspective of an organisation. For this study, documents such as evaluation reports, policies, proposals, minutes, and other memos help me to describe the MSSI processes and how various people define the project and its implementation. The documents also help to frame the official perspective on the MSSI issues and processes against which the teachers' perspectives are mapped. The official documents of the MSSI project provide a

rich source of information on how the project had planned the implementation of the professional development activities, how these were executed, as well as the strategies and models that were used to capacitate the participating teachers.

The documents also assisted in the development of the interview schedule that was used to elicit the teachers' responses. It was important to spend enough time in the field surveying the many available project documents in order to get an overall sense of all of the MSSI's (intended) activities, and the official verdict on the activities and the project as a whole. In order to construct the teachers' stories, it was necessary to understand the project clearly so as to ask the teachers relevant and appropriate questions. Consequently, approximately 15 days (3 working weeks) were spent in Mpumalanga studying and documenting information from the official documents of the project such as their strategic planning documents, policies and other reports. These documents allowed the detailed understanding of the background, aims, objective, structure, planning, conceptualisation and execution of the MSSI project.

3.6 Data analysis process

Qualitative data analysis tends to be an ongoing and interactive process which implies that data collection, processing, analysis and reporting are intertwined (Creswell *et al* 2010). In this study the analysis was done continuously during the data collection process as all of the conversations were recorded.

For analysis, I first listened to the tapes several times before I transcribed them. This allowed for the emergence of specific units of meaning and themes. The tapes were transcribed verbatim. I personally transcribed the tapes in order to make sure that all of the words of the participants were captured. Creswell *et al* assert that "all data collected by electronic or digital means (such as tape or video recordings) must be transcribed and this is best done by yourself as you will most probably include some non-verbal cues in the transcripts – silence may

communicate embarrassment or emotional distress, or simply a pause for thought" (pg. 105). After reading the data (transcript) several times in order to understand and make sense of it, coding then commenced. Coding is defined as the marking of the segments of the data with symbols, descriptive words or unique identifying names; the coding process enables the researcher to quickly retrieve and collect together all the text and other data that is associated with some thematic idea so that the sorted bits can be examined together and different cases compared in that respect (Creswell *et al* 2010:105).

After coding the transcribed data, the themes relevant to the study were clustered and categorised. Le Compte (2000) views qualitative analysis as an inductive process of organising data into categories and identifying patterns among these categories. In the present study, I then began with some categories into which the data was sorted.

A documentary data analysis was also conducted. Payne and Payne (2004) describe this as a type of method that seeks to demonstrate the meaning of written or visual sources by systematically allocating their content to pre-determined, detailed categories, and quantifying and interpreting the outcomes. All of the MSSI written documents were collected, including the different reports and memos. The documents yielded data on the project, its background, structure, aims and objectives; this was included in the data chapter so as to develop a well-rounded case of the MSSI project as a CPD intervention.

3.7 Validity and Reliability

The use of validity and reliability measures has long been common in quantitative research, and only recently has it received considerable attention in the qualitative research paradigm (Golafshani, 2003). Joppe (2000:1) provides the following explanation of validity: validity determines whether the research truly measures that which it was intended to measure or how truthful the research

results are. Joppe then defines reliability as: the extent to which results are consistent over time and if the results of a study can be reproduced under similar conditions repeatedly (2000). With regard to the validity and reliability of this research, there are two key issues which had to be attended to:

Firstly, in relation to reliability, it needed to be determined whether the results are replicable. Secondly, with regard to validity, it needed to be established whether the means of measurement are accurate and whether they are actually measuring what they were intended to measure. It is important to note that the concepts of validity and reliability are contentious terms within qualitative research traditions. They are mostly associated with the quantitative paradigms. As Creswell *et al* (2010) state, it seems that when qualitative researchers speak of the 'validity and reliability' of research, they are usually referring to whether the research is credible or not. Merriam (1998) also questions the use of these terms in qualitative research studies and prefers to speak of the trustworthiness and credibility of the data. In order to test or maximise the trustworthiness and credibility of the qualitative data in this study, the following strategies are used:

3.7.1 Triangulation

Patton (2001) advocates that triangulation strengthens a study by combining various methods. This can mean using several methods or types of data, including the use of both quantitative and qualitative approaches. Triangulation is also employed by using multiple methods, such as observation, interviews and recordings that will lead to one valid, reliable and diverse construction of realities. In the present study, more than one data collection strategy was used, including in-depth interviews and document analysis. Once more, it is important to recognise that triangulation is also a contested idea within qualitative research approaches. Richardson (2000) prefers the term crystallisation as opposed to triangulation. She argues that triangulation is based on the assumption of a fixed point or object than can be triangulated; she dismisses this fixed position as the

outcome of qualitative studies and proposes that we should not triangulate, but crystallise. Richardson (2000:934) proposes that the concept of crystallisation enables one to shift from seeing something as a fixed, rigid, two-dimensional object towards seeing a crystal, which allows for an infinite variety of shapes, substances, transmutations, dimensions and angles of approach.

To strengthen the credibility of the data, several strategies have been employed, including doing member checks and spending more time in the field for data collection in addition to the time spent doing the actual MSSI activities during the implementation periods.

3.7.2 Member Checks

Member checks describes the procedure whereby one returns to the participants at the completion of the interviews to ask them whether the captured record is accurate or needs correction or elaboration. Some scholars take this to the point where the researcher and the participants work together on the planning, conducting, and analysis of results (Ratcliff, 1995). For member checking, the transcripts were returned to the participating teachers to verify that the data accurately reflects the interviews. In some cases, parts of the transcripts had to be read to the participants telephonically so that inaudible parts of the recording could be verified.

3.7.3 Prolonged engagement in the field

A researcher needs to be in the field long enough to collect credible data, and I spent three weeks in Mpumalanga studying MSSI documents to determine the official narrative of the project. Furthermore, I spent an additional week interviewing different teachers in different schools of the province. I also made follow up interviews telephonically with some of the teachers.

This is in addition to my own experience of the MSSI project as an implementer during its second phase.

3.8 Ethical Issues

Ethics is generally concerned with beliefs about what is morally right or wrong. Research ethics is focused on what is morally proper or improper when engaging with participants or accessing archival data (McMillan and Schumacher, 2010). Clearly this study requires interaction with people (interviews) and thus, some ethical issues had to be addressed. Thus it was ensured that the participants were well-informed about the purpose of the research. I wanted the participants to understand the risks they may face as a result of taking part in the research. While the risks in this case were minimal (participants remained anonymous), they still needed to understand that voicing their opinions could be disapproved in certain situations.

It was also important to ensure that the participants were free to make independent decisions about whether they wanted to participate or not, at any point in the study, without the fear of negative consequences. This is what researchers refer to as informed consent. Informed consent is defined by Bulger (2004) as a process in which participants give their consent to participate in a research project after being informed of its procedures, risks and benefits. McMillan and Schumacher (2010) add that researchers should generally be open and honest with participants about all aspects of the study. This usually involves the full disclosure of the purpose of the research. In the consent form, it was guaranteed that the participants were aware that their participation was voluntary and that they could withdraw at any time.

Lastly, the privacy of the participants during the data collection process was ensured. In this study, the participants were guaranteed that they would remain anonymous. Thus, false names are used or numbers are assigned to participants

where necessary. Complete anonymity exists when even the researcher does not know who the identity of the respondents (an anonymous questionnaire). The participants were thus guaranteed confidentiality in this study. My stance was informed by McMillan and Schumacher (2010), who understand confidentiality to mean that no one has access to individual data or the names of the participants except for the researcher. Therefore, the participants were given a consent form (See Appendix 2). After explaining all these details, the participants understood the importance of their role in this study and willingly agreed to participate.

3.9 Entry in the field

3.9.1 Access to the Mpumalanga schools

When conducting research, especially in schools, one of the major ethical responsibilities of the researcher is to obtain permission from the education authorities. I therefore began this study by seeking permission from the Mpumalanga Department of Education, specifically from the Ehlanzeni municipality – the region that my study is focused on. The regional director was contacted by telephone to ask permission to conduct research in the region. This was followed by a formal letter which was faxed to the office of the regional director (see Appendix 3). I immediately received a verbal response of permission and the promise of an official letter confirming this. I was then referred to the person who dealt directly with the Mpumalanga Secondary Science Initiative (MSSI) project at the regional office. After explaining the study to him, as well as the kind of assistance required from him, he allowed me access to the MSSI documentation and archives, and also provided me with a list of the names of the teachers who had participated in the project.

3.9.2 Entry in the schools

Entry into the identified schools was not difficult. My past experiences in research means that gaining access to schools is frequently difficult as many teachers fear research. They tend to view research as an inspection which observes and analyses the school's practices in ways that may be intimidating. This was not the case with the schools that were visited for this study. To prepare for the visits, all of the teachers from the schools on the list (provided by the office of the regional director) were telephoned; I described the study and my intentions to interview them. All of the chosen teachers agreed immediately. Having secured their verbal consent, I wrote a formal letter to the school principals (see Appendix 4) which clearly indicated the names of the teachers to be interviewed. The principals also immediately granted permission. After agreeing on interview times with the teachers and principals, I travelled to the schools and spent a few weeks interviewing the teachers. For every teacher interviewed, I again explained the nature of the study and the details of the consent form. All the teachers expressed their willingness to participate and signed the form. After every conversation with the teachers I thanked them for their willingness and openness and requested their permission to call them should there be a need for clarification and/or further questions regarding our conversations.

In the next chapter, the interview data from the conversations and the analysis of the relevant MSSI project documents are presented.

Chapter 4

4. Findings of the study

4.1 Introduction

To understand the perspectives of teachers on continuing professional development and the MSSI, I examined the stories of the teachers who participated in the project. First I provide the results of the document analysis regarding the MSSI project. In what can be referred to as a 'thick description', I describe the nature of the project, its origins, as well as its aims and objectives. In the second section of the chapter, I provide the stories of four of the seven teachers who participated in the MSSI project. The reason for only providing the stories of four of the teachers is that the data reached a saturation point and began to repeat itself. In order to capture the data of the three remaining teachers I summarised the responses of all of the teachers into a table.

4.2 SECTION A - RESULTS FROM DOCUMENT ANALYSIS

According to the introduction to the Mpumalanga Secondary Science Initiative (MSSI) guidebook (2000), the MSSI was a project which helped teachers to work in a classroom confidently through enhancing their teaching ability. More specifically, the initiative sought to equip the teachers with the skills and knowledge necessary for teaching Curriculum 2005 (C2005), and to improve their conceptual understanding of mathematics and science. The project was conducted by the Mpumalanga Department of Education between 1999 to 2008; with the last two years of the project solely, dedicated to study visits to Japan by groups of educators from South Africa. These visits were part of a science and mathematics education project that was funded by the Japanese International Co-operation Agency (JICA). Its major purpose was "to establish a school-based

in-service training system for teachers in Grade 8 and 9 in the Mpumalanga province in collaboration with the Mpumalanga Department of Education and the University of Pretoria" (Nagao, 2006). Thus the continuing professional development of teachers was to be conducted in collaboration with the Japan International Cooperation, and the University of Pretoria, and sought to apply a cascade model of training (Nagao, 2006). It also sought to develop a province-wide in-service training system for Mathematics and Science teachers so that the initiative could be sustained (MSSI guidebook – brief introduction, 2000); (See Figure 5 for the summary of the project according to Nagao).

Figure 5: Element of the MSSI project

Main Elements of the MSSI Project

- Goal: Improved understanding of mathematics and science of secondary students.
- Aim: 1. Improvement of mathematics and science teaching via teacher retraining.
  2. Development of a province-wide system of school-based in-service training (INSET).
- Duration: Phase 1 November 1999-March 2003.
  Phase 2 April 2003-March 2006.
- Partners: Mpumalanga Department of Education/JICA/University of Pretoria.
- Target population: Mathematics and Science teachers in secondary schools.
- Characteristics of approaches:

1. Retraining for teacher capacity improvement and curriculum reform.
2. Cascade model of training, targeted at school-based INSET.
3. Promotion of peer-teacher learning as a project instrument.
4. Teacher incentives through the University of Pretoria's accreditation scheme.
5. Extensive use of monitoring and evaluation as a tool of project development.

According to a JICA policy statement (JICA 1999-2001), the major objectives of the MSSI projects were:

- To ensure that secondary school students acquire enhanced skills in mathematics and science.
- To improve the quality of teaching in mathematics and science in the province through the enhancement of the capacity and experience of the teachers.
- To promote the development of a province-wide system of continuous in-service training for mathematics and science teachers so that this capacity enhancement effort may evolve into sustained practice.

While many versions of these objectives are discussed in the various project documents, in her evaluation report, Ofir (2004) highlights two major drivers of the entire MSSI project:

- To enhance the teacher' subject knowledge and teaching skills in order to improve the quality of mathematics and science teaching in Mpumalanga.
- To establish a school-based in-service training system in Mpumalanga.

The MSSI activities were thus designed and structured to achieve these two major objectives, which moved the project's focus away from the students and student achievement. The MSSI had several distinct characteristics: firstly, it tried to combine different training concerns into a single in-service training programme; secondly, it targeted all of the secondary schools, and all of the mathematics and science teachers in the province; thirdly, it sought to establish a system of in-service training whereby teachers would meet once a month at their own schools to engage in a peer collaboration exercise for improving lesson plans and teaching methods in mathematics and science. It was envisioned that

the initiative would be executed in the form monthly meetings organised at each school by the mathematics and science teachers, to engage in peer learning activities (Nagao, 2006).

The peer learning activities, according to the MSSI Guidebook No. 2 (2002) included the following four aspects:

- Curriculum implementers travel to Japan to elaborate on annual training programmes at the district level.
- Hosting of three district-level workshops for mathematics and science HODs.
- Promotion of school-based INSET by mathematics and science teachers and classroom application of the innovative teaching methods.
- Development of the teachers' ability to teach mathematics and science through participation in the university-based research and education.

