WHAT AND HOW DO TEACHERS LEARN IN PROFESSIONAL LEARNING COMMUNITIES?

A SOUTH AFRICAN CASE STUDY

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ABSTRACT

This study, located in the field of in-service teacher professional development, investigated what knowledge teachers learned in three subject-based professional learning communities (PLCs), how they learned it, and the conditions that enabled this learning. The Integrated Strategic Planning Framework for Teacher Education and Development in South Africa 2011-2025 envisages all in-service teachers participating in PLCs in order to learn knowledge-for-teaching. There is limited research on whether PLCs are likely to be effective for this purpose in South Africa. Even less is known about what types of knowledge can be learned in PLCs. Drawing on the literature related to teacher education and professional knowledge (Shulman, 1986; 1987; Ball, Thames & Phelps, 2008; Winch, 2010, 2013a, 2013b) a "Framework for knowledge-for-teaching" was created and used to investigate what knowledge was learned by participants in three PLCs.

The study is a case study of cases in which each of the three PLCs, purposively selected, is a separate case on which cross-case analysis was undertaken (Bassey, 1999; Adler & Reed, 2002). It explored what teachers from eleven diverse schools from one school district in Gauteng discussed and did in PLC sessions over a period of eighteen months. Minutes or verbatim transcripts of audio-recordings of the sessions supplemented with individual interviews, questionnaires, and learning reflection journals of the participants provided the main data sources and were analysed using a grounded theory approach. A key finding is that teachers learned more practical knowledge than subject matter knowledge and that teachers with the ability to make inferential connections between propositions (Winch, 2010; 2013a), dependent on sound subject matter knowledge, were able to contribute more knowledge and were more confident than teachers whose subject matter knowledge was weaker. Four key factors that enabled the work of the PLCs were identified: supportive school and teacher characteristics, effective facilitation, a definite focus on learning, and the use of structured collaborative enquiry processes. From the findings a "Framework for Learning in Professional Learning Communities" was constructed to identify these and other enabling or inhibiting factors which impact on what can be learned in a PLC as well as other potential positive outcomes of participation. One implication of these findings is that the effectiveness of PLCs is likely to be improved if the enabling factors are strengthened. A second is that the model of PLC adopted in South Africa may have to be adapted to meet the needs of teachers whose subject matter knowledge is inadequate. In light of the need for subject matter knowledge, attention will need to be given to how subject matter knowledge can be learned in PLCs and to how to make this learning more systematic.

Keywords: teacher professional development, professional learning communities, facilitation, learning focus, knowledge-for-teaching, collaborative enquiry processes.

DECLARATION

I declare that this thesis is my own unaided work. It is being submitted for the degree of Doctor of Philosophy at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

Anthea Cereseto
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ABBREVIATIONS/ACRONYMS

ACE	Advanced Certificate in Education
ANAs	Annual National Assessment Tests
AP	Advanced Programme
C2005	Curriculum 2005
CALW	Collaborative Analysis of Learners' Work
CAPS	Curriculum and Assessment Policy Statements
CCK	Common Content Knowledge
CPD	Continuing Professional Development
CPTD	Continuing Professional Teacher Development
COPs	Communities of Practice
DBE	Department of Basic Education (from June 2009)
DHET	Department of Higher Education and Training
DIPIP	Data-Informed Practice Improvement Project
DoE	Department of Education (until June 2009) (also NDoE)
DSG	Development Support Group
ELRC	Education Labour Relations Council
FAL	First Additional Language
DTDC	District Teacher Development Centre
GDE	Gauteng Department of Education
GEM	Geography, English Maths (PLCs)
GPLMS	Gauteng Province Mathematics and Literacy Strategy
HCK	Horizon Content Knowledge
HL	Home Language
HOD	Head of Department (in a school)
ICAS	International Competition and Assessment for Schools
IK	Inferential knowledge
IQMS	Integrated Quality Management System
ISPFTED	Integrated Strategic Planning Framework for Teacher Education and Development in South Africa
JLS	Japanese Lesson Study
JSTC	Junior Secondary Teachers' Certificate
KCC	Knowledge of Content and Curriculum
KCS	Knowledge of Content and Students
KCT	Knowledge of Content and Teaching
KH	Knowing *how*
KHi	Skills (techniques)
KHii	Transversal abilities
KHiii	Project management abilities
KT	Knowing *that*
LTSM	Learning and Teaching Support Material
NCS (FET)	The National Curriculum Statement Grades 10-12 (General)
NDoE	National Department of Education (until June 2009) (Also DoE)

NFPTED	National Framework Policy for Teacher Education and Development
NGOs	Non-Governmental Organisations
NICPD	National Institute for Curriculum and Professional Development
NLC	Networked Learning Community
NPDE	National Professional Diploma in Education
NPLC/s	Network of Professional Learning Community/Communities
NPPLC	Networked Principals' PLC
NSC	National Senior Certificate
NSPLC	Networked Subject PLC
OBE	Outcomes-Based Education
PGP	Professional Growth Plan
PISA	Programme for International Student Assessment
PLC/s	Professional Learning Community/Communities
PLIC	Professional Learning Inquiry Cycle (Timperley et al., 2008))
PTDI	Provincial Teacher Development Institute
(R)NCS (GET)	The *(*Revised) National Curriculum Statement Grades R-9 (Schools)
SACE	South African Council for Educators
SADTU	South African Democratic Teachers Union
SAG	Subject Assessment Guideline
SBA	School-based Assessment
SCK	Specialised Content Knowledge
SSIP	Secondary School Improvement Programme
SSPLC	School Subject PLC
SMT	School Management Team
TIMSS	Trends in International Mathematics and Science Study
TPD	Teacher Professional Development

CHAPTER 1 INTRODUCTION TO THE STUDY

1.1 INTRODUCTION

Recognising that the quality of education outcomes for the majority of South Africa learners is poor (Annual National Assessment Report, 2014; National Planning Commission Diagnostic Report, 2011; Howie et al., 2007) and that teachers are central to improving these outcomes (Hargreaves & Goodson, 2006; Carnoy, 1999; Fullan, 1993; Fullan & Hargreaves, 1992; Hawley & Rosenholtz, 1984), the broad aim of this study is to investigate whether a model of teacher professional development (TPD) that relies on teachers learning collaboratively in professional learning communities (PLCs) is useful for developing teachers' learning. Specifically, the study investigates what knowledge-for-teaching[1] teachers in PLCs choose to focus on, what learning processes they follow in doing this, and what enables or inhibits their learning in the PLCs. The objects of analysis in the study are the learning activities and the processes followed by teachers in three subject-based PLCs of a networked learning community (NLC) which comprised eleven schools, mainly from one cluster in a school district in Gauteng, South Africa.

1.2 STATEMENT OF THE PROBLEM

Despite considerable investment in teacher professional development to improve the quality of education in South Africa, many learners are performing poorly (Spaull, 2013; Taylor, van der Berg & Mabagoane, 2013). Seemingly appropriate policies for holding the system and stakeholders accountable for delivery of quality education[2] have not had the intended effect. Numerous education researchers have argued that it is what teachers do in their classrooms that is far more powerful than the framework of policies that supports their work or even the context of the school in which they teach (e.g. Hargreaves & Goodson, 2006; Carnoy, 1999; Fullan, 1993; Fullan & Hargreaves, 1992; Hawley & Rosenholtz, 1984).

[1] "Knowledge-for-teaching" refers to the knowledge and skills that teachers require for their professional work and includes subject matter knowledge and practical knowledge. Knowledge is discussed in chapter 3.

[2] For example: Whole School Evaluation Policy (DoE, 2001); Integrated Quality Management System (IQMS) (ELRC, 2003); Revised National Protocol on Recording and Reporting (DoE, 2006).

According to international literature, policy assumes that schools have the capacity to meet external demands for quality and that all that is lacking is the will to do so (Elmore, 2002a; Elmore 2002b). However, research in South Africa suggests that the majority of South African schools lack sufficient internal capacity to enact policies aimed at improving quality (Taylor, in Brown, 2006). Cohen and Ball (1999) argue that internal capacity can be strengthened through a focus on improving instructional practices (a focus on the 'triad' of students, teachers and materials). In South Africa attempts to change teachers' instructional practice through teacher professional development (TPD) programmes have been largely unsuccessful (Crouch & Patel, 2008; Bloch et al., 2008) though there is some evidence that where TPD has been subject-specific and embedded in context it has been at least partially effective (Adler & Reed, 2002). Collaborative learning in professional learning communities (PLCs) and networked learning communities (NLCs) is a model of subject- and context-focused TPD that has emerged internationally over the last 25 years (Bolam et al., 2005). The Integrated Strategic Planning Framework for Teacher Education and Development in South Africa 2011-2015 (ISPFTED) (Department of Basic Education and Department of Higher Education and Training, 2011) has the stated primary outcome "to improve the quality of teacher education and development in order to improve the quality of teachers and teaching" (p. 1). The framework provides for PLCs "to strengthen teacher professionalism" (p. 14) by creating opportunities for collaborative learning. The ISPFTED aims to place teachers at the centre of TPD and assigns responsibility for professional development to teachers, with external support.

There is, however, limited research both in South Africa and globally that systematically describes what teachers choose to focus on when they learn in a PLC, what knowledge-for-teaching they learn, and what influences their choices. While the literature deals extensively with the processes that teachers use for learning in PLCs, there is very little about the kinds of knowledge they choose to work with, its theoretical underpinnings, and the extent to which the PLC process enables teachers' access to a systematic and coherent body of knowledge-for-teaching.

With the PLC model of TPD spreading globally, some studies have pointed to cultural influences enabling or inhibiting PLC effectiveness (Wong, 2010; Hairon & Dimmock,

2012). Such influences and other factors that enable or inhibit PLC functioning and effectiveness have not been fully explored in the South African context.

1.3 AIM OF THE STUDY AND RESEARCH QUESTIONS

Broadly, the study aims to explore the effectiveness of professional learning communities for furthering teacher professional knowledge. To this end, the study aims to examine what knowledge-for-teaching teachers develop and how they do so. The study also explores factors that enable or inhibit PLC functioning and teacher learning in PLCs, examining, in particular, facilitation/leadership of PLCs and school conditions.

The key research question to be addressed is:

What and how did teachers learn knowledge-for-teaching in three professional learning communities?

The sub-research questions are:

- What factors enabled or inhibited the work of three PLCs?
- Did the facilitation of each PLC's work contribute to what was achieved, and if so, how?
- What did teachers in three PLCs choose for the focus of their learning of knowledge-for-teaching and how did they arrive at that focus?
- What knowledge-for-teaching did teachers choose to focus on in the three PLCs?
- What learning processes did the three PLCs follow to address their learning focus choices?

1.4 CONTEXTUAL BACKGROUND TO THE STUDY

I was motivated to study a model of teacher professional development that used professional learning communities in a network of schools for the reasons explained below.

1.4.1 Post-1994 attempts to transform South African education and to improve its quality

Since 1994 South Africa has successfully increased access to education but not to quality education as defined in Goal Six of the Dakar Framework for Action on Education for All[3] (Fleisch, in Bloch et al., 2008, p. 1).

Through the allocation of a large slice of the national budget to education[4] and through a wide range of new policies, the government has aimed to improve the quality of education but a series of reports[5] suggests that these initiatives are failing to accomplish their intended goals. The reports show that most previously advantaged schools and a much smaller number of previously disadvantaged[6] schools are maintaining and even improving quality. However, far too many previously disadvantaged schools are lagging even further behind: "close to 80%" of South African schools are essentially dysfunctional" (Taylor, in Brown, 2006, pp. 2, 3). Van der Berg and Louw (2008) state that the "variation in the efficiency with which South African schools function has resulted in student performance being largely determined by school choice" with the 75% of students who met the minimum Mathematics requirement for entry into commerce or science-related fields at university coming from 10% of public high schools (2003 figures) (in Bloch et al., 2008, p. 57). The gap between the achieving and non-achieving schools appears to be widening instead of narrowing (Cereseto, 2009, p. 10). Spaull (2012) refers to the dualistic distribution of learner performance with the wealthiest 25% of learners attending schools that are very different from the other 75%, noting that the historically disadvantaged schools remain dysfunctional (pp. 5, 6). Spaull (2013) presents a similar picture:

[3] Improving all aspects of the quality of education and ensuring excellence of all so that recognised and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills.

[4] 17% of government expenditure (South Africa Year Book, 2009/2010: 233); "Government spends more on education than any other non-interest item in the country's budget" (R207,3 billion – 2012 budget) (South African Year Book 2011/2012 pp. 219, 222).

[5] The Report on the Annual National Assessment of 2014 (DBE, 2014); The National Education Evaluation and Development Unit National Report 2012 (Taylor, Draper, Muller & Sithole, 2012); The Umalusi Report (2004), and The Systemic Evaluation Report on the Foundation Phase (Department of Education, 2003b);

[6] A term for schools previously under the Administration of the Department of Education and Training for black learners only and which were under-resourced and provided an inferior quality education with a limited curriculum, largely ignoring mathematics and science.

> While there have been some recent improvements in pupil outcomes, as well as some important policy innovations, the picture that emerges time and again is both dire and consistent: however one chooses to measure learner performance, and at whichever grade one chooses to test, the vast majority of South African pupils are significantly below where they should be in terms of the curriculum, and more generally, have not reached a host of normal numeracy and literacy milestones. As it stands, the South African education system is grossly inefficient, severely underperforming and egregiously unfair. (p. 3)

This reality prompted me to explore a range of solutions suggested for school improvement and to decide on teacher-led improvement initiatives as a focus of research.

1.4.2 In-service teacher development initiatives post 1994

Since 1994 there have been many programmes aimed at teacher development, with many of these focused on implementing C2005 and OBE[7] methodology. They have comprised both long and short courses, workshops, school-based support by experts, meetings of clusters of schools which have mostly involved teachers checking one another's work according to a moderation tool, and cascaded training, provided both by the state as employer and many NGOs. Schools and teacher unions have also provided opportunities. However, the provision of teacher development has not been coherent, or targeted. Of particular note is the fact that the training has not made provision for follow-up support in the classroom.[8]

Policies that promote teacher development have also been implemented. The Development Appraisal aspect of the IQMS[9] policy (ELRC, 2003) intended that teachers should examine their practices, identify areas for development, and draw up a professional growth plan (PGP) annually. This policy is based on the assumption that teachers are able to diagnose reasons for learning failure and together with their development support groups (DSGs) identify and devise improvement strategies.

The Committee for the Review of Curriculum 2005 (C2005) (often referred to as the Chisholm Report, 2000, pp. vi-vii; 52-61) identified the shortcomings ("inadequate

[7] Curriculum 2005 (C2005) was the first curriculum introduced in South Africa post 1994 and it was structured on the use of outcomes-based methodology (OBE).
[8] De Clercq and Shalem (2014) provide a critical analysis of the Gauteng Department of Education programmes.
[9] Integrated Quality Management System, an Education Labour Relations Council Resolution.

orientation") in the training and development of teachers as one of seven factors contributing to the failure of educational reforms. One of the recommendations of the Final Report of the Task Team appointed by the Minister of Basic Education for the Review of the Implementation of the National Curriculum Statement (2009) addresses "Teachers and training". It states: "In-service teacher training should be **targeted** to where it is most needed (emphasis in the original). Training needs to be subject-specific" (p. 67). Crouch and Patel (2008), in identifying areas for investment, call for "... highly specific in-service training around both the specified learning goals and learning gaps". Teachers in South Africa have been asking for meaningful professional development to enable them to meet the quality demands of education officials and society at large. This call reached a crescendo at the Teacher Development Summit held in 2009: "Teachers want to know the curriculum they teach, the learners they teach, and the society in which learners are growing" (ELRC Report, 2010, pp. 56-61).

The National Policy Framework for Teacher Education and Development (NPFTED) (Department of Education, 2007) and the Integrated Strategic Planning Framework for Teacher Education and Development in South Africa 2011-2025 (ISPFTED) (Department of Basic Education and Department of Higher Education, 2011) include the policy of continuing professional teacher development (CPTD) for all teachers in service. The South African Council for Educators (SACE) has been tasked with implementing this system. The first cohort of educators (principals and deputies) began the first year of a three year CPTD point cycle in 2014 (SACE, 2014).[10] The ISPFTED identifies outputs and activities for individual and systemic teacher development aimed at improving the quality of teachers and teaching (p. 4). These include teachers completing diagnostic tests[11] to assess their competence and identify their learning needs, provision of CPTD programmes (pp. 6, 7), and use of materials developed by the National Institute for Curriculum and Professional Development (NICPD) and made available on-line (p. 7). The plan identifies categories of teachers for targeted teacher development opportunities (p. 9).

[10] By 2016 all school-based educators registered with SACE will have to obtain 150 points for continuing professional development over three years.
[11] It is envisaged that teachers would complete these tests independently and confidentially, probably on-line.

1.4.3 Professional Learning Communities in South African education policy

"Output 3" of the ISPFTED (DBE & DHET, 2011), which deals with support to teachers and access to professional development, identifies PLCs (Activity 3.3) as a vehicle for this. The policy briefly refers to structures that are expected to offer support such as the Provincial Education Departments, District Teacher Development Centres (DTDCs), subject-based teacher associations, teachers' unions, and the NICPD (p. 14). The policy sees PLCs, for example, assisting teachers to integrate their own knowledge with the latest research-based knowledge, developing expertise to analyse learner performance data, helping teachers to interpret curriculum documents, to understand the content, and to use curriculum support resources. The policy assumes that teachers will be able to learn subject matter knowledge and practical knowledge in PLCs.

The ISPFTED provides only an outline of what PLC activity would entail. In 2014, the DBE launched PLCs and Subject Committees and in September 2014, following a Professional Learning Communities Colloquium, the DBE published a draft document: "Professional Learning Communities: A Model for South African Schools" (hereafter referred to as the Draft Model) which expands on the ideas in the ISPFTED and which signals the intention of the DBE to drive the implementation of the policy. The Draft Model explains the vision of the DBE for PLCs; describes their characteristics as identified in the literature; identifies the roles of "key players" who include teachers, the school management team, districts, provinces, national officials, teacher unions, SACE, subject-based teacher organisations, higher education institutions, facilitators, and the school; explains the relationship of PLCs with subject committees and subject associations; and provides suggestions for PLC activities. The Draft Model concludes with questions and answers about PLCs indicating that the DBE has tried to address the concerns of teachers. While this is not an official document and changes to it can be expected, it makes clear what the DBE hopes to accomplish through PLCs. It is clear that the DBE intends PLCs to be a vehicle for teachers to learn both subject matter knowledge and practical knowledge as a result of participating in the suggested activities.

I chose to study PLCs, as envisaged in the ISPFTED, to find out whether they would be effective as a vehicle for professional development. I wanted to find out whether

participating in PLCs could be a worthwhile form of teacher professional development that could extend teachers' knowledge-for-teaching. Given that principals, deputies, heads of department and teachers are required to accumulate CPTD points they want assurance that if they chose to participate in PLCs for their TPD that their participation would have a reasonable chance of leading to improved knowledge and practice. I also wanted to understand what conditions are likely to be essential enablers of PLC functioning that lead to teacher learning.

1.4.4 The envisaged role of lead teachers[12] in TPD

In secondary schools, subjects are supposed to be led by an identified Head of Department (HOD). The post provisioning norms do not provide a sufficient number of these official posts so many subjects are led by a nominal subject head who is usually the teacher of that subject with the most experience or knowledge in the subject. The lead teacher's duties include assigning and monitoring the work of the teachers in the subject, planning the learning programme, ensuring correct pacing and quality and quantity of learning activities and being accountable for the learners' performance. The duties of the HOD are specified in the Personnel Administration Measures of the Educators' Employment Act 76 of 1998, and include: "To provide and co-ordinate guidance: - on the latest ideas on approaches to the subject, methods, techniques, evaluation, aids ... and conveying these to the staff members concerned" (sub-section 4.4 (e) (ii), p. C-66).

Both HODs and unofficial subject heads receive limited, if any, training for their role, and almost never any training in either subject specific pedagogy or in how to lead teachers in their schools to teach the subject so that learners are enabled to learn more effectively. There is an assumption that their prior experience and knowledge will suffice. They are placed in a position of leadership, isolated in their individual schools, and largely left to lead their subject with only their own existing knowledge and experience.

[12] A "lead teacher" is the teacher who has supervisory and leadership responsibility for a particular subject in a school. The teacher may have official management/leadership status, such as a Head of Department, but this is not always the case. It is the teacher who has assumed responsibility and accountability for the performance of teachers and learners in the subject concerned.

Lead teachers were invited to participate in the subject PLCs in order to provide opportunities for them to network, focusing on matters of common concern, with teachers of the same subject at other schools in the network, and to equip them with knowledge and skills to enable them to lead their school subject teams or other groups of teachers.

1.4.5 One school's efforts to contribute to TPD

Since 1997 the school at which I am principal has had making a contribution to closing the education quality gap as one of its strategic objectives. It has been involved in two initiatives: informal partnerships with a number of Soweto schools to provide resources and limited mentorship of teachers, managers and school governing body members during school hours and a TPD programme for Physical Science teachers from the District run once a week after school. This led me to identify teacher networking and the establishment of PLCs as a means for extending teacher learning in collaborative ways. With District encouragement, the school set up a learning network which originally consisted of six schools, later extended to eleven, and engaged in an action research project known as the "Big Project" which is described below.

The three subject-based PLCs (Geography, Mathematics and English) that are the focus of this study (the PhD project) are a segment of the NLC[13] project. The idea was that each school in the network would send a lead teacher to each subject PLC with the hope that the lead teachers would replicate the kind of facilitation and learning activities they experienced and saw role-modelled in the PLC, in subject-based PLCs in their own schools. A principals' PLC was also part of the Big Project design. Its purpose was to harness principals' support for the project, to monitor the progress and usefulness of the activities in the subject PLCs, to discuss the role of principals in creating enabling conditions for a PLC to develop and thrive in their schools, to emphasise the instructional leadership role of the principal and heads of department, and then to engage in activities which developed principals' expertise in these areas. Funding for three years was obtained from Absa Capital for a project titled: "Improving learner achievement through focused professional learning in a networked learning

[13] See Appendix 1.1 for a brief outline of the differences between PLCs and a NLC.

community".[14] The project was directed, co-ordinated and facilitated by the organising school.

The broad aim of the project was to see whether teachers could improve the quality of their learners' achievement through participating in focused professional learning in networked subject-based PLCs. The project further aimed to develop lead teachers so that they could better facilitate learning (specifically in their subjects) in PLCs in their schools.

The PhD study originally had the same broad aim but as the study progressed it became clear that the number of lead teachers participating in the project was lower than anticipated and that they and the other teachers participating in the PLCs were not sufficiently able to set up formal/official school-based PLCs because of conditions prevailing at their schools.[15] Some informal sharing of learning from the PLCs did, however, take place. As a result I narrowed the focus of my study. My research questions focused more specifically on what teachers chose to focus their learning on in their PLCs, the learning processes they engaged in and then what enabled or inhibited learning in PLCs and thus the study came to be titled: "What and how do teachers learn in professional learning communities? A South African case study".

1.5 RATIONALE FOR THE STUDY

1.5.1 The moral imperative

My reading of Michael Fullan's *The Moral Imperative of School Leadership* (2003) has reinforced my belief in my responsibility as a school leader to initiate activities which contribute more meaningfully to building teacher capacity in the system so that the achievement bar can be raised and the achievement gap closed for all learners in the system. Fullan identifies a number of "promising directions and strategies" to make this possible. These include collaborative networks within and across schools and regions operating as PLCs. To achieve quality improvement and change in school cultures PLCs involve principals and teachers in trust-based and performance-oriented practice (p. 65).

[14] Additional funding was received from the Oppenheimer Trust when additional schools joined.
[15] The reasons for the formal school leaders/lead teachers not participating in the PLCs are discussed in 5.3.1.

I wanted to investigate whether PLCs such as those envisaged by Fullan, and which comprise teachers from different types of schools, could be a vehicle for building teacher capacity, especially knowledge-for-teaching, that could contribute to general improvement in learning and to a narrowing of the achievement gap between achieving and non-achieving schools.

1.5.2 International work on PLCS as a vehicle for TPD

To understand and evaluate whether the PLCs in the study were useful for teachers' development of knowledge-for-teaching it was important to identify characteristics, firstly, of effective TPD and, secondly, of effective PLCs. It was anticipated that this knowledge would enable identification of factors that would enable or inhibit learning in PLCs.

What contributes to effective teacher professional development has been the subject of considerable debate. For example, Garet, Porter, Desimore, Birman & Yoon (2001) identify "structural" and "core features" of high-quality professional development. They argue that structurally what matters is the type and duration of the activity and whether it involves "collective participation". Core features include a focus on content, promotion of active learning, and fostering coherence (pp. 920-929). Guskey and Yoon (2009) concur. They argue that "professional development needs to be "well-organised, carefully structured, purposefully directed, and focused on content or pedagogy or both" (pp. 496-497). Effective TPD involves reflection (Wassermann, 2009) and collaboration (Garet et al., 2001; Hirsch & Killion, 2007) in time set aside for it, specifically, in school hours[16] (Wei, Andree & Darling-Hammond, 2008, p. 29). It should not be of the "one-shot generic workshop" type but rather a sustained programme over a period of time (Lassonde & Israel, 2010, p. 8).

I chose to study a PLC model of TPD because PLCs use activities and learning processes that the literature describes as effective for TPD. While there are a number of definitions of a PLC in the literature there is broad agreement that it is:

[16] A factor identified in a study of what the highest-achieving countries are providing for their teachers. These are countries achieving very well in international comparative tests, such as, Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS).

> ... an inclusive and mutually supportive group of people with a collaborative, reflective and growth-oriented approach towards investigating and learning more about their practice in order to improve pupils' learning (Stoll, 2011, p. 104).

A PLC involves teachers in reflective practice and a continuous cycle of research-in-action, research-on-action (Schön, 1983) and reflection-for-action (Killion & Todnem, 1991). The learning process is sustained and focuses on problems of daily practice. Collaborative enquiry processes are used such as the Professional Learning Inquiry Cycle (PLIC) (Timperley et al., 2008, in Katz et al., 2009, p. 71), Collaborative Analysis of Learners' Work (CALW) (Langer et al., 2003) and Japanese Lesson Study (JLS) (Stigler & Hiebert, 2009; Perry & Lewis, 2009). These processes are discussed in 2.5.2.1.

This study aims to explore the extent to which the characteristics of effective TPD and PLCs were evident in the three PLCs of the case study. Were the PLCs structured to focus on the problems of teaching and learning that related to their practice, and if so how were they structured? Were the participants in the PLCs actively involved in a collaborative way that also involved reflection on their practice? How successful were the PLCs at sustaining teachers' involvement over the three years of the project and how did teachers manage to fit PLC work into their schedules? Did the three PLCs function in similar or different ways and what can be learned from how they functioned?

1.5.3 South African work on PLCs as a vehicle for TPD

Given the need for relevant and effective TPD in South Africa and the advocacy in international literature and practice of PLCs as a suitable vehicle for accomplishing this in international literature and practice, and in light of recent policy developments in South Africa, I suggest that PLCs are an area of worthwhile and necessary research. Studies of PLCs/NLCs are relatively recent in South Africa and there is not a large body of knowledge about whether or not PLCs are effective for teacher learning in South Africa or about what conditions are necessary to enable their functioning. I refer briefly to three of them.

1.5.3.1 Teachers' knowledge development in PLCs

The Data-Informed Practice Improvement Project (DIPIP) (Phase 1 and 2), modelled on Earl & Katz's "Networked Learning Communities" (2005, p. 13), involved 62 Grade 3-9 teachers from a variety of Johannesburg schools who met weekly for two hours, during the term, for a total of 86 weeks in total from 2007 to 2010. The project aimed to:

> … create a context for professional conversations in which mathematics teachers, together with university academics, graduate students, and government-based subject advisors, discussed what information test data provided to help think about reasons for learner errors and how these might be addressed through collaborative lesson planning, teaching and reflection. (University of Witwatersrand, 2011, p. 1)

Teachers worked in small and large grade-level groups (PLCs) to conduct learning activities which included curriculum mapping, error analysis, reading and discussion of texts, designing lessons, reflecting on lessons taught using the lesson plans and designing an assessment task on a central concept, analysing the learners' responses and interviewing learners to probe their reasoning for their responses (2011, pp. 3, 4).

Brodie (2013) argues that the Data-Informed Practice Improvement Project demonstrated that PLCs can be effective for developing systematically teachers' "deep conceptual content knowledge" for teaching Mathematics, contrary to arguments against the effectiveness of PLCs, and also demonstrated that the learning can be of a "powerful and sustained nature" (p. 14). Chauraya's (2012) findings also show that teachers can learn in a PLC. The participants in his study deepened their understanding of the concept of "ratio" as they made it a topic of enquiry. They contributed their differing viewpoints with their own explanation and justifications and listened to their colleagues' views, eventually collectively constructing a new understanding. In their frequent references to "they" (their learners) they demonstrated a keen focus on the needs of their learners. Teachers were able to participate in an open manner in an environment of trust and as a result of their developing confidence.

Chauraya (2012) describes a small project he undertook, involving himself and five Mathematics teachers (Grades 7-10) from one school, that spent nine months examining issues related to ratio, using the DIPIP model. For both Brodie and Chauraya a criterion

for PLC effectiveness for teacher learning would be the development of teachers' "deep, conceptual content knowledge" so that it can be used in teaching (Brodie, 2013, p. 14), in other words, teachers change their teaching practices because of their new, deeper understanding of their subject knowledge.

Another facet of teacher knowledge explored in the DIPIP project was teacher knowledge related to mathematical error analysis. Shalem, Sapire & Sorto (2014) report that teachers "struggled to think diagnostically about learners' errors" (p. 8). They identified that teachers needed knowledge of mathematics and knowledge of how learners think when choosing a wrong answer in order to give learners a complete procedural and conceptual explanation when they explain the correction. This study revealed where teachers had difficulties and devised a tool to evaluate the quality of teachers' explanations of learners' errors.

In my study I explore the knowledge-for-teaching that teachers work with in the three PLCs and how they do this. I want to know whether they focus on subject matter knowledge or pedagogical content knowledge or both and whether they learn new knowledge that can impact on their teaching practices.

1.5.3.2 Conditions enabling PLC functioning

Reynolds's (2009) unpublished DPhil thesis investigated how teachers innovated in the face of complex, simultaneous and ongoing changes with particular reference to use of information and communication technologies. Sub-questions examined how organisational interaction and collegial and professional interactions influenced their ability to innovate and sustain innovation in practice. These questions led Reynolds to look at schools as professional learning communities. Citing Senge (1990, p. 308), Reynolds identified the importance of PLCs to schools in a complex knowledge society. However, she found that research suggests that they are "difficult to establish in secondary schools because of hierarchical administration and the strong subject-based structure that counters collaboration" (Giles & Hargreaves, 2006, p. 127, in Reynolds, 2009, p. 212). From the interviews with the research participants Reynolds identified conditions which hinder teachers' optimal use of learning communities. The enablers necessary for PLC functioning and effectiveness for teacher learning were not sufficiently present and there were many inhibiting factors,

not least being the multiple mandated changes arising from the South African curriculum changes. Reynolds identified the potential for PLCs to develop teachers' professional knowledge but significant changes in the culture, including leadership structures, and working conditions of South African teachers would be required.

Brodie (2013) also identifies some of the enabling conditions of the DIPIP PLCs, such as "immense planning on the part of the project team, immense skill and expertise on the part of the facilitators and tremendous commitment from the schools and teachers" (p. 15) which would make it difficult to scale up such a project to meet the aims of the ISPFTED.

Reynolds and Brodie both recognise criteria for the effectiveness of PLCs which are related to organisational functioning. In my study I examine factors that enable or inhibit PLC functioning and effectiveness such as school conditions and facilitation in order to investigate how school culture and teacher characteristics impact on teachers' participation and learning in PLCs. One of the aims is to identify the functions facilitators are expected to perform and whether a school-based teacher can facilitate PLC work and, if so, what personal qualities, knowledge and skills he or she would need.

1.6 CONCLUSION

PLCs are potentially an effective vehicle for developing teachers' knowledge-for-teaching and they have been identified in national education policy as a means for deepening teachers' knowledge. Consequently their functioning in the South African context merits further investigation. A major difference between the PLCs in my case study and in DIPIP is the absence of teacher educator/university-based expertise or other sources of theoretical/ research-based knowledge to supplement the teachers' knowledge. The PLCs in my case study are similar to those envisaged in the ISPFTED, namely, groups of classroom teachers, some with more and some with less knowledge.

In the research literature there is limited information about what PLCs focus on, what and how knowledge is learned, what enabling factors are essential for PLC effectiveness, and what criteria are used for evaluating PLC effectiveness. The study has aimed to address this gap in the literature and also to identify the type of supportive

conditions that are needed to enable PLC functioning. It is anticipated that findings from the study could inform education department officials who are promoting the establishment of PLCs about what PLCs may be able to achieve and what is not likely to be achieved.

1.7 STRUCTURE OF THE DISSERTATION

Chapter One has provided a contextual background to the study, stated the research problem and aims, and outlined the rationale.

Chapter Two presents literature relevant to the study from which five conceptual claims, which provide the framework for the study, are derived. I discuss the following: the centrality of teachers and instruction to quality improvement and accountability; effective teacher professional development for teacher learning; professional learning communities (and networked learning communities), including the factors that enable their functioning; and how knowledge-for-teaching is learned.

Chapter Three provides the framework for the analysis and discussion of what knowledge-for-teaching the three PLCs focused on.

Chapter Four describes the research design of this study. It restates its purpose; identifies the research questions; and explains the design and methodology of the case study, detailing how the sample was selected, the data gathered, analysed and interpreted and reliability and validity issues handled. It provides background information on the schools at which the participants in the study teach.

Chapter Five, the first data presentation chapter, describes the three networked subject-based PLCs that are the focus of this case study, and contextual factors affecting them. The description includes factors existing in schools that have the potential to enable or inhibit PLC effectiveness and teacher learning. The role played by formal school leaders is examined together with the culture, structures and contexts of the participating schools, and the characteristics of the teachers and their understanding of the PLC TPD model.

Chapter Six, the second data presentation chapter, describes facilitation/leadership as a key enabling factor for PLC functioning and teachers' learning in PLCs. It examines

how the facilitators performed their functions and met the expectations of their role. I describe each facilitator's approach and style.