Practically, the MSSI project, as illustrated earlier, was divided into two phases. Phase 1 took place from 1999–2003 and Phase 2 was scheduled from 2003–2006. From 2006–2008, the Japanese exchange visits were the major component of the MSSI. In the first phase of the MSSI, which covered a period of three years, schools were selected from four out of a total of ten districts in the province of Mpumalanga. Four more districts were added in the second year and in the third year the remaining two districts were added. By the third year of Phase 1, of the 521 schools in Mpumalanga, 313 were participants in the MSSI project (Ofir, 2004). In this phase, the MSSI team opted for a cascade approach to teacher development. In the cascade approach, information is carried to various parties through a series of cascading levels from which information is transmitted. The three primary target groups were the Mpumalanga Department of Education curriculum implementers (CIs) who were responsible for training the

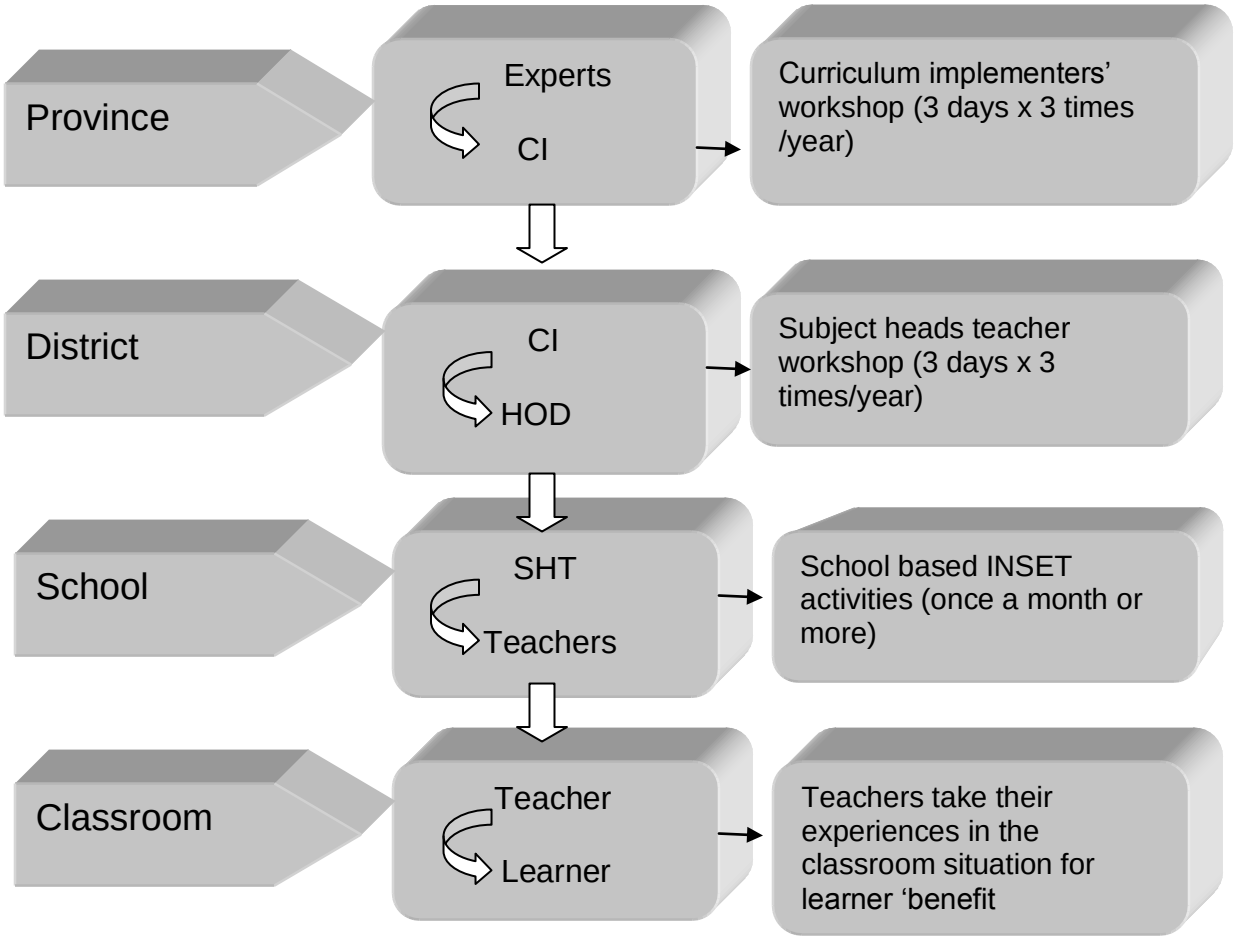
teachers, the heads of department or subject heads for mathematics and science in the schools, and the grade 8 and 9 science and mathematics teachers. The table below provides the actual number of groups that participated in the MSSI during this first phase of the project (Ofir, 2004).

Table 4: Number of participants in the MSSI (Ofir, 2004)

Mpumalanga schools offering Grade 8 and 9 mathematics and science	521
Number of participating schools	313
Number of subject's heads in participating schools	Appr. 300
Number of participating curriculum implementers	23

The curriculum implementers (CIs), or subject advisors, participated in the workshops which were coordinated by experts from Japanese universities and the University of Pretoria. The CIs also underwent a 6-week group study visit to Japan in order for them "to develop their own curriculum development skills, to be exposed to relevant Japanese systems and to develop teacher and learner support materials" (Nagao, 2004). The support materials were to be drafted during the study visit to Japan, and then used in South Africa during the teacher retraining programmes. The participating CIs were then expected to organise a district-level workshop for the mathematics and science subject heads who would also organise training sessions for the teachers in the schools. The teachers would use their experiences from the workshops and the support materials and resources in the classrooms. Diagrammatically, the process is reflected in Figure 6 below.

Figure 6: MSSI cascade model



According to the JICA-MSSI Evaluation Report (2003), some information was lost in the movement between the various layers and never reached the classroom. This loss of information is always the inherent danger of working with a cascade model. When the MSSI project was evaluated after the initial three year period, it was discovered that the cascade model had produced little or no impact in the science and mathematics classrooms of Mpumalanga; there was no evidence of changes in the classrooms of many of the teachers who participated in the project (JICA-MSSI evaluation report, 2003). It was at this stage that the second

phase of the MSSI was implemented; it had a slightly different approach to Phase 1. The major objective of Phase 2 was to more directly improve the classroom practices of science and mathematics teachers. To achieve this objective, the MSSI opted for the 'cluster' approach. This was to concentrate on creating school clusters to maximise the sharing of resources. According to the Cluster Leaders' Report (2002), the cluster approach sought the following benefits:

- Developing a co-operative and collaborative approach to the professional development of educators.
- Creating effective approaches for teaching mathematics and natural sciences.
- Fostering ties between the teachers within a cluster and encouraging the sharing of expertise and resources.
- Facilitating dialogue and reflection amongst educators.
- Fostering innovation and resourcefulness in the educators' pursuit of solutions to problems.
- Enhancing the status of the teaching profession in the Mpumalanga community.
- Promoting peer teacher learning.

As indicated earlier, the MSSI sought to develop a province-wide system of in-service training for secondary schools mathematics and science teachers with the strong emphasis on a school-based approach. According to the MSSI guidebook's brief introduction (2000), the operation of this system at the different level was captured schematically in the following table:

Table 5: MSSI operation system

Level	Key role player	Target group	Activity	purpose	Duration
Province	Japanese Univ.	Curriculum implementers (CIs)	CI study in Japan	To equip CIs with necessary skills and knowledge	Once in a year (6 weeks)
	University of Pretoria		Workshops for CIs		3 times a year (3-5 days)
District	CIs	Heads of department (HODs)	District workshops	To provide HODs with necessary skills, knowledge, materials and activities	3 times a year (5 days)
School	HODs	Educators	School based workshop	To equip teachers with necessary knowledge and skills for tackling C2005	Regularly (once a month or more)

The MSSI project partners, according to the MSSI guidebook's brief introduction, (2000) were:

1. The Mpumalanga Department of Education role was to"

- Act as the initiator and owner of the project.
- Orchestrate the partnership approach.
- Be responsible for basic decisions regarding the implementation of the MSSI.
- Establish and convene the Steering Committee's meeting.
- Designate responsible officials and curriculum implementers.
- Provide necessary budgetary recourses to cover the costs.

2. JICA, together with the Japanese universities, offered the following:

- Long-term and short-term experts.
- In-service teacher education and training in science and mathematics for curriculum implementers and educators, in Japan.

3. The University of Pretoria provided the following:

- Technical and managerial advice and the expertise in the workshops.
- Academic and intellectual support for the research and evaluation of activities.
- Intellectual support to facilitate the understanding of the Japanese educational experience.

In the sections that follow, I present the MSSI project through the eyes of seven participating teachers. Their experiences of the MSSI project are described in detail to establish whether the project's objectives and plans were implemented as proposed. The teachers' stories are also discussed in order to gain an understanding of their opinions on the MSSI as a CPD programme for teachers. As discussed previously, the seven teachers represent a broad spectrum of the Mpumalanga teachers who were involved in the MSSI over its several phases during the 6 years of active engagement.

4.3 SECTION B- TEACHERS' STORIES[1]

4.3.1 Case Study 1: Mr. Zak

4.3.2 Background

Mr. Zak has been teaching for 14 years. He began his career as a teacher in a secondary school in the province and later joined his current school approximately 4 years ago. He has taught Physical Science and Natural Sciences for grades 10, 11 and 12. Currently, Mr. Zak teaches Natural Sciences for grades 8 and 9, and Physical Science for grades 10 and 11. When asked about what it is like to teach at his current school, Mr. Zak expressed his joy and love for teaching, especially at his current school where he feels that the atmosphere is very collegial and cooperative:

> Ja, to teach at this school is very good actually since it's a new school. We are sort of developing learners on our own, the learners are good they are listening and actually they are eager to learn. And we have got very cooperative staff and a very understanding principal.

4.3.3 Participation in the MSSI

Mr. Zak was very fortunate to participate in the MSSI almost from its inception (since about 2000 when the project was introduced). He was at his previous school when the project was initiated and therefore represented that school in the MSSI. In discussing how he got involved in the MSSI project, Mr. Zak explained that the project was introduced to them (the teachers) by their curriculum

[1] All the names of schools and persons are pseudonyms.

implementer (CI) and later by the Japanese professors.

> There were some guys from Japan. They took us to a certain primary school around Bhakani where now they were putting the programme in action. They were just telling us what is expected of us, what we must do and all those things. We did issues of forming clusters, choosing cluster leaders, and preparing together.

In his discussion, Mr. Zak noted that there were only two teachers from his school:

> We were two; it was myself and the current deputy principal of the school.

The story of the teachers' participation in the MSSI initiative therefore has to begin with the selection or nomination to participate in the project. Out of curiosity, I explored how each of the teachers were identified to participate in the MSSI project. This is a critical matter in CPD, as it speaks to the motivational issues for teachers that are participating in professional development. Regarding his nomination to take part, Mr. Zak explained that his selection was almost pre-determined as the project identified all teachers of particular grades. Mr. Zak had this to say about the selection process:

> Um….. the criteria that was used, I can say , they wanted the Science teachers and Mathematics teachers, I was teaching sciences and my colleague taught Mathematics I think that was the criteria they used.

Only two teachers were selected from Mr. Zak's school to participate in the MSSI project. Assuming that his school had more than just the two Science and Mathematics teachers, what would happen to the others? The implications of the selection would be that the MSSI project, as opposed to its stated goals of establishing a broader "system" of CPD for science and mathematics teachers, would selectively focus on individuals as opposed to the "school system" In his elaboration on this point, Mr. Zak explained how the project took representatives from several schools to maximise the capacity and sharing between schools. Here is how he explained this process:

> There were two teachers from Khumbula Secondary school and from Sbula and there were other teachers from white river circuit, actually we were sort of a very big team, we were more or less twenty or plus."

Practically, therefore, the MSSI brought together teams from various schools to form bigger clusters. The collaboration across schools was evident although the collaboration within each school remains unclear from this discussion. It was interesting to discover how teachers from different schools came together to participate in the project and how their learning was fostered in the clusters. To pursue this interest, a set of questions was devised to determine exactly how the teachers worked together in the project. Mr. Zak explained the process as follows:

> We had a programme, now we meet together to discuss. We were discussing maybe, I can say (lesson) preparations. How can we prepare together, and then looking at the challenging chapters and how we can help one another in terms of subject content. The curriculum

> implementer was always there to monitor and assist us.

This description suggests that the teachers from the various schools met primarily to work with each other on matters of subject content and pedagogy. More specifically, the cluster meetings seem to have allowed teachers to learn from each other about topics that they were not familiar with:

> For example in Natural Science, there are sort of different topics that involve different learning (subject) areas, so you find there is a topic that one cannot teach but you can ask somebody else to teach for you. (You) sit together and plan. It's very simple and sometimes you find that in Natural Science and also Social Science there are sort of other learning areas integrated in them, so we organise that one will prepare whatever topic very well and go to the classroom to go and teach that topic.

Collaboration among the teachers about content and pedagogy seems to have been prioritised in the MSSI according to Mr. Zak. Indeed, Mr. Zak spoke strongly about the value of the MSSI cluster meetings that he attended:

> On the cluster meetings, I remember that I was once selected as a cluster leader. I was so involved in this one; it was a very good thing really because we came together as teachers from different schools. You sit down, you look at the challenging topics, you discuss them together and some other teachers come up with different

> methods of teaching or approaching the particular topics. Then, if a teacher is having a real challenge or difficulty in teaching, the teacher is also allowed maybe to ask anyone from the group to go to his/her school and assist her on that particular topic.

Clearly, the teacher clusters seem to have been an important catalyst for collaboration within the MSSI. Interestingly though, unlike many other teacher collaborations, the MSSI clusters seem to have gone beyond just conversations about content, but also became sites for new ideas and pedagogical strategies to be developed. The collaborations were much more comprehensive and the teachers visited each others' schools and classrooms to work with each others' learners. Such collaborations are fairly rare, especially in South Africa, as most teachers prefer to work alone.

Pursuing the issue of teacher clusters further, I was intrigued by their apparent efficiency as catalysts for the professional development of teachers. I became interested in exploring their operation, leadership and utility for CPD purposes. During the conversation with Mr. Zak I became interested in how he was selected to participate in the project as a whole and then how he was selected as a cluster leader. As he is a science teacher and the MSSI project focused mainly on mathematics and science teachers, he conformed to those standards. I then asked how he was chosen to be a cluster leader:

> Normally they looked at the performance of the learners; they looked at how your learners performed in a certain area and also your active involvement in the project that was also taken into consideration.

Clearly, Mr. Zak is not an ordinary teacher — he is a fairly successful teacher with exceptional commitment to his CPD. These two criteria seem to have earned him a leadership position in one of the key activities of the MSSI project, the teacher clusters.

Teacher clusters were not the only tools used by the project to achieve its intended objectives. As we discussed further it became clear that the MSSI had a number of other activities designed to foster the teachers' professional development needs. One of the activities that Mr. Zak raised in our conversation was the workshops which were conducted by the curriculum implementers:

> The workshops were normally conducted by the curriculum implementers; they would come to us as a cluster and workshop us together. Sometimes they called the cluster leaders to a meeting to workshop them and the cluster leaders must go back to the other teachers in a cluster and disseminate the information.

From the above quote, it is clear that both the workshops and the cluster meetings were deliberately linked: the cluster leaders were first trained to conduct workshops before they proceeded to their cluster meetings. Content was a major feature of the MSSI workshops as described by Mr. Zak:

> (The workshops covered) A lot of things, including number 1, how to conduct a cluster meeting, how to moderate the work of the teachers, and maybe also to come up with a year programme. Sometimes if they want us to know something new they call us and then we disseminate the information to the teachers. We used to do

> content, because as I have indicated, you find that in our cluster meeting there are some topics that maybe are little bit difficult for the teachers and then the curriculum implementer would come and help us here.

From the above evidence it is clear how the teachers came together from different schools and assisted each other for teaching and learning purposes. It is also clear that the project, through the collective participation of the teachers, prioritised the subject content in its approach to the teachers' CPD. Mr. Zak became personally invested in the MSSI project as he enjoyed the MSSI activities and they fostered personal development within him as a teacher. This is how he explains it:

> Yes because you grow as a teacher, because my experience has just shown me that one might not know everything in what he/she is teaching. And if you come together with other teachers, they help you a lot, actually you find yourself maybe excelling in your job.

Realising his enthusiasm for the project, I asked exactly what motivated him to participate in the MSSI project. In his opinion, his participation was not forced but voluntary:

> The curriculum implementer came to my school where I was working and then he introduced the project to me, and then he explained advantages of being in this programme his explanation made me sort of interested in participating.

There seems to have been a personal approach and discussion regarding what he would gain by participating in the MSSI project. The request for him to participate was not just a general recruitment, but personalised. The discussion regarding what benefits a participant would receive from the project was an important theme to pursue for this study. Thus I was interested to hear Mr. Zak speak about the project and its promises as outlined during the recruitment drive. I asked Mr. Zak what he found interesting about the professional development programme that he was involved in (the MSSI project). Mr. Zak noted that he was intrigued by the way the project had tried to improve the teachers' ability to facilitate learning by encouraging learner participation:

> I think what I enjoyed a lot is that the issue of making our lessons to be learner centred, because previously a teacher would just go there and disseminate the information to learners without the learners being involved. The learners were just listeners not taking part, but from this (MSSI) programme one has realised that now, learners must be involved in one way or the other. They are part of the learning process. One must not undermine the learners, that they do not know anything. Another thing is that of preparing together, it helps because we sit and plan together and share the ideas.

The influence of the professional development programme on the teachers' classroom practices and most significantly on learner participation and learning in general, was a theme which began to enter our conversation. Many CPD programmes often fail to consider the impact on the learners, and learning in general, and focus almost exclusively on the teachers. As noted by Mr. Zak, the MSSI programme assisted him to focus not only on teaching but also to begin to

think about how his practices affect his learners too. The link between CPD and learning through improved teaching is an important matter that I will revisit in the next chapter.