In Chapter Seven, the third data presentation chapter, I describe what areas of knowledge-for-teaching participants in the PLCs chose to focus on and what influenced their choice of focus.

The final data presentation chapter, Chapter Eight, describes more specifically the types and domains of knowledge that the teachers focused on and how they handled the focus on knowledge and learning, including the processes they used. This is followed with a comparison of the knowledge learning characteristics of the PLCs and a general comparison of the PLCs.

Chapter Nine presents an analysis and interpretation of the findings presented in chapters 4 to 7. Six claims identified in relation to the claims in the literature are discussed. Factors enabling/inhibiting learning in PLCs and the focus on what knowledge is learned is foregrounded.

Chapter Ten identifies implications for practice and policy related to TPD in PLCs, and in recognition of the limitations of this study, suggestions for further research are proposed.

Although not commonly done, the Appendix is organised in chapters and, for example, the appendices related to chapter 5 findings are presented in Chapter 5 Appendices. I also use a number of abbreviations, particularly in chapter 8. I have included these abbreviations in the Abbreviations List.

CHAPTER 2 LITERATURE REVIEW

2.1 INTRODUCTION

This study investigates whether professional learning communities (PLCs) can be a vehicle for teachers' in-service learning of knowledge-for-teaching that could lead to changes in teachers' knowledge and instructional practices. I begin this literature review with arguments about the centrality of teachers and of instructional practice to improvement in the quality of learner achievement. I follow this with a brief review of international researchers' claims concerning the features of effective TPD models and a brief overview of claims from TPD research in South Africa. I then provide research findings on PLCs, their characteristics, benefits, enabling conditions, and criteria for judging their effectiveness. I mention some cautions about expecting too much of PLCs and discuss briefly how cultural practices may have an impact on PLC implementation. Finally I address the first issue related to learning in PLCs, namely HOW knowledge is learned. I discuss processes for learning knowledge-for-teaching in PLCs suggested in the PLC literature and criteria for evaluating this learning. In chapter 3 I focus on the second issue related to learning in PLCs, namely: WHAT knowledge is learned in PLCs.

2.2 THE CENTRALITY OF TEACHERS AND INSTRUCTION TO QUALITY LEARNING

Fullan (2001) states that: "[E]ducational change[17] depends on what teachers do and think – it's as simple and complex as that" (p. 115). (For similar claims see also Fullan & Hargreaves, 1992; Fullan, 1993; Carnoy, 1999; Goodson, Moore & Hargreaves, 2006; Hargreaves & Goodson, 2006; and others.)

2.2.1 Teachers as the key agents for improvement in learner achievement

In a previous research project (Cereseto, 2009) I investigated how teachers experience their professionalism in the current regulatory context and what form of control (accountability) they believed would improve the quality of learning outcomes. This led me to investigate a teacher-centred model of quality improvement.

[17] Change" in the discussion in this section implies change that leads to improved quality of learning and learner achievement.

As early as 1966, the Coleman Report identified teachers' characteristics as the most influential factor on learners achieving results better than those expected for their social class (Mayeske, 1973). Writing in 1984, Hawley and Rosenholtz reached the conclusion that:

> In virtually every instance in which researchers have examined the factors that account for student performance, teachers prove to have a greater impact than program. This is true for average students and exceptional students, for normal classrooms and special classrooms. (p. 3)

Darling-Hammond (1997) argues that reforms that do not focus on teacher quality will not succeed in achieving quality improvement:

> ... what the evidence here suggests most strongly is that teacher quality matters and should be a major focus of efforts to upgrade the quality of schooling. Skilled teachers are the most critical of all schooling inputs. (Ferguson, 1991, p. 490, in Darling-Hammond, 1997, p. 272)

Researchers identify several factors concerning teacher quality that need to be given attention. Elmore (2002a) argues that accomplishing improvements in learning quality means changing teachers' knowledge of content and how to teach it. "Capacity" is identified as a critical factor in many school improvement studies (Darling-Hammond, 1997; Elmore, 2002a, 2002b, 2003; Fuhrman, 2003). Calhoun and Joyce (1998) refer to capacity as "internalised professionalism" and Cohen (1995) describes it as "internal regulatory systems ... by which professionals discriminate good, bad and mediocre work and hold themselves accountable" (p. 15). Cohen and Ball (1999) relate capacity to what is necessary for instructional change. For them "instructional capacity" is specific and is concerned with three elements of instruction: teachers, students and the materials (p. 27). In their view, teacher learning must include improving their knowledge of content and the best instructional method associated with that content.

Christie, Butler and Potterton (2007), writing in the South African context, hold a similar view:

> Student achievement does not stem from management, governance and leadership, crucial as these are. It stems from the smallest unit in the system, from the hard-to-reach core practices of classroom activities, from the quality of learning in interactions between teachers, learners and materials. And in this teachers play a crucial role. (p. 107)

The McKinsey and Company study on "How the world's best-performing school systems come out on top" (Barber & Mourshead, 2007) states conclusively: "The quality of an education system cannot exceed the quality of its teachers" (p. 14). The quality of teachers matters.

Cohen and Ball (1999), Elmore (2002a) and Christie et al. (2007) draw attention to the necessity of TPD focusing on teachers' knowledge of content and knowledge of instructional method. I refer to this knowledge as knowledge-for-teaching. In my study I focus particularly on what knowledge-for-teaching teachers focus their learning on in PLCs, the processes they use to do this, and the factors that enable or inhibit learning in PLCs.

2.3 TEACHER PROFESSIONAL DEVELOPMENT (TPD) FOR TEACHER LEARNING

In Section 2.2 above I discussed briefly the centrality of teachers, specifically their instructional capacity, for quality improvement. In this section I identify characteristics of effective TPD and identify briefly criteria used to evaluate TPD effectiveness. I conclude with cautions related to new models of TPD. I use the term TPD as it is broadly defined by Day (1999):

> Professional development consists of all natural learning experiences and those conscious and planned activities which are intended to be of direct or indirect benefit to the individual, group or school and which contribute, through these, to the quality of education in the classroom. It is the process by which, alone and with others, teachers review, renew and extend their commitment as change agents to the moral purposes of teaching; and by which they acquire and develop critically the knowledge, skills and emotional intelligence essential to good professional thinking, planning and practice with children, young people and colleagues through each phase of their teaching lives. (p. 4)

Broadly speaking, the purposes of professional development are to enhance teachers' knowledge, skills, and dispositions so that they can do their "intricate work" well (Ball & Forzani, 2009), including developing "higher order thinking and performance" (Darling-Hammond & Richardson, 2009, p. 46), and this entails thorough knowledge of the subject content and the "pedagogical skills to teach specific kinds of content" (Blank et al., 2007, in Darling-Hammond & Richardson, 2009, p. 47). Wei et al. (2009) view TPD as an investment in teacher learning which they argue is a "major engine for

academic success" (p. 28). Morrow (2007) argues that increasing teachers' knowledge leads to "improved competence in the professional practice of teaching" (p. 88).

2.3.1 Characteristics of effective TPD

Despite the ambitious vision for TPD and considerable financial and human investment in TPD programmes internationally and in South Africa, to date the evidence for any forms of teacher development being causally connected to improved learner achievement is not strong[18] (Yoon, Duncan, Lee, Scarloss & Shapley, 2007; Guskey & Yoon, 2009, p. 496).

Effective TPD has to address the deficiencies of programmes which according to Borko (2004) are often "fragmented, intellectually superficial, and do not take into account what we know about how teachers learn (Putnam & Borko, 1997; Ball & Cohen, 1999)" (p. 3). South Africa is in the same situation now as the USA was when Sykes, writing in 1996, identified the inadequate provision of TPD as "the most serious unsolved problem for policy and practice in American education today" (in Borko, 2004, p. 3).

Writing more recently, City, Elmore, Fiarman and Teitel (2011) voice similar criticism and suggest that focusing TPD directly on teachers in their specific classrooms, what they term the "core", would be more effective:

> Professional development works, if it works at all, by influencing what teachers *do*, not by influencing what they think they ought to do, or what the professional developers think teachers ought to do. The quality and impact of professional development depends on what teachers are being asked to learn, how they are learning it, and whether they can make the practices they are being asked to try work in their classrooms. (italics in the original) (p. 24)

Poor evidence of TPD impact on improvement outcomes has prompted research into TPD programmes and resulted in researchers identifying generally agreed characteristics of TPD that were likely to be more effective for teacher learning and change of practice, student learning and achievement, and general school improvement (termed "high quality professional development" by Garet et al., 2001, p. 917).

[18] Only 9 (all were in elementary schools, none at other levels) of 1343 studies in the period 1986-2003 analysed according to standards set by What Works Clearinghouse (the arm of the US Department of Education that provides scientific evidence about what works in education) could provide evidence of TPD having an effect on student achievement. No studies between 2003 and 2006 met the standards (Yoon et al., 2007).

I describe these characteristics in terms of *organisational features* (how the TPD is offered; the context set for TPD activities) and *content focus features* (what the TPD focuses on; the processes during TPD).[19]

While different writers use different terms for them, the four *organisational features* I identify are: programme design, programme duration, form of participation, and school culture.

1. Key to effectiveness is the *design* of the programme. Researchers argue that TPD is likely to be more effective if it takes less traditional *forms*, namely, "reform" types, such as coaching, mentoring, study groups, and PLCs. These forms are believed to be effective because they do not depend on outside experts delivering a "workshop" with predetermined structure, content and outcomes, often unrelated to teachers' daily practice and needs, at a scheduled time, and off-site (Loucks-Horsley, Hewson, Love & Stiles, 1998; Garet et al., 2001, p. 920; Lassonde & Israel, 2010). These new forms of TPD take note of how teachers learn, engaging teachers in active learning by including opportunities to practise new learning and make provision for feedback and on-going support over a sustained period of time, often in, or related to, the context of the individual teacher's classroom or school. They aim to transform teaching and not merely layer new strategies on top of old ones (Snow-Renner & Lauer, 2005). They also recognise that the learning process is slow and some practices are easier to change than others and some teachers take longer than others to change (Hargreaves & Fullan, 1992; Little, 1993; Darling-Hammond, 1995, 1996; Ball, 1996; Loucks-Horsley et al., 1998; Garet et al., 2001; Borko, 2004; Wei, Andree, and Darling-Hammond, 2008). Teachers are actively involved in deciding what and how they learn (Day, 1999, p. 2).
2. As indicated above, the *duration* of TPD has an impact on effectiveness. Effective TPD aimed at changing teachers' instructional practices takes time and needs to be: "sustained, coherent and intense" (Cohen & Hill, 2001). One-shot

[19] Garet et al. (2001) identified "structural features" comprising: "form", "collective participation", and "duration" (aligned in my classification with organisational features) and "core" features comprising: "focus on content knowledge", "opportunities for active learning", and "coherence" with other learning activities (I identify "focus on content knowledge" under content focus factors, "active learning" is included in the "design" and "content focus factors" and "coherence" is included content focus factors).

workshops without ongoing support are likely to be ineffective. Rather, there needs to be "a long-term, clear and defensible focus" (Brodie & Shalem, 2011) sustained over time (Darling-Hammond & Richardson, 2009). See Figure 2.1 below.

3. Research also indicates that TPD that is *collaborative* and *collegial* (Darling-Hammond & Richardson, 2009; Wei et al., 2009) and structured on *collective participation* is more effective than other TPD programmes as it encourages professional dialogue amongst participants as they work on issues jointly and share information about learners they have in common (Garet et al., 2001, pp. 922, 923). It is participant-driven, with teachers collaboratively sharing their knowledge, and grounded in enquiry, reflection and experimentation connected to and derived from teachers' daily practice (Darling-Hammond & McLaughlin, 1995, pp. 597-604). Teachers communicate with other teachers engaged in similar professional work, sharing solutions and ideas that promote improvement in outcomes for learners (Garet et al., 2001, pp. 927-928; Liebermann & McLaughlin, 1992). Effective TPD requires changes in ways of learning and doing things. Joyce and Showers (1995) point out the need to reflect with others in order to make changes:

> Without companionship, help in reflecting on practice, and instruction on fresh teaching strategies, most people can make very few changes in their behaviour, however well-intentioned they are. (p. 6; cited by Hawley & Valli, in Darling-Hammond & Sykes, 1999, p. 131)

Collaboration and collective participation promote joint accountability which in turn promotes the likelihood of changes in practices being sustained and more broadly implemented (Newmann & Associates, 1996). Hargreaves (1994) describes this effect:

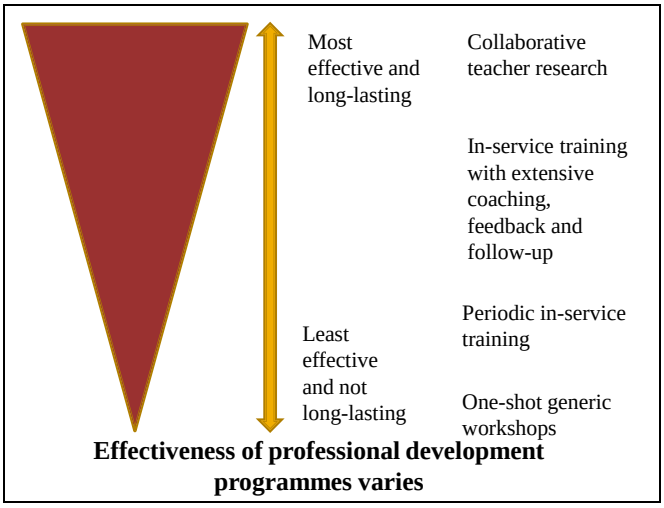
> … collaborative cultures can extend into joint work, mutual observation, and focused reflective inquiry in ways that extend practice critically, searching for better alternatives in the continuous quest for improvement. In these cases collaborative cultures are not cosy, complacent and politically quiescent. (p. 195)

4. The prevailing *school culture and conditions* exert an influence on the likelihood of TPD being effective. In particular, a high level of organisational capacity

(King & Newmann, 2000; Elmore 2002a) that is supportive of teacher learning by, for example, designating adequate time in the school day for TPD work (Yoon et al., 2007; Wei et al., 2009), and supporting networks within which teachers can practise their learning (Little, 1990; Ball & Cohen, 1999; Darling-Hammond & Richardson, 2009) enables learning. In such a culture teachers are enabled to willingly take ownership of and participate in learning processes that expose their practices, to reflect honestly, and be open to critique and challenge (Borko, 2004; Katz et al., 2009). High levels of trust, respect, and caring are needed to achieve this type of participation (Elmore & Burney, 1997; Knight, 2009, p. 513).

The diagram from Lassonde and Israel (2010) reproduced below emphasises the points made by the writers referred to above. In Lassonde and Israel's view the most effective and long-lasting TPD is collaborative teacher research.

Figure 2.1 Effective teacher professional development (Re-drawn from Lassonde & Israel, 2010, p. 8)[20]



From the findings of a number of researchers, I identify three *content focus features* characteristic of effective TPD: content of TPD, processes for handling the content, and coherence.

[20] I have modified the original by capitalising only the first word in each description, using South African English spelling and not including the Figure number that was used in the original.

1. Elmore (2002b) and others assert that the purpose and focus of TPD must be on improving student learning by improving instructional practice (Elmore & Burney, 1997). The *content* of effective TPD, therefore, focuses on the "concrete tasks of teaching, assessment, observation, and reflection that illuminate the processes of learning and development" (Darling-Hammond & McLaughlin, 1995, pp. 597-604); developing teachers' subject knowledge so that it is rich and flexible in order for them to foster learners' conceptual understanding; and on instructional practices that enable this learning (Borko, 2004, p. 6). Another content focus that is believed to have had a positive effect on learner outcomes is knowledge of how learners think about concepts and how they learn them (Corcoran, 1995; Borko, 2004, p. 6). Effective TPD content focuses on helping teachers develop and deepen specific subject matter knowledge and content-specific pedagogy, rather than general pedagogy (Kennedy, 1998; Birman, Desimone, Porter & Garet, 2000; Ball, Thames & Phelps, 2008).
2. Research indicates that TPD that uses *processes* that engage teachers in *active learning* is more likely to have an impact on their understandings and practices, for example, planning lessons, discussing teaching methods and materials with others; analysing samples of learners' work; and presenting one's work to others (Liebermann and Grolnick, 1996; Darling-Hammond, 1997; Loucks-Horsley et al., 1998; Birman et al., 2000; Liebermann & Wood, 2002); observing and being observed and "practising in simulated conditions" (Birman et al., 2000). Through sharing of knowledge, professional dialogue, systematic reflection, and action research, tacit knowledge is explored, thus unearthing knowledge-for-teaching (Lieberman & Pointer-Mace, 2010).
3. Effective TPD is *coherent*. This is so when the TPD activities build on what teachers have learned previously and align with teachers' own development goals and needs as well as requirements of national policy, such as curriculum and assessment policy. The programme itself has internal *coherence* (Cohen & Hill, 2001) and is *coherently integrated* into the broader school (district etc.) curriculum, standards (Garet et al., 2001), or improvement plan with clear and sustained learning goals (Darling-Hammond & Richardson, 2009).

PLCs that incorporate the organisational and content focus factors described above are likely to be effective. Literature on exactly what knowledge teachers learn in PLCs is explored in greater detail in chapter 3.

2.3.2 Criteria for judging the effectiveness of TPD

There are two main criteria generally used to judge the effectiveness of TPD, namely the impact on teachers and the resultant impact on learners. Where the *organisational features* of effective TPD are evident teachers' learning of the content is enabled and Easton (2008) notes that teachers' morale also improves and they become internally motivated. Where the *content* focus of the TPD is on the actual tasks of teachers' daily work TPD is more likely to be effective in bringing about changes in teachers' instructional practice, with teachers having new, richer and deeper knowledge, skills, and behaviours leading them to act in new ways that can be observed in the classroom (Elmore & Burney, 1997; Elmore, 2001; Garet et al., 2001; Easton 2008). Professional learning, in the opinion of Easton (2008), should be judged not on how good teachers feel afterwards but on results in the form of expanded knowledge-for-teaching, including changes in how they work, what they know, believe, and can actually do; by whether they are motivated to change practices and apply knowledge and skills consistently; by change in student conduct in the classroom; and improved achievement (pp. 758-759).

> Developing is not enough. Educators must be knowledgeable and wise. They must know enough in order to change. They must change in order to get different results. They must become learners, and they must be *self*-developing. (italics in the original) (p. 755)

As a result of teachers' new practices, learners do different things in the classroom which may improve their ability to learn from the teacher and consequently achieve better results (Katz et al., 2009; City et al., 2011). There is thus the likelihood of TPD having a positive impact on learners.

However, Welch (2012) cautions that too great a focus on TPD's impact on learner achievement can hinder the TPD innovation. She suggests, without making specific proposals, that other criteria for judging effectiveness of TPD could be explored.

2.3.3 Cautions relating to new forms of professional development

While characteristics of effective TPD and criteria for evaluating the effectiveness of TPD have been identified, care must still be taken to avoid TPD activities that appear to have the characteristics described above (for example, enquiry groups) becoming discussion groups and emotional support groups that are implemented superficially and have no impact on teacher or learner learning (Fullan, 2006). Huberman (1995), generally not a proponent of collegial networks, acknowledges their potential provided that the challenge of the "tinkerer", "instructional handyman" or "bricoleur" habits and dispositions of teachers are addressed (p. 196). Teachers have to be prepared to effect deep, meaningful, purposeful and ongoing changes in their practices and not just make slight adjustments or adopt new practices for a short while. Thompson and Zeuli (1999), citing Ball (1995), advise that critical attention be given to the "substantive content and pedagogy" of the TPD offerings so that teachers' practice is changed in a meaningful way.

In the next section I discuss PLCs, a "reform" model of TPD, the design of which embodies the characteristics of effective TPD. I review research that examines teacher learning through PLC activities and factors that enable or inhibit their functioning, and show how PLCs can avoid becoming superficial discussion groups.

2.4 PROFESSIONAL LEARNING COMMUNITIES (PLCs)

I begin by identifying the conceptual origins of PLCs and providing a definition of them. I show that PLCs demonstrate most of the organisational and content focus factors of effective TPD. I then examine research findings on PLC characteristics and conditions that enable or inhibit their functioning. I present criteria for evaluating PLCs' effectiveness and identify cautions that have been voiced, identify the impact that national culture could have on the implementation of PLCs and conclude this section by reiterating the grounds for proposing PLCs as a model for TPD.

2.4.1 Conceptual origins of professional learning communities

PLCs have their roots in the ideas in Senge's *The Fifth Discipline: The Art and Practice of the Learning Organization* (1990) where he states that "The organizations that will truly excel in the future will be the organizations that discover how to tap people's

commitment and capacity to learn at *all* levels in an organization" (italics in the original) (p. 4). He describes what it is like to be part of a learning team:

> Most of us have at one time or another been part of a great "team", a group of people who functioned together in an extraordinary way – who trusted one another, who complemented each other's strengths and compensated for each other's limitations, who had common goals that were larger than individual goals, and who produced extraordinary results. ... What they experienced was a learning organization. The team that became great didn't start off great – it *learned* how to produce extraordinary results (italics in the original). (p. 4)

Senge's vision of a learning organisation is of an organisation learning continuously by using information to change actions in order to improve results. This is done by asking questions like "Why are we doing this?" and "Why are we doing this, this way?" He saw organisations developing the skills to examine their performance and identify factors that were helpful and those that were damaging. Each person in the organisation would strive for "personal mastery" and share his or her knowledge or expertise with colleagues. This would result in each person being personally responsible and accountable for the work he or she does. People would work in teams and celebrate the contributions of teammates (Mundry & Stiles, 2009, pp. 7, 8).

The ideas of Wenger and others concerning communities of practice (COPs) (Lave & Wenger, 1991; Wenger, 1998; Wenger, McDermott & Snyder, 2002) have also influenced research on PLCs. Wenger suggests that through the work they do together members of COPs develop a sense of joint enterprise and identity and, in addition to forming relationships, they also develop a shared repertoire of ideas, commitment, memories and praxis (the ways of doing things in the COPs: for example, styles of conduct, discourse specific to the COP, manner and tools of practice). COPs enable members to do more difficult things by working cooperatively.

2.4.2 What is a professional learning community?

There is no single agreed definition of what a PLC is but there is broad agreement that in education it is:

> ... an inclusive and mutually supportive group of people with a collaborative, reflective and growth-oriented approach towards investigating and learning

> more about their practice in order to improve pupils' learning. (Stoll, 2011, p. 104)

To enable further understanding Stoll (2011) analyses the three words: "professional", "learning" and "community" that make up the term. She begins with "community". In her opinion a PLC focuses on learning within a collaborative community and therefore involves participants in sharing beliefs and understandings, participating and interacting, allowing for minority views, developing relationships, and being interdependent. She refers to Watkins's (2005) ABCD: "Active participants", "Belonging has developed, Collaboration is frequent and Diversity is embraced" (2011, p. 104).

The focus on the word "learning" stresses learning as the objective: both collaborative and collective learning aimed at improving learner learning:

> But collaborative learning … including peer observation, coaching collaborative forms of research and inquiry and learning conversations – reinforces how learning within professional learning communities is not a solitary experience. Collective learning is different. It involves working together; it is a joint process of generating new and common understandings and creating knowledge of value and use to all involved. (2011, p. 104)

The word "professional" foregrounds reliance on a specialised knowledge base, is client-oriented, permits autonomy within collegial control of standards and practice, and is engaged in by the adults for their learning and professional development (2011, pp. 104, 105).

The definition of a PLC that DuFour and Eaker (2006) offer also focuses on collective learning that is aimed at improving learners' learning:

> … educators committed to working collaboratively in ongoing processes of collective inquiry and action research to achieve better results for the students they serve. Professional learning communities operate under the assumption that the key to improved learning for students is continuous, job-embedded learning for educators. (p. 14)

According to these writers PLCs have a "collaborative culture with a focus on learning" where members work interdependently towards correctly identified common goals and hold one another mutually accountable for the impact of their professional practice on learner learning.

2.4.3 Characteristics of functioning PLCs

I discuss the six common characteristics of functioning PLCs identified by Stoll (2011, pp. 105, 106): collaboration, collective responsibility, promotion of group, as well as individual learning, trusting relationships, shared values and vision, and reflective professional enquiry, using the organisational and content focus factors classification. These characteristics relate to those of effective TPD in general but have a specific manifestation in PLCs.

Functioning PLCs exhibit the following *organisational factors*:

1. *Collaboration* is a key feature of functioning PLCs. It entails members working interdependently to achieve a joint goal, doing more than offering superficial assistance and support, and attaining more than would be achieved if members worked on their own. While conflict and disagreement may arise, tension giving rise to debate is viewed as an essential part of the process (Stoll, 2011, p. 106). Diversity of opinion is valued because it "brings a richer perspective to collaborative challenges 'stretching the professional repertoire beyond usual, habitual, or comfortable practice' (Mitchell & Sackney, 2007, p. 33; in Stoll, 2011, p. 106). Katz & Earl (2010) describe collaboration as "intensive interaction that engages educators in opening up their beliefs and practices to investigation and debate" (p. 30). Little (1990) describes four levels at which teachers work starting with the less intense and more informal and independent "*story telling and scanning for ideas*", moving to "*aid and assistance*", often interpreted as a plea for help without unwarranted interference. Then comes "*sharing*" where there is free sharing of ideas and aspects of work but usually excludes curriculum, learning and instruction matters. The final level is "*joint work*" which is the type of collaboration required in effective PLCs. It entails:

   > … encounters among teachers that rest on shared responsibility for the work of teaching (interdependence), with their motivation to participate grounded in needing each other's contributions in order to succeed in their own work and a confidence in the others' competence and commitment. (p. 10, in Katz & Earl, 2010, p. 31)

2. Members of a functional PLC take c*ollective responsibility* for their learners' learning and the learning of fellow members. This quality promotes commitment and accountability, ensuring that everyone contributes (Stoll, 2011, p. 106).

McLaughlin and Talbert (2010) agree that members of a PLC do "joint work together" and "have norms of collaboration and mutual accountability" arising from members' "internal sense of professional responsibility":

> … a group of individuals who share a goal, assess their progress, make corrections, and hold themselves accountable for achieving their common goal. (p 35)

3. *Group as well as individual learning is promoted* (Stoll, 2011, p. 106). Unlike more traditional forms of TPD, teachers in PLCs learn along with their colleagues. They talk about information and data, interpret it together and then share it. They learn as individuals and share this learning with others and in turn they learn from others' learning. Their learning is communal rather than solitary such as in the "learning enriched" schools described by Rosenholtz (1989).
4. *Trusting relationships* are evident in functional PLCs. Members respect their colleagues, trust their competence, believe they have integrity and will do as they say, and care about one another (Stoll, 2011, p. 106). There is "relational trust" (Bryk & Schneider, 2002). It is the key condition of productive relationships but, provided there is a sufficient minimum level, trust can be built as members work together. It is robust trust that allows for differences of opinion while still collaborating (Lieberman & Grolnick, 1996, in Katz & Earl, 2010, p. 30).

The *content focus factors* evident in functioning PLCs include:

1. The PLC has a *clear sense of purpose focused on learning* (Stoll, 2011, pp. 105-106) that constitutes the PLC's s*hared values and vision*. Hord (1997b) believes that for a PLC to be effective the entire staff needs to be involved in developing the vision[21] ("a mental image of what is important") which must have as a core characteristic a focus on learners' learning. Katz & Earl (2010) assert that the focus should be "compelling and high-leverage" and be sufficiently challenging for teachers to rethink their beliefs and practices resulting in their unlearning and changing existing practices (p. 29). The PLC work includes working out what the high-leverage interventions or responses are that participants should make as

[21] Although the PLCs in this study are not school-based but subject-based, the principle that all participants in the PLC should be involved in developing the PLC's vision is applicable.

a team or as a school to address a learning gap among struggling learners (McLaughlin & Talbert, 2010, pp. 35-38). Timperley and Robinson (2003) believe that to have direct impact a PLC needs to focus on learning in ways that are concrete and useful.

2. PLC members engage in *reflective professional enquiry,* conversations about issues of their practice to which members apply new knowledge to solve problems jointly (Stoll, 2011, p. 106), termed "professional learning conversations by Earl & Timperley (2008). Louis and Kruse (1995) call this "reflective dialogue" in which teachers talk about their learners' learning, the processes of teaching and learning, and they identify issues for further inquiry and problem-solving (in Hord, 1997b, p. 3). Katz & Earl (2010) refer to this reflective quality as an "enquiry habit of mind" which is a habit of using enquiry and reflection to question a problem of practice, seek solutions and evaluate their success:

> The enquiry process comprising questioning, reflecting, seeking alternatives, and weighing consequences promotes the "transparency" of what otherwise might remain unobservable facets of practice, making tacit knowledge visible and open to scrutiny. (Earl & Katz, 2002; Little, 2005, in Katz & Earl, 2010, p. 31)

2.4.4 Factors that enable PLC functioning

A definite focus on learning as an enabler has been discussed above. In this section I discuss effective facilitation; teachers' characteristics that support the work of PLCs; and supportive school conditions.

2.4.4.1 Effective facilitation

Effective facilitation is considered the strongest enabler specific to PLCs. High quality facilitation appears to be the key to effective functioning and sustainability of PLCs and the learning that results. It is therefore important to investigate the facilitator's role. What a PLC facilitator is required to accomplish is different from what the presenter of other models of TPD is required to do.

As the "formal leader" of the PLC the facilitator has the responsibility, at least initially until there is sufficient group momentum, to encourage and motivate participants. This is

made easier if the facilitator assists the group to identify its content focus and then sets and monitors the agenda. The facilitator shares leadership, with informal leaders such as those who provide instructional leadership in the form of exemplary teaching, knowledge of theory and research, or other necessary skills such as an understanding of how to reflect or do learning enquiries (Katz et al., 2009, pp. 52, 61).

The precise responsibilities of the PLC facilitator may vary from one PLC to another but broadly they deal with *organisational, motivational and professional strategies* (Lassonde & Israel, 2010, p. 90) or structural, process, purpose and agency issues (Hadfield & Chapman, 2009, p. 132) necessary for the implementation of the *organisational* and *content focus factor*s of effective TPD.

The facilitator is expected to enable PLCs to function effectively for teacher learning. To accomplish this, the facilitator performs *organisational, motivational and professional functions.* With reference to *organisational* factors of effective TPD, the facilitator is expected to build and communicate a shared vision focused on learning, build the organisational structure to support the PLC work, take care of the practical and logistical issues, such as arranging the venue, materials, and programme, and developing, sharing or distributing leadership. Thereafter he/she is responsible for establishing norms for participation and maintaining the participation of PLC members in a skilful way to achieve maximum learning:

> Participation is at the core of what makes a network[22] different from other organisational or process forms. Who participates (issues around power, and resources), how they participate (issues about relationships, co-ordination, facilitation, governance) why they participate (issues around vision, values, learning goals, needs, benefits, motivation, commitment), and for how long (issues around sustainability). (Church et al., 2002, p. 14, in Hadfield & Chapman, 2009, p. 17)

The facilitator, exercising *motivational* strategies, is required to create a team environment that is safe and supportive even in times of conflict and disagreement (Chappuis, Chappuis & Stiggins, 2009). This implies that PLC members are willing and able to consider, respect, value and appreciate the diverse opinions, ideas and beliefs of others and members may speak openly and freely without fear of being attacked, ridiculed or losing

[22] In this section what is said about networks is deemed applicable to PLCs.

status as a result of what they say. Judgment is suspended and all ideas are deemed worth considering. When trust levels are high there is a cooperative spirit of openness, sharing, acceptance and support (Wald & Castleberry, 2000, p. 62). To gain trust entails dealing with tensions, alliances, factions; inevitable competing agendas; the "illusion of consensus"; and "pseudo-community" (Grossman, Wineburg & Woolworth, 2001).

The facilitator is expected to develop collaboration directed towards reflective enquiry focused on learning, build teachers' capacity, and provide support for them in the learning process. This entails the exercise of *professional* strategies. The facilitator must maintain the focus on learning and its transfer to the classroom by, for example, asking members whether they have tried out new strategies in the classroom and how these are working. Through active participation in the learning process, including, collaborative activities, teachers are likely to learn skills of analysis and reflection which enrich their knowledge base and enable them to perform at a higher professional level. Facilitators help teachers to track their growth and its impact on learners by, for example, looking at artefacts from the classroom. Facilitators take on the role of "advanced learner" and their duties include: "doing the reading and activities in advance of meetings so they can help steer team members through unfamiliar or complex concepts" (Chappuis et al., 2009, p. 58). The facilitator is a learning leader rather than the subject leader. His/her task is to enable the participants to become more competent, more independent, and more skilled as practitioners. The facilitator is a builder of bridges, scaffolding learning for participants so that they move from what they already understand to new insights:

> This bridging occurs in the 'zone of proximal development' (Vygotsky, 1978) – the mental distance between a person's current problem solving ability and the ability the person can achieve if coached and supported by a more skilled individual. (Colton & Sparks-Langer, 1992, p. 158, in Langer et al., 2003, p. 131)

The facilitator is required to move teachers "away from merely polite interactions to the kind of thinking, problem-posing, and problem solving" (Lambert et al., 1995) that is required in collaborative enquiry, in other words, guiding participation to "authentic talk about real work" (p. 93, in Langer et al., 2003, p. 128). This is not an easy task because teachers do not commonly engage in "sustained authentic talk" about the actual work they do. The facilitator needs to pay close attention to what is said, responding in a way that enables participants to explore the thinking further and deeper. A skilled facilitator helps

members see assumptions and probe their validity and skilfully pushes the participants to take risks and try new ideas and throughout the process checks for understanding (Hadfield & Chapman, 2009, p. 133). The facilitator is not expected to give answers but to paraphrase, probe, clarify, help deepen the participants' understanding, and guide the group to seek outside expertise when necessary (2009, pp. 129-131).

Facilitators require knowledge and skills to deal with the inhibitors of effective learning in PLCs such as: consensus locking, power seeking, recognition seeking, lack of support from formal leadership, clowning around, apathy or lack of commitment, negativity in statements such as, "Yes but … we tried that", the existence of "sacred cows" (untouchable issues or practices), denial of issues, and fear of the "elephant in the room" (sensitive topics that cannot be talked about) (Johnson, undated PowerPoint).