4.3.4 MSSI and its relevance in the classroom

One of the dimensions one should focus on with regard to teacher professional development is to explore whether the programme has any relevance to the life and work of the prospective beneficiaries. As discussed earlier, Mr. Zak found the MSSI programme personally meaningful with regard to the content knowledge that he and his colleagues acquired in both the workshops and the clusters:

> In the MSSI, we were mostly assisted on how to conduct experiments, how to prepare a lesson, which is exactly what we needed to do in the classroom environment.

4.3.5 Selected Models of professional development

The literature on professional development covers a wide-spectrum of models that can be used to assist in the development of teachers. Interestingly, the MSSI by design had used a number of alternative but supporting models of professional development to achieve its objectives. Among the models used by the project were the workshops as well as the cluster meetings. Part of my study is about how the teachers view the different models. What the teachers' perspectives and preferences were regarding the different models of professional development is an important question as it affects both their interest and participation. Thus, in the conversation with Mr. Zak it was important to explore what models he perceived to be the best. His response was that he thought both models were very effective:

> Mina (myself) I think what I like most about this (MSSI), I can say almost everything but mostly the workshops and the clusters. (that is) because in the workshops that is where now we were getting more information on what we were supposed to do in the classroom and also in the cluster we were also helping one another on how to teach the learners, in terms of the content, in terms of approaching any topic, and in terms of making preparations. So I can say the two helped us.

Mr. Zak found both cluster meetings and workshops to be most helpful and he believes that they are complementary because one provides information (the workshops), while the other allows for collaboration and the sharing of content and pedagogy knowledge. Thus he views the workshops as a source of information and the clusters as platforms for collaborating and sharing with colleagues. This was an interesting part of the research as most of the literature on professional development models underscore the ineffectiveness of large workshops as vehicles for teacher development (discussed in the literature review in Chapter 2). I was quite intrigued by this opinion and although Mr. Zak was positive about these two models and the MSSI as a programme of professional development, he did make suggestions about how such CPD initiatives could be improved. First he believes that it should be compulsory that all teachers must, in some way participate in these programmes, and that such a programme should conduct follow-ups with the teachers:

> The best way is that one must come up with a standing programme, a programme where everybody will be on. I don't want to say a

> mechanism where everybody will be forced but some people take it light, so if maybe there can be a policy that says everybody must follow.

This quote is a clear illustration of the opinions of many teachers who feel strongly about the value of professional development programmes to the point of advocating that they be almost compulsory for all teachers. Mr. Zak's strong views emanate from his observation that other teachers did not take the programme seriously and thus, that there should be policies that encourage teachers to participate.

A second suggestion from Mr. Zak is that there should be follow-ups after the interventions; the facilitators should go to the schools to check that the skills acquired by the teachers at the workshops and clusters are implemented. He believes that other teachers did not even bother to implement their new skills and knowledge:

> You see in some other places you find that teachers are doing other things different from what we discussed, so that is why I am saying if maybe there can be sort of a policy or something that will force people that something must be done in this way, I don't know, that's my feeling.

The importance of support and the continuous evaluation at school and classroom level is important for the success of professional development initiatives. For Mr. Zak, the MSSI enabled him and his colleagues to receive this support as they visited each other's schools and classrooms.

4.3.6 Teacher's conceptions

Much of the literature on professional development tends to show that in spite of there being a number of professional development interventions in South Africa, teachers' practices still remain the same – they tend to remain traditional. It was argued earlier that part of the reason for this lies in the fact that we still know very little about what it is that the teachers want from professional development. Therefore Mr. Zak's opinions regarding his own professional development are also deemed important. It is imperative that researchers begin to listen to and understand what teachers want as they are the beneficiaries of the professional development. When asked about his own conception of the MSSI initiative as a professional development programme, Mr. Zak repeated his belief in its value and power. In his view, the programme had helped him greatly to develop his subject matter knowledge, pedagogy, and his ability to collaborate with other teachers:

> Ah! about this programme, I think that in these kind of programmes you gain a lot, in terms of maybe your teaching styles, approaching things in the class and the sharing of ideas because to me that is also the very important thing, and also that it develops a person in terms of how you prepare your lessons in class, how to follow the work schedule and you also get some materials, you learn also to share teaching aids, because sometimes you find that in your school, you do not have this but if you sit together with the other teachers, now you are able to share. The project also taught us to improvise, that now if you don't have this you can use that. In these projects one can gain a lot.

Mr. Zak was adamant that he would gladly participate in such a project again, but that such programmes must involve not only one teacher from a school, but all of them:

> I think what I can recommend is that instead of taking one or two teachers in a school, I prefer that all the teachers be involved in that programme, because if you take one or two teachers sometimes, it is difficult as the third or second information that you get from a second person is not similar to the one you get from the horse mouth, that's what I think must be changed.

As evidenced in the above quotation, Mr. Zak states that taking one or two teachers from a school does not build a school's capacity, but only develops the individual teacher. He points out that the information that is attained from attending a workshop or cluster meeting is different from "second hand" information and therefore all teachers must attend these events. In relation to the MSSI activities that he participated in, Mr. Zak pointed out that activities such as clusters and workshops must be kept as they are:

> But something that I can say maybe it must be kept as it is the cluster, the workshops, those ones I can say they must just stand because really they are helping, they also help us to do uniform things, to do things uniformly, that now if you go to school B you find that they are doing almost the similar thing with school A. So if we keep the workshops and the clusters, and everybody is attending it will be simple, you will find that we are all doing the same thing, and sometimes there are all the same

> topics, because this clusters we come up with programmes that by this time we must have covered this and that also helps to maintain the good standard of learning and teaching unlike when everybody is doing his/ her own thing.

In his conclusion Mr. Zak noted that the teacher professional development programmes are indeed useful, not only for him individually, but for all of the teachers who participate. However, he did identify time as a major obstacle to the successful implementation of these programmes:

> The problem is with time, time is not there, because normally teachers prefer that you use the teaching time for professional development, instead of using their own time. The other problem on time is from the people offering the professional development, because definitely you cannot just take a teacher to a one day workshop and expect the teacher to work on and on, and that maybe in a year there are only two workshops.

It was not surprising that the obstacle of time appeared in our conversation as the literature on professional development suggests that it is not possible to consider professional development without taking into account the issue of time. In the conceptual framework on professional development in Chapter 2, the concept of duration is identified as one of the core features of professional development. This matter will be revisited in Chapter 5.

4.4 Case Study 2: Mr. Sipho

4.4.1 Background

Mr. Sipho has been a teacher for the past 22 years. He began his teaching career in a rural school in Mpumalanga where he taught Physical Science for grades 10, 11 and 12. He was employed there for 9 years before moving to his present school, where he is currently a Head of Department (HOD) for Mathematics and Science. Sipho is also responsible for teaching Physical Science at grade 12 level. When asked about his experiences of teaching, particularly at his current school, Sipho noted the supportive atmosphere that prevails at his school:

> Yeah, it is very fine. The teaching atmosphere here is quite comfortable because of the supportive principal and colleagues.

In his explanation of what he described as a "comfortable teaching atmosphere", Sipho attributes this collegial environment to the fact that his colleagues, as well as the principal, have developed an ethos of working collaboratively and assisting one another whenever possible. The support one receives from his/her colleagues and the school management team seem to be important factors for a "comfortable teaching" environment according to Sipho.

4.4.2 Participation in the MSSI

Sipho noted that he was amongst the first people to participate in the MSSI project when it first started in the 1999. At the time however, he was not in the same school as he is now. He was the only teacher selected to participate in the project from his previous school. As in all the cases, I enquired how the teachers were selected to participate in the MSSI project. Again, this was to explore the

extent to which the teachers were allowed to voluntarily participate based on their desire to do so. As with the other teachers in this study, most selections were coincidental in that the project sought to work with only mathematics and natural sciences teachers of the lower (or GET) grades: 7, 8, and 9. Sipho describes this below:

> The reason I was selected is that I was actually the only teacher for Mathematics and Science in the school. The other teachers joined the school later. But initially I was teaching both subjects in the school.

As in the previous case study, Sipho also noted that irrespective of being the only teacher from his school participating in the MSSI project, the project allowed him to work with teachers from other schools in the area, in what is referred to as a cluster:

> Yes, we came together as teachers from different schools. We were helping each other, a teacher would come and present his problem to the group, we would discuss the problem together. One of us would teach the topic and as he is teaching we would identify the loopholes in his teaching and we would discuss, taking note of the problem that was raised by the teacher. If you wanted the background on the chapter, you come and we discuss the chapter as a group then you have knowledge.

Having heard how the participating teachers met and worked together despite being from different schools, I also became interested determining specifically what they did in the clusters. First and foremost, Sipho pointed out that in the cluster meetings, they worked collectively as a group to make sure that teachers returned to their schools with more knowledge than when they arrived at the cluster meetings:

> We were making sure that, you as teachers when you go back to your school, you must have some knowledge on the subject and you must know exactly what you are going to do. Above all, when you are teaching, you must have confidence; we were capacitating the teachers so that they know the subject better.

Evidently, the goal of the MSSI clusters was for the teachers to collaborate and learn together. Importance seems to have been placed on the teachers learning from one another, and teaching one another. The goal was to improve the group's instructional ability. Instructional improvement, as defined by Sipho and his colleagues, seems to include "knowing the subject better"; "knowing exactly what you are going to do when you go back to school (teaching plans)"; and "having confidence (affective domain)". What is interesting here is not only the MSSI's emphasis on building and nurturing collaboration and collegiality among the participating teachers, but also the importance of how teachers define the content of these collaborative meetings. Three key topics are seen as part of the curriculum of professional development and learning: subject matter content, pedagogy, and personal dispositions and self development (building a teacher's confidence). The teachers not only focused on learning the content and how to present it in such a way that learning will be improved in the classroom, but there was also a focus on changing the persona of the teachers – changing how

they see themselves in relation to their work. The notions of content, pedagogy and personal development in the conversation with Mr. Zak seems to repeat itself in the conversation with Sipho.

As with Mr. Zak, the conversation about what exactly the cluster teachers did when they came together was pursued with Sipho. Thus, I sought to explore how the clusters strove to achieve the goals of personal development, content enrichment and pedagogical expertise for the teachers. This was Sipho's response:

> We established a cluster where I was a cluster leader. I was elected by the other teachers in the cluster. We used to meet once a month and prepared together. We did learning programmes, micro planning and everything about teaching and learning. We used to teach the same thing in a circuit even our schedule, we did the same thing.

As was heard before, the cluster teachers worked on their syllabi, and then prepared lesson together and assisted each other in selecting and sequencing topics for their circuits. It would appear that the clusters soon became a vehicle for coordination and leadership regarding instructional matters. What is remarkable about this instructional leadership is that it was led by the teachers themselves. As with Mr. Zak, Sipho was also nominated by his peers to lead their cluster. Sipho was therefore regarded as a leader. It is remarkable to note that while many of the MSSI teachers enlisted in the project because of their need to improve as Science and/or Mathematics teachers, they were soon exposed to various leadership opportunities in relation to matters of teaching and learning. In other words, they soon became instructional leaders within their circuits and schools.

Cluster meetings were not the only activity that Sipho and his colleagues in the MSSI project participated in. Workshops were also one of the MSSI activities that Sipho was actively involved in. In these workshops they were 'workshopped' by the cluster leaders, and the facilitators from the project's university partners:

> In the workshops, we encouraged and showed teachers how to construct their lesson plans. We assisted them to prepare, in the area we taught the same thing so that if a learner moves from one school to another, she must not find it very strange. Each and every teacher-learner was given micro-kits the micro-kits were very helpful, as they also assisted the teachers in terms of improvising.

In terms of the structure of the MSSI programme, workshops were used to complement the teacher clusters. As described above, Sipho seems to have found the workshops useful in complementing the work done in the clusters. Sipho was particularly excited about the opportunities for collaboration and collegiality that were developed through the MSSI structure and format "It [the MSSI structure] made us know each other. If we meet in the streets, we greet each other because we were made to become friends in the MSSI. Even today many teachers are now cluster leaders through this MSSI".

While collaboration at the professional level was ensured in the MSSI project, a collateral benefit was also the development of friendships among the teachers who would ordinarily not have known each other. Such a personal benefit is not often set as a primary goal of any professional development programme but, as is the case here, teachers list it as one of the key benefits. It is on the basis of such friendships that one can begin to ponder possibilities for the sustainability of professional development programmes and ideas.

In the conversation with Sipho, I also noted the fact that he felt that his participation in the programme also helped him with his own personal growth and change in attitude. As he indicated, his involvement with the MSSI influenced his thinking and that of his colleagues with regard to their personal development:

> Maybe there is an idea that you have seen in the text book, when it is applied in the MSSI workshops you find that, this is simple to solve, so most of the misconceptions on Science were discovered there. So people were made to register (for further study). No one told us that we must register, we just decided on our own after maybe a session; I remember some of my friends they said "you know this Potchefstroom University, let us go and register there because this MSSI is telling us that we are lagging behind with information. We may know the information but we were not able to discover how they come about getting the answer there. So through the MSSI we engaged with each other and discovered more and thought further about our own development.

As Dewey (1966) argues, a good learning opportunity is one that leads to further opportunities for learning and development. The MSSI intervention seems to have sparked the need and desire in the participants for further learning and development. The acknowledgment of one's limitations and thus the recognition of the need for further education was an important point raised by Sipho in his description of how the MSSI project led to his personal development and subsequent transformation.

One of the questions I asked Sipho in our conversation was to identify two or three of the most important aspects of the MSSI project that he would keep if he were to redo the project. Sipho mentioned how important it was to work together with other teachers in the clusters:

> The MSSI has established that cluster system. Clusters are flourishing now through the MSSI, they were emphasised by the MSSI project. Most school are performing greatly because of some activities of the MSSI, the process of bringing together the teachers was a powerful one. Teachers now know each other, you know that, that one is specialising in such and such a subject, so we can go to him for his expertise. Teachers are willing to help each other.

4.4.3 MSSI and its relevance in the classroom

One of the important aspects for teachers in a professional development programme is that they must be able to take what they have learned and apply it in practice. With this in mind I asked Sipho how relevant the activities in the MSSI were to his teaching:

> Seemingly MSSI was done primarily for a syllabus that is there at school. Most of the activities that we were doing in the MSSI are in our textbooks. Most experiments that we did, even in terms of content, for instance there was this organic chemistry, everyone was struggling with the topic but since the MSSI, we found it easy. Every MSSI activity that we did in the workshops, I brought

> them to school to give to the learners especially the science experiments.

Sipho describes how relevant the MSSI activities were to his own teaching. His description of the correlation between what he learned in the project and his teaching attests to the relevance of the project. He may not have been aware that the MSSI project documents were deliberate in trying to build these links between what teachers had to do in their classrooms and the project activities. Considering this, the need for professional development activities to link well with teachers' classroom activities is critical.

Sipho also found the MSSI activities to be relevant to the specific content of the subjects that he teaches:

> The project assisted us as we were doing Natural Sciences. Natural Science is a projection of geography, agriculture, physical science and biology, four subjects. So if I have not majored in one of this subjects, it would be difficult for me to teach the other parts, so the MSSI assisted us to pinpoint some of the chapters that are from other subject areas. All this we did though the activities that they gave us to do, like taking us to the dam to observe how water pollution affects the animals. We would then go and do the same to the learners; this is how I find it to be relevant.

The importance of the subject matter focus of the MSSI is highlighted in this discussion. In addition, Sipho emphasised the personal transformation that occurs when a teachers acquires skills in other subjects that they may not have specialised in during their pre-service teacher education programmes. A Biology

teacher's sudden acquisition of Agriculture or Geography knowledge could be life altering as it could allow a career change. Furthermore, the ability to apply their new knowledge was enhanced by activities that were designed in such a way that the teachers could implement them with almost no need for adaptation. A further example is described by Steve when he says:

> We did content, all about Natural Science. I remember the eco-system, they told us about each ecosystem that you can take the learners to observe the ecosystem and that it's not always that when you want to show them the eco-system you take them to Kruger National Park. Even around the school. Yes we were not aware that around the school can be an eco-system but when they taught us we become aware. Even now when I want to take the learners to observe the ecosystems I take them to the ground here in school. For each quarter we also come together and set a common question paper in a circuit.