Oehrtman, Carlson and Vasquez (2009) classify facilitation actions as *process behaviours* and *dispositional behaviours*. *Process behaviours* concern "productive engagement" (all members participating in exploring or clarifying an issue problematic to the PLC members); "effective use of conceptual resources" (participants contribute relevant ideas to build knowledge, recognising gaps in knowledge and seeking it from external sources); and "persistence and reflection" (participants stay involved in the discussions until solutions are found; they evaluate the quality of their solutions and reflect on the effectiveness of the methods used to reach the solutions). *Dispositional behaviours* include "speaking with meaning"/"conceptual orientation" (justifying responses by considering context and providing a rationale for their approach rather than giving a procedural explanation, for example, of Mathematics/Science concepts), "exhibiting intellectual integrity" (not pretending to understand when one does not, not agreeing when one has counter views, willingness to challenge ideas and be challenged); and "coherence" (participants look for connections among ideas, and generalise conclusions to other contexts) (pp. 96-98). Oehrtman also suggests "respecting the learning process of colleagues" and trying to understand the contributions of colleagues (p. 94).

Langer et al. (2003) explain that the style of facilitation may vary from directive when the facilitator teaches, models and provides feedback and is thus more dominant in the discussions, to non-directive when the facilitator listens and prompts and is less dominant in

discussions. A facilitator would use the former style when the members lack the necessary skills or knowledge but as the members become more "autonomous" the latter style might be used with comment reserved unless the group misses something significant or organisational matters need to be addressed (pp. 132, 133).

The *personal qualities* of facilitators are likely to influence how effective they are. Chapman et al. (2008) identify five network leadership intelligences which they use to describe the "complex mix of individual leadership skills and aptitudes, collective actions and group processes" that are necessary for leading a learning community. The facilitator may not display them all but participants with these desired intelligences should be given the opportunity to exercise informal leadership. The intelligences cover a range of technical and social skills: "management intelligence" (understanding the enabling structures, routines and coordination for facilitation to happen), "leadership intelligence" (how to build and shape the network and move it towards accomplishing its goals), "social intelligence" (understanding what members need and value, and what motivates them), "pragmatic intelligence" (understanding what can realistically be achieved in the network), and "contextual intelligence" (understanding what makes the network unique) (in Hadfield & Chapman, 2009, p. 76). Each of these intelligences requires knowledge, skills and particular personal qualities of facilitators, for example, "social intelligence" entails relationship building skills, communication skills, and other personal characteristics.

The need to develop facilitators who can create PLCs that are spaces for "genuine and rigorous inquiry into current practices and who can support teacher learning of both content and pedagogical content knowledge" has emerged as one of the findings of the DIPIP project (Brodie, 2014d, p. 1). In reports on this project, the crucial role of facilitation and expected facilitation outcomes are largely the same as those discussed above but Brodie (2014) adds enabling the PLC to be exposed to expertise and new knowledge to overcome the tendency to rework current and known explanations (p. 2). Brodie (2014c) in a Learning Brief presents "A model for continuous professional development of facilitators of professional learning communities" designed for training Mathematics PLC facilitators but generalisable to other PLCs. She proposes a comprehensive model for such training which includes learning about *process* and *dispositional behaviours* as well as specific appropriate

knowledge content (in this case Mathematics knowledge). Recognising the difficulties of the role, the model also provides ongoing support for facilitators as they carry out their responsibilities.

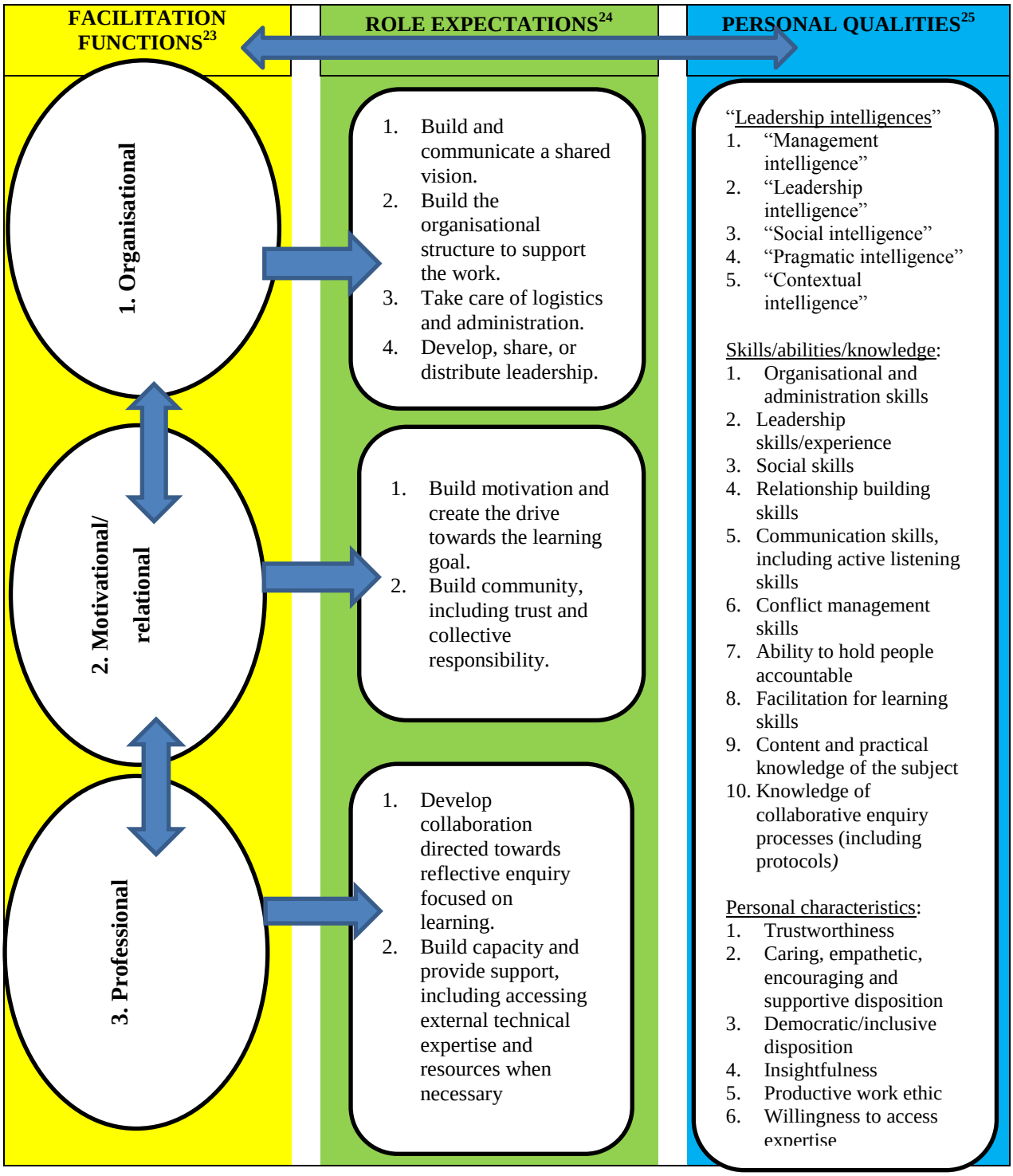
In summary, using a combination of *organisational, motivational and professional* strategies together with appropriate *personal qualities*, the facilitator is responsible for meeting the *organisational and content focus* requirements of TPD. To accomplish all this he/she may call in outside expertise and make use of structured enquiry processes which are discussed in 2.5.2.1. In this study I show how the facilitators performed their *organisational functions* of building and communicating a shared vision focused on learning, building the organisational structure to support this, taking care of logistics and administration and developing/sharing/distributing leadership; *motivational functions* of motivating participants towards the learning goal and building community, including trust and collective responsibility; and *professional functions* of developing collaboration directed towards reflective enquiry focused on learning and building capacity and providing support in order to achieve effective TPD for PLC participants. Using the factors discussed in this section I created a "Framework for effective facilitation" (Figure 2.2) in terms of which, in chapter 6, I describe how the facilitators in this study carried out their facilitation responsibilities.

2.4.4.2 Teachers' characteristics that support the work of PLCs

Certain personal qualities of teachers and their mindsets enable PLCs to have a significant impact on teachers' learning.

Firstly, PLCs work best when teachers participate voluntarily (Chappuis et al., 2009, p. 59). Volunteer teachers are willing to give up the extra time and show a commitment to professional development (Smith, Wilson & Corbett, 2009, p. 23). "Teacher community works most smoothly when teachers self-select into groups of like-minded colleagues" (Grossman & Wineburg, 2000, p. 47). Lieberman and Grolnick (1999) refer to Parker's (1977) general study on networks organised for school improvement which identified, amongst its five key ingredients, that the participation should be voluntary with equal treatment (p. 25, in Lieberman & Grolnick, 1999, p. 293). Parker also added that participants should have a strong sense of commitment to the project and feel they are part of something special (p. 7, in Lieberman & Grolnick, 1999, p. 293.)

Figure 2.2 Framework for Effective Facilitation of a PLC



[23] The facilitation functions are those suggested by Lassonde and Israel (2010) (see 2.4.4.1)
[24] The expectations used here are those described in the literature about facilitation in general, and in PLCs/NLCs in particular (see 2.4.4.1).
[25] Qualities include "Leadership intelligences" identified by Chapman (2006) (in Hadfield & Chapman, 2009) and other qualities inferred from the discussion of Oehrtman et al.'s (2009) classification of process and dispositional behaviours of facilitators. (see 2.4.4.1).

Secondly, McLaughlin and Talbert (2010) consider it necessary to have a minimum level of expertise and experience in the PLC. They suggest a ratio of about one out of three members should have strong instructional skills (p. 36). Without a critical mass of teachers with experience and skill a PLC does not have the knowledge resources to collaborate effectively so that learners can improve (p. 37).

Thirdly, PLC functioning is enabled when participants are open to their practices being scrutinised by peers, not for evaluative purposes but for sharing, learning, and improving and when they are comfortable receiving feedback and giving it, including debating, discussing and disagreeing with ideas proposed in the PLC (Hord, 1997a, pp. 23, 24).

Lastly, it is enabling when teachers have a mindset that believes in TPD and values continuous learning. These teachers see "teachers as learners" and gaining new knowledge and skills as a "professional obligation" (Chappuis et al., 2009, p. 57). They are willing to give up more time for PLC work than that required when attending workshops. They understand that a collaborative enquiry TPD model requires their collaboration and active participation (2009, pp. 57, 58), a high level of cognitive involvement (Kilpatrick, Barrett & Jones, 2003, p. 6), a willingness to build trusting relationships, a belief in the competence of colleagues, and care for other members (Stoll, 2011, p. 106).

2.4.4.3 Supportive school conditions[26]

TPD in general is enabled where there is a "supportive school culture and conditions" because, for example, the morale of teachers is likely to improve and they are more likely to be committed and internally motivated (as indicated in the criteria for evaluating TPD effectiveness) (Hord, 1997b; Easton, 2008). This section highlights supportive school conditions that are enabling specifically for PLC effectiveness, namely: school culture, formal school leadership, and resources.

i) School culture

PLCs are easier to establish and sustain when there is already a culture of trust, caring, co-operation and collegiality combined with intellectual curiosity and desire to learn

[26] Although the participants in the PLCs came from different schools and therefore from different school cultures and conditions, the enablers identified here are also applicable to their participation in a networked PLC.

(Smith et al., 2009, p. 23). PLC work is enabled where the school has a collaborative culture; is "learning-enriched" rather than "learning-impoverished" (Rosenholtz, 1989);[27] supports teacher learning in the interests of serving learners' needs; and is used to doing "joint work" in a "deprivatised" setting (Little, 1999, pp. 235, 254, 255).

ii) Formal school leadership

Hord (1997b) identifies s*upportive and shared leadership* as a feature of functioning PLCs. When school leaders provide the support that nurtures the required culture and have a collegial relationship with their staff, promote their professional development and share leadership, power and decision-making, PLCs are enabled. School leaders, suggests Carmichael (1993), give up their belief in their "omnicompetence" and along with the teachers become learners too: "… [There is] no longer a hierarchy of who knows more than someone else, but rather the need for everyone to contribute" (p. 393, in Hord, 1997b, p. 2). Such leaders/principals are described by Louis and Kruse (1995) as "post heroic leaders who do not view themselves as architects of school effectiveness" (p. 234, in Hord, 1997b, p. 2). In a PLC the source of authority is in "shared ideas" and not in the power of position (Sergiovanni, 1994b, p. 214, in Hord, 1997b, p. 2).

The formal school leader, usually the principal, is central to establishing and sustaining effective PLCs because he/she influences the tone and culture of the school and has the power to promote TPD in PLCs by providing the time and protecting it and obtaining necessary resources (Chappuis et al., 2009, p. 59). McLaughlin and Talbert (2007) observe:

> We've seen really vital professional learning communities just completely evaporate with the change of the principal, who didn't share the importance of collectivity. (p. 39)

The school leader is responsible for building trusting and caring relationships amongst teachers and learners and empowering staff, students, and parents to participate more fully and contribute expertise for the good of the school (Boyd & Hord, 1994, in Hord, 2010,

[27] In cases where individual teachers from different schools attend a networked PLC (NLC) this may not apply but they would be likely to develop the culture in the NLC if other participants came from schools with rich learning cultures.

pp. 1, 2).[28] Hargreaves (2007) suggests that for "stability and longevity" there needs to be high-quality senior leadership for five years and, citing Spillane (2006), "an outstanding and supportive school principal at the helm (p. 189).

iii) Resources

The most important structural supportive condition is having sufficient time for PLC work: "extended blocks of time during the school day are the most productive structure for learning communities worthy of their name" (Smith et al., 2009, p. 22). This view is supported by Chappuis et al. (2009) who emphasise that there must be time for all the learning activities, for example, time to learn, time to practise, and time to reflect.

New forms of technology may be used to help PLC activity, but it is not an absolute prerequisite. It can provide access to, for example, a larger community of learners, greater content expertise, examples of excellent instruction, and virtual libraries (Atkinson, Cate, O'Hair & Slater, 2009, p. 134).

2.4.5 Factors inhibiting the functioning of and learning in PLCs

If the factors discussed in 2.4.4.1 – 2.4.4.3 above are absent or only minimally present PLCs are unlikely to function effectively and hence little real learning is likely to occur. A further three factors have been identified as specifically inhibiting the work of PLCs.

2.4.5.1 Multiple reform programmes operating simultaneously

It is difficult for PLCs to function if the education district has other reform programmes in place at the same time, as these distract teachers' focus and consume time (McLaughlin & Talbert, 2010, p. 39).

2.4.5.2 Incentive schemes involving teachers individually and/or in competition with one another

PLCs depend on collaboration and are thus negatively affected by competitive accountability pressures such as education policies that link teachers individually to their learners' performance as this discourages knowledge sharing and collaboration (McLaughlin & Talbert, 2010, pp. 39, 40).

[28] In this study involving networked PLCs with teachers from different schools, this role was performed by the PLC facilitator and to a lesser extent the NLC project co-ordinator.

2.4.5.3 Absence of designated time for PLC activities

Finally, I draw attention to the enabling/inhibiting factor of time. The provision of time is an enabler but the *absence of it* is the single most common inhibitor mentioned by participants when identifying factors that inhibited the success of their teams (Chappuis et al., 2009, p. 59).

2.4.6 Criteria for evaluating PLC effectiveness

Criteria for judging effectiveness are elicited from the positive results that can be observed in teachers, learners and schools as a result of teachers' participation in PLCs. DuFour (2004) argues that PLCs measure their effectiveness on the basis of measurable results, not their intentions, that they learn by doing, engaging in collective enquiry into what constitutes best practice, and by honest evaluation of members' current practices, and their learners' current performance levels (pp. 15-17).

In this study I have not measured learner performance before and after the PLC activities so I can make no claims about improved learner performance. There is, however, a wide variety of other results of effective PLC activities that can be observed. I refer only to those that I explore in this study.

"Measurable results" from PLC participation identified by Hord (1997b) include: teachers build new knowledge about good teaching and classroom practice and increase their understanding of subject content which enables them to make significant sustained changes in their practice; and their morale is higher (p. 5, 6). Huberman (1995) requires effective PLCs to have a focus on "substantive content and pedagogy" (in Thompson & Zeuli, 1999). Katz et al. (2009) evaluate a PLC's effectiveness (amongst other criteria) in terms of whether it has a significant impact on teachers' professional learning, morale and performance (p. 16). For Lieberman (1995b) it is the extent to which teachers develop a stronger voice to express their perspective and exercise leadership with peers; and the level of intellectual and emotional stimulation present (pp. 593-594).

In their study, Bolam et al. (2005) identified three criteria for evaluating PLCs: "ultimate impact" focused on learners' results and conduct, "intermediate impact" focused on learning knowledge-for-teaching, aspects of professionalism and morale,

and "operational performance", a criterion related to PLC functioning/sustainability (p 150). I use the latter two criteria in this study as I did not aim to explore the first one.

2.4.7 Cautions in regard to excessive expectations of PLCs

While recognising that PLCs are the TPD "new flavour of the month", McLaughlin and Talbert (2010) view them as a good solution for TPD but not a "quick fix" strategy (p. 41). PLCs cannot be introduced without an understanding of the full range of support needed for them to work. They are learning communities and cannot be used by education officials as "*implementing*" communities (2010, p. 42).

Working in a community may be too difficult for teachers as it disrupts traditional norms, such as working in isolation and maintaining surface friendliness. PLC learning processes, such as confronting conflicts, may not be comfortable, but are "painfully necessary" (Wineburg & Grossman, 1998, p. 352). Moving teachers from isolation to community breaks down the defences teachers have established for themselves and can release workplace conflict that has been contained: "it is far easier to mark papers alone rather than negotiate with other adults who do not share your beliefs" (Grossman & Wineburg, 2000, p. 47). Working in community implies inclusivity and diversity but can create tension, exposing the fragility of the group. Normal societal "fault lines"[29] are mirrored, with those who disagree or do not fit in being pushed to the margins of the group (2000, p. 48).

Establishing authentic community requires honest and open engagement with colleagues but the norm of "interactional congeniality" may get in the way, resulting in pseudo-community where participants behave as if they agree in order to create the "illusion of consensus" for the sake of "impression management" (2000, p. 17, 18). Under such circumstances the PLC cannot collaborate in enquiry processes effectively, thus undermining the potential for learning.

The quality of work in PLCs is not easily monitored and evaluated as the traditional measures for doing this would compromise the trust and sense of safety that is already difficult to establish and sustain. However, in addition to self-reflection, external review, and feedback are necessary to maintain the effectiveness of the PLC. Some measures to evaluate effectiveness that are demanded by funders may hinder the

[29] For example, those based on race, religion, gender, class.

learning processes of PLCs and cannot be obtained without risking their effectiveness (Lieberman & McLaughlin, 1992, pp. 674, 676).

The PLC model of TPD requires human and physical resources at a level which may not be sustainable. Sourcing, training, and retaining sufficient suitable leaders/facilitators may not always be possible (Lieberman & McLaughlin, 1992, p. 676). The time commitment required of PLC participants is heavy, both in PLC session time and time for follow-up work between sessions. The financial resources also may not be available once initial research funding is exhausted.

This case study which investigates PLC effectiveness for TPD in South African schools may reveal further difficulties not identified in international research.

2.4.8. The influence of socio-cultural factors on PLC models and functioning

The PLC literature mostly derives from Anglo-American contexts and not much is known about how PLCs are implemented in other parts of the world and whether the generally understood ideas and practices associated with PLCs transfer to other cultures. Hairon & Dimmock (2012) alert the PLC research community to how socio-cultural contexts "mediate and filter 'Western' notions of PLCs" (p. 405). Examining PLCs in the Singaporean/Asian context, these writers point out the difficulties in implementing PLCs in a high-achieving educational environment that is hierarchically and centrally organised and where there is great respect for authority and teacher dependence on that authority. They argue that despite the enabling environment created by the Ministry of Education (MOE) which introduced the idea of PLCs thirteen years ago, implementation of this model of teacher learning has been problematic owing to societal conditions. Although the MOE encouraged schools to innovate and develop the curriculum according to their learners' needs, provided tools and templates for PLC work and required one additional hour to be set aside in the school week for professional development, teachers' and school leaders' practices and beliefs did not change from dependence on top-down authority and instructions (the "command and control" culture (p. 414)), to bottom-up teacher-initiated learning (p. 416). Another difficulty with PLC implementation in Singapore arose from the envisaged role of the school leader as the person tasked with implementing a PLC in his/her school. PLC leadership required a different set of skills from those traditionally expected of school

leadership. School leaders were accustomed to operationalising MOE policies and managing rather than, for example, building relationships, motivating and mentoring teachers, and sharing leadership. Without these new skills school leaders would, by implementing PLCs, merely be increasing teachers' workload and supporting the performativity and managerial culture whereas PLCs were intended to develop professionalism (p. 418). The net result was that the PLC model implemented in Singapore had its own identity and did not manifest the characteristics of PLCs as described in the Anglo-American literature.

A study by Wong (2010) of two PLCs in a Shanghai school also identifies the impact of culture on Chinese teachers. Like their Singaporean counterparts, they operate in a hierarchical system where there is great respect for authority. The writer explains that there have been structures (Teaching Research Groups (TRGs)) for teacher collaboration since the 1950s and so collaboration amongst teachers as envisaged in PLCs is not a new concept although Wang (2002) terms it "contrived teaching organisation" (in Wong, 2010, p. 626). What is new is the type of relationships expected in PLCs and how the learning work is conducted. The cultural values and practices of taking collective responsibility for learners' learning and working collaboratively assisted PLCs. However, the value of consensus-seeking and harmony limited the type of critical interaction necessary for learning. Wong's study showed that teachers' respect for authority resulted in a PLC where an external authority was used being more productive in terms of learning that could lead to changing teachers' practice than a PLC which relied on internal expertise. The PLC that relied on its members' knowledge was not as productive and it tended to entrench traditional thinking without critically engaging and reflecting on its practices. Once again a study outside the Anglo-American context points to PLCs in different cultures working in ways that differ from those described in much of the literature. Even within the Anglo-American literature Lee & Lee (2013) identify what they term the Fullan model used in the United Kingdom and the DuFour model used in the United States which differ from one another in terms of what is prioritised in PLCs with respect to collaborative learning, reflective dialogue, and how the models treat conflict in PLCs. In my study, as I identify enabling and inhibiting factors on PLC functioning, I will bear in mind the possibility of socio-cultural factors having an impact on the model of PLCs likely to emerge.

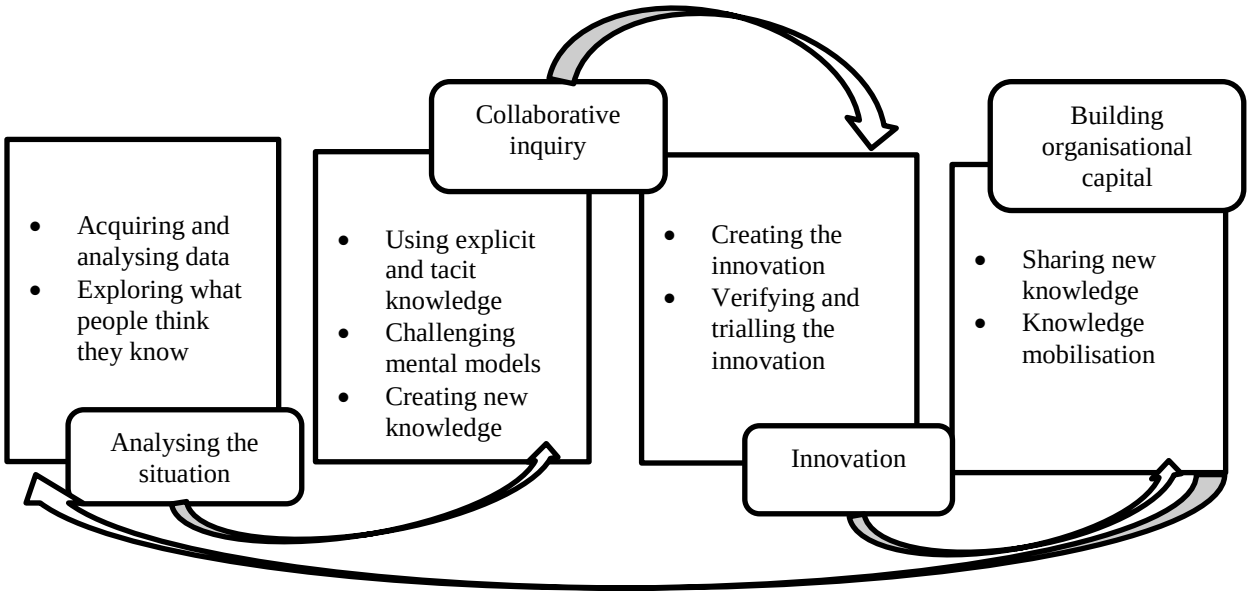
2.5 PROCESSES FOR LEARNING KNOWLEDGE-FOR-TEACHING IN PLCS

Effective PLCs focus on learning. While the literature on what knowledge-for-teaching PLCs focus their learning on is limited (more on this see chapter 3), there is a large body of literature that describes how PLCs learn. This study explores the in-service learning of qualified teachers in PLCs. The assumption is made that most teachers participating in PLCs have completed a teaching qualification and have thus learned a substantial body of professional knowledge and, in addition, possess personal knowledge acquired in various ways.[30] In this section I discuss how informal learning happens in TPD/PLCs from both a theoretical and a practical perspective.

2.5.1 Collaborative enquiry learning - theoretical perspective

Opinions of writers on how teachers learn through TPD activities vary. They include references to collaborative and reflective learning processes (Billet, 2001). In Figure 2.3 below, Earl & Hannay (2011) show how new knowledge is created in the enquiry process and point out the potential impact on change and innovation (p. 188). The cycle recognises that learning together does not happen in a linear process but is iterative and consists of repeated episodes of reflection and action (2011, p. 190).

Figure 2.3 The cycle of knowledge work (after Earl & Hannay, 2011, p. 188)



[30] It is recognised that the quality of the pre-service preparation for teaching in the apartheid past may have been woefully inadequate for many South African teachers (Morrow, 2007, pp. 58, 59).

A similar representation is provided in Timperley et al.'s (2008) Professional Learning Inquiry Cycle (see Figure 2.4) which begins by asking what knowledge and skills the learners need as a prompt for asking what knowledge and skills the professionals need in order to meet the needs of the learners and improve learner achievement. This latter model is used to describe and analyse the findings about how teachers work with knowledge and learning in the subject PLCs in this case study.

According to Thompson and Zeuli (1999) teacher learning that is likely to bring about change in practice occurs when there is:

> a sufficiently high level of cognitive dissonance to disturb in some fundamental way the equilibrium between teachers' existing beliefs and practices on the one hand and their experience with subject matter, students' learning, and teaching on the other. (p. 355)

Dissonance at this level provokes transformation beyond tinkering (1999, p. 355). To bring about learning there needs to be time to resolve the dissonance. In my study the dissonance resolving activity is related to learners' work. The learning of, for example, how to teach a Geography skill such as drawing a cross section of a topographical map and the conceptual knowledge that underlies it enables teachers to develop a new repertoire for practice. Continuing assistance to teachers to reinforce the new learning is still required (1999, pp. 356, 357).

Stoll (2009) emphasises that learning involves a process which leads to change in thinking and practice which she calls 'knowledge animation'. This process makes knowledge "accessible and mobile so that it stimulates dialogue that challenges thinking, promotes new understanding and helps them [teachers] generate new knowledge that will enhance their practice and policy" (in Earl & Hannay, 2011, p. 198).

In the next section I explore the use of collaborative enquiry processes for acquiring knowledge-for-teaching.

2.5.2 Collaborative enquiry learning - practical perspective

Researchers propose a number of processes through which teachers engage collaboratively in enquiry learning. In this section I describe four enquiry processes.

2.5.2.1 Enquiry processes

PLCs can use a number of processes that entail participants displaying an enquiry habit of mind collaboratively, following an "iterative process" of "thinking in circles" (Earl & Hannay, 2011, p. 190). In an environment of respect and challenge, participants make use of relevant data and their explicit and tacit knowledge for new learning, taking care not to be limited by their own pool of knowledge (Earl & Timperley, 2008, pp. 3-11). These are active processes where people contribute by reflecting, talking and developing shared meaning, and not simply receiving (Robertson, 2011, p. 215). The processes allow for the "give and take of information, the levelling of power relations, the sharing of vulnerability" to enable participants to "enter a deeper place of learning and being" (2011, p. 218), making people more "agentic" (2011, p. 223).

In what follows I discuss three examples of learning processes used by teachers in this study: "Professional Learning Inquiry Cycle" (PLIC) (Timperley et al., 2008, in Katz et al. 2009, p. 71); "Collaborative analysis of learners' work" (CALW) (adapted from Langer et al., 2003); and "Japanese Lesson Study" (JLS) (Lewis & Tsuchida, 1998, pp. 12, 24; Stigler & Hiebert, 2009; Cerbin & Kopp, 2006, pp. 250, 251). I also discuss protocols (Easton, 2008; 2009; Caine & Caine, 2010) which are advocated by many writers, although they have their limitations (Datnow, 2011) and were not used by the PLCs in this study.

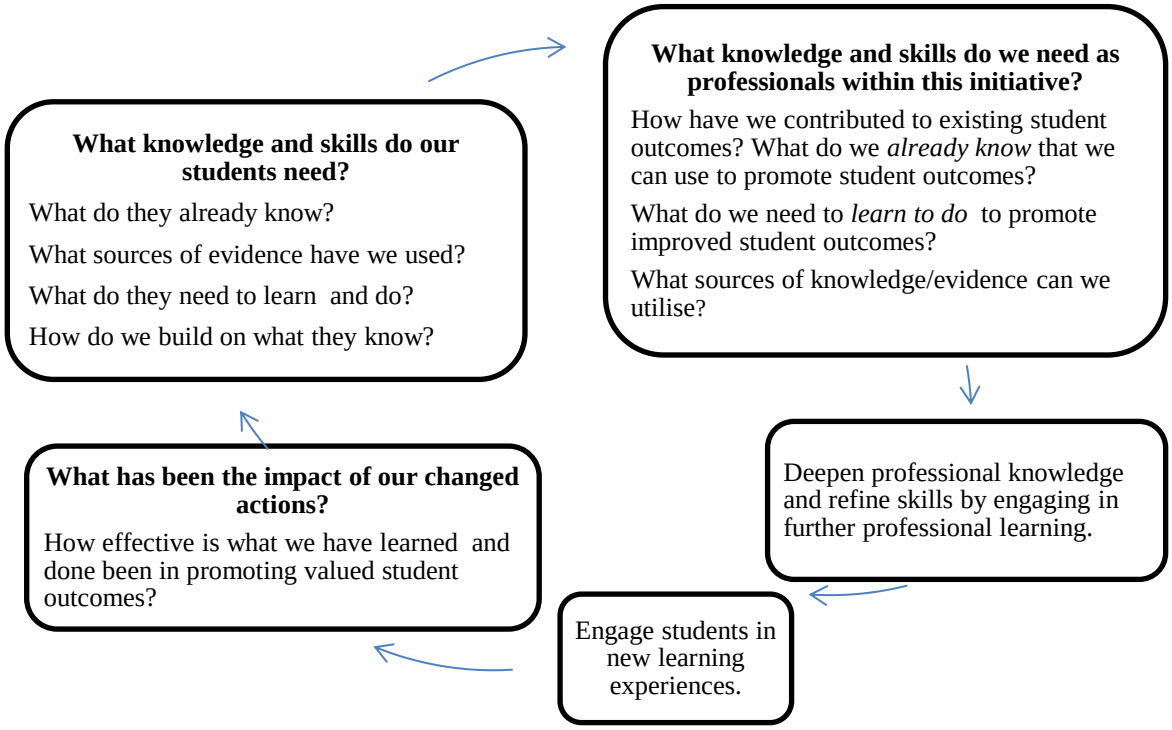
If the learning processes are followed through at least one complete cycle, the writers listed above believe these processes have the potential to deepen and enrich teachers' knowledge-for-teaching, leading to improved instructional practices that have a positive impact on the instructional core.

i) Professional Learning Inquiry Cycle (PLIC)

Figure 2.4 below is a representation of the "Professional Learning Inquiry Cycle" (Timperley, Wilson, Barrar & Fung, 2008, in Katz, Earl & Jaafar, 2009, p. 71). The PLIC process involves teachers in using evidence from a number of sources, establishing learners' needs and then determining what they need to learn in order to meet the needs of their learners. Teachers then do what is necessary to deepen their knowledge and skills, put into practice their new knowledge and learning and finally evaluate the impact of the new/changed practices in terms of their impact on learners' learning. Having done that, the cycle begins again in response to the findings of the evaluation. The process involves

teachers in critical self-reflection and collaborative reflection at all stages. New knowledge is created and available to all members of the PLC (and beyond if it is shared in other contexts).

Figure 2.4 Professional Learning Inquiry Cycle (Timperley, et al., 2008, in Katz, et al., 2009, p. 71 (a representation))



ii) Collaborative analysis of learners' work (CALW)

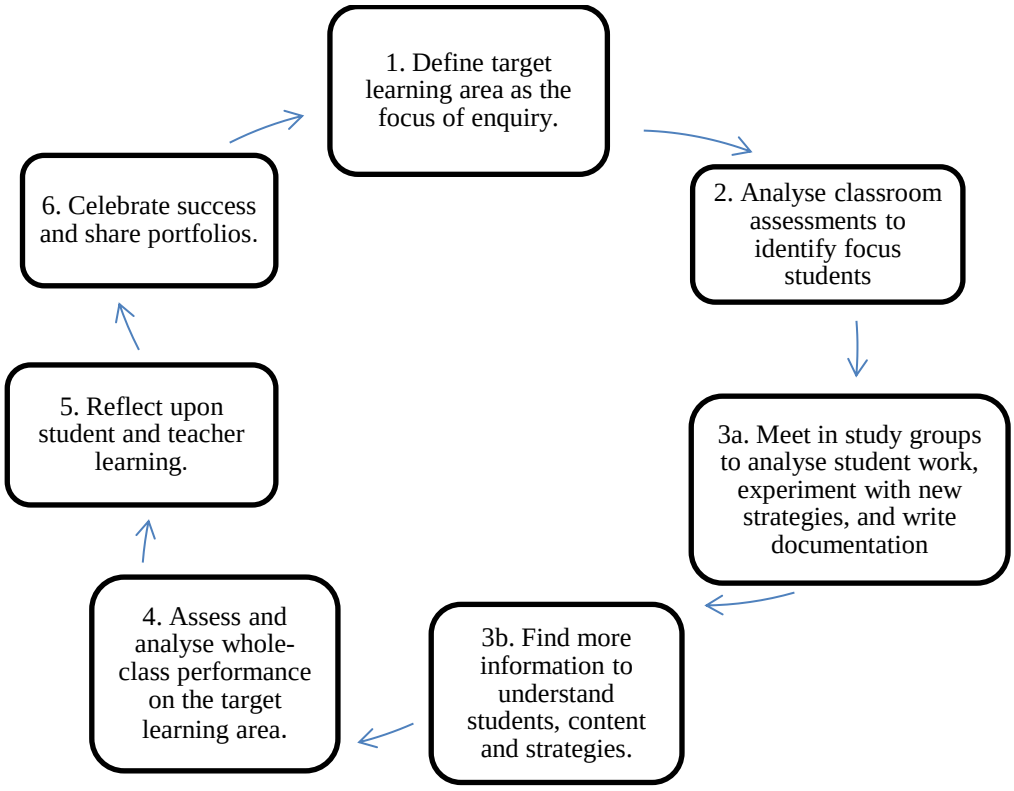
Langer et al. (2003) describe "Collaborative Analysis of Student Work" (CASW) as a TPD process that aims to help teachers "gain a deeper understanding of the link between their instruction and their learners' learning around a target-based learning area" through collaborative and reflective enquiry which focuses on samples of student work and studies students' learning over time (pp. 3, 4).

The CASW process requires a framework for reflective enquiry[31] (theoretical framework), a culture of collaborative enquiry (including norms for collaboration), facilitation/leadership and support. CASW consists of enquiry phases: define the learning target, analyse assessments to select focus learners, meet in a group to analyse

[31] This could be Langer et al.'s (2003) Framework for Reflective Inquiry or Timperley et al.'s (2008) Professional Learning Inquiry Cycle.

and experiment, find information, assess and analyse whole-class performance, reflect on teacher and student learning, celebrate success, and share (2003, p. 13). The cycle is depicted in Figure 2.5.

Figure 2.5 CALW cycle (adapted from Langer et al's CASW, 2003, p. 13)



According to Langer et al. (2003) the benefits for teachers of participating in this process include: increased clarity about learning outcomes for learners; increased commitment and confidence; improved analytic and reflective skills; growth in professional knowledge; greater self-awareness regarding professional practice. Learners' performance improves and parents are clearer about their children's learning targets and progress (p. 19).

In this study I refer to the CASW process as collaborative analysis of learners' work (CALW) because samples of learners' work are used in the process.

iii) Japanese lesson study (JLS)

Stigler & Hiebert brought the widely used Japanese practice of lesson study to the attention of the United States in the book *The Learning Gap: ideas from the world's teachers for improving education in classrooms* (2009). They recommended lesson

study as a TPD approach to build professional knowledge of teaching and to improve teaching and learning (Perry and Lewis, 2009, pp. 365, 366).

Lesson study is a teacher-initiated improvement effort for building knowledge-for-teaching and improving teaching. It focuses on *how* learners learn and not on *what* they learn. It explores how learners make sense of the material, what kinds of difficulty they have, how they answer questions, and how their thinking changes during the lesson (Cerbin & Kopp, 2006, pp. 250, 251). Yarema (2010) defines it as follows:

> In Japan, Lesson Study is a model for a community of practitioner-teachers to follow as they study student thinking for the purpose of improving instructional practices in their own classrooms. (p. 5, in Doig & Groves, 2011, p. 87)

Lesson study involves actual lessons taught to one's own class but with special features: they are observed by other teachers; carefully planned, usually in collaboration with one or more colleagues; focused – designed to embody a particular goal or vision of education; captured for further use later;[32] and discussed by the teachers themselves and sometimes by outsiders (Lewis & Tsuchida, 1998, pp. 12, 14). Lesson study is a knowledge building process. The findings generate practitioner knowledge and professional knowledge about teaching (Cerbin & Kopp, 2006, p. 255). The process of lesson study is summarised in Figure 2.6.

Teachers who engage in JLS identify benefits, such as improved classroom practice through the feedback; greater understanding of new curriculum content or approaches; connections made between classroom practice and broader goals such as the implementation of national goals; exploration of conflicting ideas and consideration of alternative views; provision of examples of excellent teaching, contribution to shaping national policy, and acknowledgement of the central role teachers play in Japanese education (Lewis & Tsuchida, 1998, p. 50).

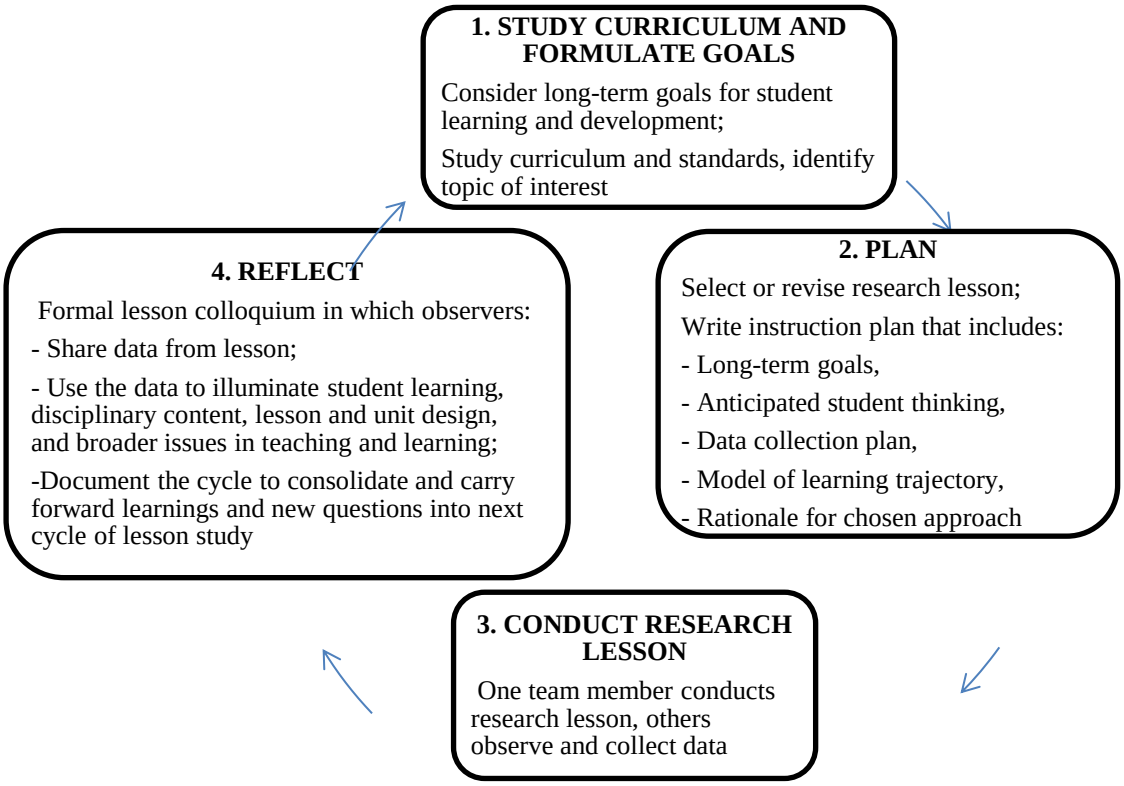
The writers do admit that Japanese culture is supportive of this process of collaborative enquiry for improving learning outcomes. There is a collaborative culture amongst teachers (and learners) where copying others is seen as a way of assisting teacher

[32] For example, they are recorded, videotaped, audiotaped, observed with a checklist, copies made of student work, a particular issue focused on, the number of ideas students volunteered tallied, and comments by selected children transcribed (Lewis & Tsuchida, 1998, pp. 12, 14).

development and there is no element of competition. Self-critical reflection "hansei" is emphasised and esteemed. The curriculum is stable with major changes once in twenty years and only fine-tuning in between (Lewis & Tsuchida, 1998, pp. 50, 51) and "frugal" in that there are a limited number of topics to cover in a year.

One of the PLCs in this case study used this collaborative enquiry method to design lessons on the concept "exponents" which learners found difficult.

Figure 2.6 Japanese Lesson Study Cycle (after Lewis & Hurd, 2011, p. 2)



iv) Protocols

Research on PLCs has identified lack of a learning focus, limited instructional talk, and an absence of structure as factors that limit the effectiveness of PLC activity (see 2.4.4 – 2.4.7). To overcome these problems a number of writers (Allen, 1998; Allen & Blythe, 2004; Blythe, Allen & Powell, 2007; Elmore, 2007; Easton, 2008; 2009; Caine & Caine, 2010) propose the use of protocols. Caine & Caine (2010) liken a protocol to a "container" which provides "a space in which the process happens" (p. 3). He goes on to describe the objective:

> to create a field of listening, explore essential ideas and skills in a conceptual and experiential way, commit to real-world action, and then to process and learn from experience. The combination of elements, together with the emphasis on hearing each other and working together, begins to build an *authentic professional learning community* over time. (p. 4)

Easton (2009) believes protocols can help groups achieve deep understanding through dialogue, explore ideas deeply through learner work and artefacts of educator practice, provide guidelines for conversation based on norms that everyone agrees upon in order to make the dialogue safe and effective, provide a facilitated set of steps that everyone understands and has agreed to that permits a kind of conversation that people do not usually have, promote the development of ideas as certain people talk while others listen and then the talkers listen and the listeners talk, with each round characterised by reflection and exploration (p. 1).

Writers on protocols believe that using protocols enables a small number of participants (3-4) to accomplish something useful in as little as 30 minutes dialogue whether they are of similar or different ability, knowledge and experience. There are different protocols for different learning experiences and goals (Easton, 2009, p. 2, 3). Using them protects both presenters and participants (2009, p. 12); deepens discourse, promotes enquiry, challenges core beliefs and values, requires participants to account for their performance, and exposes assumptions (2009, p. 14).

Little et al. (2003) highlight the usefulness of protocols for structuring conversation, providing procedural steps and guidelines and slowing down teachers' responses (p. 188). Elmore (2007) believes they help to clarify the roles and responsibilities of participants, make group norms explicit and keep the work productively focused. Not only do protocols help with structuring the activities of the group but they also help manage emotions because they make the observation more impersonal, allowing for depersonalisation of the discussion about the observed practices. Although participants may find this difficult to do, discussion deals with descriptions rather than evaluations or norming. Evidence is more factual than emotive. The person is separated from the practice (pp. 21, 22).

Examples of protocols include: the "Tuning Protocol" for developing more effective assignments and projects and how they are assessed; The "Collaborative Protocol" for

learning about the goals and interests learners focused on in an assignment, the strengths and needs of a particular learner, and to reflect and gather ideas for refining classroom practice, such as describing the work, asking questions, speculating about problems and issues in the individual learners' work; The "Consultancy Protocol" for gaining insight into problems of practice (Blythe, 2007, p. 34); the "Rounds Protocol" for helping participants understand a learner from his work (Easton, 2009, pp. 37-40); the "Vertical Slice Protocol" for guiding participants in their examination of all the work done by a sample of learners over a narrow period of time (pp. 41-44), and the "Success Analysis Protocol" for helping participants understand why something has gone right and to substantiate the case with evidence (pp. 57-59).

In sum, it is argued that protocols provide the means for deep professional discussion, collaboration and trust-building even when used by inexperienced facilitators (Easton, 2009, pp. 8, 12, 13).

2.6 CONCLUSION

In this literature review I have discussed the centrality of teachers and instruction in programmes aimed at improving learner achievement. Figure 2.7 sums up in four analytical levels what has been discussed in 2.3 to 2.5.

Level 1 includes the characteristics of effective TPD and the criteria for evaluating whether the TPD has been effective (discussed in sections 2.3.1 and 2.3.2). PLCs require the characteristics of effective TPD outlined in **Level 1**. In addition, they have their own specific forms of these characteristics for effective functioning (**Level 2**). For example, the specific form of participation of a functioning PLC is collaboration and use of reflective professional enquiry; the content focus of the PLC activities is on teachers' and learners' learning, and the specific culture required is one where teachers take collective responsibility for their and their learners' learning and trust one another (discussed in section 2.4.3).

Level 3 consists of specific characteristics enabling and inhibiting PLC functioning and learning and the criteria for evaluating effectiveness. The characteristics outlined in **Levels 1 and 2** are required because if they are absent the functioning of PLCs is inhibited. If school culture and conditions are not supportive of PLC activities and

actively work against them being effective (for example, if there are multiple reform programmes with different objectives operating in a school) the TPD **Level 1** content factor characteristic of alignment is absent; if teachers have to compete for performance rewards it discourages collective responsibility which is a PLC **Level 2** characteristic; and if there is no time in the school day for PLC activities the TPD **Level 1** characteristic of "school culture and conditions" that support TPD is absent (discussed in section 2.4.4). **Level 4** discusses the processes which the literature suggests are useful for learning knowledge in PLCs, that is HOW knowledge is learned. These levels lead to the discussion in chapter 3 about WHAT knowledge is learned in PLCs.

Cautions against expecting too much of PLCs and the influence of socio-cultural factors on PLC functioning have also been noted.

While the literature on PLCs deals extensively with organisational factors and processes for conducting PLC activities, it does not describe what knowledge PLCs focus on. In the following chapter, using literature on professional knowledge in general and on professional knowledge for teaching in particular, I develop and describe a framework (Figure 3.4) for investigating what knowledge teachers learn in PLCs and conclude with criteria for evaluating knowledge learning in PLCs.

Figure 2.7 Four levels of TPD

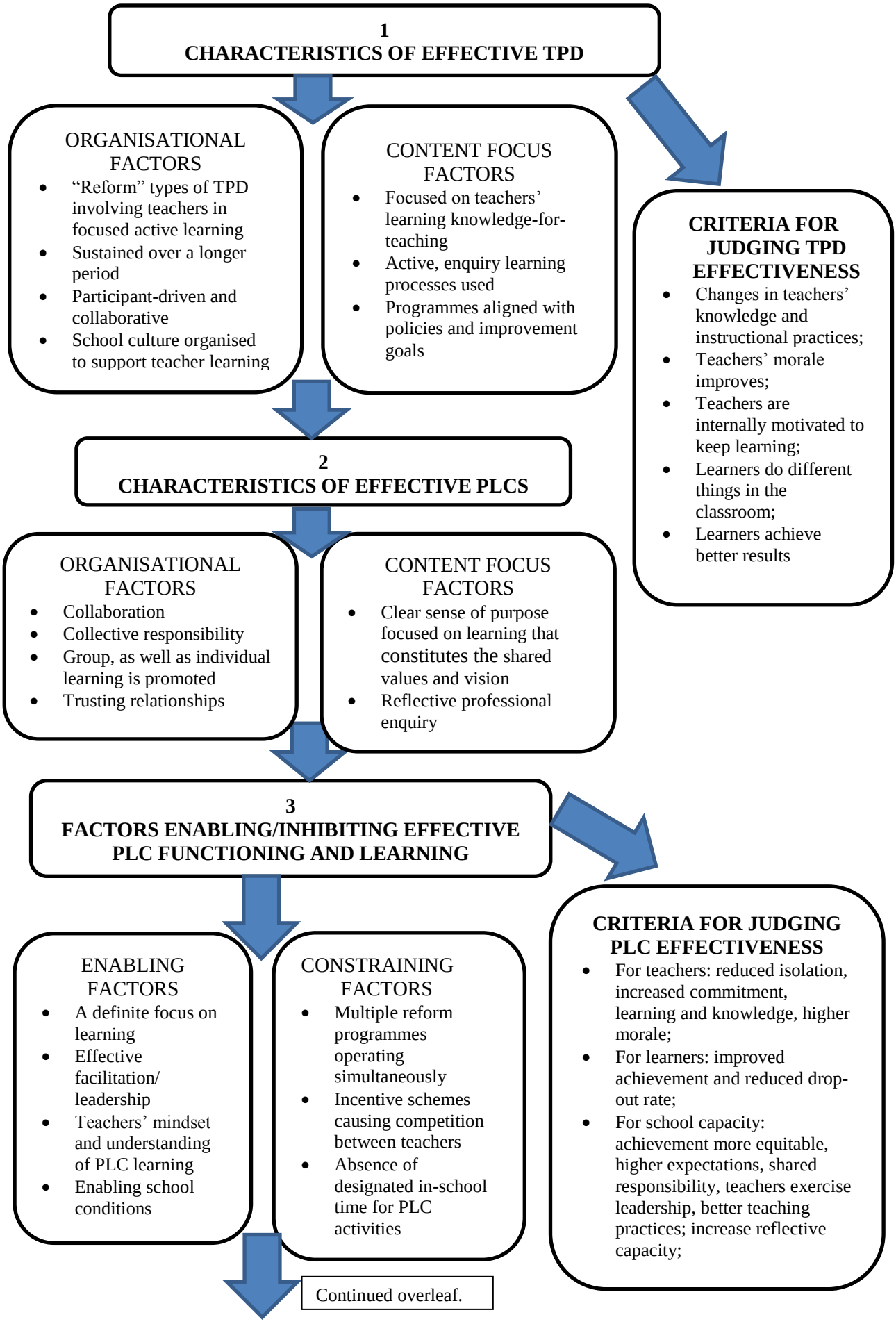
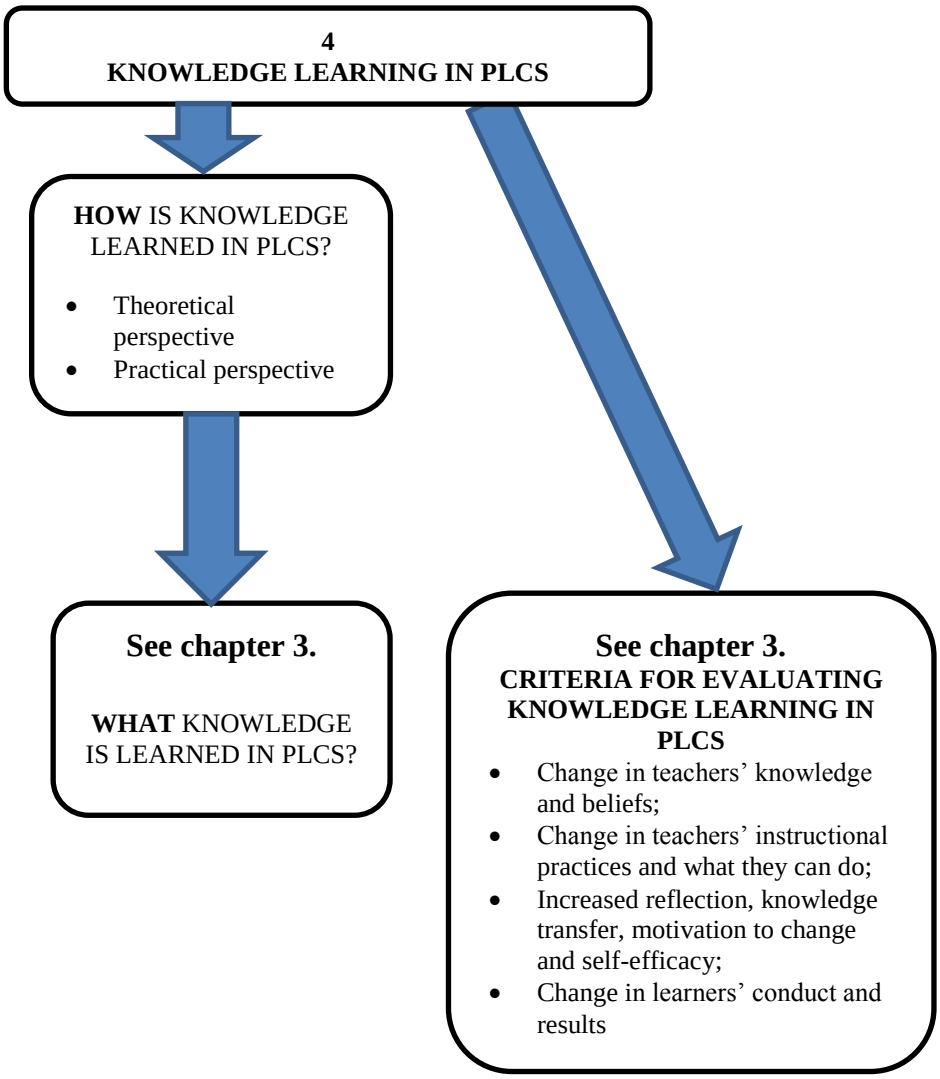


Figure 2.7 Four levels of TPD continued



CHAPTER 3 KNOWLEDGE-FOR-TEACHING AS THE OBJECT OF STUDY IN PROFESSIONAL LEARNING COMMUNITIES

3.1 KNOWLEDGE-FOR-TEACHING: WHAT IS LEARNED IN PLCS

The PLC literature describes ways of organising PLCs, emphasises having a clear focus on learning, and suggests learning enquiry processes. However, what knowledge-for-teaching the participants in PLCs focus on is not described. To address this gap in the literature I explore the general literature on professional knowledge and the teacher education literature on knowledge-for-teaching. From this I construct a framework which I use to describe, analyse and interpret what knowledge was studied in the PLCs that are the focus of this study.

The importance of TPD, and specifically PLCs, having an appropriate learning content focus has been demonstrated by a range of researchers (Elmore, 2002b; Katz & Earl, 2010; McLaughlin & Talbert, 2010; Stoll, 2011). They have argued that effective TPD focuses on the instructional core to improve what and how teachers teach and what learners do and learn in the classroom (Darling-Hammond & McLaughlin, 1995; Elmore 2002b). Given the emerging emphasis on PLCs for teacher learning in current South African TPD policy and the informal nature of PLC learning experiences, compared with those in the formal programmes such as Advanced Certificates in Education or the Gauteng Primary Language and Mathematics Strategy, it is important to investigate what types of knowledge it is feasible to address in PLCs. While the literature on effective TPD and PLCs emphasises the importance of TPD activities having a clear content focus on learning, there is, however, very little in the literature to explain exactly what knowledge teachers should or could learn in less formal programmes such as run in PLCs. As PLCs are informal it would seem reasonable not to expect the systematic development of knowledge concepts such as is expected in formal pre-service or in-service teacher education programmes.

3.2 *WHAT* KNOWLEDGE IS LEARNED

Teacher education and TPD are forms of "professional education" which aim to develop the professional knowledge of the teacher. In this section I explore types of knowledge

and the relationship between them and provide a classification of knowledge-for-teaching.

3.2.1 Types of knowledge

Knowledge is generally classified into three types:

- Propositional or theoretical knowledge
- Procedural or practical knowledge
- Personal knowledge

Propositional or theoretical knowledge refers to WHAT teachers know (Gamble, 2009) or "knowledge *that* (KT)" (Ryle, 1979; Winch, 2013a, pp. 129, 130). Other terms in the literature include: declarative, factual, and abstract knowledge (Knight, 2002); academic knowledge (Morrow, 2007); codified explicit content "knowledge *that*" which is public and given status (Eraut, 2000, pp. 113, 114). Bernstein terms propositional knowledge "vertical knowledge" as the body of knowledge develops in a hierarchical manner leading to greater levels of abstraction (1999)[33]. Examples of propositional knowledge include:

> … conceptual discipline knowledge; sociological and psychological theories of learning; theories of motivation and discipline; principles of how learners learn a particular subject; common learner misconceptions and errors; subject specific analogies etc. (Bertram, 2011, p. 11)

"Knowledge *that*" is an essential component of "occupational capacity" (Winch, 2010; 2013b) which, for teaching, includes systematic knowledge, such as subject knowledge and other theoretical knowledge for teaching, understanding the standards for excellence in the occupation and how society views them, knowledge of changes in the occupation and knowledge of the environment in which it is practised (Winch, 2013b, p. 296).

Winch (2013a) also identifies "knowledge by acquaintance", a type within propositional knowledge, as knowledge which is mostly acquired through the senses and which cannot be easily described or sufficiently established propositionally. For example, when a person does something like smelling a rose, s/he is acquainted with a rose and

[33] This may not be true of all school subjects, for example English.

has knowledge of a rose by acquaintance (p. 129). It is a simple and limited form of "knowledge *that*" and one cannot make inferences systematically from this type of knowledge.

Procedural or practical knowledge, which is not easily codified, refers to knowing HOW (Gamble, 2009) or "knowledge *how*" (KH)" (Ryle, 1979; Winch, 2013a, pp. 130, 131). For teacher education other terms in the literature include: the behavioural and cognitive skills teachers bring to class (Knight, 2002); teachers' technical knowledge (Morrow, 2007) or craft knowledge (Samuel, 2009); and knowledge-in-practice, grounded in the professional activity (Kelly, 2006). Eraut (2000) includes procedural and process knowledge in his definition of personal knowledge: "the cognitive resource the person brings to the situation that enables them to think and perform" (p. 114). Examples of practical knowledge include:

> … procedural pedagogical knowledge; teaching and assessment strategies (both generic and for particular disciplines); planning techniques; procedural classroom management techniques etc. (Bertram, 2011, p. 11)

"Knowledge *how*" involves a person knowing applicable rules and acting intentionally in accordance with these rules. It is goal-directed. "Knowledge *how*" includes skills (personal task-related abilities which can be evaluated in terms of standards of performance and in moral terms), techniques (ways of doing things), and virtuous actions (ways of exercising moral virtues such as patience and kindness) (Winch, 2012, pp. 59-61). Winch (2012; 2013a; 2013b) has written extensively on "knowledge *how*" and I examine his ideas in greater detail in 3.2.2 in order to arrive at a fine grained analysis of what "knowledge *how*" comprises.

Many writers assert that practical knowledge is not easily articulated because it becomes automatic and intuitive (Eraut, 2000, p. 131; Kelly, 2006). Wilson and Demetriou (2007) argue that this knowledge is generally learned informally and is context specific. Winch (2010) does not agree. In his view "knowledge *how*" is formal and grounded in "knowledge *that*" and "not in everyday experience, ideological underpinnings or tacit knowledge" (Shalem & Slonimsky, 2013, p. 77).

Teachers also have *personal knowledge* ("ontological commitments", Desforges, 1995, in Bertram, 2011, p. 9) which are their deep-seated beliefs and these are difficult to change. Examples of personal knowledge include:

> … knowledge of self; awareness of others; beliefs about knowledge, learning and schooling; reflexivity; confidence etc. (Bertram, 2011, p. 11).

All three types of knowledge are necessary for teachers to perform their job of organising systematic learning. Learning new knowledge involves the disruption of these three types of existing knowledge (Thompson & Zeuli, 1999; Bertram, 2011, p. 10). In this study, however, I focus particularly on the first two types: propositional and procedural knowledge, "knowledge *that*" and "knowledge *how*" which hereafter I refer to as KT and KH, respectively.

As the learning in PLCs is informal the activities are more likely to focus on learning KH. I examine KH in more detail in order to understand what this concept comprises and how it can be learned.

3.2.2 Know-how

The concept of know-how is worth exploring as it is an essential component of "occupational capacity" along with knowledge *that* (Winch 2013b, p. 296). Winch (2010; 2013a) identifies two sub-types of know-how which I have termed: epistemic knowledge *how* or inferential knowledge (IK) and practical/social knowledge *how* (KH).

3.2.2.1 Inferential knowledge/Epistemic knowledge *how*

In Winch's (2013a) view a person may only claim to have knowledge of the content of a proposition and to understand it if he or she can understand the inferences related to it and can express them (p. 130). Winch identifies two abilities associated with inferential knowledge which Muller and Young (2013) describe as (a) "facility with *existing knowledge*" and (b) "facility with *new knowledge*". A person who has "facility with *existing knowledge*" knows and understands the "inferential relations" between propositions, not only the propositions themselves. This implies knowing the power of the propositions, including knowing which rules are not open to argument and which could be objected to and revised (p. 10). To have "facility with *new knowledge*" a person would be expected to know the "procedures in assessing, testing and acquiring

new knowledge". This implies knowing what would constitute adequate grounds for justifying the inclusion of a new idea in the subject knowledge body (Muller & Young 2013, p. 10). Winch (2013a) sums this up:

> Expertise in a subject involves practical knowledge concerning the management of and exploration of propositional relations, acquaintance with key objects, events, states and processes, and not least, acquaintance with practical procedures for gaining and validating new knowledge. (p. 134)

The "facility with new knowledge" is perhaps more applicable to researchers than to classroom practitioners. Winch (2013a) describes the complex relationship between propositional (KT) and practical knowledge (KH). Both of these "facilities", however, require the practitioner to have a substantial body of KT.

3.2.2.2 Practical/social knowledge *how*

Know-how includes practical knowledge (KH) but Winch (2013b) argues that there is more to the concept of practical knowledge than is generally realised. He identifies three conceptions/levels/orders of KH: (i) skills, which he describes as techniques combined with the requisite ability to apply them in a context and to enact them with appropriate character; (ii) transversal abilities such as planning, controlling, co-ordinating, communicating, evaluating; and (iii) project management abilities (pp. 283-295). These three levels ("orders") of KH relate to one another in a nested and hierarchical way (2013b, p. 295). To manage a project (third-order), transversal abilities (second-order) are needed. For example, project management involves planning and evaluating and the skills, including the techniques (first-order) used to achieve these transversal abilities, such as those needed to create a spreadsheet.

According to Winch (2013b) all practical knowledge, namely "skills" (techniques), transversal abilities, and project management abilities involve the agent's character in the way the action is performed (p. 285). Practical knowledge involves intentional, appraisable human actions directed at achieving a goal and these are exercised in a social dimension. Practising a technique involves the exercise of judgment, weighing up of alternatives and fine-tuning according to circumstances. Second- and third-order abilities require thoughtfulness, care, attention and judgment, or what Winch calls "intellectual agency".

Winch (2013b) identifies differences between "skills" (techniques) and the second- and third-order abilities. "Skills" are abilities applied to perform a particular task using relevant techniques, for example swimming butterfly stroke. Second-order abilities (for example, planning) and third-order abilities (for example, writing a book) involve a range of actions related to an articulated sequence of tasks or/and transversal abilities used over a longer term to produce or deliver goods and services which in the case of project management are complex goods and services. The techniques used to exercise a "skill" have a stable identity across different contexts. There are criteria to describe how they are to be exercised and to evaluate how well they are exercised. They can be said to be done correctly or incorrectly. On the other hand, second- and third-order abilities have a diffuse identity determined by the agent's ability to respond to the demand of context. There is a range of criteria to determine how they are performed. They cannot be said to have been done correctly or not, but rather they are appraised in terms of whether the abilities achieved their intended goal or not. Different evaluative vocabulary is used in different contexts. "Skills" are potentially transferable, that is replicable in similar situations, for example swimming butterfly stroke in a swimming pool or in the sea. However, a skill may not be actually transferable if the agent does not have the ability to adapt to the new context (p. 287). Transversal abilities are not necessarily transferable as, for example, planning a school lesson involves specific skills (or techniques) such as planning a diagram (which is transferable across contexts) but needs to take into account contextual matters such as learners' ability.

3.2.3 Relationship between knowledge of theory and knowledge of practice

Morrow (2007) argues that it is necessary to understand the special nature of the relationship which exists between knowledge of theory (KT) and knowledge of practice (KH) in professional knowledge (pp. 76, 77). It is not possible simply to apply theory to practice and expect improvement because professional practice always involves more than the application of a technical (theoretical) principle:

> Professional practice involves what has been called 'situational appreciation' (that is, a professionally appropriate perception of what is salient in particular situations), 'judgement-in-context' (professional judgements that take informed account of the details of particular situations) and 'knowledge-in-practice (as opposed to knowledge of practice). (p. 80)

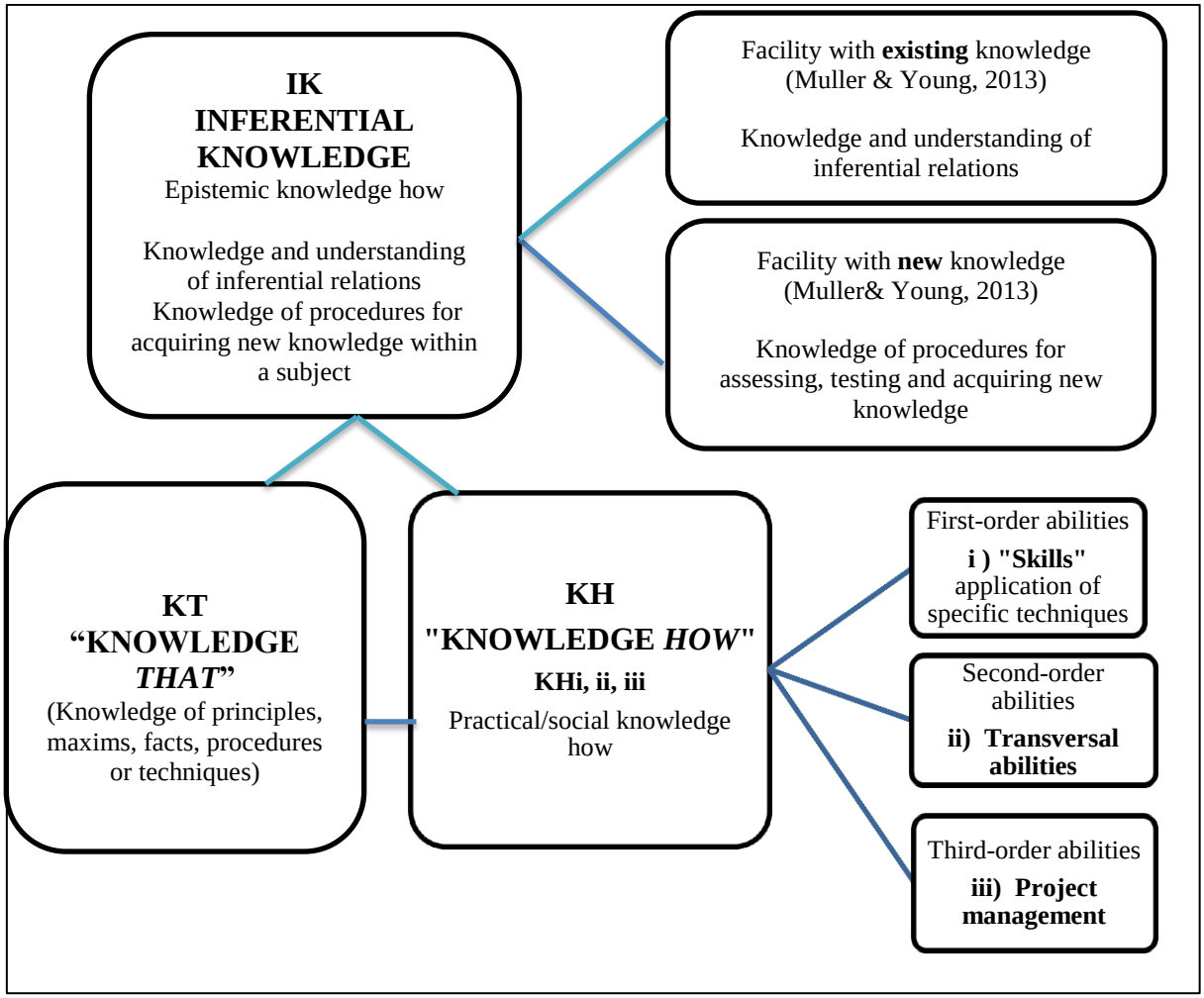
His argument is in alignment with Winch's view that techniques may have a stable identity and be able to transfer to new contexts but higher order abilities (transversal and project management) do not have a stable identity and depend on circumstances. Teaching is more than a collection of techniques and thus transferring knowledge from one context to another is not a simple matter.