4.4.4 Selected Models of Professional Development

As indicated earlier, the MSSI had a number of activities that the teachers participated in. In an effort to find out from Sipho which model he perceived to be the best in assisting teachers to improve their skills and knowledge, I asked him if there was any model he considered the best. He responded as follows:

> I believe clusters. You see, coming together helped us great deal, it was good to share ideas because we are all not the same. Some have

> knowledge on what others do not have. I really enjoyed them, because as I said, in a circuit teachers come together and prepared together what we were going to do in school. You always knew whatever you are doing the other teachers are on the same page, most importantly, the sharing of information.

It appears that the clusters were very popular with Sipho as he believes that the collaboration enhanced the sharing of knowledge among the teachers. Thus Sipho's opinions are certainly very similar to those of Zak's.

4.4.5 Teacher's Conception

Summarising his own perspectives on the MSSI as a teacher professional development project, Sipho noted that such projects are good and encourage collective participation between teachers from different schools. Like Zak, Sipho felt that the project could have been improved if all of the teachers and schools participated in this kind of professional development programme:

> What I would like to see being done differently is that, I would like to see teachers from different circuits being called to participate because as I am saying that MSSI project selected two schools per circuit, so not all the teachers had opportunity to participate to this important project. They must therefore take all the teachers in the project so that eventually everyone should get involved.

Once more, the issue of the involvement of other teachers in the project arises. It is important to note that in the previous case study and with all of the teachers

who participated in the study, expanding these initiatives to involve all teachers is strongly suggested. Teachers feel that it will not suffice to involve only a few teachers in these projects. Many teachers believe that it is important that all of the teachers in the profession participate and benefit equally from such innovative initiatives. Finally, Sipho expressed a strong belief in the importance of regularly attending professional development programmes as they revive knowledge and keep teachers updated with the subjects they teach:

> I like such projects; you see. You learn, there was once a speaker who said, "If you get a qualification you must be aware that after two years, everything disappears if you are not doing something to update yourself. Take for instance, I got my diploma in 1993 but now its 2010, if I was not actively involved in the activities offered in the MSSI project I don't think today I would know anything.

4.5 Case Study three: Mrs. Lizzi

4.5.1 Background

Mrs. Lizzi has been teaching for the past 16 years, and has mostly been teaching General Science and Biology at the grade 8 and 9 level. She is currently teaching Natural Sciences and Geography. She teaches the two subjects in grades 9, 10 and 11. She has been teaching at her current school for her entire teaching career. When asked about how she enjoys teaching at her current school, Mrs. Lizzi noted that it was enjoyable, although she lamented the challenge of learners who were no longer "ready to learn":

> It is enjoyable to teach in this school though maybe we are having some challenges due to the kind of learners that we are working with. Seemingly learners of nowadays are not prepared to work, that's why the teachers are pulling very, very tough, because teaching is about teaching and learning but in my school its only teaching that takes place, it's a real problem and it also affects our results.

As much as Mrs. Lizzi enjoys teaching, she drew attention to the challenges of linking teaching with learning. For her, teaching is a purposeful activity that is designed to foster learning. Without such learning, it would be difficult to talk about a successful classroom practice. She therefore discussed the challenge confronting teachers who seek to link their teaching to students' learning and stated that it becomes "very, very tough". It is important to note how this conversation with Mrs. Lizzy helps one to understand a teacher's perspective in terms of their needs for the professional development intervention. It is clear therefore, that for any professional development intervention to be useful in Mrs. Lizzy's view, it has to create a link between teaching and student learning. This is an interesting method of formulating the teachers' professional development needs, or targets at her school, as most professional development programmes tend to focus on teaching alone and do not link this with student learning.

4.5.2 Participation in the MSSI

Mrs. Lizzi was also one of the lucky teachers who participated in the MSSI project since its inception. As with the other teachers in the previous cases, she was selected as the only teacher from her school to participate in the project. Once more, I asked Mrs. Lizzi how she was selected to participate in the project.

Again, the main reason was that the MSSI project selected Mathematics and Science teachers, specifically in the lower grades:

> I was teaching mathematics and science in grade 8 and 9 and the MSSI focused on mathematics and science teachers specifically in lower grades.

Mrs. Lizzi's participation in the MSSI project was a major transformational experience. In slight twist to the stories of the other teachers who used the MSSI project to build and nurture their expertise, the project allowed Mrs. Lizzi to transform her career as a science teacher by developing in her new expertise in the physical sciences. She noted that the project turned her into a science teacher which she was not before her participation in the project:

> It helped me so much because I have not majored in (physical) science at the college but I had done Biology and Geography. When I got to this school, I was asked to teach natural science and I struggled, but due to the MSSI programme I managed to do it.

As this was a major (and possibly unintended) outcome of the intervention, I was interested in finding out exactly how the MSSI project helped Mrs. Lizzi to teach science. During the conversation I asked her exactly that[2]:

> I did not know even how to use the apparatus as well as to do many of the science experiments. You see in the MSSI project, we mostly focused

[2] It is important to note that Mrs. M uses the term "science" mostly to refer to the physical science component of the subject which she had no background in during her teacher training programme. Sometimes, though, she also uses the term to mean "natural sciences" which she currently teaches.

> on doing science experiments, so now I do have the confidence and I do enjoy doing the science practical's because science is more on practicals.

From the foregoing quotation it is evident that her participation in the project not only transformed her into a science teacher, but it also gave her the confidence to do what she was previously unable to do. It is interesting to realise that teachers do not only see professional development programmes as a platform to improve just their content knowledge and pedagogical content knowledge, but they also see it as a tool for their development as well as personal transformation. In this case we see a teacher who did not train in science, but who, during and after her participation in the professional development project, became and felt like a well-rounded science teacher. The investment in the professional development programme thus acquired a new personal meaning for this participant.

Returning to her participation in the MSSI project, as with the other teachers in the previous cases, Mrs. Lizzi also noted how the MSSI project enabled her to work collaboratively with the teachers from different schools in the area:

> We worked together as a group; we did mostly practical to be able to prepare learners to know what they are doing. Learners say mathematics and science are difficult but through practical they begin to like the subjects. Again, you can take me to any school from here to White Haize. I know my colleagues because of the clusters, and we share each other's experiences, you don't think you are the only one with the problem in your school. You know what other schools are experiencing and you share together.

In the conversation with Mrs. Lizzi, it was discovered that she was also a cluster leader and had been elected by the other teachers in her cluster for this leadership role. In her explanation of how she was elected, she said:

> I would not really be able to say how they did it, as it was in the cluster meeting and somebody just nominated my name, I think maybe it was because I was one of the people that had joined and participated in the project from its beginning.

Mrs. Lizzi was very modest about her election as cluster leader. She did put too much thought into it other than that the other teachers may have valued her sense of commitment and experience as she was one of the few teachers in her cluster who was involved with the MSSI project from its inception. Given her modesty about her leadership, it was intriguing to explore what her specific role as a cluster leader was and how she exercised this leadership role. For Mrs. Lizzi, the training she received as a cluster leaders helped her to lead her colleagues. During their training as clusters leaders, the MSSI teachers were given materials to share with their colleagues back in the clusters:

> They used to give us some materials whereby we would have to duplicate the materials and to supply the teachers and train the teachers so that they go to their various schools and give the information to their learners.

Clearly the MSSI not only enabled Mrs. Lizzi to become a better teacher and a science teacher, but it also enabled her to become a teacher (cluster) leader. This role as teacher leader did not necessary come naturally to Mrs. Lizzi as she noted that it was the guideline from the training – in the form of teaching

materials – that helped her to fulfil the role. She was able to take back to her cluster whatever was covered during the cluster leaders' training workshops. Asked about how she dealt with her cluster, Mrs. Lizzi noted that she would allocate the topics to be dealt with different teachers in the group for them to present on different days:

> You see, I was training them, but we were also supposed to share, as I said that I have not specialised in science, I am a biology teacher, I studied biology, I also needed their views and their knowledge.

When she was asked about working with teachers from different schools (collective participation), she noted that they helped one another:

> Okay, we were sharing ideas. As I have said for me to gain the knowledge of Science, it was because of the other teachers, the teachers come with different ways of teaching certain topics some were easier than the others.

It is also clear that one aspect of the project that made Mrs. Lizzi a better science teacher was being able to work with other teachers (the clusters). The value of these collaborations was emphasised throughout the conversation; they helped to transform her into a "new science teacher" which she was not before the professional development intervention. While this transformation might appear minor and perhaps even less spectacular to an experienced observer, it is important to note how critical it was for her and specifically how she kept revisiting the theme in different parts of her story about the MSSI.

Mrs. Lizzi also concluded that her participation in the project totally changed her attitude towards teaching science which she initially thought was the most difficult subject to deal with:

> This programme helped me a lot, hence I said I knew nothing about science, and then by attending the workshops and participation in the clusters I gained more knowledge and confidence on how to teach science. My attitude is changed I used to think science was the most difficult subject.

Mrs. Lizzi also believes that sharing knowledge in clusters is an excellent idea. She noted that in order to succeed one needs to involve oneself with other people and work with other people:

> The sharing of knowledge, the person cannot say I know everything, and as we share, the more we grow.

4.5.3 MSSI and its relevance to classroom

I also wanted to determine whether the activities involved in the MSSI had any relevance to Mrs. Lizzi's teaching. This was important to pursue particularly in the case of Mrs. Lizzi as she had deliberately made a point about the links between teaching and student learning. Therefore I asked whether she found such activities to be relevant or not in her classroom. Her response was positive and she stated that in the project they did many of the science experiments which she had to perform for her pupils:

> It helped a lot, most of the time we did some experiments in this project in both the workshops and cluster meetings. You see when you do only theory and you don't do practical, learners will never know. When you teach experiments the learners do practical work and so they will not only hear but to see, touch, and it's not easy for the learner to forget.

The value of the practical work done during the MSSI workshops for her teaching is underscored in her statement. Other MSSI activities that Mrs. Lizzi participated in and found to be relevant in her classroom included the focus on the science curriculum and how to improvise in rural schools. In her examples, Mrs. Lizzi said the following:

> There was a time whereby they taught us about the planets and I was surprised this thing is so easy and how to make the learners to know which planets follows each other. It was very much interesting and I came and practiced it and then I sent the learners to go and do the projects. That's why I am saying sharing knowledge is very much powerful. If I did not attend those workshops I would still rob the learners and teach the biology part and leave out the science part.

Mrs. Lizzi elaborated further and described improvising in the rural setting:

> in my case I used to know that if I want a beaker I must go to the laboratory and get it, I did not know that even what I am having I can use as an

> improvise. Now I just tell the learners just to bring, say a plastic coke bottle. We cut it into a beaker and we do the activity. You see when they do, they understand better. When I want to put tea as my indicator into acid lemon or vinegar what will happen, then they discover not by teacher telling them; you see practical is very interesting and it makes the learners to understand the subject.

The ability to improvise in the rural South African setting was a very important lesson which Mrs. Lizzi learned in the professional development intervention. While the issue of improvisation might seem obvious to some, it is not so for the many teachers in rural areas whose major explanation for the poor scientific knowledge of many learners is a lack of adequate facilities such as laboratories and equipment. While not trivialising these genuine needs and complaints, it is important to note that the approach in this case was to continue in spite of the challenges and limitations of context – a very important goal of the MSSI project.

4.5.4 Selected Models of Professional Development

Mrs. Lizzi found the MSSI workshops to be very useful for her in relation to the structure of the programme. She stated that the workshops were useful in giving them all the training necessary to conduct the activities in their classrooms:

> In the workshops, they trained us, and then we came back and trained the teachers, we also did the content, as well as the science experiments. As I mentioned, they also gave us the materials and such were used in the classroom.

Along with the workshops, Mrs. Lizzi also found the cluster meetings to be the best practices that she participated in because they (the teachers) were able to share in greater detail the knowledge they got from the workshops:

> So when we come back from the meetings we would get to our clusters and share everything that we learned from the workshops. We equipped each other so that we go back to our various schools to practice what were equipping each other with.

Mrs. Lizzi found both the workshops and the clusters to be helpful in this regard. She viewed the workshops as the places where they (cluster leaders) received the information which they could then share in greater detail with the other teachers at the cluster meetings.

4.5.5 Teacher's conceptions

Part of the aim of this study is to understand the teachers' own perspectives of professional development, and in particular, to find out what they think would be the best way to improve their classroom practices. In pursuit of this aim I therefore asked Mrs. Lizzi about her opinions on the MSSI project. She responded by asserting that it was really refreshing, uplifting, and that it reinforced her confidence as a teacher.

Clearly, Lizzi was fairly excited about the MSSI as a teacher development programme. For her it was an "uplifting" intervention. However, Mrs. Lizzi also felt that there were other issues which could be considered for improving future teacher professional development programmes. She specifically mentioned the issues of resources, time and the involvement of other teachers in such training:

> After workshop, if only they can provide us with the materials, equipments and the chemicals. Also they must include all the teachers, and not just one teacher from each school, they must also do the training regularly.

Once again the issue of time was raised. Mrs. Lizzi believes that despite the benefits of professional development programmes, it is important for teachers to be trained more regularly. Similarly, she felt that often teachers do not have adequate resources to conduct science experiments in their schools as many of them teach in rural settings. For teachers to be able to fully implement their learning in the classroom, the issue of resources will always be a critical component to consider in the planning of professional development interventions.

Another critical factor that arose in the conversation with Mrs. Lizzi is who gets involved in the professional development programmes. In her opinion it would be important to involve more teachers from all schools instead of just one or two. The importance of this observation is emphasised earlier in this study in the discussion on the theoretical framework that informs the emerging consensus regarding effective professional development (see Chapter 2). Involving many teachers from each school is important for the support of the teachers and for the long-term sustainability of the professional development in each school. In her closing comments, Mrs. Lizzi was very emphatic about the need for the continuous professional development of teachers, and was very positive about the MSSI or any project with activities similar to what she experienced during the MSSI:

> I enjoyed participating in the MSSI project really. It improved my knowledge, that's why I can go again. There are a lot of changes taking place and they need a teacher to develop himself or herself. If you stay, you will be left behind.

4.6 Case Study four: Mr. Smith

4.6.1 Background

Mr. Smith has been teaching since 1988 and has taught Mathematics and Physical Sciences in grade 8 and 10. He was later appointed Head of Department (HoD) of his school in 1996 where he continued to teach Mathematics and Science. In 2007, he was appointed principal of the school. He is currently the principal of the school and also teaches grade 12 Physical Science. Mr. Smith has therefore been in this same school for the past 23 years and for his entire teaching career. Asked about what it is like to teach in the school, Mr. Smith noted that it was not easy to teach in the school as it has had four principals in the past 12 years; this has made it hard for teachers to adapt to different leadership styles:

> This is a very difficult school to run. You know after a period of 12 years, the school has been run by 4 principals. You know, every principal would come with her/his own leadership then it's difficult for the teachers who have to adapt to all the leadership styles. So, to be an educator in this school has not been so good. Many of the educators are coping, some are not.

Regardless of his status as the principal of the school, Mr. Smith still understands the difficulties that the teachers experience. His understanding of the importance of leadership in creating enabling conditions for teaching and learning is a crucial aspect of what the case of Mr. Smith brings to this study. In Mr. Smith's opinion, teachers' professional development needs should be linked to the leadership of the school and especially to its role in creating an enabling environment for teaching and learning.

4.6.2 Participation in the MSSI

Asked about his participation in the MSSI Project, Mr. Smith said that he participated in the project from 2001, two years after its inception. He also explained how the project was helpful to him as it promoted the establishments of clusters, and encouraged teachers to form teams, do team planning, and perform team teaching.