In Morrow's view professional education, including TPD, aims to help improve the "rationality and reliability" of the professional judgment of teachers and their knowledge-in-action (p. 80). For professional education to be useful for organising systematic learning, teachers require both subject matter knowledge (KT) and the knowledge of how to give learners access to this knowledge (KH), in other words, to "dis-embed" the knowledge (2007, p. 82). The ability to do the latter, amongst other things, distinguishes the mathematics teacher from the mathematician (3.2.4). The point that Winch adds to this view is that without strong KT, the teacher has insufficient conceptual understanding to make the inferences (IK) (Winch, 2013a) necessary to apply the knowledge and to do the dis-embedding, let alone judge appropriateness to context (KH).

I have drawn on Winch's classification of KT and KH and his distinction between two epistemic abilities: inferential knowledge and practical knowledge ("skills" (KHi), transversal abilities (KHii) and project management abilities (KHiii)), to examine the aspects of knowledge that teachers work with in their PLCs studied (Winch, 2010; 2013b). See Figure 3.1 for the framework that I use. The classification of KH is of particular significance because it is easier to learn something that has a stable identity than to learn abilities that are enacted in different ways, in different contexts.

In sections 3.2.1 to 3.2.3 I have explained that both KT and KH make up the professional knowledge base for teachers and that IK is used when working with KT and KH. My purpose in the next section is to apply these concepts to the literature on teacher knowledge.

Figure 3.1 Knowledge *That* and Knowledge *How* Framework



3.2.4 The relationship between "knowledge that" and "knowledge how" in professional knowledge for teaching

Shulman's (1986) analysis of teacher education curricula led to his concern for what he terms the "missing paradigm" problem, namely, the absence of a focus on learning content knowledge (subject matter knowledge) in these programmes. He argued that much greater emphasis was placed on pedagogy or generic teaching practices. In his widely quoted work he asks questions such as:

> What are the sources of teacher knowledge? What does a teacher know and when did he or she come to know it? How is new knowledge acquired, old knowledge retrieved, and both combined to form a new knowledge base? … How does learning *for* teaching occur? (p. 8).

These questions indicate the complexity Shulman sees in professional knowledge and in the relationship between subject matter knowledge and pedagogy. Shulman's motivation

for categorising teachers' professional knowledge was his concern that substantial subject specific knowledge was being neglected for more general knowledge of pedagogy but that to teach effectively it is necessary to have a solid grasp of subject matter knowledge in order to exercise sound professional judgment. This relates to Winch's view on the necessity of sound KT for making the inferences needed for sound judgments. In addition to subject knowledge Shulman (1987) introduced the concept of pedagogical content knowledge (PCK) as a signifier of the special kind of professional knowledge that teachers need to enable learners to learn content.

In his critical examination of the content of teacher education in modern times, Shulman (1986) articulates the lack of real understanding concerning the complex inter-relationship between what teachers know and how they teach what they know:

> … no one asked how subject matter was transformed from the knowledge of the teacher into the content of instruction. Nor did they ask how particular formulations of that content related to what students came to know or misconstrue… (p. 6)

Shulman (1986) proposed a classification into "forms" for representing "domains and categories" of knowledge: propositional knowledge, case knowledge, and strategic knowledge (p. 10). Shulman's "forms" relate to Winch's distinctions between KT and KH and they are important for the analysis in this study because they bring about more specific classifications.

Propositional knowledge (or what Winch terms KT), Shulman suggests, comprises three sub-forms: "*principles* (e.g. check for understanding), *maxims* (the "accumulated wisdom of practice", e.g. break a piece of chalk in two before use to avoid squeaking against the board) and *norms* (neither theoretical nor practical but normative and serving to guide the teacher to act morally and ethically, e.g. do not embarrass a child in front of his class)" (p. 11).

Case knowledge, in Shulman's understanding, is a vehicle for teaching theoretical knowledge. It comprises knowledge of cases "specific, well-documented, and richly described events" which are examples of practice described in detail (pp. 11, 12). The knowledge embodied in cases, he argues, is more memorable because of their narrative nature than, for example, lists of principles and maxims, and thus easier to learn. The

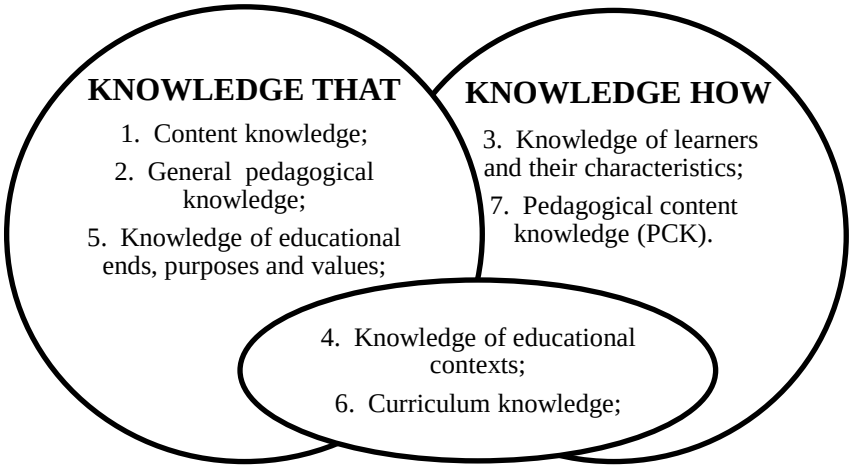
knowledge embedded in case studies includes knowledge that teachers use to exercise professional judgment and demonstrates both their propositional knowledge (KT) and their practical knowledge (KHi, ii and iii). By writing this knowledge up in cases it becomes part of the body of KT which teachers need as a theoretical basis on which to exercise professional judgment in new contexts (in Winch's terms, their inferential knowledge (IK)).

Shulman's category of *strategic knowledge* does not fit easily into KT or KH types of knowledge. Shulman believes strategic knowledge is necessary in a situation when the applicable principles clash with or contradict one another and professional judgment has to be exercised. It relies on the agent's ability to reflect, respond flexibly, and reason using a substantial body of KT. Thus it refers to inferential knowledge substantially and is applied in second- and third-order KH (pp. 12, 13).

In Figure 3.2 I classify Shulman's (1987, p. 8) framework of teacher knowledge which he sub-divides into seven categories of the knowledge base",[34] into KT or KH according to where the knowledge category mostly lies.

[34] "Content knowledge; general pedagogical knowledge, with special reference to those broad principles and strategies of classroom management and organisation that appear to transcend subject matter; curriculum knowledge, with particular grasp of the materials and programs that serve as 'tools of the trade' for teachers; pedagogical content knowledge, that special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding; knowledge of learners and their characteristics; knowledge of educational contexts, ranging from the workings of the group or classroom, the governance and financing of school districts; and knowledge of educational ends, purposes and values, and their philosophical and historical grounds." (Shulman, 1986, p. 8)

Figure 3.2 Classification of Shulman's categories of knowledge



What Shulman calls *content knowledge* is mostly KT and refers to what the teacher knows of the subject, including knowing the facts and concepts but also understanding the substantive structure (the "ways in which the concepts and principles of the discipline are organised to include the facts") and the syntactic structure ("ways in which truth or falsehood, validity or invalidity, are established") of the subject (Shulman, 1986, p. 9). Aspects of this subject matter knowledge relate to Winch's IK – see Figure 3.4. The teacher has to know and understand inferential relations. Shulman argues that the subject matter content understanding of a teacher must be at least equal to that of a non-teacher who has majored in the subject. He or she needs to "understand *that* something is so" but must also "understand *why* it is so". In addition, the teacher should know which topics are central to the discipline and which are inessential and require less emphasis in the curriculum (1986, p. 9).

I classify c*urriculum knowledge* as both KT and KH. Shulman includes knowing the range of programmes for teaching subjects and topics at various levels, knowing what teaching materials there are to teach these programmes (KT) and then knowing the reasons for choosing which materials to use in which particular circumstances (IK). In other words, the teacher is familiar with alternatives available from texts, films, software programmes and so on. Curriculum planning requires KH ii and iii (see Figure 3.4). In addition, a teacher with sound curricular understanding has an understanding of the lateral curriculum (what learners are studying in other subjects in the same grade) (KT) in order to make links with other subject content for learners (IK), and the vertical curriculum

(what learners have studied in the previous year and will study in the following years) (KT) (1986, p. 10).

I classify Shulman's (1986) concept of *pedagogical content knowledge* (PCK) as KH. This concept was introduced by Shulman to signify the special kind of knowledge teachers require that goes beyond the subject knowledge to knowledge specifically *for teaching* the subject ("content most germane to its teachability") (p. 9). PCK enables teachers to teach the subject matter knowledge prescribed in the curriculum. Having this knowledge differentiates the teacher of the subject from the subject specialist. Shulman provides the following explanation of pedagogical content knowledge:

> … the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations – in a word, the most useful ways of representing, formulating the subject that make it comprehensible to others … Pedagogical content knowledge also includes an understanding of what makes the learning of specific topics easy or difficult: the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning of those most frequently taught topics and lessons. (1986, p. 9)

Other writers have defined PCK as: "the intersection of knowledge of the subject with knowledge of teaching and learning" (Niess, 2005, p. 510); "that domain of teachers' knowledge that combines subject matter knowledge and knowledge of pedagogy" (Lowery, 2002, p. 69); "the product of transforming subject matter into a form that will facilitate student learning" (de Berg & Grieve, 1999, p. 20); and

> Pedagogical content knowledge is a teachers' understanding of how to help students understand specific subject matter. It includes knowledge of how particular subject matter topics, problems, and issues can be organised, represented and adapted to the diverse interests and abilities of learners, and then presented for instruction … The defining feature of pedagogical content knowledge is its conceptualisation as the result of a *transformation* of knowledge from other domains. (Magnusson et al., 1999, p. 96, in Ball et al., 2008, p. 394)

In this understanding PCK implies that teachers have full conceptual understanding of their subject matter knowledge (that is KT and IK). They are able to make the inferences so that they can teach a subject. They know how it is organised and what procedures must be followed to admit a new idea into the body of subject knowledge. Knowing how to work with KT and teach it to learners with diverse abilities requires KHi, ii and iii.

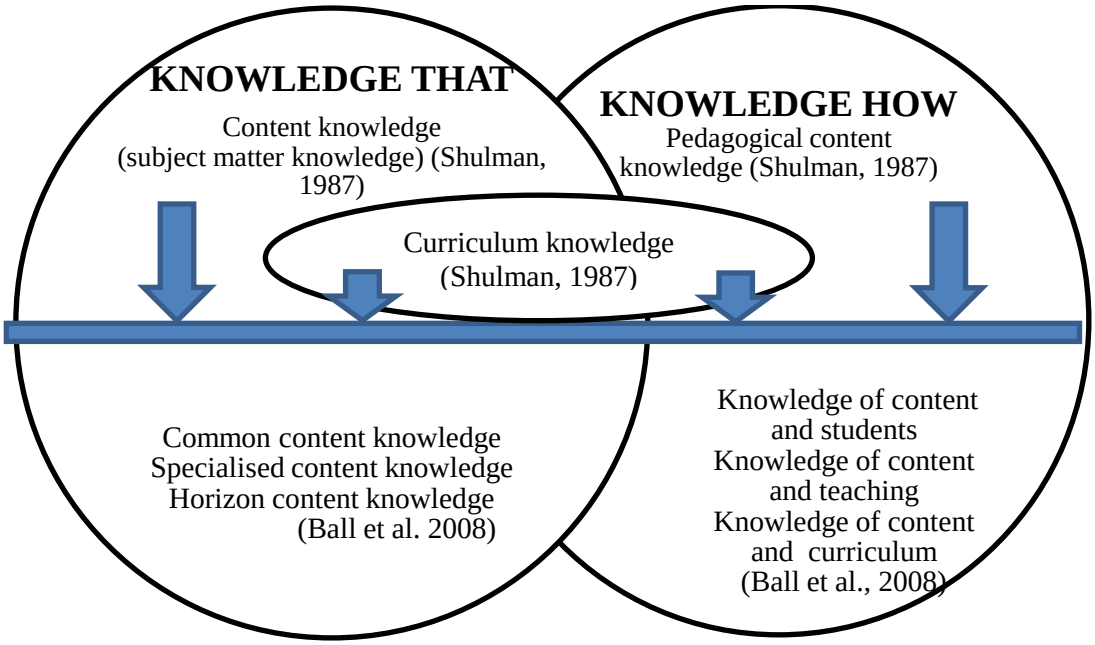
Teachers require strategies to deal with misconceptions that arise from learners' preconceptions and this often involves reorganising the latter's existing understandings (KHi and ii). Knowledge of the actual misconception is KT. *Knowledge of learners and their characteristics,* Shulman believes, is a fruitful area for research because of the influence of misconceptions on learners' future learning (Shulman, 1986, p. 10).

Following Shulman's identification of the "missing paradigm" in teacher education, writers have argued for teacher education to place greater emphasis on subject matter knowledge. From their study which explores the question: "What do teachers need to know and be able to do in order to teach effectively?"[35] Ball et al. (2008) build their practice-based theory of content knowledge for teaching on Shulman's classification (p. 389). Their work aims to identify categories of teacher knowledge which traditionally make up the general curriculum of teacher education. They identify six domains of teacher knowledge.

In Figure 3.3 I have created a framework for examining knowledge-for-teaching. I place Shulman's (1987, p. 8) classification of content-related categories of knowledge within Winch's KT and KH classification. I then add Ball et al.'s (2008) six domains of mathematical knowledge for teaching using their classification into subject matter knowledge and pedagogical content knowledge (p. 403) to this classification of KT and KH.

[35] Their study focused specifically on what was needed for teaching Mathematics.

Figure 3.3 Classification of knowledge-for-teaching



For Ball et al. (2008) KT includes firstly "*common content knowledge* (CCK)" which is mathematical knowledge required by everyone who works with mathematical matters, and is not unique to teaching. It includes knowing the material they teach, knowing what is right and wrong, using terms and notation correctly, being able to identify inaccuracies in learning materials (p. 399). Secondly, teachers need "*specialised content knowledge* (SCK)" which is the mathematical knowledge that is unique to teaching. This includes being able to make "features of particular content visible to and learnable by students". It involves "unpacking of mathematics that is not needed – or even desirable – in settings other than teaching" (Ball et al., 2008, p. 400). Thirdly, in a refinement of their classification, Ball et al. (2008) added "*horizon content knowledge*" (HCK) (knowledge of how mathematical topics are related along the length of the curriculum) under subject matter knowledge. These three domains of knowledge also require the appropriate exercise of Winch's IK.

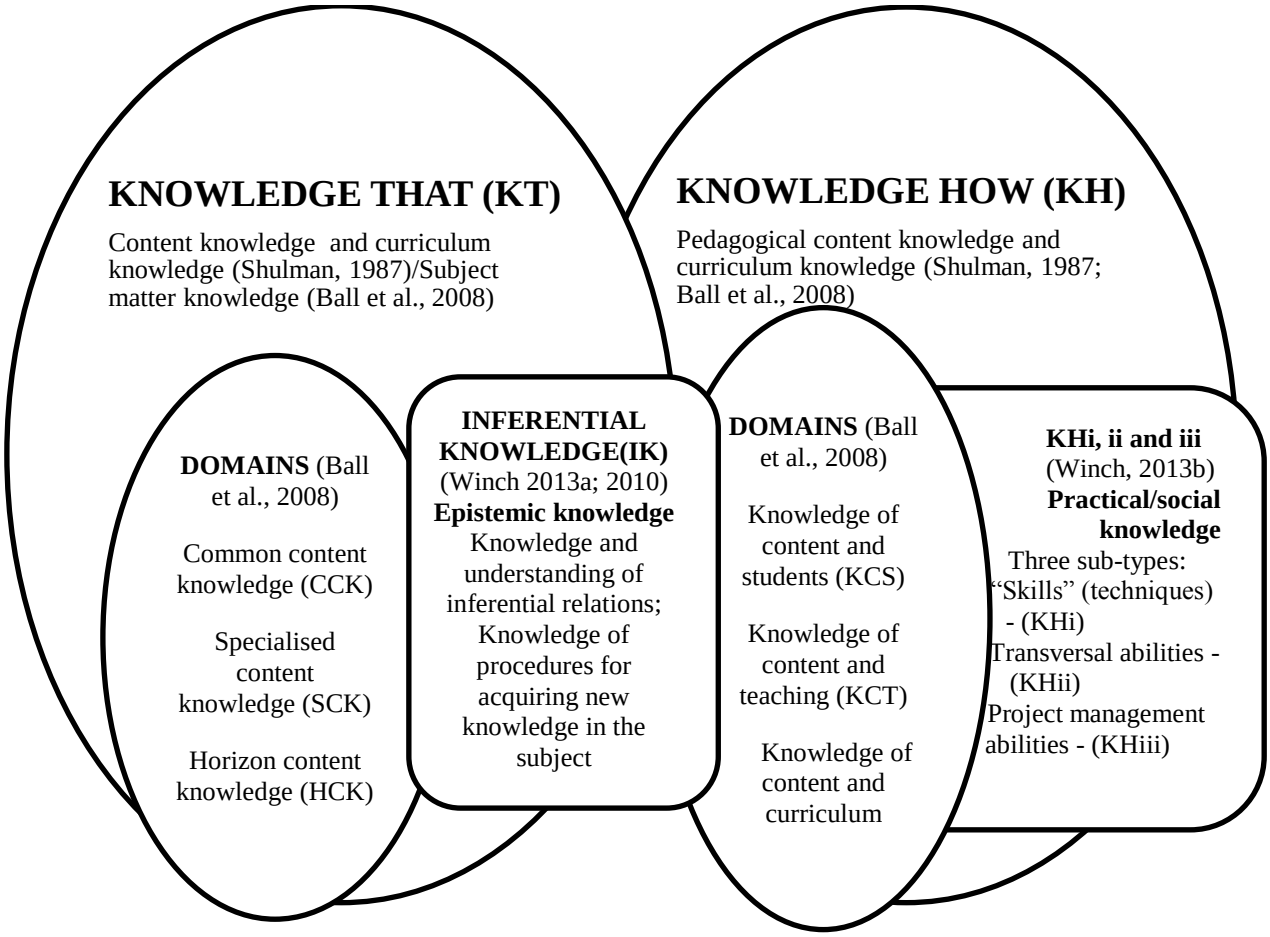
Under KH, I include, firstly, Ball et al.'s domain of "*knowledge of content and students* (KCS)" which combines knowing about mathematics and students. This includes understanding student thinking, being able to anticipate what students will find difficult or easy, and knowing what the common misconceptions and errors are (2008, p. 401). Secondly I include "*knowledge of content and teaching* (KCT)" which combines knowing

about mathematics and teaching. To do this the teacher needs to understand the mathematical issues and the student issues that affect the learning of a concept. This includes knowing how to sequence the learning, deciding which representations, procedures and methods to use when teaching a concept, knowing when to stop and clarify a point, when to respond to a student contribution to make a mathematical point or when to ignore a student contribution (2008, pp. 401, 402). These domains would mostly entail KHi and ii but could also require IK. Lastly, I include Ball et al.'s refinement of Shulman's "curricular knowledge" "*knowledge of content and curriculum* (KCC)" (pp. 402, 403). This includes knowing the range of programmes for teaching a particular subject at a particular grade level, knowing the instructional materials available for teaching the programmes, and knowing how to decide which materials are best suited for teaching the programmes (Ball et al., 2008). This domain would involve IK and KHi, ii and iii.

Figure 3.4 provides a composite framework for understanding knowledge-for-teaching. I placed Shulman and Ball et al.'s classifications into Winch's classification of KT, IK and KHi, ii and iii. Ball et al.'s domains describe what knowledge teachers learn and Winch's classification identifies the type of knowledge they learn. While KH depends on KT, IK depends significantly more on KT. I use this framework to describe the knowledge that teachers work with in the PLCs in this study.

Although Ball et al.'s classification is focused on Mathematics knowledge I find it sufficiently generative to extrapolate to the other subjects in the study, namely: English and Geography. I use the above classification to describe the types of knowledge-for-teaching that teachers focus their learning on in the PLCs.

Figure 3.4 Framework for knowledge-for-teaching



3.3 CRITERIA FOR EVALUATING THE LEARNING OF KNOWLEDGE IN TPD/PLCS

According to Easton (2008) professional learning should be judged not on how good teachers feel afterwards but on results in the form of changes in teachers' knowledge and beliefs, their motivation to change practices and apply new knowledge and skills consistently, and what they can actually do:

> Developing is not enough. Educators must be knowledgeable and wise. They must know enough in order to change. They must change in order to get different results. They must become learners, and they must be *self*-developing. (p. 755)

In her opinion there should also be change in learner conduct in the school and classroom, and improved achievement (pp. 758-759).

Kelly (2006) is critical of what he terms "instrumentalist" practices which assume that learning transfers to the classroom and measure success according to learner

achievement. He suggests that teachers who engage in reflective, collaborative, enquiry-based problem-solving practices use more complex measures of success (p. 516):

> Thus from a socio-cultural view, to reduce the complex web of distributed knowing and collaborative learning within which teacher expertise is set to simple causal relationships demanded by the notion of impact is, at the very least, unhelpful. (2006, p. 516)

Learning is likely to have taken place if the following outcomes are evident in teachers: they are more reflective (Langer et al., 2003); they trigger new perspectives in fellow collaborators (Morse, 1994); their knowledge-for-teaching has grown (Langer et al., 2003) and transferability of knowledge has increased (Bullough & Pinnegar, 2001); their teaching and learning practices have changed; they provide more useful feedback (Langer et al., 2003); and they display greater self-efficacy (Lassonde & Israel, 2010, pp. 9, 10).

Fraser et al. (2007) sum this up:

> … professional learning can be seen as the processes that result in specific changes in the professional knowledge, skills, attitudes, beliefs or action of teachers. (p. 157, in Bertram, 2011, p. 12)

In this study I aim to identify whether PLC activities are effective for teacher learning. I do this by examining what teachers focus on in PLCs and what they learn, specifically what knowledge-for-teaching they learn.

3.4 CONCEPTUAL FRAMEWORK FOR THE STUDY

From the literature reviewed I have identified five conceptual claims which provide the framework for this research study.

- *The work of PLCs is likely to be enabled*
  - *when there is a supportive school culture with supportive formal school leadership, school structures and resources, and*
  - *when teachers understand and accept the PLC model of teacher professional development and have an improvement- and an enquiry-oriented mindset.*

In this study I have aimed to identify the school-related contextual conditions and teacher characteristics that enable PLCs to work effectively and those that inhibit such work.

- *Facilitators play a key enabling role in sustaining PLCs' functioning and facilitating/leading teachers' learning in PLCs through the exercise of organisational, motivational and professional functions combined with a complex range of personal qualities.*

  The ISPFTED envisages PLCs functioning across the length and breadth of South Africa but little attention has been given to how they will be facilitated. In this study I have used school-based teachers as facilitators to see whether they were able to facilitate in a manner that enabled learning in a PLC and if so how they did so and what approaches and styles they used. I have explored what could improve the likelihood of facilitation enabling learning.

  - *PLCs are likely to enable teachers' learning of aspects of professional knowledge when the participants agree on and give sustained attention to a topic which they have identified as important for their professional learning.*

  This study has investigated what teachers in PLCs choose to focus on when a structured agenda or formal programme is not imposed on them. I have explored factors that influence their choice of focus. I have also explored whether the focus on a particular topic is sustained and covered in depth or whether the PLCs deal with many topics for shorter periods in a more superficial manner.

  - *The collaborative enquiry processes such as Professional Learning Inquiry Cycles, Collaborative Analysis of Learners' Work, Japanese Lesson Study, and protocols are useful enquiry-based and reflective processes for teachers to use in learning aspects of knowledge-for-teaching in PLCs. They are likely to work better if there is a critical mass of expert knowledge, experience and confidence available to the PLC.*

The literature on PLCs describes extensively how knowledge can be learned in PLCs. In this study I have explored whether the PLCs effectively used the collaborative enquiry and reflection processes described in the literature.

- *The knowledge-for-teaching that PLCs focus on includes "knowledge that" (subject matter knowledge) and "knowledge how" (practical knowledge/pedagogical content knowledge) and covers six domains of knowledge. PLCs use inferential knowledge in some learning activities.*

While the literature on PLCs does not deal specifically with what knowledge PLCs focus on, this study has attempted to explore in detail what types and domains of knowledge the learning in PLC focuses on and whether PLCs are an effective vehicle as envisaged in the ISPFTED for addressing the subject matter knowledge deficiencies of many teachers in the country.

3.5 CONCLUSION

The literature review presented in chapter 2 established the centrality of teachers and of instruction for improvement in the quality of learning; identified characteristics of effective TPD and effective PLCs, factors enabling/inhibiting learning in PLCs, focusing particularly on facilitation/leadership, and school conditions; drew attention to limitations of PLCs and noted socio-cultural influences on PLC functioning and perspectives on how teachers learn in PLCs. Chapter 3 has identified types and domains of knowledge-for-teaching from which I created a framework for describing findings related to what knowledge is learned in PLCs and concluded with criteria for evaluating knowledge learning in PLCs. This study explores these ideas with the aim of understanding what aspects of professional knowledge (knowledge-for-teaching) teachers can learn in a PLC and how they do so. The conceptual claims outlined in 3.4 provide the framework for discussing the findings of this research study.

CHAPTER 4 RESEARCH DESIGN AND METHODOLOGY

4.1 RESTATING THE PURPOSE AND AIM OF THE STUDY

In chapter 1 I explained that despite ambitious visions for TPD and considerable financial and human investment in TPD programmes internationally and in South Africa, to date the evidence for any causal connection between improved learner achievement and any form of teacher professional development is not strong (Yoon et al., 2007; Guskey & Yoon, 2009, p. 496). In South Africa the quality of learner achievement is still poor (Taylor et al., 2013; Spaull, 2013) and Crouch & Patel (2008) argue that the type of TPD that teachers in South Africa have experienced has had little impact on their practice or on learners' performance. This may be because it has been largely of a generic nature and insufficiently related to context rather than subject- and context-focused which research findings indicate is likely to be more effective (Adler & Reed, 2002). This study has explored a model of TPD that has emerged internationally, namely, collaborative learning in professional learning communities (PLCs), which is subject-specific and context-embedded.

Main research question:

What and how did teachers learn knowledge-for-teaching in three professional learning communities?

Sub-research questions:

- What factors enabled or inhibited the work of three PLCs?
- Did the facilitation of each PLC's work contribute to what was achieved, and if so, how?
- What did teachers in three PLCs choose for the focus of their learning of knowledge-for-teaching and how did they arrive at that focus?
- What knowledge-for-teaching did teachers choose to focus on in the three PLCs?
- What learning processes did the three PLCs follow to address their learning focus choices?

The research question is explored through the sub-research questions, empirical research questions and evidence outlined in Table 4.1 overleaf.

Table 4.1 Research Questions

Main research question	Sub-research questions	Empirical research questions	Source of evidence	Chapter/s where findings presented
What and how did teachers learn knowledge-for-teaching in three professional learning communities?	1. What factors enabled or inhibited the work of three PLCs?	1. What school conditions supported or inhibited teachers' participation in a PLC? 2. What characteristics of PLC participants enabled or inhibited learning in a PLC? 3. What did this model of TPD require from teachers that was different from other models of TPD?	Minutes and transcripts of PLC sessions In-depth interviews with eight PLC members Focus group interview with facilitators Facilitators' questionnaires PLC participants' questionnaires PLC members' learning reflection journals Participating schools' HODs, and principals' questionnaires	Chapter 5
	2. Did the facilitation of each PLC's work contribute to what was achieved, and if so, how?	1. What functions were facilitators expected to fulfil? 2. What role did facilitation play in PLC functioning? 3. What approaches and styles did facilitators adopt and why did they choose these? 4. How important were relationships and trust? If they are important, how were these developed? 5. How was motivation developed and sustained?	As above	Chapter 6
	3. What did teachers in three PLCs choose for the focus of their learning of knowledge-for-teaching and how did they arrive at that focus?	1. Was the choice influenced by contextual conditions at the schools of the PLC participants? 2. Was the choice influenced by the knowledge and experience of the PLC participants? 3. To what extent did PLCs choose their learning focus as a result of the facilitator's influence, their learners' needs, or their own learning needs? 4. Was a consistent focus achieved and sustained?	As above	Chapter 7

Main research question	Sub-research questions	Empirical research questions	Source of evidence	Chapter/s where findings presented
	4. What knowledge-for-teaching did teachers choose to focus on in the three PLCs?	1. What aspects of knowledge-for-teaching did the PLCs focus on? 2. What types of knowledge were developed in the PLCs? 3. Did the learning process balance a focus on subject matter knowledge and PCK, and if so, in what ways? 4. What did teachers do in the PLC that made their activities useful for learning?	As above Examination of artefacts used or created by PLCs	Chapter 8
	5. What learning processes did the three PLCs follow to address their learning focus choices?	1. In what ways did PLCs maintain both focus and collaboration? 2. How did the PLCs learn knowledge-for-teaching? 3. What, if any, enquiry-based learning processes were used? 4. To what extent did the teachers use reflection in their learning?	As above	Chapter 8

4.2 RESEARCH DESIGN OVERVIEW

This case study examines a segment (the Focus Project) of a larger action research study of a Networked Learning Community (NLC), initiated by the researcher's school (the Big Project) details of which are included in Appendix 4.1. This case study is in fact a case study of cases (Bassey, 1999; Adler & Reed, 2002), with the three PLCs each being a separate case on which a cross-case analysis has been undertaken.

Yin (1994) defines case study in terms of the *process* of conducting it: "A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (p. 13). The case study approach suits this research as I am interested in process and a richly descriptive end-product (1994, 29, 33).

In his writing on case study Stake (1995) focuses on the *unit of study.* In this research the units or phenomena investigated are the learning work of teachers who participate in subject-based PLCs within the NLC and the factors that enable or inhibit the functioning of the PLCs.

According to Mouton (2001), a research design provides the overall plan for achieving the research aims (p. 56). This study is located within a qualitative research paradigm. Qualitative research is "*interested in understanding the meaning people have constructed*", "*the researcher is the primary instrument of data collection and analysis",* and *"it usually involves fieldwork"* (italics in original) (Merriam, 1998, pp. 6, 7). "A qualitative case study is an intensive holistic description and analysis of a single instance, phenomenon, or social unit" (Merriam, 1998, p. 21). It implies a direct concern with experience as it is 'lived' or 'felt' or 'undergone' (Sherman & Webb, 1988, p. 7, in Merriam, 1998, p. 6). Qualitative research can reveal how parts work together to form a whole in contrast to quantitative research which takes apart a whole to look at the parts. In qualitative research "it is assumed that meaning is embedded in people's experiences and that this meaning is mediated through the investigator's own perceptions" (Merriam, 1998, p. 6). Patton (1985) emphasises that qualitative research is interested in understanding the uniqueness of situations and that this understanding (in depth) is an end in itself (p. 1, in Merriam, 1998, p. 6).

This study is an exploratory one which has aimed to investigate teacher learning in three PLCs (the phenomenon or unit of analysis), using verbatim transcripts/minutes of PLC sessions, in-depth individual interviews of PLC participants, facilitators' focus group interviews, principals', HODs', teachers' and facilitators' responses to questionnaires, and teachers' and facilitators' reflection journals.

All research involves a research problem or research question for which answers are sought. This study is an example of applied research as its aim has been to understand factors that are likely to impact on how PLCs function and what teachers focus on in their learning in the PLCs. An understanding of these factors is important in light of the Integrated Strategic Planning Framework for Teacher Education and Development in South Africa (ISPFTED) (see 1.1) which envisages the widespread use of PLCs for TPD.

4.3 RESEARCH METHODOLOGY

Methodology is concerned with the process of accomplishing the research aims and thus with the tools, procedures, specific tasks and individual steps associated with a particular study (Mouton, 2001, p. 56). After completing a literature review to verify that I was not

duplicating a previous study and to discover the most recent and authoritative theoretical and empirical work in the area of the proposed study, I proceeded to gather data, a process which began with identifying data sources, data collection tools, and respondents (Mouton, 2001, p. 99). In this section I describe how the cases were selected, what data collection tools I used, who the respondents were, and how they were selected.

4.3.1 Selecting the cases

The three cases that make up the case study were selected from the seven subject PLCs of the NLC. The NLC comprised teachers from six schools (two suburban and four township[36] ones) who were members of a cluster within a Gauteng school district. Over time the NLC grew to eleven secondary schools from this district (three suburban, including the NLC co-ordinating school, one CBD[37] school, one in a low-cost housing settlement, and six in townships. Teachers and principals from these schools were invited to participate in the subject PLCs (English, Mathematics, Mathematical Literacy Physical Sciences, Life Sciences, Geography, and Accounting) and the principals' PLC.

I selected the Geography, English and Mathematics subject-based PLCs as the cases making up this study. These PLCs were chosen by means of "non-probability sampling" of the "purposive" or "judgmental sampling" type[38] (Babbie, 2005, pp. 188, 189). I chose this mode of sampling/selection because these subject PLCs seemed to be different from one another in composition and functioning and thus would provide richer and more diverse data than PLCs that were similar in nature:

- the Geography PLC teachers appeared to be less confident of their subject matter knowledge than those in the other PLCs and relied extensively on the facilitator;

[36] A "township" is the term for a proclaimed housing settlement. In South Africa, however, the most common daily use of the term refers to high density and originally poorly serviced dormitory settlements on the outskirts of towns established by the apartheid government for African persons, often assigned on the basis of ethnicity and language.
[37] Central Business District
[38] Purposive sampling – A type of non-probability sampling in which a researcher selects the units to be observed on the basis of his or her judgment about which ones will be the most useful or representative. Another name for this is judgmental sampling. (Babbie, 2005, pp. 188, 189)

- the English PLC had fewer regular participants than the other PLCs but all were confident of their knowledge and engaged from the start with the collaborative enquiry process as envisaged in the PLC model of TPD; and
- the Mathematics PLC, the largest group, consisted of an equal number of teachers who were confident of their knowledge and those who were not. The facilitator had previous experience of participating in a PLC in the DIPIP project. They began their PLC work by examining learners' errors, also envisaged as an important process in the PLC model of TPD.

4.3.2 Data collection: identifying data sources, data collection tools and respondents

Researchers who undertake case studies are advised to collect data from multiple sources in order to enhance the validity of any claims that they make from their analysis of this data (Flick, 2002). This section describes each source of data for the study and the process of its collection.

4.3.2.1 Interviews

"Qualitative interviewing design is flexible, iterative, and continuous, rather than prepared in advance and locked in stone. … questioning is redesigned throughout the project." (Rubin & Rubin, 1995, pp. 46, 47). Janesick (1998) in "*Stretching" Exercises for Qualitative Researchers* provides very helpful guidelines and warnings about pitfalls which I studied in order to conduct interviews as effectively as possible. The checklist covering details, such as: giving advance notice, how the questions should be approached, logistics, moderator skills and what to do after the session, was particularly helpful (pp. 38, 39). In order to facilitate the transcription and analysis of the data collected in the individual and focus group interviews I used a voice recorder to record the discussions. Participants gave consent for this to be done.

a) Individual teachers' interviews

I used a semi-structured interview schedule (Appendix 4.2.1) to interview seven individual teachers, two from the Geography and English PLCs and three from the Mathematics PLC. The teachers were selected by the NLC co-ordinator based on a) the teachers' attendance record (more than 80% of sessions) and b) their volunteering to be interviewed.

I interviewed the teachers at their schools, after school hours in classrooms or offices, during September and October 2011 (the English and Mathematics teachers) and in January and February 2012 (the Geography teachers). The teachers chose the place and time and they appeared to be quite at ease in the environment. The interviews took the form of a conversation where I asked questions that were familiar to me while trying not to appear as if I were following a tightly structured list of prepared questions. The main topics included the teacher's attitude towards learning, professional development experiences, how the teacher helps learners learn more effectively, experiences related to subject responsibilities, and experiences from participating in the subject PLC. These topics were chosen in order to obtain background information about the PLC participants that would help me understand their current beliefs, practices and experiences related to what this study was investigating. I tried to let the interviewees do nearly all of the talking while I listened carefully, interpreting the meaning of the response and its significance for the research and then either asking other questions to take the matter further or judging that the response was complete and directing the interviewee to a new aspect (Babbie, 2005, p. 314). I tried to observe Steinar Kvale's (1996, p. 88) seven stages[39] of the interviewing process as summarised by Babbie (2005, p. 316). I recorded the interviews with the participants' knowledge and permission. An expert third party transcribed them and I checked the transcription. I observed all ethical considerations in this process.

Some advantages of this type of interview are:

- avoidance of the pitfalls of self-completed questionnaires, such as the use of ambiguous and vague terms, double-barrelled questions, asking questions outside the knowledge scope of the participant;
- face-to-face interaction with respondents which enables any serious misunderstandings to be addressed immediately;
- the voice record captures completely and accurately the detail of the respondents' responses and nuances of verbal expression, providing evidence which can be quoted.

[39] Thematising: clarifying the purpose of the interviews; Designing: laying out the process through which the purpose can be accomplished, including a consideration of the ethical dimension; Interviewing: doing the actual interviews; Transcribing: creating a written text of the interviews; Analysing: determining the meaning of gathered materials in relation to the purpose of the study; Verifying: checking the reliability and validity of the materials; Reporting: telling others what has been learned (Steinar Kvale, 1996, p. 88, summarised by Babbie, 2005, p. 316).

Some disadvantages are:

- the researcher-interviewer can impose his/her presence or agenda and exert undue influence on the participants;
- the interviewer requires skill to prevent the respondent digressing significantly from the questions and to curtail responses that are irrelevant or unnecessarily lengthy and to direct follow-up questions to make sense of responses that may be confused;
- transcription of interviews is time-consuming and requires careful checking.

To limit some of these disadvantages of semi-structured interviews I tried to ensure:

- that the interview schedule was not too long,
- that questions were posed in an order that would advance the collection of data in the most efficacious manner,
- that sensitive questions were broached in a careful manner at the most opportune time in the interview,
- that the language I used was well understood by participants, and
- that I did not ask leading questions that influenced the participants to give a particular response.

b) Focus group interview

I conducted one focus group interview with facilitators of all the subjects in the NLC in August 2012. Eleven facilitators participated in an interview at the school co-ordinating the NLC, after school hours in an office. The facilitators knew one another and the researcher. Informal conversations amongst the facilitators and the researcher about NLC work were frequent so participants contributed freely to this recorded interview. Participants appeared to be quite at ease in the environment and understood that I was inviting them to express honest opinions. I hoped that this would enable me to derive maximum benefit from the interaction (Babbie, 2005, p. 316). Participants prepared for the interview by reading the interview questions, (semi-structured interview schedule - Appendix 4.2.2) and by answering a questionnaire (Appendix 4.2.7), prior to the interview.

This method of data collection has advantages: it is flexible; it delivers speedy results; is not costly to do; and group dynamics often result in new ideas emerging that would not necessarily have done so in an individual interview. However, there are some negative factors associated with this method (Stycos, 1981; Cohen et al., 2000; Wooten & Reid

II, 2000): the researcher has to be skilled in handling the discussion which is more difficult to control than in individual interviews; care must be taken to prevent domination by some individuals and groupthink; the researcher must avoid over-directing the discussion or imposing his/her own viewpoints; and the data obtained can be difficult to process and analyse. Aware of these advantages and disadvantages, I tried to maximise the opportunities that this method provides and to avoid doing what could prevent rich and reliable data emerging from the discussions.

c) School background interview

A structured interview schedule (Appendix 4.2.3) was administered by an assistant to the principals or deputies of the eleven participating schools (the initial six schools and the five that joined at later stages) after a discussion with me about the approach and the detail required. The purpose was to obtain data about each school in order to understand the context in which the PLC teachers worked. The data sought was mostly of a factual nature, for example: the location and history of the school, its size, learner and staff numbers, its academic achievements and what the school prides itself on, the qualifications of the teachers, professional development offered and teachers' attitude towards it, the level of collegiality in the school, the extent of parental involvement, resources available for teachers, measures the school has in place to assist learners, what the principal believes hinders learners' progress, and what teachers complain about. These interviews were conducted at the beginning of the NLC project in January/February 2011 except for schools Wood and Valley where they were conducted in March 2013.[40] It should be noted that these are the subjective responses of the individual respondents.

The participants responded orally and the recorder captured their responses while they were speaking. Follow-up questions could be used to obtain a clear and full understanding of the response. One challenge was that the recorder needed to listen exceptionally well to capture the nuances of the responses and to guard against bias in the way answers were recorded.

[40] Wood only joined in 2012. The new principal of Valley was prepared to complete the questionnaire. When the NLC co-ordinator had tried to administer it to the previous principal, the teachers refused access.

4.3.2.2 Questionnaires

I used eleven questionnaires: a background questionnaire for all the PLC participants, including the facilitators, two facilitator's reflection questionnaires, a Head of Department's questionnaire, a facilitator's questionnaire, three progress questionnaires for participants, facilitators, and principals, and finally three end of project questionnaires (Appendices 4.2.4 - 4.2.14). The questionnaires for this study included questions aimed at eliciting background information about the schools, biographical information about the participants in the study, and an understanding of teachers' experience of professional development and participation in PLCs. The questions that explored teachers' personal beliefs and practices were open-ended.

The principles which inform the construction of questionnaires and their advantages and disadvantages are applicable to all the questionnaires. If quality data is to be obtained from questionnaires the right questions must be asked. Questions must be specific, easily understood (concepts/terms must be known to the respondents) and focus on one idea at a time; they must not be leading questions; the format of the questionnaire and the sequence of questions should enable thoughtful responses; they should be piloted to see whether they meet the objective of the research and can be understood in the same way by all participants. The advantages of the questionnaire are: it is cheap and relatively quick to administer; answers are recorded and can be reviewed easily at a later stage; it standardises what is explored and therefore makes description and comparison simpler. The disadvantages are: it is easy to omit essential questions and thus miss important data; analysis of the data is time-consuming. In this study these disadvantages could be overcome. If questions were omitted it was possible to ask them in a follow-up questionnaire as there was regular contact with the participants (Munn & Drever, 1999).

a) Background questionnaire completed by all participants[41]

The participants, including the facilitators, completed this questionnaire (Appendix 4.2.4) at the beginning of the project. It explored their personal background, confidence

[41] "participants" includes facilitators as the model of TPD in PLCs that this study uses does not rely on an external facilitator but one of the PLC participants who takes on that role. The lead teacher from the co-ordinating school assumed the role to start the project off.

in aspects of knowledge-for-teaching, teaching context, beliefs and experiences related to learning and teacher professional development.[42]

Understanding that self-completed questionnaires have a number of pitfalls, I went through the questions orally with the facilitators and then asked them to allow participants time at the beginning of the first two PLC sessions to complete the questionnaire. I tried to ensure that the respondents understood the meaning of the concepts and terms used, except when the objective of the question was to discover what the respondents knew or did not know about the topic. If participants had any difficulties with interpreting the questions, facilitators were able to assist. Participants took the questionnaire home after the first session and most of them completed it in the second session. I believe this was an appropriate way of obtaining detailed and honest information. The disadvantages were that I could not (easily) probe the respondents for more detail and the return rate (approximately 70%) meant that not all participants contributed to my understanding of the phenomena that I was exploring in the questionnaire.

b) Brief reflection questionnaires (after six and twelve months) and longer questionnaire (after eighteen months) completed by facilitators

As it became apparent that the facilitators were playing a key role in the functioning of the PLCs it was important to explore their experiences. The brief questionnaires (Appendices 4.2.5 – 4.2.6) were answered, after six and twelve months, by the facilitators in their own time and aimed to explore their perceptions of how the PLCs were working and to what effect, what they did in their sessions, and what they would do differently in future sessions. The third questionnaire (Appendix 4.2.7) was longer and explored the facilitators' prior experience of facilitating, or training in how to facilitate, as well as how successful they felt their facilitation had been. The questionnaire asked them to assess the extent to which they had performed certain facilitation/leadership functions. It included an exploration of the facilitators' attitude towards being a facilitator in the NLC project. This questionnaire was administered after eighteen months of the project's existence.

[42] Teachers who joined the project in the course of the first year were also asked to complete the questionnaires. Their return rate was lower as they were not given time in the sessions to complete it.

Once again I was mindful of the limitations of self-completed questionnaires so I handed out the questionnaires in a meeting of facilitators and gave them time to read the questionnaires and ask me questions. A deadline (one week later) was given for the return. The return rate was 100% for all the facilitators' questionnaires.

c) Questionnaire completed by Heads of Department

The NLC project originally anticipated the participation of mainly HODs or lead subject teachers. This did not happen so I asked all the HODs of the NLC subjects from all the participating schools[43] to help me understand why they were or were not attending the PLCs, if they were, what their experiences were, and if they were not, were the teachers who were attending reporting back to the school in any way (Appendix 4.2.8). Responses to the questionnaire helped me to see the key role that school leaders play in enabling the functioning of PLCs. This questionnaire was administered at the end of the first year of the project (November/December 2011). I did not have an opportunity to mediate the questionnaire in any way so I provided a short introduction before the questions. I had to rely on the principals to ask their HODs to complete it and return it before the close of the school year. The principals brought the completed forms to their last PLC session of the year. I estimate[44] that the return rate was about 60%. I believe the responses represented the full range of opinion and experience and would not have been different if more questionnaires had been returned because the questionnaires that were received came from a range of HODs across the schools and subjects.

d) Questionnaires on progress completed by teachers, facilitators, and principals

In the last session of the second year of the NLC project (November, 2012), participants, facilitators and principals were asked to complete a progress questionnaire (Appendices 4.2.9 – 4.2.11). For each group there were slightly different questions which asked them to describe and evaluate their experiences of PLCs, including identifying the strengths and challenges of PLC work, and to make recommendations for the final year of the project. The questionnaire also asked everyone to consider whether this PLC model could be used in a national TPD strategy, and what would be

[43] The principals of Purpose and Valley were excluded because their teachers were not attending and Wood joined later.
[44] I had to estimate the number of HODs based on each school's enrolment.

the benefits and challenges of using this model. Finally, it asked respondents to evaluate the success of their PLC group, including the likely impact of the PLC work on learners' performance. I mediated the questionnaires given to principals and facilitators. The facilitators mediated the questionnaire to participants in their PLC. I advised the facilitators to say very little and to allow the participants to respond freely to whatever the question suggested to them in order to avoid influencing their responses. All questionnaires were completed in the final PLC session for the year and so the return rate was 100% of the parties present on that day (40 questionnaires collected). As it was the last session of the year attendance was lower than normal[45] so the data collected from this instrument represents a sample of the parties in the NLC. I believe, however, that the responses were sufficiently representative because more than half the regular participants in each PLC completed the questionnaire.

e) Questionnaires completed by teachers, facilitators, and principals at the end of the project

In the last PLC session teachers, facilitators and principals completed an 'end of project' questionnaire which explored similar issues to those in the progress questionnaires described above. The questionnaire included an evaluation of the effectiveness of the PLC and specific questions about learning knowledge-for-teaching. The facilitators mediated the questionnaire to participants in their PLC and I mediated it to facilitators and principals. Although only 30 questionnaires were returned because attendance at the PLC session was lower than usual because it was near the end of the school year, I believe the responses were sufficiently representative of all the participants because those who did respond taught at different types of schools and attended different subject PLCs.

4.3.2.3 Audio-recordings of PLC sessions

All PLC sessions were audio-recorded except for Geography sessions 1, 3 and 14; English sessions 1, 3, 10, 11, and 12; and Mathematics session 1.[46] An expert third party transcribed all the sessions conducted from January 2011 to March 2012 for the Geography and English PLCs and from January 2011 to May 2012 for the Mathematics

[45] Teachers reported not being able to attend because of grade 12 examination duties.
[46] The sessions were not recorded because the facilitator did not collect the recorder or failed to switch it on correctly.

PLC[47] and I checked them. I observed all ethical considerations in this process. An advantage of this checking was that I was able to hear/read almost every word spoken in the PLC. The transcripts, along with the artefacts referred to in the discussions, provided a full and accurate record of the work done in each PLC session. These were the main data source for the study.

4.3.2.4 Minutes of PLC sessions

When a session was not recorded the facilitator provided written minutes of it.[48] These minutes comprised a list of the activities done in the session and points to note but not the discussion amongst participants. These records were by their nature not complete and detailed. I asked the facilitators for clarification when I needed more information to assist me when classifying the sessions.

4.3.2.5 Learning reflection journals

At the end of most sessions[49] teachers and facilitators wrote a short reflection on the session in a notebook which was handed out and collected at each session. The NLC project co-ordinator controlled these. The journal entry was supposed to be a reflection on participants' learning but sometimes it was merely a list of activities done in the session. The Mathematics facilitator usually posed a question for participants to reflect on. Facilitators reflected on their learning as well as their experiences of facilitating the session.

4.3.2.6 Artefacts used or created in the PLCs

At the end of each session the facilitators handed in copies of the artefacts used or created in the PLC. This enabled me to see the materials the PLCs were working with as I read the transcripts. Examples of these are included in Appendix 8.3.

4.3.2.7 Informal observations and notes

I observed teachers as they arrived for the PLC sessions. I noted their body language and conversation. I made notes on the individual interviews and focus group interview as they took place. These notes covered observations of the context and of the way the

[47] This entailed 13 Geography transcriptions, 11 English transcriptions, and 19 Mathematics transcriptions.
[48] This entailed 3 sets of Geography minutes, 4 sets of English minutes, and 1 set of Mathematics minutes.
[49] Sometimes the facilitator forgot to hand out the journals so not every session was followed up with a reflection.

interviews were set up and conducted. I observed the teachers and the facilitators in an informal way as they arrived for the interview, their introductory remarks and the perception I had of their willingness to participate.

4.3.3 Accessing the data sources

I applied to the Gauteng Department of Education to conduct research in identified public schools. The letter of motivation included the rationale for the study and the benefits that could accrue to the GDE as a result of the study. Permission was granted (Appendix 4.3.1). I then provided similar letters of motivation and a participant information sheet to the district director, principals, and SGBs of the NLC schools requesting their consent and co-operation (Appendices 4.3.2 and 4.3.3). I attached a copy of the letter of permission from the GDE to assure them that the study had been approved and that the GDE would have no objection to their being involved. At the first meeting of the subject PLCs, facilitators and teacher participants were given similar letters (Appendix 4.3.4) and the information sheet. The consent of all participants was obtained. I emphasised that care would be taken to ensure confidentiality and that ethical considerations would be observed.

4.3.4 Description of the data sample

4.3.4.1 Schools' sample and school background information

The data from the school background questionnaires provided information which helped the researcher understand the PLC participants' contextual situation and needs. As the schools themselves are not the object of analysis I present a summary of the data from these questionnaires in Appendix 4.4. Table 4.2 below provides an outline profile of each school.

Table 4.2 Outline profiles of the schools

	Name of school[50]	Location, type and Grades offered at the outset of the study	Fees/no fees	Number of learners enrolled in school in 2011	% Pass rate for Grade 12 in 2010, 2011 and 2012	% Pass rate in English HL or FAL in 2010, 2011 and 2012	Pass rate in Mathematics in 2010, 2011 and 2012	Pass rate in Physical Science in 2010, 2011 and 2012	Pass rate in Life Sciences in 2010, 2011 and 2012	Pass rate in Geography in 2010, 2011 and 2012	Pass rate in Accounting in 2010, 2011 and 2012	Pass rate in Maths Literacy in 2010, 2011 and 2012
1	Field	Johannesburg Far North, RDP housing, priority[51] Gr 10-12 (extended to include gr 9 in 2013),	No fees	902	49,3 57,9 77,5	HL 58 100 100 FAL 98 100 99	15 31 61	25 48 73	60 58 84	67 69 95	53 80 61	86 87 97
2	Siza	Soweto, township, underachieving, Gr 10-12,	No fees	804	49,5 53,3 68,9	99 93 100	21 50 93	18 27 45	44 75 67	49 77 84	31 23 32	93 78 95
3	Galaxy	Johannesburg, suburban, achieving,[52] Gr 8-12	Fees	885	98.8 98,4 98,1	100 100 100	87 87 92	86 96 88	99 100 96	100 100 100	100 100 100	100 100 100
4	Lots	Soweto, township, priority, Gr 8-12	No fees	988	74,6 81,7 87,5	100 100 100	34 27 50	71 61 94	78 96 64	85 98 78	43 68 72	100 97 99
5	Rock	Soweto, township, underachieving Gr 10-12	No fees	865	40,1 59,6 87,7	95 97 99	24 63 75	18 25 58	49 65 87	61 70 82	21 45 45	74 83 97
6	Lake	Johannesburg suburban, achieving, Gr 8-12	No fees	1113	100 99,5 100	100 100 100	100 98 100	97 93 100	100 100 100	100 100 100	100 100 100	100 100 100
7	Purpose	Soweto, township, priority, Gr 1-12	Fees	1500	61 69 63	98 99 98	47 43 49	23 62 26	64 62 41	74 59 61	68 76 42	80 86 85
8	Stadium	Soweto, township, priority, Gr 8-12	No fees	918	53,2 58,9 82,2	97 97 99	26 34 65	32 36 39	59 62 85	60 62 59	32 33 40	75 83 91
9	Ivy	Johannesburg suburban, achieving, Gr 8-12	Fees	405	95,6 85,5 97,4	100 100 100	82 85 72	80 78 79	100 100 100	100 100 100	N/A	N/A
10	Wood	Randburg, CBD, underachieving, Gr 8-12 (independent)	Fees	100	56,8 76,5 44,4	HL 80 86 67	23 38 20	10 44 20	45 63 29	50 57 63	57 29 17	69 90 85
11	Valley	Soweto, township, priority, Gr 10-12	No fees	769	60,2 59,7 78,7				Not provided			

[50] All schools' names used are pseudonyms.
[51] Schools were termed "underperforming" when they achieved a Grade 12 NSC pass rate under 60%, later adjusted to under 80% and termed "priority" schools..
[52] "Achieving" is used here to denote schools that achieve a NSC pass rate close to 100% each year.

4.3.4.2 PLCs selected for the study

The Geography, English, and Mathematics PLCs were selected for study for the reasons outlined in 4.3.1. Table 4.3 below provides a summary of the sessions analysed. Details of PLC participants are provided in Appendix 5.1.

Table 4.3 Summary of PLC sessions analysed

PLC session information	Geography	English	Mathematics
Number of sessions analysed[53]	16	15	20
Average length of session in minutes	49	58	63
Number of hours	13	15	21

4.3.4.3 Individual teachers' sample

The seven teachers (Table 4.4 below) I interviewed were selected by the NLC coordinator[54] from amongst the regular participants in the Geography, English, and Mathematics PLCs (4.3.2.1a). From the Geography and English PLCs I interviewed one HOD or lead teacher and a post level one teacher. From the Mathematics PLC I interviewed one HOD, one lead teacher and a post level one teacher. The English HOD was a participant and facilitator. Details of the teachers interviewed are provided in Table 4.4 .

[53] I analysed the first seventeen sessions of the Geography and English PLCs of which Geography and Mathematics missed one and English missed two. I analysed an additional four Mathematics sessions because they were in the middle of a long inquiry cycle and I wished to capture the entire process.
[54] The grounds are explained in 4.3.2.1.a.

Table 4.4 Summary of individual interview teacher participants

	Teacher's name[55]	Teacher's school	Interview date	Gender	Age (approx.)	"Race"[56]	Subject PLC attended
1	Mongi	Rock	19/01/2012	Female	42	Black	Geography
2	Bal	Field	03/02/2012	Male	47	Black	Geography
3	Fred	Lake	28/09/2011	Male	53	White	English
4	Sal	Ivy	28/10/2011	Female	50	Coloured	English
5	Viv	Galaxy	12/10/2011	Female	50	White	Mathematics
6	Will	Galaxy	28/09/2011	Male	40	Black (foreign)[57]	Mathematics
7	Alph	Stadium	27/09/2011	Male	40	Black (foreign)	Mathematics

4.3.4.4 Facilitators' focus group sample

All the facilitators in the NLC participated in the focus group interview (4.3.2.1.b). I use data contributed by only the Geography, English and Mathematics facilitators for the analysis of facilitation presented in chapter 6 but I use data from all the facilitators for the analysis of factors that enable or inhibit PLCs' functioning. All the facilitators were from Lake School, the NLC co-Ordinating School. Information about the facilitators is summarised in Table A6.1, Appendix 6.1.

4.3.5 Management of data sources

All "field notes", completed questionnaires, reflection journals, copies of artefacts, minutes of sessions, and transcripts of audio-recordings have been filed and kept in my home office. The electronically captured voice recordings of interviews and PLC sessions have been stored in folders on my computer which is password protected.

[55] All participants' names used are pseudonyms.

[56] In this study I refer to the social construct of "race" as historical practices in South Africa privileged the "white race" over other "races" resulting in most "black" people receiving a vastly inferior and underfunded education to that of "whites". "Coloured" and "Indian" education was marginally better. These discriminatory practices extended to colleges and universities for "races" other than "whites" resulting in a cohort of teachers with inadequate preparation for teaching a modern curriculum. The practices persisted officially until 1994 (actually later because the new curriculum and restructuring of education departments happened after 1996) but their impact continues to this day. In the TPD environment "race" is sometimes used as a proxy for teacher knowledge/preparedness for teaching. Funders of education research and improvement initiatives are more inclined to support programmes aimed at assisting "black" people or schools with "black" learners. In South Africa "race" is still used as a classifier ostensibly in order to gauge the level of redress.

[57] The reference to "foreign" identifies these teachers as not having been educated in the South African apartheid education system in which "black" people received an inferior education.

When the project is complete I will transfer all the recordings to a disk which will be kept in my home office. All data will be destroyed after three years.

4.3.6 Data reliability and validity

Qualitative field research has both strengths and weaknesses (Babbie, 2005, pp. 320-321; Mouton, 2001, p. 150). Its strengths are that it enables in-depth insights because subtle nuances can be captured. The researcher can establish good rapport with the subjects and this promotes optimum data collection. It is easy to engage in field research relatively spontaneously as opportunities arise. Qualitative field research is flexible and can be modified at any stage. However, such research does not easily lead to generalisability of results, the measurement instruments are not standardised, and analysis of the data can be extremely time-consuming.

The validity and reliability of the research data are fundamental to the worth of the entire research process. Validity is concerned with what the measurement (instruments) actually measured. Did they measure what was supposed to be measured? Reliability relates to the dependability of the data. Would the same measurement (instrument) obtain the same result each time it was used (Babbie, 2005, p. 321)? With respect to validity, Mouton (2001, p. 150) considers the type of qualitative research undertaken for this study to have "high construct validity" as the data obtained are not superficial as could be the case with surveys and some other measurements. Concepts can be understood in depth and illustrations given to enrich the data. There is a potential problem, however, relating to reliability because of the potential for the bias of the researcher to affect the collection and analysis of data. This deficiency can be mitigated if the researcher is scrupulously aware of the impact of self and deliberately adopts an objective scientific stance as far as this is humanly possible. The small sample that is measured also affects the reliability of the data. It is valid for what was measured but if a different sample were measured using the same measurement the same results might not be found.

Errors can be made at each stage of the research process; some possible sources of/reasons for error have been referred to above. The researcher must be cognisant at all times of the potential for error and must reflect at each stage of the process on whether there could be any threats to the validity or reliability of the data and make any

necessary adjustments or caution him or herself against the known pitfalls and common causes of error. Bias and sloppiness/inaccuracy are potentially threats at all stages. There are also potential sources of error at the data analysis stage, namely, drawing inferences from data that are not supported by the data and selective interpretation (Mouton, 2001, p. 110). Such errors at this most significant stage may nullify the strategies which have been applied consistently through all the preceding stages of the research to obtain reliable and valid data.

Mindful of Kvale's (2002) "scientific holy trinity" of "reliability[58], validity[59] and generalisation[60]" (p. 300, in Henning, 2004, p. 146), I used the following strategies to promote reliability and validity in the data collection:

- piloting the instrument (interview schedule);
- making adjustments to the instruments to improve clarity in the questions and provide for a logical flow of ideas, before I used them (Mouton, 2001);[61]
- triangulation using different kinds of data sources, using different methods in order to give "different views or vantage points from which to understand a category" of data (Flick, 2002, pp. 37, 38) (multiple data sources were used such as recordings of sessions, journal reflections, questionnaires, interviews and the findings presented using descriptions and quotations from PLC sessions supported by evidence from questionnaires, interviews, reflection journals and also quantified in Figures and Tables);
- being as aware as possible at every step of my own bias, arising from my motivation for conducting the research, I checked my interpretations with respondents[62];

[58] "The quality of measurement that suggests the same data would have been collected each time in repeated observations ... not to be confused with *validity*" (Babbie, 2005, p. 489).
[59] A term describing a measure that accurately reflects the concept it is intended to measure. ... Though the ultimate validity of the measure can never be proven, it is possible to agree on its relative validity on the basis of *face validity*, *criterion-related validity*, *construct validity*, *content validity*, *internal validation*, and *external validation*" (Babbie, 2005, p. 490).
[60] As understood generally – the extent to which a phenomenon identified in one situation is relevant more broadly in other situations.
[61] I did this at two stages. I adapted the questionnaire submitted in the proposal and then I mediated the questionnaire to the facilitators when I saw the questions would be too difficult if I did not have an opportunity to mediate to the actual respondents. This did not affect the substance of the data collected.

- checking correspondence of research data with ideas and claims in the literature;
- checking for validity at each step of the research process (e.g. the validity of the sample for the research design, using valid instruments, transcribing the interviews in a valid manner).

The small size of a case study limits generalisation but because the NLC involved teachers from diverse school locations and types there are possibilities in this study for generalising the data and findings. The nature of this type of qualitative study does make it difficult to achieve both reliability and validity at the same time as ensuring rich data from data collection tools, such as semi-structured interviews and transcripts of audio-recordings. Babbie and Mouton (2001) acknowledge this tension between the criteria for reliability and validity and argue that a "trade-off" is generally necessary (p. 124).

4.3.7 Ethical considerations

There are areas of ethical concern because the study required teachers to reveal aspects of their practice that are personal and about which there may be high levels of sensitivity. These were detailed and addressed in the application for permission to conduct this research that was submitted to the University of Witwatersrand's School of Education Ethics Committee. See Appendix 4.3.1 to 4.3.4 for approval to conduct the research from the GDE, the research information sheet, letters to the GDE District Director, school SGBs, principal, and participants, and the consent forms.

4.3.8 Researcher's bias

Merriam (2001) cautions that both research writer and audience need to be aware of bias when case study methodology is used: "An unethical writer could so select from among available data that virtually anything he [sic] wished could be illustrated" (Guba & Lincoln, 1981, p. 378, in Merriam, 2001, p. 42). As this PhD research study is a focused study within a larger action research study of a NLC initiated by the school of which I am principal there is potential for bias. At all stages of sample selection, data selection, and data analysis and interpretation, I endeavoured to be alert to the potential of bias and its dangers for corrupting the study.

[62] However, I recognise the truth of Borland's (1991) statement that "When we do interpretations, we bring our own knowledge, experience and concerns to our material, and the result, we hope, is a richer, more textured understanding of its meaning" (p. 73, in McCotter, 2001, p. 11).

4.4 DATA ANALYSIS AND INTERPRETATION

4.4.1 Approach to analysis

The data collected by means of the fieldwork must be analysed ("'breaking up' the data into manageable themes, patterns, trends and relationships" (Mouton, 2001, p. 108)) and interpreted to lead to the completion of the research process and the attainment of the research purpose. Mouton (2001) describes interpretation as involving:

> the synthesis of one's data into larger coherent wholes. One interprets (and explains) observations or data by formulating hypotheses or theories that account for observed patterns and trends in the data. Interpretation means relating one's results and findings into existing theoretical frameworks or models, and showing whether these are supported or falsified by the new interpretation. (p. 109)

I analysed the data collected using the grounded theory approach developed by Glaser and Strauss (1967) which has been described as a "tool for constructing substantive theories" (Henning, 2004, p. 114). The process begins "with observations rather than hypotheses and seeks to discover patterns and discover theories from the ground up with no preconceptions" (Babbie, 2005, p. 389). The data were analysed to explore, describe and explain what and how teachers learned in the PLCs and the processes and conditions that enable or inhibit the operation of PLCs for TPD. The analysis focused firstly on how teachers in PLCs chose their learning focus, secondly, what knowledge-for-teaching participants chose to focus on in PLCs and thirdly, what learning processes they followed to address their choices. Fourthly, it has focused on what enabled and/or inhibited teachers' learning of knowledge-for-teaching in a PLC. The findings, however, are not presented in the order that the data was analysed.

Qualitative data analysis techniques such as classifying, categorising[63] and concept mapping[64] were used.

[63] "In open coding, the codes are suggested by the researchers' examination and questioning of the data." (Babbie, 2005, p. 395). "Data are broken down into discrete parts, which are compared and questioned with 'what, where who, when and how'. In other words, open coding fractures data into concepts and categories. Then the data are compared and similar incidents are grouped together and given the same conceptual label. The process of grouping concepts at a higher, more abstract, level is termed categorising." (Henning, 2004, p. 131)

[64] "Concept mapping - The graphical display of concepts and their interrelations, useful in the formulation of theory." (Babbie, 2005, p. 399)

I did not begin analysing the transcripts until six months after the commencement of the study although I had listened to the audio-recordings after each session and interview to obtain an understanding of what each PLC was doing and had read the journal entries at regular intervals, and the responses to questionnaires soon after they were administered.

4.4.2 Analytic processes used

I used three analytic processes to explore the research questions.

The first process, involving five stages, was used to explore the third sub-research question:

- What did teachers in three PLCs choose for the focus of their learning of knowledge-for-teaching and how did they arrive at that focus?

The second process, also involving five stages, explored the next two sub-research questions:

- What knowledge-for-teaching did teachers choose to focus on in the three PLCs?
- What learning processes did the three PLCs follow to address their learning focus choices?