Mr. Smith was also nominated to be a cluster leader and had the opportunity to go to Japan on a study tour of their education system:

> You see, I had an opportunity to go to Japan. I stayed there for four months. We did a programme on practice science teaching in secondary schools. The subjects that we focused on were physical sciences and, they don't call it geography they call it earth science. So it was life sciences, physical sciences and earth science. So we were focusing on these three sciences, and we were doing a lot of activities around that. It was very easy to come back and implement that to my fellow teachers....

Clearly, Mr. Smith was among the teachers whose life may have changed as a result of the cultural exchange experience. Once more, we see the focus of the intervention on the opportunity for personal development.

Mr. Smith also indicated that he came back with a number of activities that he presented and discussed with his colleagues in the cluster meetings. When asked about examples of such activities, Mr. Smith described them as follows:

> You see, we are always complaining here, we are saying we need resources but the type of the resources that we need, we talk about things that have to be bought, but then in Japan you know waste materials can be made a resource for teaching. You see from a bottle you can make a beaker, you can make a test tube.

For Mr. Smith, his experience in Japan also allowed him to contextualise his teaching to a rural context where resource constraints are often the reason cited for poor teaching of the sciences. He was able to share some of these ideas and experiences with his cluster teachers upon his return from Japan.

Another example which Mr. Smith was able to share with his colleagues was the knowledge which he acquired in Japan. Mr. Smith quoted an example of teaching waves in the classroom:

> For example, the teaching of waves, we teach waves in grade ten for instance, the longitudinal waves transverse waves, and the only thing that we use to demonstrate that is either a spring balance or water ring, but in Japan we were able to also construct a machine, that can be used to demonstrate that, constructing it with some waste materials.

The opportunity to use waste material to design and demonstrate scientific equipment was empowering for Mr. Smith. His wish is that he should have been given the ability to present all of the activities done in Japan, not only on the circuit level, but also on the national level. Mr. Smith argued that it would have been ideal if all of the teachers in the province could have been exposed to his

presentations instead of only the teachers in his cluster. He felt extremely strongly about the need for a much broader leadership role in sharing his experiences regarding the improvement of the teaching of science in the province:

> My hope was that when I come back, I would be given a platform to present to a group of teachers at the national level where I would have teachers from different circuits. Unfortunately that did not happen.

In Mr. Smith's opinion this was an opportunity for the province to utilise his experiences and newly acquired knowledge to enhance the professional development of his colleagues, which was completely wasted. An important issue that is raised by this story is that teachers do not only want an opportunity to participate in the professional development programmes, but would also like to participate in the design and leadership of these opportunities. The MSSI provided several of these opportunities for the teachers, but not nearly enough judging by Mr. Smith's response.

> While discussing his participation in the MSSI project, I asked Mr. Smith how he was selected to participate in the project, as well as the trip to Japan. Firstly, like the other cases presented in this chapter, Mr. Smith was the only teacher at his school who participated in the MSSI project. He was selected to go to Japan as one of the cluster leaders on the project. With regard to his selection, Mr. Smith said the following: You know, fortunately I was teaching physical science grade

> 8, 9 and 10. That's the fortunate part; MSSI was about science and mathematics and in those lower grades.

Even though he was the only teacher from his school who participated in the MSSI, Mr. Smith worked together with teachers from various schools in the cluster. As indicated earlier, he was a cluster leader:

> I was the one that was organising the activities, making sure that at least per month we are having two formal meetings, where we discuss issues, but every week we would be having an inset where we would be dealing with problematic topics in science, and it was not that I am always the one always leading, we gave each other time to present something, because you are not going to say if you are a physical science teacher you know everything in the subject. You might be good in one section and not good in another. So we were given a chance, so once a week we would be doing these presentations, and then twice a week we would then visit the schools after coming up with a topic like organic chemistry and teaching the topic in a school and then going to the next school. This we did as a cluster.

In the conversation, Mr. Smith went into greater depth in explaining how his cluster functioned and what they did to support each other. He drew attention to the collaboration within the cluster and that he was not the only one to present particular topics but that others did too. The unique feature of his leadership

was his ability to organise not only the cluster meetings, but also the lesson study sessions. In these sessions, the teachers would prepare together and move from school to school to teach the same lesson to various groups of learners; the other teachers would have various roles, from being the observer to being the facilitators. Having learnt how Mr. Smith and his colleagues participated in the clusters, I wished to explore in more detail what they did in the cluster meetings; this is what Smith had to say:

> I participated in the cluster and fortunately I also became a cluster leader, so it was my responsibility as a cluster to make sure that I organise the teachers, where we draw a common pace setter so that what is done in this school this week is also what is done in that school. So we were teaching the same thing, same week, same time. So we would be writing the same tests at the same time. We were also inducting teachers in the subject as a cluster and we would also rotate to school teaching.

As Mr. Smith summarised what they did in the cluster meetings, he noted that they engaged in common planning, set common assessment tasks for inducting new educators in the subject and to do team teaching. It is important to notice the important role of the cluster in not only helping teachers with difficult subject matter, but also in the critical role of induction. This is the first case where we find teacher induction fully integrated into professional development of teachers.

Cluster meetings were not the only activity that Mr. Smith and his colleagues participated in, as they also took part in the MSSI workshops. He noted that they invited a curriculum implementer to conduct the workshop to help them as a cluster with certain issues:

> As a cluster, we would attend a workshop that is organised by a curriculum implementer. Basically what would happen in these workshops is that we would be trained on content and we would be with other clusters from the other areas so that we would still learn something from the other clusters.

Mr. Smith also mentioned the MSSI documents, information material (the study guides), which supported their learning during their workshops:

> So, most of the workshops that we had were guided by MSSI documents. MSSI documents had all the activities that had to be done, so the curriculum implementers would give us this MSSI guide documents. You find sometimes we are focusing of grade 10 Science experiments.

The MSSI guide seems to have been an important resource to support the work of the clusters and the workshops. Interestingly though, so far Mr. Smith is the only participant who has mentioned these curriculum materials and their importance in the achievement of the MSSI project. It is unclear why the matter was not mentioned by the other teachers.

Mr. Smith also described how the majority of the MSSI workshops that were most beneficial to the teachers were those that were conducted during the school holidays. This is because, with the benefit of having full days to conduct their workshops on (as opposed to after school), after three days they would have covered almost the entire syllabus for grades 10, 11 and 12.

> We came back with all the confidence to stand in front of the class and present and demonstrate so the curriculum implementers indeed conducted the workshops, they were using the study guides.

In the conversation, Mr. Smith also indicated that his participation in the project was voluntary as he could not resist all the activities that were provided by the MSSI:

> MSSI emphasised practice science teaching. We must teach science practically and the only way you could teach science practically is when you have organised yourself in teams. It's when you engage in peer teacher learning, when you are able to learn from one another. MSSI emphasised that learners not only hear what you teach them but must also see and do. So I did not have problem to participate and it came at the right time so it was voluntarily.

In his summary on how meaningful the project was to him and his colleagues, he indicated that firstly, the project was activity based, and developmental in nature:

> To me it is activity based, it made the teaching of science very interesting to both the educators and the learners, you know, if you attend the workshops, you have the confidence, and if you

> are confident, you become competent; it makes your work easier.

4.6.3 MSSI and its relevance in the Classroom

As I stated previously, there was also an interest in determining whether the activities that the teachers conducted in the MSSI project were relevant to their classroom work. I therefore asked Mr. Smith what activities he found to be relevant to his work in the classroom:

> All the activities were structured and were aligned to the syllabus. Most parts were very practical, and the learners could see touch and do, so it was very relevant.

As evidenced in the above quote, the practical part of the science that Mr. Smith conducted in the MSSI project was exactly what he (and his colleagues) required in their classrooms. It is not surprising to hear him emphasise the value of the MSSI practical work, as most science teachers, especially in rural or resource deficient settings, find science practicals very challenging to arrange and then conduct with their learners.

4.6.4 Selected Models of Professional Development

As mentioned in all the other cases, the MSSI initiative had a number of activities and it was imperative to find out from the teachers, as the beneficiaries of the professional development, which model they believe was best. In his response, Mr. Smith noted that his trip to Japan was the most important experience in the project:

> The visit to Japan was an eye opener, because its where I met other colleagues from other African states. There was a person from Zimbabwe, one from Zambia, one from Ghana, one from Tanzania and one from Uganda, you know. From my experience one could see that we were teaching the same thing but in different ways. We learned how to teach science and how science is taught in other countries. We also engaged with professors on the content, they lectured us, they conducted experiments with us, they also took us somewhere where we could see science in practice. The visit really was an eye opener; we did everything that could help one to teach science.

It is very rare to find professional development programmes that have their own exchange programme or that foster the sharing of experiences between schools, provinces, or even across countries. This ability, made possible by the MSSI initiative, to compare notes with colleagues from different schools, cities, and countries is critical for professional learning. It is through these experiences, and sharing across geographical boundaries, that Mr. Smith could assess himself, discover his own expertise, and develop new skills and confidence. At this stage of the interview with Mr. Smith he was what else he perceived as a best practise of the MSSI; he also listed the clusters, workshops as well as the study guides as the more effective aspects of the MSSI for their learning:

> All these are inseparable and they are interdependent you cannot have workshops without the study guides to assist you, and you cannot have workshops if you don't have teachers organised in a cluster. They are so

> interdependent, so I like all of them, clusters, workshops and study guides.

It is clear that Mr. Smith saw all of the structural features as interdependent. He believed that the clusters were the best because they allowed teachers to share information, while the workshops were good for distributing that information to larger groups of teachers. The study guides, on the other hand, were useful because they provided a resource that could be used in both the workshops and the cluster meetings.

The issue of time arose yet again during the discussion with Mr. Smith. The issue in this case was not about how many times the professional development should have taken place, but about when they actually took place. On this issue he found it inconvenient that the workshops were scheduled during the school holidays; he believed that the school holidays are their time to relax:

> These workshops were conducted during holidays, eh… that time is also for us to rest, to re-charge, and I am sure many people did not like it.

It is not clear how widespread this sentiment was among the MSSI teachers, as Mr. Smith was the only one to raise the matter in this group of cases.

4.6.5 Teachers Conceptions

In closing the interview, I once again sought to establish the teacher's opinions on professional development. When I asked about his perspectives on professional development for teachers, specifically the MSSI project, Mr. Smith noted that the value of such programmes was that they provide a platform for teachers to share their knowledge together:

> You see in such projects, we plan together, you learn a lot of things from your colleagues and you develop, both personally and professionally.

In his conclusion, Mr. Smith was very firm in his recommendation that all the circuits should participate in such professional development programmes. He felt that it would be important for all the teachers to be involved in, and to benefit from, the professional development programmes. This idea of the need to enlarge the professional development pilots to include all teachers is an idea that has been raised in some of our previous case studies as well.

In this chapter I have presented in greater detail, a number of case studies that describe the perspectives and experiences of the teachers who participated in the MSSI project. During the analysis of the data, it became clear that some of the themes were repetitive. Thus, their opinions on their experiences had several similarities which contributed in some ways to their perspectives and views about effective professional development programmes. Rather than present all seven cases in a repetitive fashion, I have opted to present four of these cases in greater detail. This is to illustrate the depth of the data, and also the similarity among many of the emerging themes. In Table 6 below, I present a summary of the major trends in the data from all seven cases that I investigated for this study.

Table 6: A synopsis of the repetitive themes from the case studies

Teachers	Theme 1 Participation in the MSSI project	Theme 2 MSSI and its relevance in classroom	Theme 3 Selected models Of PD	Theme 4 Teacher's conceptions
Zak	• Two teachers from his school participated	• Focus on Experiments • Focus on lesson preparations	• Workshops • Teacher clusters	• That all teachers participate
Sipho	• Only teacher who participated	• Focus on Content knowledge • Focus on Pedagogy	• Teacher clusters	• That all the teachers participate
Lizzy	• Only teacher who participate in the MSSI	• Focus on Content knowledge • Focus on Experiments • Hints on how to improvise	• Teacher Workshops	• That all teachers participate • Resources be provided • more time for the CPD activities
Smith	• Only teacher who participated	• Focus on Content knowledge • Focus on Pedagogy	• Teacher Workshops • Teacher Clusters • Visits to Japan	• That all teachers participate
Donald	• Only teacher who participated	• Focus on Content knowledge • Focus on Pedagogy	• Teacher Clusters	• More time be provided
Thembi	• Only teacher who participated	• Focus on Content knowledge	• Teacher Clusters	• Adequate resources be provided
Sizwe	• Only teacher who participated	• Focus on Experiments • Focus on Content knowledge	• Teacher Clusters	• That all teachers participate

In the next chapter, I discuss in detail the major findings from the data, as well as explore the relationship of these findings to the literature reviewed in Chapter Two. I also discuss the conclusion and the recommendations of my study.

CHAPTER 5

5. Summary of the Findings, Discussion, Conclusion and Recommendations

5.1 Introduction

This chapter presents the findings and conclusions of the study, and their implications for both policy and practice. I also discuss the meaning of the findings and conclusions, with reference to the literature, on continuing teacher professional development. More specifically I discuss the meaning of teacher professional development in South Africa and other developing countries.

My study originates from the premise that if professional development is worthwhile and necessary for the development of teachers and the improvement of their classroom practices, why is it that in spite of attending and participating in many professional development programmes, teachers' classroom practices for the most part have not changed? The premise of this study therefore, is that the teachers ought to provide explanations regarding these matters. The main aim of the present study is to explore teachers' perspectives on continuing professional development, and specifically on the Mpumalanga Secondary Science Initiative (MSSI) project. I aimed to explore the perspectives of teachers who had actually participated in the MSSI project, and the influence of the project on their classroom practices. I wanted to conduct an intensive study as well as make sense of how the MSSI project influenced the teachers, and determine the teachers' experiences of the programme and the impact or lack thereof on practice.

In summary, I particularly intended to explore the ways in which the participating teachers thought about their work before, during, and after their participation in the MSSI project. I specifically intended to examine the ways in which the teachers gave meaning to their thoughts and beliefs through their behaviour in the classroom.

In this study I particularly focus on what the teachers did in the MSSI project, how this was done, what teacher professional development strategies were used, and most importantly, how all the activities in the MSSI project influenced the participating teachers' classroom practices, if at all. Finally, I explored, with the aid of the teachers' perspectives, what the best professional development strategies to foster effective classroom practices are. The study specifically addresses the following research questions:

- What are the teachers' views and beliefs about the MSSI as a case study project of CPD?
- What are their views and beliefs on the CPD practices and strategies used in the MSSI initiative?
- How the MSSI did affect the classroom practices of the participating teachers?
- How can the effect or lack thereof be understood and explained from the perspectives of the teachers

In the previous chapter (Chapter 4), I presented, in the form case studies, the stories and experiences of the teachers who participated in the MSSI project. The teachers' stories were used to highlight some of the major themes that arose from the collected data. In this last chapter, I intend to take this process a step further and not only describe the major findings, but consider their implications, as well as give the conclusions of the study. In closing the chapter, I will also propose and discuss an alternative teacher professional development model to that of Desimone *et al* (2009) based on the data provided by the teachers who participated in this study.

5.2 Major findings

The discussion focuses on the five major findings that have emerged from the data presented in Chapter Four. Firstly, I will discuss structure as an important consideration for teachers when reflecting on a programme of continuing professional development. Then I will explore personal transformation and growth before discussing the findings with regard to collaborative teaching, content knowledge and duration of engagement with the continuing professional development programme.