The third process, involving seven stages, investigated the first two sub-research questions:

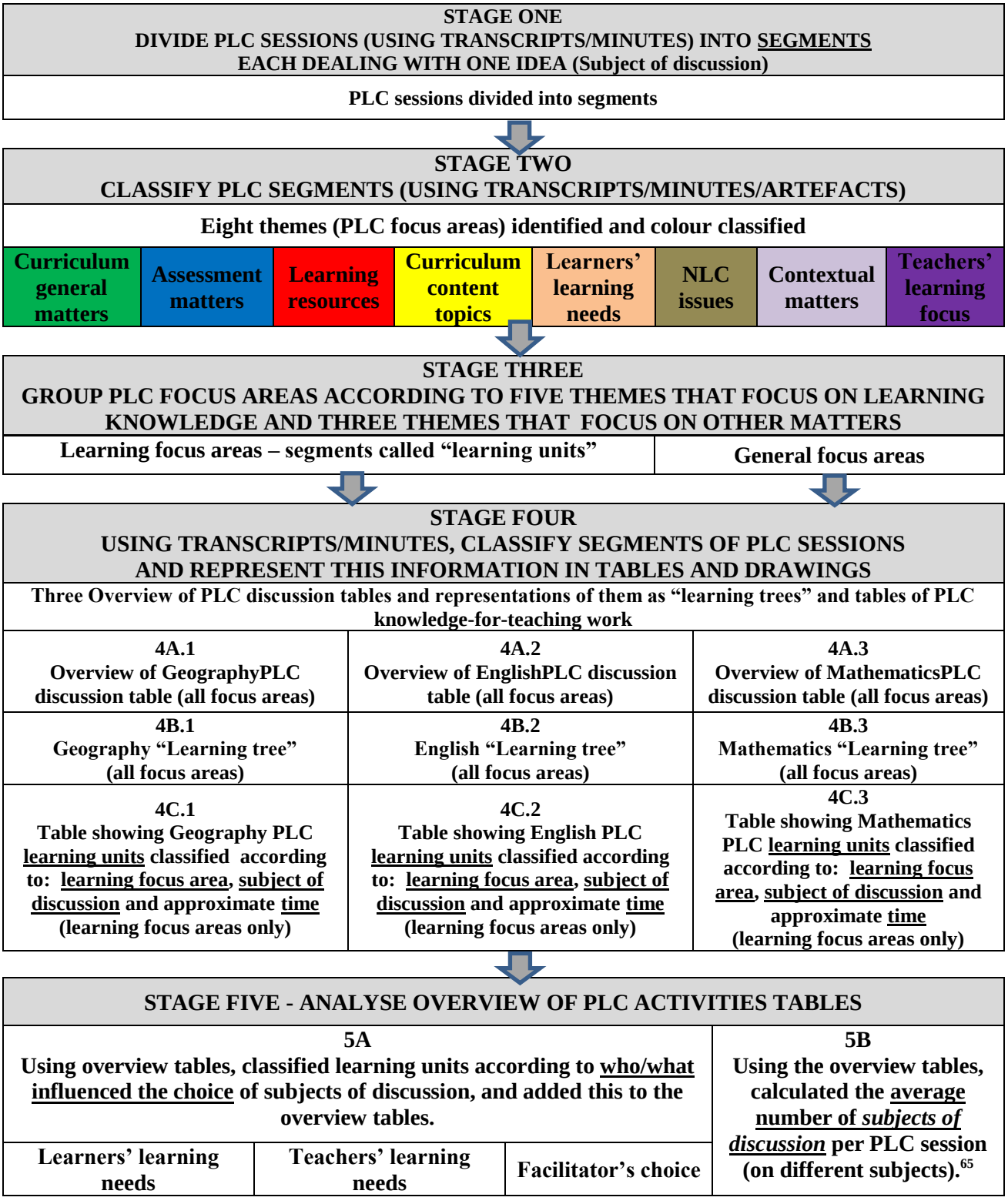
- What factors enabled or inhibited the work of three PLCs?
- Did the facilitation of each PLC's work contribute to what was achieved, and if so, how?

Definitions of most of the themes, classifications and categories as well as the appendices associated with these are not provided in this chapter but are given in the relevant chapters where the findings in relation to each question are presented.

4.4.2.1 First process

Figure 4.1 overleaf depicts the five stages comprising the first process.

Figure 4.1 First process



[65] In some cases a new idea was raised thus creating a new learning unit/*subject of discussion* but later in the session the PLC returned to that same *subject of discussion* although in a different learning unit they continued with the original idea. For this reason it is not possible to calculate the average by simply dividing the number of learning units by the number of sessions to determine the average for the PLC.

Stage 1 entailed reading all the transcripts/minutes of the PLC sessions and examining the artefacts referred to in the transcripts/minutes. I then divided the sessions into segments.[66] A segment refers to a PLC's discussion of one idea, hereafter referred to as a *subject of discussion*. For example, the facilitator of the Geography PLC showed the teachers how to teach the development of a "mid-latitude cyclone" using cut-out shapes and the teachers practised using them. They spent 20 minutes on this. The change to a different *subject of discussion* marked the end of the segment. Segments ranged in length from 1 minute to 70 minutes. PLCs often returned later, in a new segment, in the same session or a later session to an earlier *subject of discussion* to explore it in greater depth.

In Stage 2 I classified the segments (using the transcripts/minutes) in order to identify what teachers focused on in the PLC sessions. The themes were derived from what I found teachers discussed when I examined the transcripts of the segments and from what the literature advocates PLCs should focus on, namely matters of daily practice. I identified eight themes:[67] *curriculum general matters, assessment matters, learning resources, curriculum content topics, learners' learning needs, NLC issues, contextual matters,* and *teachers' learning focus,* and provided definitions for them (7.2). I termed these eight themes PLC focus areas. I colour-classified them in order to distinguish them visually. See Appendix 4.5 in which a brief summary of each segment is provided in order to enable the classification into themes.

As this study aimed to find out what knowledge-for-teaching teachers focus on in PLCs, in Stage 3 I grouped the focus areas into those that dealt with learning knowledge-for-teaching, termed learning focus areas, and those that dealt with other matters, such as NLC organisational issues, teachers' contextual difficulties, and teachers' expression of their learning needs, termed general focus areas. Segments of the PLC sessions that deal with learning focus areas are termed learning units.[68]

Stage 4, comprised three steps:

[66] Geography 73 segments; English 84 segments; Mathematics 142 segments.
[67] These themes are later termed "focus areas" when used to describe the focus of the PLCs (see chapter 7).
[68] Geography 54 learning units; English 60 learning units; Mathematics 114 learning units.

1. In order to obtain a more detailed understanding of what the PLCs focused on in each segment I created an Overview of PLC discussion table[69] for each PLC (Stage 4A) (Appendix 4.5.1 – 4.5.3). I analysed the data for each segment of the three subject PLCs' sessions using a table with the following headings: "Date", "Segment", "PLC's homework", "Time in minutes" and "Dominant focus area". I colour-classified the "Segment" column according to the focus area of the discussion/activity in the segment. The time of segment is an approximation using readings on the audio recording of the sessions or an estimate provided by the facilitator when the minutes of sessions are used. These Overview of PLC discussion/activity tables were used extensively for the next steps and stages in the analysis.
2. I used these overview tables to create three "Learning Trees" (Figures 7.4 – 7.6) so that I could obtain a visual overview of the focus areas covered over the period of the study. The branches of the trees represented each of the focus areas and provided detail of the *subjects of discussion* in each segment as well as the time spent on these (Stage 4B). From the trees it could be seen whether a PLC spent a long time on a few *subjects of discussion* either in the same session or in later sessions or whether it dealt with many *subjects* for only short periods.
3. I created the third representation, using the overview tables, to enable a more detailed understanding of the knowledge-for-teaching that each PLC learning unit dealt with. I created three tables (Tables 7.3 – 7.5) that classified the learning units of each PLC according to learning focus areas, *subjects of discussion* within each of these focus areas (a subject of discussion could be dealt with in one or many different learning units[70]), and the time spent on each *subject of discussion*. Time was measured using the readings given as I played back the voice recordings on the computer. Time for the learning units described in the session minutes is approximate.

Stage 5 dealt with two further aspects of teachers' focus in PLCs:

[69] Discussion here includes the activity associated with the discussion, for example, doing practical things like cutting out shapes that represent cyclones, examining samples of learners' work, answering the Mathematics test questions.
[70] For example, the Geography *subject of discussion* of map work was dealt with in 11 learning units over 6 sessions.

1. The stages of analysis described above detail the focus of the work of each PLC but it was also necessary to understand how these choices were arrived at. In Stage 5A I classified each learning unit to determine who or what influenced the PLCs' choice of *subjects of discussion* using three themes arrived at from an analysis of the transcripts as well as the literature on PLCs, namely: *learners' learning needs, teachers' learning needs*, and *facilitator's choice*. I added this information to the Overview of PLC discussion tables (Appendix 4.5).
2. In Stage 5B I used the number of *subjects of discussion* per session as a proxy for the depth and/or breadth of the learning that would be enabled. I counted the number of *subjects of discussion* dealing with the same idea, albeit in more than one learning unit, to determine the average number of *subjects of discussion* per session for each PLC.[71] I did this to see whether there was a difference between the PLCs' handling of the *subjects of discussion* (what the learning unit dealt with), and used this as a proxy for the depth of discussion.

Table 4.5 provides a summary of the number of sessions, segments, learning units, *subjects of discussion* per session in each PLC. Table 4.6 provides a summary description of terms used. Findings which emerged from the first five stages of the analysis are presented in chapter 7.

[71] In some cases a new idea was raised thus creating a new learning unit/*subject of discussion* but later in the session the PLC returned to that same *subject of discussion* and, although in a different learning unit, they continued with the original idea. For this reason it is not possible to calculate the average by simply dividing the number of learning units by the number of sessions to determine the average number of *subjects of discussion* for the PLC.

Table 4.5 Number of sessions, segments, learning units, subjects of discussion per session in each PLC

	Number of sessions analysed	Segments All focus areas (8)	Learning units Learning focus areas (5)	Average number of *subjects of discussion* per session
Geography	16	73	54	3.1
English	15	84	60	2.2
Mathematics	20	142	114	4.0

Table 4.6 Summary of terms used

Segment	A section of a PLC session in which one idea (hereafter termed *subject of discussion*) is discussed; a new segment begins when the PLC begins discussing a new idea.
Learning unit	A segment that focuses on a *learning focus area* idea;
Subject of discussion	The idea that the PLC talks about in the segment; the same *subject of discussion* may be addressed in more than one segment in a single PLC session.

4.4.2.2 Second process

Figure 4.2 overleaf presents the next five stages of the analysis which I now describe.

For the five stages of the second process of analysis I used the Overview of PLC discussion tables but I focused on only the learning focus area segments, that is, the learning units. In Stage 6 I identified two categories for analysing the learning units in greater detail.

- WHAT knowledge (KT/subject matter knowledge, IK/inferential knowledge and KH/practical knowledge at three levels and in six domains - see 3.2.4 for definitions and descriptions) the PLCs worked with, and
- HOW (enquiry cycles, collaborative discussion and other ways of learning - see 8.3 for definitions and descriptions) PLCs worked with the knowledge.

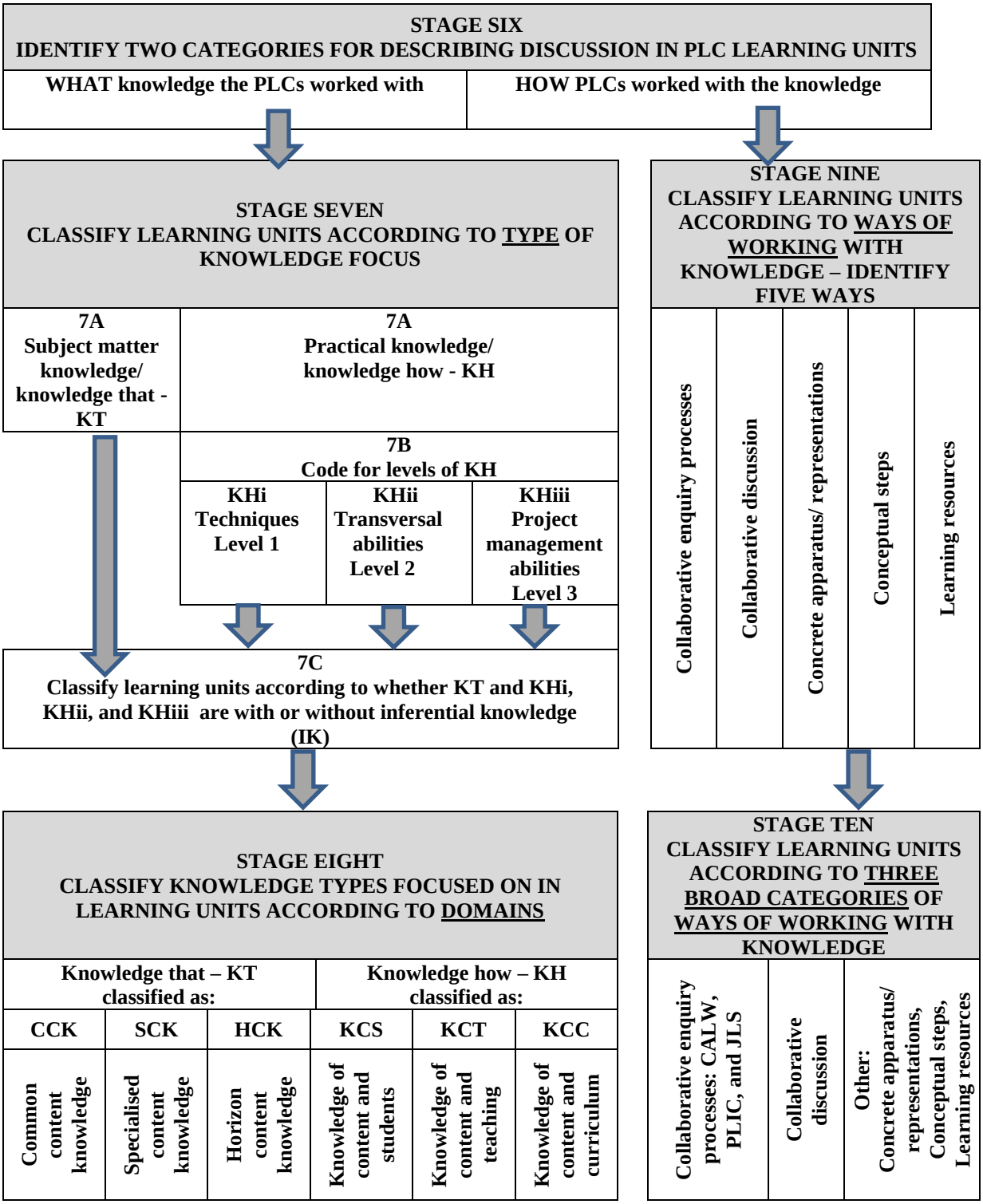
In Stages 7 and 8 I analysed WHAT knowledge the PLCs worked with. Firstly, in Stage 7, I used a common classification of professional knowledge, namely: propositional knowledge (Gamble, 2009)/knowledge *that* (KT) (Winch, 2013a, pp. 129-130; Ryle, 1979) and practical knowledge (Gamble, 2009)/knowledge *how* (KH) (Winch, 2013a,pp. 130-131) to classify the *type* of knowledge that each PLC learning unit worked with. I counted the number of learning units that used mainly KT and those that

used mainly KH to find out the proportion of learning units that focused on these *types* of knowledge (Stage 7A).

Secondly, in order to further describe what *types* of knowledge-for-teaching the PLCs handled I used Winch's concept of know-how and the two sub-types of practical knowledge that he identified: epistemic knowledge how/inferential comprehension (referred to here as IK) and practical knowledge (referred to as KH) (2013b, p. 296). Inferential knowledge (IK) involves the ability to make inferences that show relationships between ideas and this ability depends on strong KT. I used Winch's classification of practical knowledge into three levels or "orders" (techniques, transversal abilities, and project management abilities, referred to hereafter as KHi, KHii, and KHiii, respectively) (2013b, pp. 283-295) to show the complexity of the practical knowledge involved in each learning unit. In Stage 7B I classified the learning units of each PLC for levels of KH: KHi, KHii, and KHiii, to understand more precisely what *type* of practical knowledge the PLCs worked with. In Stage 7C I classified learning units according to whether IK was used or not when learning KT and when learning KH at the three levels.

Stage 8 was the final stage of analysing WHAT knowledge the PLCs worked with. In order to obtain a finer-grained understanding of what kinds of knowledge within the types of KT and KH PLCs worked with, I turned to Ball et al.'s (2008) classification of knowledge-for-teaching according to six *domains*, three for KT: common content knowledge, specialised content knowledge and horizon content knowledge, and three for KH: knowledge of content and students, knowledge of content and teaching, and knowledge of content and curriculum. I classified each learning unit according to the *domains* focused on. Units could be classified for more than one *domain* where more than one domain was used. PLCs often focused on more than one *type* and *domain* of knowledge in a single learning unit. Learning units were therefore classified for all of the *types* and *domains* focused on.

Figure 4.2 Second process



In order to classify a learning unit as having dealt with a particular *type* and *domain* of knowledge I used a knowledge classifying instrument which provided examples of what could be classified as each *type* and *domain* of knowledge to assist me (Appendix 4.6). I added the information from Stages 7 and 8 to the Overview of PLC discussion tables (Appendix 4.5).

The last two stages of analysis examined HOW the PLCs worked with knowledge. Stage 9 involved classifying the learning units from all the sessions to discover the ways in which the PLCs worked with knowledge. Five themes were identified (hereafter termed "ways of working with knowledge"): *collaborative enquiry cycle process, collaborative discussion, concrete apparatus/representations, conceptual steps, and learning resources*. The themes were derived from what the literature on PLCs suggests about how PLCs work with knowledge as well as from an analysis of the PLC session transcripts. Definitions for these themes are provided in chapter 8.3. In order to present these findings Stage 10 involved categorising these ways of working according to whether they were *collaborative enquiry cycles*, *collaborative discussion* or *other ways of working*. I identified the way of working in each learning unit and then counted the time each PLC spent on each learning unit using the different ways of working. The way of working in each learning unit was added to the Overview of PLC discussion tables (Appendix 4.5).

The findings of the analysis undertaken in stages 6 – 10 are presented in chapter 8.

4.4.2.3 Third process

The third analytic process is shown in Figure 4.3 overleaf. This seven-stage analytic process began with reading all the transcripts and minutes of the PLC sessions, interview transcripts, questionnaire responses, and comments in reflection journals and making two mind maps, one for enabling factors and another for inhibiting factors, of all the factors that were raised in the data that related to enabling or inhibiting PLC functioning (Appendix 7.1) (Stage 11).

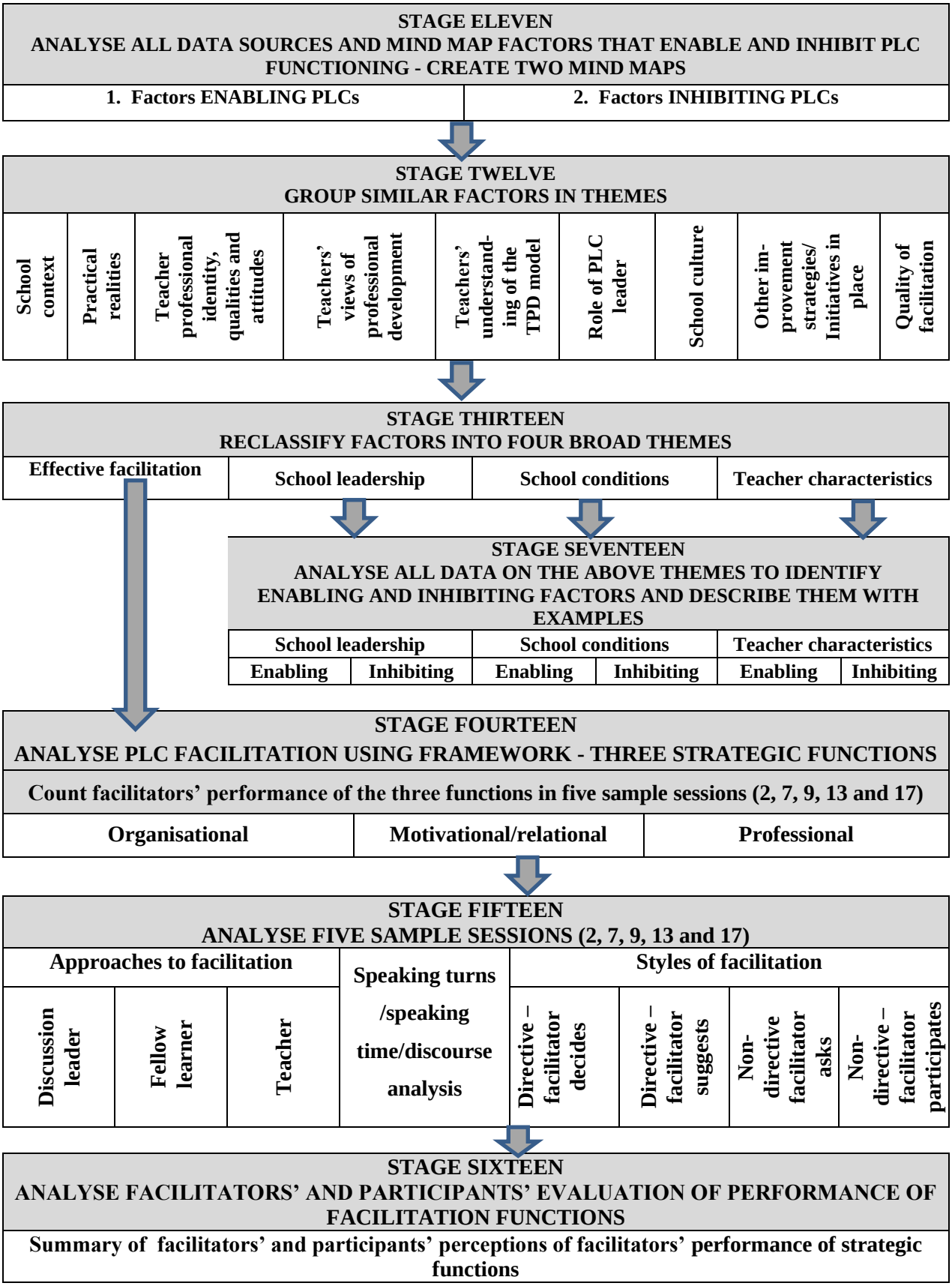
In Stage 12, using the data from both mind maps, I identified nine themes around which the enabling/inhibiting factors clustered, namely: school context; practical realities; teacher professional identity, qualities and attitudes; teachers' views of professional

development; teachers' understanding of the TPD model/difficulties with the model; role of the leader in the PLC; school culture; other improvement strategies/initiatives operating in the school; and the quality of facilitation. Definitions of the themes are provided in Appendix 7.2

Stage 13 involved reclassifying the nine themes/factors into four broad themes in order to focus more specifically on the key enabling/inhibiting factors and to avoid repetition and overlap in the presentation of the findings. The four themes were: effective facilitation (which includes the role of the leader in the PLC and the quality of facilitation), school leadership (factors extracted from school context, factual realities and school culture), school conditions (school context, factual realities, school culture, other improvement strategies/ initiatives operating in the school), and teacher characteristics (teacher professional identity, qualities and attitudes; teachers' views of professional development; teachers' understanding and ability to work with the TPD model/difficulties with the model).

In order to obtain a more complete understanding of *what* facilitation in PLCs entailed it was necessary to analyse facilitation in more detail. Stage 14 involved analysing the data using the facilitation framework developed from the literature (Figure 2.2). Using the PLC session transcripts I counted the number of speaking turns for which the facilitators performed each of the three functions in five sample sessions (one from each quarter of the period of the study, sessions 2, 7, 9, 13, 17). This stage led to an understanding of the extent to which the facilitator focused attention on each of the three functions: organisational, motivational/relational and professional. I used the descriptions of these functions given in 2.4.4.1 to classify the turns.

Figure 4.3 Third process



In Stage 15, to discover *how* the facilitators carried out their functions I analysed the transcripts of five sessions (2, 7, 9, 13, 17). I did this by looking at three factors:

- Using the transcripts I classified each speaking turn of the facilitator according to the approach to facilitation using three categories: discussion leader, fellow learner, and teacher-telling and demonstrating. These terms are defined, with examples, in Appendix 6.3. See also 2.4.4.1.
- I counted the facilitators' *speaking turns and speaking time* (lines in the transcripts were used as a proxy for time) to examine how many speaking turns facilitators had compared with teachers' turns and what percentage of session time facilitators spoke compared to teachers' speaking time. I wanted to identify the extent to which facilitators spoke themselves or encouraged participants to speak. This information also provides an indicator of the extent to which the facilitator dominated the PLC.
- I classified the facilitators' *style* of facilitation in each speaking turn using four categories: (i) directive – the facilitator decides what the PLC should do, (ii) directive – the facilitator suggests what the PLC should do, (iii) non-directive – the facilitator asks the teachers to decide what to do, and (iv) non-directive – the facilitator participates as a PLC teacher. These terms are defined, with examples, in Appendix 6.4. The information gained from this analysis enabled me to understand how the different PLCs were facilitated. From the literature on discourse analysis I identified the discourse features of mood, polarity and modality as useful for an analysis of facilitators' speaking style. The four categories are defined, with examples, in Appendix 6.5.

Stage 16 involved analysing facilitators' and participants' evaluations of the facilitation of their PLC (using a rating scale of 1-5) and comparing the facilitators' and participants' perceptions of how their PLC was facilitated over the period of the study (Table A6.9, Appendix 6.6). It was important to know how self-aware the facilitators were in order to recommend the type of support that would assist facilitators to be more effective or in order to select facilitators who were likely to be effective because of their personal qualities.

The final stage of analysis, Stage 17, involved returning to the four broad themes identified in Stage 13, other than facilitation, and classifying the available data according to these themes. I then categorised the data on each theme according to the factors considered enabling and those considered inhibiting in order to obtain a full picture of what appeared either to enable or inhibit PLC functioning.

Findings from stages 11-13 and 17 of this process are presented in chapter 5 and from stages 13-16 in chapter 6.

4.4.3 Approach to interpretation

Booth (1995) suggests that writing is thinking in print. In this study the writing process was part of the thinking and interpreting stage and involved a number of drafts as the thinking progressed.

In the final stage of the research I merged and integrated data from the cases and theories from the literature reviewed in order to provide evidence for my argument. Gumundsdottir (1996) calls this process of meaning making "transformation". He goes on to describe "interpretation" using the words of Ormiston and Schrift (1990), as "the exchange of one word for another. This integration of the final data as evidence in an argument is what Henning (2004) refers to as "re-contextualisation of data" (pp. 107-109).

The findings of this study are presented in four chapters. Chapter 5 deals broadly with who the PLC participants were and factors operating at school level that enable or inhibit PLC functioning. Chapter 6 deals with facilitation/leadership as a key enabler of PLC functioning and Chapter 7 with what they chose to focus on in their subject professional learning communities. In chapter 8, I describe more specifically what knowledge-for-teaching the PLCs engaged with and how they did so. I begin by presenting findings related to broader contextual conditions which are less conceptual in understanding and then progress to specific examination of knowledge learning which is more deeply conceptualised.

In chapter 9 I answer the research questions by presenting my argument and the interpretation of the data. I make six claims which examine the ideas and claims in the literature review in light of the findings of this study. In chapter 10, the final chapter, I

draw conclusions when I identify the implications of the findings for PLC practice and policy and, noting the limitations of the study, suggest areas for further research.

4.4.4 Notation used in data presentation

The following notation codes were used.

G/E/M	Throughout G is used to denote Geography, E for English, and M for Mathematics, and P for Principals' PLC
GA1	Geography artefact number 1
G1M-09/02/2011	Geography PLC session 1, minutes, date of session
G4R-13/04/2011	Geography PLC session 4, audio-recording, date of session
Bal/G/Q1	Teacher's name (pseudonym)/Geography PLC/Questionnaire 1
G5T/04/05/2011:10-11	Geography PLC session number Transcript/Date of session: line numbers in transcript;
JC/GR/04/05/2011	Teacher's name (pseudonym)/Geography PLC Reflection journal/Date of entry date
Mongi/Rock/I/19/01/2012	Name of person interviewed (pseudonym), School (pseudonym)/ Interview transcript/Date of interview
Clara/FT/17/08/2012:24-28	Facilitator's name/Focus group transcript/Date/Line numbers in transcription
MT3/FT3	Male teacher/Female teacher number 3, participant in the PLC, used when the transcriber could not identify the speaker by name/pseudonym
Table A6.1	Refers to Table 1 in chapter 6 of the Appendix

Numbers given in brackets after an idea has been mentioned refer to the chapter and section where the idea is discussed.

The words "see" and "chapter" are omitted to save words as there are a very large number of references, e.g.: ""knowledge *that*" or the "knowledge *how*" related to it (hereafter referred to as KT and KH) (3.2)" refers to a reference in chapter 3, section 2.

When the reference is to the Appendix, the word "Appendix" is stated, e.g. "Teacher Questionnaire 1 (Appendix 4.2.4) which explored teachers' confidence …"

4.4.5 Use of excerpts from the transcripts of audio-recordings

I use only short excerpts from the transcripts of the audio-recordings as evidence for statements made in the data presentation chapters. I do not provide the full transcript.

CHAPTER 5 CONTEXTUAL CONDITIONS THAT ENABLE AND INHIBIT TEACHERS' LEARNING IN PROFESSIONAL LEARNING COMMUNITIES

5.1 INTRODUCTION

In this chapter I briefly describe (I) the teachers and facilitators who participated in the three PLCs and (ii) their teaching and learning contexts. I then describe factors operating at school level that the teachers and facilitators identified as enablers or inhibitors of teacher learning in PLCs. I conclude with a comparison of the three PLCs and a summary of key enabling factors.

5.2 BROAD DESCRIPTION OF THE THREE PLCS

5.2.1 Description of PLC participants

A summary of the participants, including facilitators, of the three PLCs is provided in Table 5.1 below. Further details are provided in Appendix 5.1.

Table 5.1 Summary of PLC participants

Subject PLC	Number of participants	Gender	Age (approx.)	Experience in subject	Qualifications	Race[72]
Geography PLC	8	6 males 2 females	Average age 43 years, ranging from 35 – 55 years	Ranges from 15 - 33 years, (4 HODs and 4 PL 1s)	4 year diploma x 3, degree and diploma x 3, Hons in Geography and diploma x 1 completed, and x 1 studying;	7 black 1 white
English PLC	6	1 male 5 females	Average age 46 years, ranging from 26 – 55 years	Ranges from 3 – 30 years, (3 HODs, 3 PL 1s)	Diploma x 1, degree x 3, Hons x 2;	1 black, 1 coloured, 4 white,
Mathematics PLC	12	5 males 7 females	Average age 34 years, ranging from 24- 50 years	Ranges from 2 – 27 years, (3 HODs and 9 PL 1s)	Diploma x 3, degree x 5, hons x 3 (not all in Maths), masters x 1;	6 black, 1 coloured, 5 white

[72] In this study I refer to the social construct of "race" as historical practices in South Africa privileged the "white race" over other "races" resulting in most "black" people receiving a vastly inferior and underfunded education to that of "whites". "Coloured" and "Indian" education was marginally better. These discriminatory practices extended to colleges and universities for "races" other than "whites" resulting in a cohort of teachers with inadequate preparation for teaching a modern curriculum. The practices persisted officially until 1994 (actually later because the new curriculum and restructuring of education departments happened after 1996) but their impact continues to this day. In the TPD environment "race" is sometimes used as a proxy for teacher knowledge/preparedness for teaching. Funders of education research and improvement initiatives are more inclined to support programmes aimed at assisting "black" people or schools with "black" learners. In South Africa "race" is still used as a classifier, ostensibly in order to gauge the level of redress.

5.2.1.1 Geography

The Geography PLC had eight participants, with five being the average number attending each session over thirteen sessions. Five of the participants taught at schools classified as "priority schools", one at a low-fee independent school that was struggling to achieve a pass rate above 60%, one at a school that was struggling to maintain former good standards, and the facilitator was at a school that has performed consistently at a high level. All the participants had specialised in Geography, with half having at least a first degree that included courses in Geography.

The teachers participating in the PLC wanted their learners to "grow" and succeed. When asked in a questionnaire what made them happy as teachers, they responded: "Delivering quality content to the learners which will impact positively in their future" (JC/G/Q1), "to see them grow intellectually from one level to the other" (Jim/G/Q2), "when learners 'get' the idea/concept, when they improve" (Gay/G/Q1), and "if all of them pass my test/exams" (Mab/G/Q1). Participants were prepared to put in extra effort despite instructions from the SADTU[73] regional officials not to work after 15:00. When commenting on what made him unhappy as a teacher, one said: "If learners are failing my subject, I feel bad and unhappy." (Mab/G/Q1). Another teacher said: "I regard my job as a calling. I think it is the will of the Almighty GOD for me to find myself in the right place at the right time, which is where I am, TEACHING" (upper case in original) (Bal/G/Q1).

The Geography PLC participants evaluated themselves positively with respect to most teaching competencies. Participant Questionnaire 1 (Appendix 4.2.4) which explored teachers' confidence and knowledge in various aspects of teaching indicated that they judged themselves to be usually confident or very confident in most areas, with three describing themselves as "extremely confident/knowledgeable – I can teach others". Only in two areas: "Analysing learners' results and deciding on remedial / extension strategies" and "Helping struggling learners to overcome their learning difficulties" did some of the teachers indicate that they were only "sometimes confident/ knowledgeable" (Table A5.4, Appendix 5.). From these data it could be assumed that the teachers had the necessary capacity and that they could confidently share

[73] SADTU is the teacher union to which most of the teachers in the priority schools belong.

knowledge, including making their practical knowledge explicit. The discussions in the PLC sessions generally did not support this assumption (see chapters 7 and 8). Considerable time in the PLCs was spent dealing with specific subject content which the teachers asked to focus on because they were not confident about either the "knowledge *that*" or the "knowledge *how*" related to it (hereafter referred to as KT and KH) (3.2), for example, the "tri-cellular system" in the *curriculum content topic* of climatology.

The facilitator, Gay, had twenty years' experience but did not claim to be "Extremely confident/knowledgeable – I can teach others" except in the subject matter knowledge category. She participated equally with the other teachers but the group regarded her as the "expert" and looked to her for information and guidance throughout. She provided teaching resources and practical teaching ideas, such as teaching models, maps, notes for learners, examples of useful newspaper articles, test and examination questions. She led all the PLC discussions, usually offering to follow up by summarising the session's activities and sometimes creating the final version of a worksheet or assessment task that the group had worked on. The choice of subjects of discussions covered in the group was determined by the group members' responses when the facilitator asked them: "What do you find problematic when you are teaching map work? What do you struggle with? What do you find difficult to do?" (G5T/04/05/2011:10-11).

5.2.1.2 English

The English PLC[74] comprised six members, averaging four at a session, representing only two or three schools, over the fifteen sessions. Only one regular participant came from a priority school. All the participants were qualified with four having at least a first degree with a major in English. The other two had diplomas with a specialisation in English.

Two teachers from an achieving school were happy when sharing ideas and extending their learners: "being in the classroom with diverse personalities developing the leaders of the future" (Sam/E/Q1) and "I enjoy trying to expose learners to think for themselves and have confidence in their ideas" (Fred/E/Q1). On the other hand, the teacher at the

[74] This refers to the PLC that comprised Home Language and First Additional Language teachers. In 2012 a separate PLC operated for teachers of First Additional Language.

priority school was happy when she could simply get on with the job and experience some success: "I am able to carry out normal lessons, assess the learners and coming up with positive results" (Mol/E/Q1).