5.2.1 Structure of the continuing professional development

In terms of the MSSI project, the teachers I interviewed were both attracted to and intrigued by the structures that were used to promote teacher learning. In its first phase, the MSSI project adopted a cascade model: regular workshops were organised for the Heads of Department to focus specifically on the syllabi of Science and Mathematics. When the project was evaluated after the initial three year period of implementation, the key conclusion of the report was that the cascade approach that was used had produced little or no impact on the Science and Mathematics classrooms of Mpumalanga. There was no evidence of change in the classrooms of many teachers who participated in the project (JICA-MSSI evaluation report, 2003). This observation would not surprise many researchers in education and certainly did not surprise me in this particular case. This is partly because the cascade model has been widely criticised as an inadequate model for delivering effective training (HSRC, 2000): when the intended message is transmitted to the next level, it is likely that crucial information may be 'watered-down' or misinterpreted (Fiske and Ladd, 2004). It was in response to this critique that the MSSI adopted a cluster or network approach but did not abandon the workshops which convene teachers from different schools to discuss issues relating to the teaching and learning of Mathematics and Science. These teachers met at different times and participated in activities designed to

challenge and change their knowledge and classroom practices; as one of the teachers reflected:

> Yes, we came together as teachers from different schools. We were helping each other. A teacher would come and present his problem to the group, we would discuss the problem together, and one of us would teach the topic. As he is teaching we would identify the loopholes in his teaching and we would discuss, taking note of the problem that was raised by the teacher, if you wanted the background on the chapter you came and we discuss the chapter as a group, then you have knowledge.

The teachers I interviewed found this structure to be excellent and refreshing. They felt that they gained new knowledge through sharing information with other teachers. In the clusters or networks, the teachers formed smaller subject-related groups to share knowledge and expertise under the facilitation and support of university-based subject matter experts. As reflected in the stories of the teachers in Chapter Four, the clusters seemed to foster networking, sharing and collaboration among the teachers. As if in agreement with what the teachers in my study had to say about teacher networks, Villegas-Reimers (2003) argues that networks bring teachers together to address the problems which they experience in their work; teachers thereby promote their own professional development as individuals and as groups. In the MSSI project, the teachers talked specifically about the lasting friendships that had been formed in the MSSI project and which continue to inform their work. The network or cluster approach of the MSSI seems to have created lasting opportunities for networking and for building professional relationships around subject matter and classroom practice. These opportunities continue to serve as a resource (base) for the participating

teachers long beyond the lifespan of the MSSI project.

Furthermore, another important dimension of the structure of the MSSI relates to the teacher workshops. While the mid-term evaluation of the MSSI found that the use of workshops alone was not an effective strategy for changing the teachers' classroom practices, the project did not abandon the workshops completely. The workshop approach was adapted and combined with the clusters. The workshops were presented by the curriculum implementers to the cluster leaders who would then train fellow teachers in the cluster meetings. Each cluster selected a leader who would receive further training that he/she was expected to bring back to his/her cluster. The MSSI teachers were happy with much of the information that they received from these workshop sessions and considered them to be informative and helpful in their teaching:

> I would prefer the workshops, you see. They keep the teachers on their toes. Not to say you know, the workshops are telling you that you do not know. In the workshops we were trained on how to prepare a lesson, you find that I know how to prepare a lesson from the college, you find that is now an old thing, so the workshops helped us to prepare lessons nowadays, how to set a quality exam for the learners, and how to conduct the experiments, and how to improvise. That's why I can recommend the (MSSI) workshops.

This support for the workshops is reflected in the literature on professional development. Cutler and Ruopp (1999) for instance, argue that teachers found the particular continuing professional development workshops important for personal development, support, the provision of information, teaching

confidence, skills development and a change in teaching habits. The support for large scale teacher workshops is not, however, necessarily a support for the cascade approach to professional development. In fact, my analysis in this case shows that many teachers stated that the combination of both workshops and cluster meetings was one of the best practices in the MSSI project. As one of the teachers noted:

> I think what I like most about MSSI; I can say almost everything but mostly the workshops and the clusters. Because in the workshop that is where now we were getting more information on what we were supposed to do in the classroom and also in the cluster, we were also helping one another on how to teach the learners, in terms of the content, in terms of approaching any topic, and in terms of making preparations. So I can say (a combination of) the two helped us.

The strategy of combining the two professional development models (in this case the teacher clusters and the workshops) is consistent with some of the recommendations from recent literature and scholarship that was reviewed in Chapter 2. Swart, Engelbrecht, Ellof and Pettipher (2002) note that given the new understanding of professional development as an ongoing process of growth and learning, there are cases that show that offering workshops, seminars and courses, in accompaniment to other types of professional development, can be successful. In the case of the MSSI, the data suggests that the teachers indeed felt more comfortable with the combination of the cluster meetings and workshops.

Even though the teachers from this study found the CPD workshops to be effective and useful, much of the literature reveals that many researchers are critical of the workshops. This is because these researchers see most workshops as isolated, fragmented, and incoherent encounters that are decontextualised and detached from the real classroom situation (Collinson and Ono 2001; Villegas-Reimers, 2003). It is probably the combination of the workshops and the clusters which provided a saving grace for the MSSI project.

The third component of the structure of the continuing professional development with regard to the MSSI initiative relates to the project's study visits to Japan. As explained earlier in the study, the curriculum implementers (CIs) participated in a 6-weeks group study in Japan in order to enhance their own curriculum development skills, to be exposed to relevant Japanese practices, and to develop teacher and learner support materials with support from Japanese subject matter experts. The resulting support materials were to be used in South Africa as resources in a retraining programme for teachers:

> The visit to Japan was an eye opener, because its where I met other colleagues from other African states. There was a person from Zimbabwe, one from Zambia, one from Ghana, one from Tanzania and one from Uganda, you know. From my experience one could see that we were teaching the same thing but in different ways. We learned how to teach science, and how science is taught in other countries. We also engaged with professors on the content. They lectured to us, they conducted experiments with us, and they also took us somewhere where we could see science in practice. The visit really was an eye opener. We did everything that could help one to teach science.

There are not many examples of teacher professional development programmes that allow an exchange of experiences among the participants by physically visiting different teaching contexts during the professional development sessions. One example of such a case in the literature is described by Villegas-Raimers (2003). This was the United Kingdom/Australia Fellowship Scheme for Teachers of Science. The programme was funded by the governments of both the UK and Australia, and it provided funding for a handful of teachers travel to the host country to observe excellent practice, participate in research projects, attend workshops and join in discussions with colleagues in the host country.

This structural component of the CPD programme, which allowed for such a rare exchange across countries and continents, seems to have distinguished the MSSI project for the participating teachers. In their view, a teacher professional development programme that is comprised of all of the three structural features discussed in this section is capable of improving their classroom practices. The extent to which this is actually the case could not be measured in this research study post facto and should be a subject of another doctoral research study that could be designed to coincide with the implementation of a similar teacher intervention project. Thus it is important to consider the structure of the programme when planning a CPD intervention for teachers. Data presented in this study suggests that the MSSI project was able to provide the participating teachers with the opportunities they needed, partly because of the manner in which it was structured.

5.2.2 Teacher Collaboration

A second major theme is that of teacher collaboration. In the MSSI project, teacher clusters were not just structures around which the CPD was constructed.

As illustrated in the case studies in Chapter Four, they soon became convenient vehicles for networking and fostering subject-specific collaborations among the participating teachers.

In Chapter Two the elements of a conceptual framework for studying and discussing teacher professional development programmes were explored. With regard to this, Desimone (2009) identifies some of the characteristics of professional development that are critical for increasing the knowledge, skills and practice of teachers. In the conceptual framework, Desimone (2009) also posits that it is these characteristics which hold the promise of increasing student achievement. One of these critical features, as mentioned earlier, is *collaborative participation*.

It is argued that one of the means for realising collective participation in a CPD project is by recruiting several teachers from the same school, grade, or department. This allows interaction and discourse among colleagues, which can be a powerful form of teacher learning (Desimone 2003; Borko, 2004). In the MSSI project, teachers were expected to meet in clusters. These clusters were a collection of teachers from various schools in Mpumalanga. Through these clusters, teachers were in contact with other teachers and could learn new skills from each other. The teachers also supported each other by sharing their experiences; this is described by the following statement by one of the interviewees:

> Yes, we came together as teachers from different schools, we were helping each other. A teacher would come and present his problem to the group. We would discuss the problem together, and one of us would teach the topic and as he is teaching we would identify the loopholes in his teaching and we would discuss, taking note of the problem that was raised by the teacher. If you wanted the background on the chapter you come and we discuss the chapter as a group then you have knowledge.

It is evident from the above quotation that teachers from different schools met and conducted many of the activities as a group. Besides the specific content knowledge that the teachers discussed in their clusters, they also shared and discussed their problems regarding pedagogy and classroom practice. Several researchers (Muijs, 2008; Marnewerk, 2002; Dittmar Mendeolsohn and Ward, 2002) concur that cluster membership has several advantages which include the fact that the exchange of expertise is improved as members learn and solve problems collaboratively. In her support of teacher collaboration, Villegas-Reimers (2003) also indicates that teacher networks have the advantage of bringing teachers together to address the problems which they experience in their work; thus they are able to foster their own professional development as individuals and as groups. The MSSI teachers confirmed that these cluster meetings were very useful in many ways; an example of this is the fact that they also learned about, and conducted, lesson studies within these meetings. A lesson study is a teacher professional development strategy used by Japanese teachers. The strategy has one teacher prepare a lesson for presentation with the assistance of another teacher; the lesson presentation is then observed and constructive comments and suggestions are made (Jita, Maree and Ndlalane, 2007). For the MSSI teachers, these clusters provided a rare opportunity for them

to assist one another to understand and be able to deal with problems in their respective classrooms. The MSSI teachers also visited the schools of their fellow cluster member to assist them with any problems.

> Especially on the cluster meetings, I remember I was once selected as a cluster leader, I was so involved in this one, it was a very good thing really because, we came together as teachers from different schools you sit down, you look at the challenging topics, you discuss them together, some other teachers come up with different methods of teaching, approaching the particular topics and the, if the teacher is having a real challenge or difficulty in teaching, the teacher is also allowed maybe to ask anyone from the group to go to his/her school and assist her on that particular topic.

From the above quote and the previous quote, it is noticeable that the teachers referred to observing each others' lessons as well as requesting the assistance of the other teachers with any difficulty in the classrooms. Indeed, the teachers did all of these activities as a result of the MSSI cluster meetings. Teacher observation has been a contentious practice in South Africa since the days of rigid inspections in the apartheid era. Accordingly, many teachers prefer not to be observed whatsoever. Commonly, they would rather struggle on their own than be open to collaboration and learning. Thus it was remarkable that the MSSI project was able to implement teacher collaboration beyond just talk and to the level where teachers were able to work together, and observe, support and critique one another.

Huberman (2001) notes that teacher networks in other contexts have allowed teachers to communicate, address issues, observe each others' work and invite the help of experts from the other fields. The MSSI project had, as one of its major aims, the promotion of the Japanese lesson study approach. Ono and Ferreira (2010) observe that the MSSI aimed at, amongst other things, institutionalising lesson study as a form of school-based, continuing professional development. The strategy seeks to have teachers conduct study lessons which are watched by a number of teachers who observe the actions of the teacher and the learners. During the lesson, the teacher observers listen attentively and make notes for discussion and feedback after the lesson.

The opportunity to collaborate and the lesson studies were helpful in improving the teachers' pedagogy. However, more significantly, the clusters also enabled the integration of subject matter within and across disciplines. For example, one of the participating teachers mentioned some difficulty with teaching Natural Sciences, primarily because the subject is interdisciplinary. As they explained it, it was difficult for some of the teachers to focus on all of the fields within the subject because some of them only majored in one section, for example Zoology or Physics. However, through their participation in the MSSI clusters, the teachers became less frustrated as they could share and learn the other sections of the subject with one another:

> You also find that, in this Natural Science there is Geography, there is Biology and Physical Science, so the teachers who majored in Biology will not treat the Science part, the one who majored in Science will not teach the Biology part that is what we clarify in the clusters.

The issue of teachers who have been hired to teach subjects that they have not majored in also emerged in the data as one of the critical issues that, according to the participating teachers, necessitated the professional development intervention. Fortunately for the MSSI teachers, the clusters helped to address this situation:

> You find that there are teachers who are teaching a subject whereas they did not major or specialised in it, they do not know the real core of the subject.

The evidence provided above clearly illustrates how the participating teachers were positive towards collaboration as it provided opportunities to those who would otherwise be frustrated and stressed. It is difficult to imagine a situation in which a teacher is asked to teach what he/she is not qualified to and thus the sense relief brought about by collaborations in the clusters must have been immense. Indeed it is not far-fetched to think that the collaboration would have resulted in the teachers experiencing less stress and difficultly (Muijs 2008). Clusters could be an instrument to address the various needs of teachers as they all have different educational backgrounds, variable content knowledge, and some may even have no teacher education experience at all (Stodolsky *et al* 2008).

Based on the evidence presented in this study, the findings seem to support Desimone's (2009) idea that collective participation is one of the critical features to consider when planning and implementing a professional development programme. As the data reflects, it is this kind of professional development programme that teachers would be happy to participate in:

> In the clusters I gained a lot, in terms of maybe teaching styles, approaching things in the classroom and the sharing of ideas because to me that is also the very important thing. And also, that it develops a person in terms of how you prepare your lessons in the classroom, and how to follow the work schedule and also get some materials. You learn also to share teaching aids, because sometimes one finds that your school does not have this. If you sit together with the other teachers, now you are able to share. The project also taught us how to improvise, that now if you don't have this you can use that. Through this clusters one can gain a lot.

5.2.3 The Content focus and the context of teaching in the rural settings

The third finding from the case studies is the importance of focusing on subject matter content in a professional development programme. Indeed, the MSSI project focused deliberately on Mathematics and Science. In all the activities, the subject matter content was an ever-present theme. For example, in the workshops and the clusters, the teachers' exchanges were all about the subject matter content and how to effectively teach it to learners:

> In the workshops, they used to train us on content, because as I have indicated, you find that some topic may be just difficult for the teachers and then the CI would come and help us here (in the workshops). So when we come back from those workshops we would get to our clusters and share everything that we learned from the workshops

> with the teachers. We equipped each other so that we go back to our various schools and give our learners the right thing.

The focus on content was very evident to the participating teachers, as described by yet another teacher:

> We did content, all about Natural Science. I remember the ecosystem. They told us about each ecosystem that you can take the learners to observe and that it is not always that when you want to show learners the eco-system you take them to Kruger National Park. Even around the school, yes, we were not aware that around the school can be an ecosystem but when they taught us we become aware, even now when I want to take the learners to observe an ecosystem I take them to the ground here at school.

The weaknesses of many Science and Mathematics teachers in mastering the content of those subjects has been discussed extensively by many South African researchers (Jita and Ndlalane, 2006) It is with this in mind that the MSSI project opted to focus the project on the subject matter content of Science and Mathematics. The idea was to eliminate the weaknesses in the teachers' knowledge of their subject matter. Interestingly, the quotation above provides evidence confirming the need for such a focus. For a Natural Sciences teacher to be so excited about the discovery that ecosystems exist all around their school and not only in conservation parks such as the Kruger National Park is indicative of the serious weaknesses in the teachers' knowledge of the subject matter. The

fact that this example was remembered so vividly by this teacher, even a few years after that MSSI intervention, demonstrates how profound a learning experience the intervention must have been.

In an earlier discussion the importance of the structure of a professional development programme for the participating teachers was underscored. However, as with both structure and collaboration, it is not only the separate presence of each key theme in our findings that is important in shaping a potentially successful professional development intervention but also their connections. Similarly, the combination of structure and content focus was also evident throughout the design of the MSSI intervention. Evidently, it was not only in the workshops and clusters that teachers were extensively exposed to the mathematics and science content. During their extended visits to Japan, teachers did not only focus on how to teach these subjects, but they also studied the subject matter content more intensively as well:

> You see, I had an opportunity to go to Japan. I stayed there for four months. We did a programme on practice science teaching in secondary schools. So the subjects that we focused on were physical sciences and, they don't call it geography they call it earth science, so it was life sciences, physical sciences and earth science. We were focusing on these three sciences. We were doing content with a lot of activities around that. It was very easy to come back and implement that to my follow teachers....

It is very clear that the activities that the teachers were involved in for the MSSI project emphasised mathematics and science content. This seems to have been one of the highlights of the MSSI projects. What actually attracts teachers to

professional development is, according to Gusky (2002), their belief that it will expand their knowledge and skills, contribute to their growth and enhance their effectiveness with their students. The data in this study shows that a professional development initiative that focuses on content tends to provide teachers with the knowledge, skills and confidence to teach the subject matter. From the teachers' perspective, it makes it implementing their new knowledge and skill easy. This sentiment was echoed by yet another one of the participating teachers:

> I found it helpful when we did the content. I enjoyed it so much. It improved my knowledge. It was refreshing, uplifting and it really made me feel like I am a teacher. That's why I would love to go again, there are a lot of changes taking place and they need a teacher to develop himself/herself. If you stay, you will be left behind!

Desimone *et al* (2006) agree that teachers with better content knowledge have more confidence and motivation to further develop their knowledge and skills than teachers with less content knowledge. In the theoretical framework that was discussed in Chapter Two, Desimone (2009) speaks of the focus on content as one of the most critical features of a professional development programme which seeks to improve teachers' classroom practices. In her discussion on the issues of content focus, Desimone argues that a compilation of evidence from the past decade points to the link between activities that focus on subject matter content and how students learn that content, and increases in teacher knowledge and skills, improvements in practice, and, to limited extent, increases in student achievement (p.184).

In her elaboration on the focus on content, Desimone (2001) also suggests that the content covered during professional development activities varies according to at least four dimensions. Firstly, professional development activities may vary in the emphasis they place on the subject matter that the teachers are expected

to teach and the methods they are expected to employ. Some activities are primarily intended to improve teachers' knowledge of the subject matter content, while some are designed to improve general pedagogy or teaching practices (classroom management, lesson planning or grouping methods) and others focus on helping teachers use particular curriculum material (new textbooks, science kits).

Based on these discussions, it is clear that the MSSI project was, in its design, not far from what has been suggested in the literature. A careful scrutiny of the activities that the teachers performed in the MSSI project shows that it covered all four of the dimensions discussed in the literature; in addition to the subject matter content that the teachers covered in the MSSI project, the programme also focused on the teaching methods, teaching practices, and activities which helped with the use the curriculum materials:

> In the clusters, as cluster leaders, we encouraged and showed teachers how to develop the lesson plans. We assisted them to prepare, teach and assess the learners. In one region, we taught the same thing so that if a learner moves from one school to the other, she/he must not find it very strange. Again each and every teacher was given micro-kits (science kits with apparatus for experiments) to use and give to the learners during science lessons. The micro-kits were very helpful, as they also taught teachers to improvise.

As suggested above the teachers covered the content in all the four dimensions discussed earlier. Interestingly, the teacher quoted above draws attention to an important issue that is somehow left out of Desimone's framework: improvising teaching to fit the context within which it is to be taught and learned. The data in

this study reflects that the teachers are, thanks to the MSSI initiative, comfortable with adapting their teaching skills and knowledge to the rural setting. This was obviously very important as most of the participating teachers in this study come from the rural areas of Mpumalanga. The MSSI's use of science micro-kits was partly influenced by this fact because in rural settings, science laboratories and other such facilities are often not available:

> In my case, I used to know that if I wanted to make use of a beaker, I must go to the laboratory which we do not have here at all. I did not know that whatever I have, I can use. So now, I just ask the learners to bring a plastic, say a coke bottle. We cut it into a beaker and we do the experiment. They have indeed helped us to do whatever practical or experiment we want to do with or without labs.

The important variation on the content theme lies in the recognition that a professional development programme does not have to be completely general; as teachers have different needs, a programme can be modified to suit the needs of the teachers it is developing. For example, some schools may be rural while others may be urban and as such the focus should be varied to suit the individual needs of those schools. For the MSSI therefore, it seems like the exploration of subject matter was mediated by the consideration of context. This is an important variation to the Desimone (2009) model. The data in this study has uncovered the importance of making context a valid addition to the theme of subject matter content. As Robinson and Carrinton (2002) assert, teachers prefer programmes that are more practical in nature and which aim to meet their specific needs. As Lee (2005) asserts, continuing professional development programmes need to be modified to meet teachers' individual needs; this has been reaffirmed by the perspectives of the MSSI teachers in the present study.

5.2.4 Time of engagement

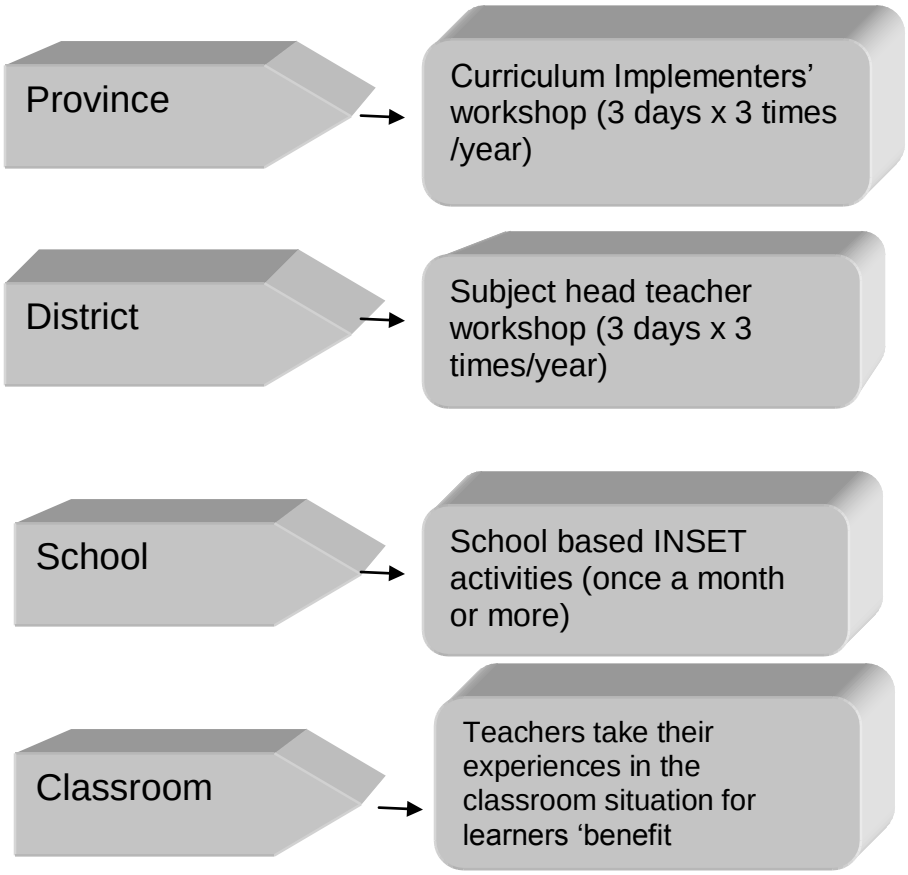
The fourth major finding of this study deals with the amount of time available for teachers to attend professional development programmes. The amount of time spent in the professional development activities must receive consideration because professional development, by its nature, should happen while the teachers are engaged in their work and profession. Longer activities, as noted by Desimone (2009), are more likely to encourage in-depth discussions of content, student conception, and misconceptions. Garet *et al* (2001) draw attention to the emerging consensus from literature regarding teacher learning and professional development, about the call for professional development to be sustained over time. Many scholars have argued that most of the reforms suggested by policy-makers to improve both the quality of teaching and learner performance, require teachers to make fundamental changes to the way they approach their teaching and learning (Spillane, 2004; Cohen and Hill, 2001). Many teachers will continue to struggle with these proposed changes, partly because they are requested to implement something which many of them may never have experienced in their own training.

In their discussion of duration, Garet and his colleagues argue that the longer the professional development activities are, the more likely they are to encourage in-depth discussions of content and pedagogical strategies (Garet *et al* 2001). These scholars also indicate that the more time that is spent on activities will result in a greater likelihood that teachers will be able to implement their new practices and obtain feedback on their teaching. To be more successful therefore, teacher learning and professional development programmes have to try and expose teachers to realistic classroom procedures and situations. However, such exposure requires time – an adequate amount of time for the teachers to switch roles and become learners, in order to fully experience (from the learners' perspective) the new practices that they are expected to implement in their classrooms.

Duration of CPD, therefore, refers to time in a multi-dimensional sense. Firstly, it refers to the time necessary to fully train the teachers. This may involve the learning of subject matter content, new pedagogical practices, the context of learning, and the tools and resources for enhancing learning. Secondly, it is about providing the space, time and opportunities to practice what they have learned during the CPD intervention in real classroom situations. The third component of duration is about sustainability and involves providing an adequate amount of time for the new practices to be properly implemented and perfected in the teachers' classrooms. This requires sustained opportunities for practice, support and reflection (in practice).

The data in this study suggests that the MSSI took the issue of duration seriously and provided extended opportunities for the teachers to acquire new knowledge and practices, and to then practice those in a supportive environment (aided by the curriculum implementers and university professors involved in the partnership). The MSSI project took place over a period of six years (with an additional two years of group study visits to Japan), and this duration exposed teachers to all of the different activities within the project. The central focus of all the activities was on learning the subject matter content, and practicing the new approaches to teaching that subject matter in their own classrooms. In Figure 5, the structure of the MSSI professional development activities as extracted from the document analysis is illustrated. The structure clearly shows the number of days per year that the MSSI activities (specifically the workshops and the cluster meetings) took place.

Figure 7: Duration of the MSSI activities per levels



At the provincial level, we observe that the curriculum implementers were trained by the experts from the partner universities – both local and Japanese. The training was normally scheduled over 3 days, and this took place three times per year. The curriculum implementers therefore, had nine days of active engagement with the project in a year. This arrangement allowed them time to learn, consider what they had learned, perhaps implement some of their new skills and then reconvene later in the year for the second workshop (and repeat that process once more). Similarly, the curriculum implementers would train the subject head teachers in similar manner. The school-based INSET activities on

the other hand, which were much closer to the actual classrooms, took place once a month, or more frequently if the teachers desired to do so. Corresponding to the data from the document analysis, one of the participating teachers explained this process:

> We used to meet monthly, we used to prepare together, we came together as different schools, we did everything together as a circuit, preparation, even our work schedules even when one teacher has a problem, we would call an urgent meeting and assist the teacher. We helped each other a great deal.

The monthly meetings allowed the teachers to collaborate and rely on one another for support. Support for the teachers in the MSSI project, therefore, did not only come from the university professors, but also from their peers. It is important to note that such support was fairly regular. This type of support is a ingredient for the potential success of a CPD programme.

In the earlier discussion of the MSSI activities, attention was drawn to the teachers' group study visits to Japan. The Japanese study tours provided the teachers with extended opportunities to learn, to practice and to reflect on their newly acquired knowledge and skills. One of the teachers interviewed considered these study tours as follows:

> You see, I had an opportunity to go to Japan. I stayed there for four months. We did a programme on practice science teaching in secondary schools so, so the subjects that we focused in were physical sciences and.....

Referring back to the conceptual framework in Chapter 2, the issue of duration featured prominently in the discussion of the emerging consensus on the characteristics of successful CPD programmes. Desimone (2003), Cohen and Hill (2001) and Supovitz and Turner (2000) argue that intellectual and pedagogical change requires professional development activities to be of a sufficient duration, including the span of time over which the activity is spread and the number of hours spent on the activity. Part of the positive perspective that the teachers had of the MSSI project was due to the fact that it was spread out over six years. The teachers were engaged and supported for a minimum of six years with monthly activities throughout. The MSSI may in some ways be what Bolam (2003) has in mind when he states that a professional development programme is most effective when it is a constant, continual process that includes properly planned development and individual follow-up through supportive observation and feedback, educator dialogue and peer coaching (Bolam, 2003:103).

5.2.5 Personal transformation and growth

My fifth and the final set of findings in this study suggest that personal transformation and growth is important for teachers who participate in a professional development programme. Teachers are attracted to a professional development programme not only because of the four aspects discussed earlier, but also because it can fundamentally change them for the better. This is the theme that I have labelled “personal transformation and growth”. In his account of why some teachers are able to change their classroom practices by adopting very difficult and challenging approaches to their teaching of Science, Jita (2004) argues for the need to consider the teachers’ biographies or identities as a critical factor in this ability. He argues that the teachers’ (multiple) identities contribute to determining whether they are able to change their classroom practices and embrace some of the more fundamental changes that are required in many of the

curriculum reforms. Based on his research with a group of South African Science teachers who managed to significantly change their classroom practices to promote student learning, Jita (2004) says that “to change their classroom practices, teachers in South Africa and elsewhere will be challenged to (first) reconsider and change who they are as individuals (identities) within existing frameworks of educational practice” (p.25).

If professional development programmes such as the MSSI programme aim to help teachers to change their classroom practices, then they may need to pay more attention to the issue of teacher identity. In this view, CPD programmes will have a better chance of success if they help to change who the teachers are personally, by, for example, providing them with life-changing experiences which can become a catalyst for such changes. Unfortunately, many professional development programmes concentrate either on the content or on the teaching methods without considering what the impact on the teachers’ individual personal transformation and growth may be (Van Eekelen, Vermunt and Boshuizen, 2006).

One of the key findings about the MSSI project was that it afforded the participating teachers several opportunities to change their lives. Many of the teachers that were interviewed discussed how the project enabled them to transform their lives and grow on a more personal level. In one very vivid case in Chapter 4, a teacher who has not previously studied or majored in natural science was asked by her principal to teach Natural Science. She had in fact studied Geography for her teacher training diploma but the MSSI initiative helped her to succeed:

> You see it (the MSSI) helped me so much. When I got to this school, I was asked to teach general science and I have done only biology and geography at the college. I knew nothing, nothing

> about science but then, by attending this programme, I like it and I am confident with teaching of natural science

The important point raised in this quotation is how the teacher's life changed forever through her participation in the project. Although she had studied Life Sciences at college, by her confession she was in no way close to being a Physical Sciences teacher. Her participation in the MSSI project however, enabled her to learn and develop the knowledge, skills and confidence required to teach Physical Sciences. Over the period of her involvement in the MSSI, she was literally transformed into being a competent Natural Sciences teacher irrespective of her previous qualifications. She finally felt confident that she was able to do all of the activities that were associated with the teaching and learning of Natural Sciences:

> This programme helped me a lot, hence I said I knew nothing about Science, and then by attending the workshops and participation in the clusters I gained more knowledge and confidence on how to teach natural science. My attitude is changed. I used to think that natural science was the most difficult subject.

This is one example of how a professional development programme can begin to reshape a teachers' identity forever – changing an insecure Life Sciences teacher into a competent and confident Natural Sciences expert. Through this example and others discussed in Chapter 4, we have a picture of the kind of professional development programmes that teachers would like to enlist in, something that would have a lasting effect on the lives of the participating teachers.

Through her own active participation in the programme, and the MSSI experiences, the teacher referred to earlier will forever remain a competent Natural Sciences teacher.

Another example of the programme changing the lives of the teachers was the teacher exchange programme to Japan. Many of the participating teachers, who had that opportunity to travel and experience the Japanese (teaching) culture first-hand, also saw the project as a transformational experience which changed their lives forever:

> The visit to Japan was an eye opener, because its where I met other colleagues from other African states. There was a person from Zimbabwe, one from Zambia, one from Ghana, one from Tanzania and one from Uganda. You know, from my experience one could see that we were teaching the same thing but in different ways, we learned how to teach science, and how science is taught in other countries. We also engaged with (Japanese) professors on the content. They lectured us, they conducted experiments with us, and they also took us somewhere where we could see science in practice. The visit really was an eye opener; we did everything that could help one to teach science.

In the latter example, the teachers who had the opportunity to travel to Japan experienced the Asian culture and specifically the Japanese teaching culture. Even if the expedition was merely a tourist venture to the East, it may have still been a life changing experience. However, in reality it was not just about experiencing and learning another culture, but it was part of a carefully designed programme to enhance the teachers' knowledge, skills and teaching practices,

and to offer extended opportunities for self-reflection and personal transformation. The interaction with other teachers from various countries in Africa was also an opportunity for the MSSI teachers to learn about teaching Science beyond South Africa. Such opportunities are indeed very rare, but have the potential to be transformative. There are many stories of transformation that the participating MSSI teachers discussed during the interviews. Beyond the personal transformation, many of the teachers were promoted as a result of their participation in the MSSI project. In the final analysis, the data suggests that the MSSI teachers felt more comfortable with their professional development programme, partly because it focused on their need for personal transformation and growth

5.3 Conclusion and Recommendations

The need for high quality professional development is a central component in nearly every modern proposal for improving the quality of education in South Africa and abroad. Policymakers increasingly recognise that schools can be no better than the teachers and administrators who work within them (Guskey, 2002). Indeed, if all students are to succeed, they must have teachers who know how to teach every student to a high standard. Unfortunately, many teachers, especially in developing countries, do not have the necessary skills to do this nor are they equipped to confront the challenges and adverse conditions they face in trying to improve the quality of education in the schools. It is therefore necessary to find appropriate professional development approaches to ensure that all the teachers, even the most experienced ones, are equipped with the necessary knowledge and skills for improving learner performance (Hirsh, 2005). Just like the practitioners in other professions, teachers need to broaden their knowledge and improve their skills over the course of their careers (Report on Teacher Professional Development, 2006). Therefore, it is no surprise that funders, educators and researchers all suggest professional development for improving the quality of education in schools. Unfortunately, at this point there is strong

agreement among researchers that currently, much of the professional development offered to teachers does not meet the definition of effective professional development (Birman *et al* 2000); research seems to indicate that most professional development programmes for teachers are unsatisfactory and do not meet their intended goals (Boyle *et al* 2005).

The present study originates from the view that, for the redesign of CPD, it would be important to understand the perspectives of the teachers on the kinds of professional development programmes that they feel are promising. Thus, policymakers have to explore professional development from the side of the participating teachers in order to clearly understand what would be best for changing their classroom practices. After all, as Robinson (2003) argues, recent views of professional development frequently emphasise the importance of involving teachers in defining their needs and developing opportunities for their own professional development. Almost all of the innovative literature, Robinson, speaks of the importance of the personal engagement of those involved in any reform processes. To make informed policy and programme decisions regarding professional development, district and school leaders need to know whether professional development programmes are currently reaching the teachers who need them most (Desimone *et al* 2006).

The present study used a critical theory perspective to explore what teachers think of the professional development programmes they have attended. As discussed in Chapter 2, critical theory seeks to empower the oppressed. Teachers are the key actors in continuing professional development and should be involved in the decisions made by the authorities. Teachers are involved in doing the work and should thus be allowed to give their opinions on professional development programmes. Critical theory was quite important in framing this study as the affected teachers were involved in framing the problem and possible solutions.

The study, as presented throughout this chapter, has uncovered five major sets of findings. These findings provide suggestions for what the teachers identified as the best characteristics of effective professional development programmes. The study examined the teachers' perspectives and listened carefully to the issues that they raised.

It is imperative that teachers are directly involved in their professional development. All of the data collected in this study suggests that in order for continuing professional development programmes to be successful, they have to be meaningful to the participating teachers. The challenge for policymakers and management is to understand what the teachers want and what they find meaningful, and then to design continuing professional development programmes that respond to the teachers' needs. The central thesis of the present study is therefore that teachers should not only be involved in the planning of the CPD programmes, but that the programmes should be aligned with their personal circumstances and motivations. Only if the CPD programmes have personal meaning for the teachers will they have the potential to be transformative and life changing. If Jita (2004) is correct in his argument that changing the classroom practices of teachers may be influenced by whether the CPD programmes they attend are transformative, then there is bigger challenge for organisers of teacher professional development programmes. The challenge is to determine which experiences have the potential to be personally meaningful and transformative for the participating teachers. Such knowledge and information can only result from a comprehensive interaction and collaboration with the teachers. If this interaction can be accomplished then the resulting opinions of the teachers must be considered, protected, privileged and then incorporated into the planning and implementation of the CPD programme. The perspectives of the teachers in this study would appear to suggest that the MSSI project may have been one example, in some ways, of such a proposed interaction and collaboration with teachers for CPD.

For the teachers I interviewed, who participated in the Mpumalanga Secondary Science Initiative (MSSI) project, the project was not just a chance to refine and develop their subject matter knowledge and teaching skills in science and mathematics, but a genuinely life changing experience.

To conclude the study, it remains for me to (re) examine the conceptual framework proposed by Desimone (2009) for what she considers a worthwhile programme of teacher professional development. I wish to review her model with the aid of the findings from the present study, wherein the MSSI teachers were able to provide us with pointers as to what made their CPD programme personally meaningful and transformative.

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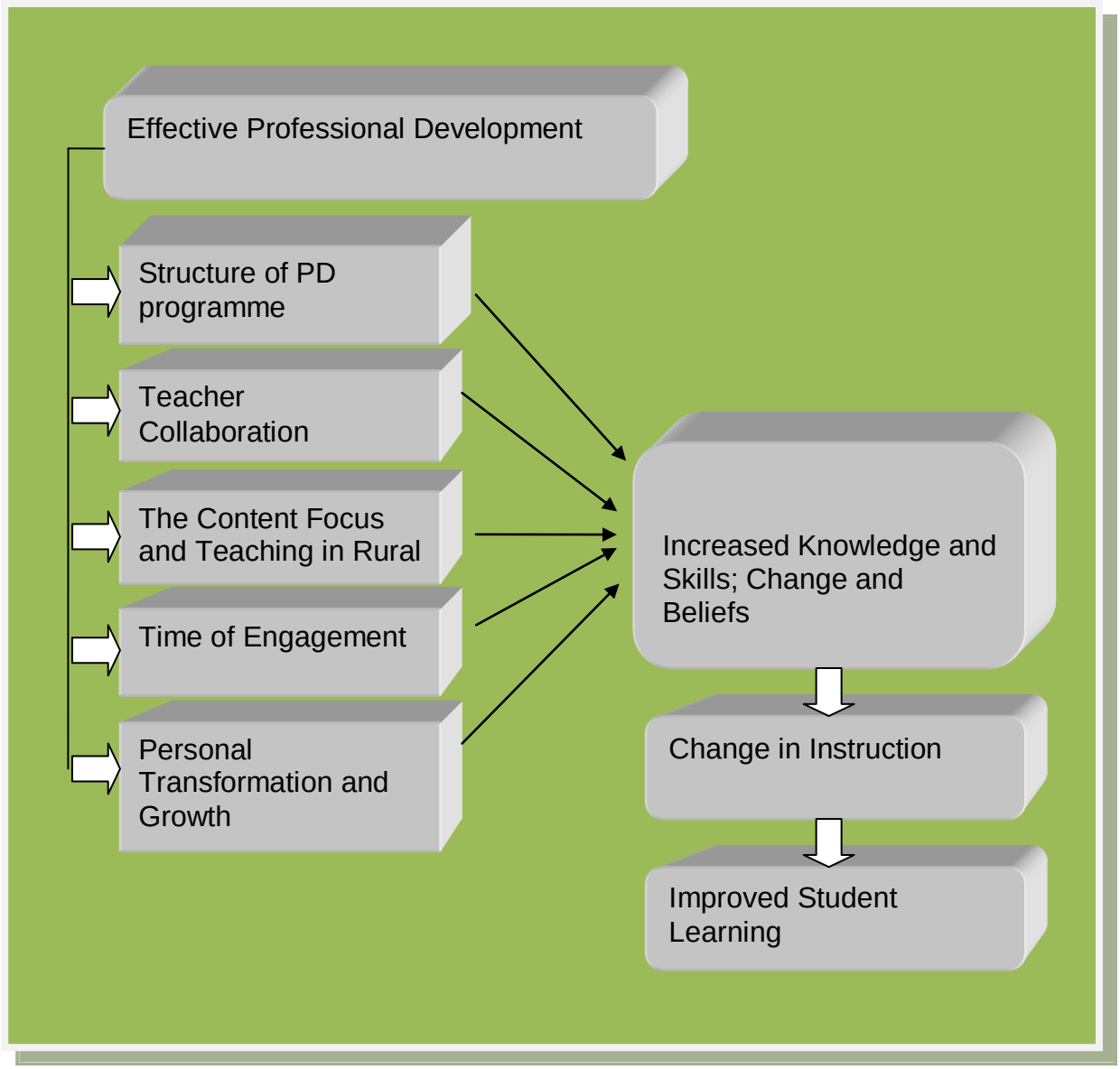
From the foregoing discussion of the findings, it is therefore possible to suggest a refinement of the Desimone model. Two key additions to the Desimone model are personal transformation and the context of teaching in the rural settings. Factoring these additions into the equation, a proposed new model of an effective CPD is illustrated in figure 8 below:

Figure 8: An alternative model of an effective CPD for teachers



In Chapter 2 I presented the following summary of the Desimone conceptual framework for professional development:

That the core features of professional development activities (focus on content

knowledge; opportunities for active learning; and coherence with other learning activities) could be expected to have significantly positive effects on teachers' self-reported increases in knowledge, enhancement of skills and improvement of classroom practice. It is primarily through the core features that the structural features, such as workshops; clusters; collective participation of teachers from the same school or cluster; or amount of time devoted to the CPD, significantly affect teacher learning.

Furthermore, Desimone (2009) found that the six features of professional development discussed earlier, were related to an increase in teachers' self-reported knowledge and skills and changes in teaching practice. These scholars argued that the core features (content focus, active learning and coherence) worked through the structural features (active learning, duration, and collective participation).

The present study was designed partly to test these claims within the context of the MSSI project in South Africa. Indeed, my findings as presented in chapters four and five have demonstrated the validity and utility of the Desimone (2009) model in the South African context. I have, however, presented a revised model of CPD in Figure 8 based on the data collected in this study. My model demonstrates that while useful, the Desimone (2009) model is missing two important components that proved to be important for CPD in South Africa and probably for other developing nations too. The transformative value and the context factors constitute two important core features of CPD that are actualised through the structural features.

To restate, the Desimone (2009) thesis states that there are at least two central components to a conceptual framework for studying teachers' professional development. One is recognising a set of critical features that define effective professional development, as discussed above. The second is establishing an operational theory of how professional development influences teacher and

student outcomes. The revised CPD model that I have developed and presented in Figure 8 above helps to extend the conceptualisation of the core features as espoused by Desimone (2009). Through a deliberate privileging of the teachers' opinions on CPD, I have been able to understand the importance of the transformative value of CPD and its context as core features of any CPD engagement for teachers, especially in the developing countries.

Chapters 4 and 5 have also tried to respond to Desimone's second challenge of outlining how these two additional core features of CPD might work with other features to influence the outcomes of teachers and students. While I am confident about the teachers' perspectives regarding what works for them, and particularly their identification of these new core features, the operational theory on how all the factors work together to shape the desired outcomes is still a work-in-progress. Further research in developing countries is still needed to provide an adequate explanation of why the Desimone model and its variants, including the one that I have developed in this study, work in the ways that they do to produce the desired teacher and student outcomes.

In conclusion, I therefore present my model as a work-in-progress, in recognition of the opinions of the many teachers whose perspectives have hitherto remained unknown. Teachers do have opinions, and they know well that CPD might work to fulfil their present and anticipated needs. Therefore many more teachers may too continue to add to and refine the CPD model that I have proposed in this study. The research challenge is to continue to listen to these teachers and to explore and make sense of their experiences in the search for better models of CPD in general. The present study has set the stage for such work in South Africa.

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Appendix 1: Interview Protocol

Teachers' perspectives on continuing Professional Development: a case study of the Mpumalanga Secondary Science Initiative

The study explores teachers' perspectives of CPD in general, and explores its **meaning for them personally** and in the context of their work.

By following seven teachers, who were part of a science and mathematics professional development intervention for six years to seven years, I explored the **teachers' conceptions of the intervention**, **its meaning for them and their work** over the period of intervention and beyond.

1. Name and background – How long have you been teaching…Where? Which grades? What subjects?
2. Present work experience: School? Subjects? How is it like to teach at school X? [probe: why do you say X]
3. I wish to focus a little bit on your involvement in the MSSI project: You participated in the MSSI – can you remember which years you participated in the project [reminder: Phase 1 of the project began in 1999 – 2003 and then Phase 2 began in 2003 – 2006].
4. Which school(s) were you teaching at when you participated in the MSSI activities?
5. Were you the only one at the school who participated or there were others? [how did you all get to be involved? How were you selected to participate?
6. Were there any other schools or teachers that were also involved? How did you work together if at all? [examples]

7. Which MSSI activities were you involved in? What did you do exactly? [Describe some of things you actually did as part of your involvement]. Did you enjoy doing those activities? [Why?]
8. I would like to understand why you got involved in the MSSI activities in the first place? [Probe: what were some of your reasons? Forced or voluntary participation and motivational issues]

9. What were 2 or 3 of the most important or interesting things for you about the MSSI? Why do you find these interesting or important? [focus on each one]
10. Did you find the MSSI activities relevant to what you were doing in class? [How was it relevant? Explain…Use an example if you can to show me how it was relevant for you in your work with learners]
11. Did you find the MSSI activities useful for your teaching? [Use example to show]
12. If you remember, the MSSI had a number of activities: like the workshops, the clusters, the study guides and Japanese study visits – which of the activities did you like the most Tell me about each one of them: what did you like about X?….what is that you did not really like about Y?
13. If you were to tell a story to new teachers about the MSSI as a teacher development project you were once involved in, what would you want them to know about it?
14. If you were to get involved in a similar project again, what would you want to see done differently? [What should be improved?] [What should be kept in the original project?]
15. Would you get involved again in such a project? [Why?]

Appendix 2 Informed Consent

Dear Participant

Thank you for your time. I am conducting a PhD research project entitled: ***Teachers' Perspectives on Continuing Professional Development: the case study of the MSSI project,*** with the University of South Africa (UNISA)***.*** The project is aimed at understanding your experiences with all the processes of the MSSI project. Please be assured that the information you provide will be treated with absolute confidentiality and the researcher (I) will not share the information with any third parties. You will also remain anonymous, your name or other identifying information will not appear on the study report. Your participation in this research study is voluntary and you can withdraw from this study at any time. I appreciate your cooperation and the time you have put aside to help me in this important project. If you should have any questions or suggestions, please contact me (***Matseliso Mokhele)*** at 082 504 2053 or my study supervisor, Professor L.C. Jita at (012) 429 4840.

Your kind cooperation is highly appreciated; the interview will **not** take more than 2 hours of your time.

Participant's signature _____Date_____

Researcher's signature _____Date_____

- *The signature of a **participant** in this document indicates agreement to participate in this study.*
- *The signature of the **researcher** on this document indicates agreement to include the participant in the research and attestation that the participant has been fully informed of his/her rights.*

Appendix 3: Letter to the Regional Director

Hillview Park
Vivian Street
Pretoria

15 September 2010

The Regional Director
Ehlanzeni Region
Mpumalanga Department of Education

Dear Sir.

RE-APPLICATION FOR CONDUCTING RESEARCH AT EHLANZENI

I hereby apply for permission to conduct research in the Ehlanzeni region. The aim of this study is to explore teacher's perspectives on continuing professional development. The study will focus on only the schools that participated in the MSSI project. It is hoped that the study will make a meaningful contribution to the literature on Teacher Professional Development. The results will be shared with the department.

I further request your permission to conduct interviews with:

- ✓ Teachers who participated in the MSSI project
- ✓ Only mathematics and Science teachers

The normal school program will **not** be interrupted.

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

Kind Regards

Ms. Matseliso Lineo Mokhele
PhD candidate (University of South Africa)
Contact no. 082 504 2053

Appendix 4: Letter to the school

Hillview Park
Vivian Street
Pretoria

15 September 2010

The Principal

Dear Sir / Madam

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 teacher's perspectives on continuing professional development. The study will focus on only Science and Mathematics teachers who participated in the MSSI project. It is hoped that the study will make a meaningful contribution to the literature on Teacher Professional Development. The results of the study will be shared with the school.

I further request your permission to conduct interviews with:

- ✓ Maths and Science teachers who participated in the MSSI project.

The normal school program will **not** be interrupted.

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

Kind Regards

Ms. Matseliso Lineo Mokhele
PhD candidate (University of South Africa)
Contact no. 082 504 2053