Responding to Questionnaire 1, the teachers in this group considered themselves "Very confident/knowledgeable" or "Extremely confident/knowledgeable – I can teach others" in all the aspects of their work (Table A5.5, Appendix 5.2). Their conduct and contributions in the group would suggest that their self-evaluations were reasonably accurate. The members were willing to examine their practice and make changes to benefit the learners. They deliberately worked on designing new ways of teaching curriculum content topics and then spent a considerable amount of time reflecting on the effectiveness of their teaching and designing additional lessons to remediate learners' learning difficulties.

The facilitator, Fred, declared at the outset that he was merely chairing the sessions and that other members of the PLC could facilitate sessions. Sam facilitated one session. Fred, like Gay, also did not claim to be "Extremely confident/knowledgeable – I can teach others" except in the subject content category. Sam, on the other hand, described herself as "Extremely confident / knowledgeable – I can teach others" in all the categories except "Constructing diagnostic assessment tasks" and "Helping struggling learners to overcome their learning difficulties". Fred led the PLC activities, kept the group focused on what they had decided to do, and did the administration work. He did not impose his ideas on the group. When Sam facilitated she was more directive mostly because she had brought items to show the group. Neither Fred nor Sam acted as if they were the experts although they did do much of the speaking because they shared ideas and asked questions. Other participants' questions and responses were generally brief and sometimes interrupted. Except for two sessions when the PLC was dominated by two highly confident and knowledgeable teachers[75] the group focused on learners' work to ascertain teachers' learning needs.

[75] They came from an achieving school: one was older and very experienced and one much less experienced; both were white. They were part of the group for only four sessions.

5.2.1.3 Mathematics

The Mathematics PLC maintained a consistently higher number of participants than the other two throughout sixteen sessions. It was also the most diverse group. Including the facilitator, there were twelve people in this PLC from seven different schools, four of which were priority schools. The average attendance at each session was eight. Generally all the teachers were qualified and where their initial qualification was not a specialisation in Mathematics, they had subsequently obtained a more specific Mathematics qualification. At the end of the first year of the study, after twelve sessions, Will, the most qualified member (MEd in Mathematics education) left to take up a position at Pretoria University. At the beginning of the following year two inexperienced teachers from the facilitator's school joined because they had heard about the PLC and wanted to be part of it. One of them, Taz, wanted to study further (formal qualification) because of the interest stimulated by the PLC.

The teachers reported that they were happy when they felt they were helping learners to achieve their goals and to be successful at Mathematics: "Seeing my former learners coming back telling me they are professionals like engineers and doctors" (Russ/M/Q1), "to see my learners doing well in their studies and chosen career paths" (Alph/M/Q1), "to make a positive difference in a learner" (Di/M/Q1) and "the 'light-bulb' moment for a child; seeing children respond positively to Maths" (Amy/M/Q1). They were unhappy because of the paper work and general workload: "administrative tasks and feeling like there is so much more to do but not having the time available" (Clara/M/Q1). They were also unhappy when their learners failed to achieve because they took responsibility for this and so felt it even more when officials blamed them: "being blamed for learners that fail when I have done my utmost best – humanly possible" (Russ/M/Q1) and "to see a child fail to achieve their goals after they have passed through my hands" (Alph/M/Q1).

Most of the teachers in this group, responding to Teacher Questionnaire 1, rated themselves as "Very confident/knowledgeable" or "Extremely confident/knowledgeable – I can teach others" in most teaching competences except for "Designing summative assessment tasks", "Constructing diagnostic assessment tasks", "Analysing learners' results and devising remedial/extension strategies" and "Planning and monitoring the

completion of the curriculum each year by teachers in your subject" (this is a responsibility usually performed by the HODs so this was understandable.) See table A5.6, Appendix 5.2 for the details.

Amy, the facilitator of this group, although relatively inexperienced as a Mathematics teacher and acknowledging that she had much to learn, had some prior understanding of the role of facilitator because she had been a participant in the University of the Witwatersrand DIPIP Project.[76] She facilitated the PLC group in a businesslike manner and ensured that it maintained its focus and completed the NLC administration tasks asked of the group. She did not try to provide answers and assume the role of expert. Clara, an experienced, highly qualified and highly regarded teacher, facilitated two sessions and was deferred to by PLC participants as the expert in the group although she too did not claim to have all the answers.

In the next section I describe the contextual factors affecting the PLC teachers in their daily work in order to begin to identify factors that enabled or inhibited teachers' learning in PLCs and to help explain the reasons for each PLC's choice of focus.

5.2.2 Contextual factors affecting PLC participants

5.2.2.1 Geography

While the overall NSC pass rate in most of the schools was less than 60% for the last two years (2009, 2010), the pass rate for Geography in the participating schools ranged from 49% to 100% (Table 4.2). The Geography PLC spent 5% of their time discussing contextual matters. All the teachers reported that their classes were of mixed ability.

The teachers in the priority schools reported many contextual difficulties ranging from education deficiencies to socio-economic conditions impacting on the learners' needs and conduct, and lack of facilities and teaching resources. They reported that many of their learners were educationally under-prepared for the grade they were in because they had been promoted in terms of policy which allowed learners to progress even if they had not met the requirements for passing. The teachers said their learners were unable to understand English sufficiently: "They cannot read, write or even copy what is written on the chalkboard" (Oupa/G/Q1). The teachers also felt that they had the

[76] DIPIP – Data Informed Practice Improvement Project (Phase 1-2);

challenge of teaching learners who had transferred into their schools because they had failed at other schools. They reported that the majority of their learners were poor and were provided with a daily meal by the school[77]. Their learners reflected the general problems evident in their communities: "Some of our learners have unstable character due to social problems" (JC/G/Q1), being under the influence of drugs and/or alcohol: "environment not quite conducive – learners smoke dagga/come drunk at times" (Jo/G/Q1). All the PLC participants complained about lazy/unmotivated learners and uninvolved parents.

Except for the facilitator and Mab from Ivy College, the participants complained about lack of resources, both facilities and learning and teaching support material (LTSM). As will be seen in 7.2 a considerable portion of the PLC time was spent developing and sharing teaching resources. The teacher from Wood College complained that he did not have space for the outdoor learning which is so important in Geography. Most schools had the minimum such as chalkboards and chalk but: "the rest is luxury, unless you provide for yourself" (Bal/G/Q1). They did not have sufficient textbooks and often, if they had a textbook for use with classes, the teacher found it unsuitable[78].

5.2.2.2 English

The overall NSC pass rate for all but one of the teachers' schools was close to 100% with 100% of learners passing English Home Language. Mol from Wood College was trying to raise the standard from below 70%[79] at the start of the NLC project[80] (Table 4.2).

The English PLC did not spend time discussing contextual matters (2%) to the same extent as the Geography teachers. Only Mol said that what made her unhappy as a teacher was "limited resources and facilities, otherwise results could have been better" (Mol/E/Q1). The English teachers' complaints were about insufficient time for TPD, or teachers' negative attitude towards TPD, and insufficient time to follow the steps involved in "process writing" thoroughly. They complained about the learners'

[77] The School Nutrition Programme has not yet been extended to secondary schools so schools found their own resources to feed learners in need.
[78] This is often judged so because the diagrams in the common tasks/examinations are taken from a different text book from the one used in some schools.
[79] 2010 NSC English pass rate;
[80] They achieved a 100% pass in 2013.

obsession with the mark they obtained for a task rather than being interested in what they needed to learn and demonstrate in order to attain a higher mark, their lack of general knowledge, and their preference for television viewing rather than reading which the teachers believed hindered development of their imagination and of comprehension and writing skills: "They can't read that. You bring the Sunday Sun and say, 'Read and then tell me what you have read.' Nothing. We have a problem. They can't create stories." (E2T/23/02/2011:473-474).

5.2.2.3 Mathematics

Teachers in this PLC came from a range of schools where the pass rate for NSC Mathematics in 2010 ranged from 15% to 99% with seven schools achieving under 50% (Table 4.2). The Mathematics PLC seldom discussed contextual factors. In one session they attributed the cause of learners' present problems to past poor teaching of Mathematics concepts and the learners' negative home circumstances. Another contextual issue raised was the requirement that the priority schools write compulsory common tasks. Alph reported that he had been in trouble for setting his own tasks. He interpreted this as a lack of trust and Nomsa believed that the common tasks were making the teachers lazy: "At times they make us lazy because we know that something [an assessment task] is coming [from the district]" (M12T/19/10/2011:375). The contextual difficulties mentioned in the Teachers' Questionnaire are similar to those raised by teachers in the Geography PLC: under-resourcing: "I feel resources are not enough" (Aya/M/Q1), "no laboratory, no library" (Russ/Q1); negative societal influences: "the learners smoke dagga/come drunk" (Russ/M/Q1). An additional contextual factor mentioned by a participant in this PLC was politicisation of the school environment: "A very politicised school environment where teachers do not trust each other and this stifles collegial interaction of teachers to share knowledge" (Alph/M/Q1).[81]

In the next section I describe the factors that participants in PLCs identified as enabling or inhibiting.

[81] Political interference was not mentioned in the English and Mathematics groups. However, the Principals' PLC (not part of this case study) frequently discussed this issue.

5.3 SCHOOL LEVEL ENABLERS OR INHIBITORS OF PLCS

Facilitators and teachers experienced the following as enabling: supportive school leadership, supportive school conditions, teacher characteristics that support the work of PLCs, and supportive education department initiatives. When these enabling conditions were absent PLC functioning and teacher learning was inhibited. For example when school leadership and school structures did not support PLC work and teachers did not understand the PLC model of teacher professional development that required more active participation over a longer period than they were used to, PLC work was inhibited.

5.3.1 Enabling or inhibiting school leadership

Research identifies support of school leadership, particularly formal leadership, as a key enabler of PLC[82] functioning (Earl & Katz, 2010, p. 36). The following actions and attitudes of school leaders were identified as enablers of PLC functioning and teachers' learning in PLCs: promoting and assisting teachers' attendance and commitment to the PLC activities; providing opportunities for teachers to report back to other teachers at the school; speaking positively about the impact of PLC participation on teachers' knowledge, practice and confidence; and additionally, in the case of HODs, contributing leadership and knowledge to the PLCs.

The principals of the eleven schools in the NLC were invited to attend the principals' PLC. In the PLC sessions, principals discussed issues concerning the subject PLCs as well as matters of relevance to school leaders, including the value of a school as a whole being a PLC. Eight principals attended very regularly (Appendix 5.4 for attendance details):

> I can't imagine myself having missed one of the sessions. It is my priority on the list. I learn something new always in each session, e.g. mentoring teachers, coaching teachers and reprimanding in a polite way for work to be done. (X/PQ2/11/2012)

All the principals who attended the principals' PLC were supportive. They demonstrated this by, for example, changing the starting time of the principals' PLC and the dates of meetings to coincide with the subject PLCs so that they could role model to their teachers that they were also involved in PLC TPD. They motivated teachers to attend the PLCs for the purpose of improving learner achievement in the subjects. Four

[82] Earl and Katz (2010) refer to NLCs rather than PLCs.

principals personally transported teachers to the venue to enable their teachers' participation and two others organised transport for their teachers. Five principals made a deliberate effort to tell their staff how they and the participants in the subject PLCs were benefiting from attending sessions. They invited participants to give feedback and encouraged their teachers to share with other teachers in the subject team and with teachers from other schools in the community. Principals motivated teachers to participate in a PLC by speaking of the positive outcomes they observed, for example attributing improvements in the learners' results and teachers' confidence to the teachers' participation in the subject PLCs: "Our grade 10 learners' performance has improved. The young Funza Lushaka teachers[83] are empowered" (Y/Q2/11/2012). Their belief in the value of PLC work was an enabler of PLC functioning as it helped maintain motivation and commitment to the PLC. Sam identified the principal's motivational role as an essential enabler: "Principals would need to enthuse their staff and motivate them to believe in the process" (Sam/Q2/11/2012).

Principals' attendance rate at the PLC was not, however, an indicator of their teachers' participation rate. The principals were committed to the benefits of PLC participation but most struggled to obtain significant teacher involvement. In this study I found that two schools had a significantly larger number of teachers participating in the subject PLCs (Appendix 5.5). These principals were highly motivated and their school culture supported professional development and a commitment to learner performance improvement. One principal had no teachers attending the subject PLCs and he felt guilty that he was unable to convince his teachers to participate despite his own enthusiasm for PLC activities:

> I feel guilty though that none of my teachers are part of the programme. They are missing a lot on what I think contributes to their professional development in a very big way. For me this is the only meaningful professional development that I know and I have attended since I was appointed as principal. (Valley/Q2/11/2012)

Regardless of how enthusiastic and supportive of PLCs a principal is, the enabling role he or she can play is inhibited in the absence of a supportive school culture. While the principal has an essential role to play in changing a negative culture, it seemed not to be possible to effect the change in the short term.

[83] These are newly qualified teachers whose studies were financed through bursaries, called Funza Lushaka bursaries, provided by the government.

It cannot be said that most of the HODs supported participation in the PLCs. Originally the intention was for the HOD of the subject, the lead teacher, to attend and then replicate PLC activity in school subject PLCs but this did not happen in most cases. With the aim of understanding this phenomenon I administered a questionnaire to HODs at the end of the first year in order to gauge their support for the TPD project, to understand their reasons for or against attending, and to find out whether they had noticed any benefits if their teachers had attended. It emerged that in some schools they had agreed to send representatives: "A teacher from my department was attending" (MS/Rock/HODQ/11/2011). In some cases these were volunteers and in other cases they were delegated to attend. Some HODs appeared to believe that teacher professional development was only for beginner teachers or those with weak subject matter knowledge. These attitudes were experienced as inhibitors of PLC functioning because the PLC did not benefit from the HODs' support, knowledge and experience. Attendance at PLCs was not valued as an opportunity for all teachers to learn.

A common problem in the "priority" schools was that one HOD was responsible for four or more subjects yet he or she only had expertise in one or two of those subjects so could not give subject support to teachers of the other subjects. HODs tended to view their HOD role as administrative and supervisory rather than as including instructional/curriculum leadership. Lack of agency, leadership and support of the PLC can be sensed in one HOD's response. He was waiting for someone else to create the opportunity for teachers attending the PLC to share their new knowledge: "No platform was created for report-back discussions" (TN/HODQ/11/2011). Another's response indicates that participation in the PLC was not a priority because he had scheduled management meetings at the same time, despite notice of the dates and times of the PLC having been sent out well in advance of the meetings. This would have prevented the lead teachers of a number of subjects at that school from attending:

> In most cases I could not [attend] because these meetings were clashing with my scheduled management meeting. (PM/Rock/HODQ/11/2011)

The most common reasons given for not attending were: lack of time, the time of the PLC (Wednesday after school), travel distance, and conflicting school commitments:

> I did not attend because of the amount of work at school, the time of the project, and the way the project was run at the beginning.[84] (DM/HODQ/11/2011)

The general impression from the questionnaire responses was that the HODs believed TPD was for other teachers (newer in the profession, less qualified). It seems that they felt they had done their job if they "sent" someone who needed to learn, implying that they did not. The fact that the model of TPD used in the PLC was the topic of a research study was a stumbling block to one HOD who viewed it with suspicion: "Many of them [teachers] said it was a research and they were not benefiting"[85] (SD/HODQ/11/2011). At the school at which this comment was made there was disagreement amongst the teachers about whether they were benefiting, one was and the other was not. The HOD, however, reported a positive change in the teaching of the one who was attending (SD/HODQ/11/2011).

It would appear that the HODs did not fully understand the TPD model. This inhibited PLC functioning. Although the HODs were all invited to attend the information sessions many did not do so because they had the belief that TPD was not necessary for them. One HOD who did not attend and consequently had not experienced the PLC activities for himself, which would have allayed his fears, said he would attend:

> If there is mutual sharing of ideas to benefit learners. I wouldn't like to be part of a talk shop that would just benefit a few individuals at my expense and time. (MM/HODQ/11/2011)

Another wanted a different form of TPD where the facilitator had the knowledge and the participant teachers would learn from him/her. The idea of doing joint work and using the knowledge and experience of everyone was not understood or even desired:

> I didn't attend regularly because I did not benefit anything from the Lake educator who produces good grades every year. He wanted us as poor performing schools to tell him how we present our lessons instead of showing us his good methods. Lake educators should first present lessons to show their good methods. (AM/HODQ/11/2011)

On the other hand, when the HODs showed support for their teachers' participation by speaking of its positive impact on teachers' knowledge and practice and providing opportunities for the participants to give feedback it motivated greater involvement and commitment of teachers from their schools, thus enabling PLC functioning. A number

[84] The teacher is referring to the attempt to do collaborative analysis of learners' work rather than workshop teaching of content and handing out of material.
[85] "Benefitting" in this context refers to teachers receiving hand-outs and other materials rather than learning through collaborative effort.

of HODs reported seeing a change in the confidence, commitment and interaction with other teachers of those who attended the PLCs. One stated:

> Yes, the workshop was very effective. She used to bring lots of teaching aids. It changed her time management and a general improvement of approaching how to teach the subject matter. (MT/HODQ/11/2011)

One of these HODs recognised the change in the teachers after attending the PLC because they were "empowered in mastering the subject content" and used the materials received from the sessions (Rock/HODQ/11/2011). Another said:

> Yes, there is great change. The teaching method of the teacher has improved and the learners' performance has improved too. (NS/HODQ/11/2011)

At some schools a meeting time was set aside for these teachers to report back on PLC work:

> Yes, they do tell other educators during our departmental meetings. (JM/HODQ/11/2011)

The functioning of the PLCs was enabled when the HODs participated themselves or ensured the subject leaders attended and could report back in some way. The involvement of this level of school leadership appears to have been a key factor in determining the attendance and commitment of participants. The lack of participation in the NLC of the majority of the schools' subject leaders appears to have been a strong inhibiting factor. The influence of the HODs on teachers' participation seems to have been greater than the principals'. A participating HOD said she benefited from the sharing and wanted more content-based discussions and development on how to be an effective HOD (TN/HODQ/11/2011).

Learning in the PLC was inhibited when the school or district required teachers to attend other meetings on the PLC day because that disrupted the enquiry and knowledge acquisition process and caused teachers to be unprepared for the sessions because they had missed steps and not done the follow-up activities. For example, Fee described how erratic attendance hindered the PLC's work:

> If just… If… I just feel if there was more constancy … And if the Galaxy man would come all the time, not just when he wants, you know, a task to take back, you know it would allow, it would allow for us to do a lot more, because you know… (Fee/FT/17/08/2012:587-591)

5.3.2 Enabling or inhibiting school conditions

5.3.2.1 School culture

When the school as a whole was improvement oriented and its staff expected the learners to achieve more and believed they could, the morale, motivation, and work ethic of the participants were enabling for the functioning of the PLCs and for meaningful learning. Teachers who came from schools with this type of positive culture were optimistic and believed their PLC learning efforts could make a difference. They arrived excited to learn: "This is also going to help to make me more positive about teaching, and to improve the attitude of my learners to be more positive" (Aya/MR/16/03/2011). The facilitators found this positively enabling. It was also helpful if, to some extent, the secrecy and privatisation of teachers' practice had been broken down and sharing and team work established as a school norm. Some participants came from schools where to some extent this had happened and they were able to relate their positive experiences. Fred explained that at his school there was a structure in place that enabled the development of a culture of shared practice, such as a specific time for school PLCs: "So, ja, the structure is important. If they are expected to do it, and they have to be there, then they do it and they all did it, with enthusiasm" (Fred/Lake/ I/28/09/2011).

When teachers were cynical about making a difference and were overwhelmed by negative contextual conditions the facilitators experienced this as inhibiting because participants customarily saw reasons why the new knowledge and new ways of teaching that the group created would not work in their schools. For example, Russ reported in his journal that the lesson the Geography PLC had been working on would not work in his school with his learners. At the suggestion of other PLC teachers, the facilitator went to that school and taught the lesson they had discussed to show that it could be done with minimal resources and learners who had English language difficulties. Most participants in the PLCs saw themselves as positive and different from their colleagues. They reflected on their colleagues who displayed inhibiting conduct, for example, such as a belief that they had nothing new to learn: "But because of pride and prejudice you find some people say they've nothing to learn" (Alph/SHS/I/27/09/2011). When asked in the final teachers' questionnaire whether PLCs as envisaged by ISPFTED would work the participants identified the need to minimise negative factors in school cultures

such as: laziness, reluctance to work after 15:00, and a politicised environment. Russ even said that teachers would need to be "encouraged by money incentives" (T/Rock/Q1).

5.3.2.2 School structures, including structured time for PLC activities

Learning in PLCs was enabled when teachers came from schools where the formal leaders such as the principal and HODs promoted teacher collaboration and provided structured time in the timetable or the after school programme for teachers to work together to share knowledge and experience. These teachers had experience in jointly creating lessons and assessments and solving problems. They were able to model collaborative enquiry which enabled the learning in the PLCs. There were not many of these teachers. However, some teachers learned during the first sessions and then implemented PLC-like meetings in their schools. Alph explains how, before he joined the PLC, teachers rushed through work even if they did not understand but subsequently they met beforehand to discuss how to teach the topic: "Then before you go to class we have started that programme where we actually discuss the lessons before we are there, so that we also discussed the pacing. … We usually do them during lunch hours and times when we remain here at school, yes" (Alph/SHS/I/27/09/2011).

Time was the most important factor mentioned frequently by all participants. Lack of time for PLC work was a serious inhibitor: "Actually time is my biggest frustration. Time inhibits in terms of everything" (Viv/GHS/I/12/10/2011). Teachers found it enabling when school leaders protected their time for collaboration from external pressures such as unplanned meetings called by the district officials and additional duties imposed by them. Fred reinforced this when he advised a teacher in his PLC how to set up a PLC at her school: "And I kept saying again and again to her and, you know, whoever would listen that in fact, you know, the school structure is very important because however motivated teachers are, um, they need a little bit of a, a set time…" (Fred/Lake/I/28/09/2011).

If schools created opportunities for participant teachers to report back to their colleagues it increased the impact of PLC learning because teachers were able to 'upload' from the PLC then 'download' in school PLCs which then gave feedback to the subject PLC thus enhancing the meaningfulness of the activities of the PLCs. Fred emphasised the

benefits of the PLC's efforts being transferred to school PLCs as the TPD model envisaged when he explained how a teacher not in the PLC used some of the PLC ideas: "I asked T to try it with the grade 8s and we [the school PLC] ended up analysing what her class had done and looking at the results. And it was actually quite encouraging to see the results that came out of her lessons" (Fred, Lake/I/28/09/2011). Effective school communication structures enabled the learning opportunities and successes of the PLCs to reach a greater audience. Where there was little communication between teachers because there were no channels for this, ideas from the PLCs were not able to permeate the school. Facilitators experienced as inhibiting the lack of communication about PLC work to other teachers or miscommunication as this created false expectations. For example, teachers thought they would attend workshops and obtain hand-outs for use rather than having to participate and create materials. Some were suspicious of the PLC learning processes because they thought they were being used as "research guinea pigs".

PLC learning was enabled when schools had formal structures for helping learners to improve their performance, such as early morning, afternoon and Saturday classes and where extra work was expected of the teacher. Teachers used these additional learning opportunities to try out what they learned in their PLCs. They were able to give extra assessments and practice exercises, increasing feedback opportunities to the learners and to themselves which they did not have time for in normal school hours because they had to follow the fast-paced district subject work schedule.

5.3.2.3 School contextual realities

The contextual factors experienced as most enabling were having time to meet for PLC activities and not having an overloaded timetable. Positive teacher and learner morale and high expectations also helped. For many participants, particularly those from the "priority schools", contextual factors were inhibitors because, although participation in the PLC had motivated them personally, the teachers at their school did not believe there was much point in learning anything as they could have no impact or they were overwhelmed by what was already required of them. In many of their schools there was a culture of low expectations and lack of motivation amongst both learners and teachers. Often teachers were appointed to teach a subject for which they were not qualified and of which they had very limited subject knowledge which undermined their confidence

and made them reluctant to participate in TPD programmes because the next year they might be assigned to teach another subject.

5.3.2.4 Education department initiatives

PLCs were enabled when the policy or strategies of the education department (national, provincial and district) supported teachers' participation in PLCs. The ISPFTED, which promotes PLCs as a national teacher development strategy, and the district support for the NLC of which the three PLCs were part, are examples of enabling initiatives. Facilitators and teachers in priority schools experienced as inhibiting the fact that they were compelled to follow prescribed GDE district work schedules and common examinations/assessments each of which, they claimed, prevented them from trying new teaching methods and tasks unless they were given extra teaching time to do so. The multiple improvement strategies and interventions and district monitoring measures such as checking the pace of teaching against the prescribed work schedule that teachers at these schools were subjected to inhibited PLC functioning. If teachers in these schools were not allowed to use the assessment tasks or lesson designs that the PLCs constructed collaboratively it reduced the incentive for teachers to participate in PLCs. To enable teachers' learning Tracey argued that "We would need the department to let the schools do their thing without interference" (Tracey/Q2/11/2012). PLC functioning was inhibited when the district called unscheduled meetings that clashed with the planned PLC sessions.

5.3.3 Enabling or inhibiting teacher characteristics

PLC learning was enabled when the teachers had sufficient subject matter knowledge to participate in discussions. The type and depth of learning was influenced by teachers' knowledge. Teachers unqualified in the subject who were sent to the PLC to learn a subject from scratch inhibited collaborative enquiry work because their needs were different from those teachers with some expertise in their subject. A minimum level of knowledge was necessary for the PLC to function. This could be provided by the facilitator or external resources.

Fred, a facilitator, understood that PLCs could create new knowledge collaboratively and that included bringing in outside knowledge:

> It just occurred to me just in terms of the PLC I don't know if it's part of what's intended to happen, but what I found also quite interesting was… it was also a means to bring in other relevant material. So sometimes a PLC, um… Say for instance we had done work on sentences and then I found an interesting article that dealt with sentences which I then shared with the department and we discussed that which was all relevant to what we had been doing. So it's also a nice way of… of, you know, not only just focussing on that particular relevant task, but it can bring in other theory or other stuff that you've found. (Fred/E/I/28/09/2011)

Sam pointed out that the absence of a knowledge expert did not prevent effective learning[86] because teachers could access the knowledge they needed. In her opinion teachers' attitude was most important:

> I don't think that you need a real, an advanced expert. I think that what you do need, more importantly, is willingness to learn. So I think that even if you get two, a set of under-performing schools, teachers who really, really have the passion (sorry to use that word, but it is the only one that I can think of right now) the passion to work together to improve, I think that they can. As long as you say you have that access. So they can use textbooks if they don't know. Um, and then they can, and they can role model things. (Sam/FT/17/08/2012:243-248)

Positive beliefs were also enabling, for example: belief that learners could learn and achieve, that teachers had the power to make a difference (self-agency), and that teachers were learners too. Clara emphasised the willingness of teachers to abandon professional pride and learn:

> That's where I think we as individuals, and it's got to, for something like this to work I think the teachers have to, we use the same term again – buy into it. But in order to do professional development properly, teachers per se have to get some form of humility. (Clara/FT/17/08/2012:74-77)

It was enabling when teachers had an improvement- and an enquiry-oriented mindset, were self-motivated and attended the PLC to learn. For example, Aya understood that the PLC works to find answers to questions in order to assist participants to teach better and poses this problem in his journal "Problem to think about – the learners understand you when you teach but at a later stage they tend to forget" (Aya/MR/09/02/2011). This is the kind of topic the PLC would discuss collaboratively. When teachers understood and were willing to try the PLC model of TPD this enabled learning. The model depended on identifying and agreeing on a focus for learning and then sharing knowledge and experience, being reflective, and risking. It required active participation and honest contributions. Teachers needed to understand that they were not coming to get ready-made materials but rather to work jointly on creating them; learning using this

[86] Sam was mindful of the difficulty of finding sufficient experts for all PLCs.

model would be a slow process as there were no instant fixes. Fred focused on the importance of introducing the model clearly:

> So I think it's quite important the way the whole project is presented to people, you know, the way it's… because also people have said, you know, it depends on teacher buy-in and all of that, you know, so it's a very tricky thing to get… Because I think it is very beneficial, but I think people's first perception of it is onerous and it's a big job and it's going to just be a waste of time and all that. (Fred/FT/17/08/2012:517-521)

Clara agreed when she articulated the need for: "A proper understanding by all members of the model, purpose and where the group is headed, buy-in" (Clara/Q2/11/2012).

Teachers needed to want to do work that met learners' learning needs, not necessarily their own. In an interview with Alph, a lead teacher, an understanding of the model was expressed. He pointed out what he had learned through the collaborative process of the model and the impact it had had:

> So as a teacher you need to dig deep into that before you even call the learner so that when the learner says this you have a way of correcting it, yes. So that's why I have found it so interesting really to attend these teacher development sessions because I believe where two professionals meet there is light that is shared. And there is light that is spread, yes. (Alph/M/ I/27/09/2011)

When teachers expected to be given materials rather than working jointly to develop the knowledge and skills to create the materials themselves, or when they wanted to be told how to do things rather than participating in the enquiry process, learning was inhibited: "… he did not really respond to the actual NLC mandate which was to work together to improve teaching and assessment. He wanted content (which I am sure helped him)" (T/Q2/11/2012). It also hindered learning when teachers were impatient and did not want to complete the learning enquiry cycle. They wanted to stop when the materials or lesson had been designed and did not want to follow through by trying it out in order to evaluate its impact.

Learning in PLCs was enabled when participation was voluntary rather than coerced because learning in PLCs depended on trust and cooperation amongst participants and was slow. The benefits were not seen for some time:

> And it's because of time. Time is what it needs to, to work. It takes times. It takes a lot of time. To build relationships. You see it's all about relationships and trust and those things. (T/FT/17/08/2012:604-605)

PLC functioning and learning were enabled by teachers who trusted their colleagues and were willing to expose their practice, share honestly, and commit to the collaborative learning and reflection process. "Staff would need to feel they can contribute, no matter how insignificant or miserable they feel" (Sam/Q2/11/2012). Sal realised the value of sharing, risking and engaging in an enquiry process which focused on a meaningful teachers' learning need which arose from learners' learning needs. She also appreciated the feedback and evaluation of the new practices that group members tried:

> I also think the big distinction there is when it's adults and people with some experience that when you have that kind of learning there's recognition of some experience that people have. And while it's varied, and some of it… some people have more to offer than others, but once somebody feels that I too can add, immediately the process for you is a different one and you're more open to learning and to the other, because no-one's come along and said, 'I've decided you need to now learn this.' (Sal/E/I/28/10/2011)

Facilitators experienced the absence of the above factors as inhibiting. For example, Gay struggled when participants did not share and risk. When teachers attended the PLC merely to obtain transport money, did not want to do the extra tasks with their learners (and thus not obtain the feedback needed by the group to judge impact of changes), believed they 'knew it all' and that everything they did was effective, and had a negative view of learners in their schools and of parents, these factors hindered the learning in the PLCs:

> I mean I've got one guy, S, who comes and he'll, although he sort of participates he won't ever bring anything, I'm sure. He has slept through two sessions. (Gay/FT/17/08/2012:426-428)

Participants' sustained commitment and accountability to the group for doing the between session "homework" were important enablers of learning because learning in a PLC is a process over time and depends on teachers' regular contributions. Lack of punctuality and irregular attendance inhibited systematic engagement and learning in each step of the enquiry process. Clara complained about: "sporadic attendance by some participants – this makes continuity really challenging" (Clara/Q2/11/2012). Teachers' absences prevented their contributing to follow-up activities and reflecting on the impact of their new learning, thus inhibiting their own learning as well as the group's.

5.4 COMPARISON OF THREE PLCS

I briefly compare the composition of the PLCs in Table 5. 2 below.

Table 5.2 Comparison of PLCs

	Factor	Geography	English	Mathematics
1	Size of group per session	On average five teachers per session	On average four teachers per session	On average eight teachers per session
2	Qualifications of participants	Teachers were qualified with either a three or four year college level specialisiation in Geography or a degree with at least two years of Geography.	Teachers were mostly well-qualified with a degree majoring in English.	Teachers were generally well-qualified and some had upgraded in Mathematics when their initial qualification was more general.
3	Schools where participants teach and pass rate for the subject at commencement of project (2010 NSC average for subject)	Five poorly resourced "priority" township schools, one well-resourced achieving suburban school; one struggling to maintain past achievement level suburban school; and one poorly resourced urban school struggling to achieve. The pass rate ranged from 45%-100% with the PLC's average being 63%.	Four well-resourced achieving suburban schools; one suburban school struggling to maintain past achievement levels, and one poorly resourced urban school struggling to achieve. The pass rate ranged from 80%-100% with the PLC's average being 96%.	Five poorly resourced "priority" township schools, six well-resourced achieving suburban school; one struggling to maintain past achievement level suburban school. The pass rate ranged from 15%-100% with the PLC's average being 65%.
4	Confidence[87] of participants	The majority of teachers self-reported being extremely confident or very confident/knowledgeable about their subject matter knowledge and very or usually confident/ knowledgeable about most other aspects of teaching. The areas where they reported being less confident were: analysing learners' results and deciding on remedial/ extension strategies and helping struggling learners to overcome their learning difficulties. From observation of the teachers' participation it appears they were mostly not very confident of their subject matter knowledge or PCK.	All the teachers self-reported being extremely confident or very confident/knowledgeable about their subject matter knowledge, PCK, assessment, and lesson design. The majority reported being extremely confident or very confident/knowledgeable about the other aspects of teaching. Their participation and reflective contributions confirmed this.	The majority of teachers self-reported being extremely confident or very confident/ knowledgeable about all aspects of teaching except for designing summative assessments tasks where the majority was usually confident or very confident/ knowledgeable and for constructing diagnostic assessment tasks and planning and monitoring the completion of the curriculum each year where the majority was usually or sometimes confident/ knowledgeable. Their participation and reflective contributions confirmed this.

[87] Confidence here refers to the teachers' attitude and approach and not to the quality or extent of their knowledge.

5.5 CONCLUSION

In this chapter I have described the teachers and facilitators in the three PLCs and their contextual realities. I have identified and described factors operating at school level that are key to enabling learning in a PLC. Without a critical minimum level of these enabling factors being present, learning in PLCs is likely to be severely hampered, or even impossible. In the next chapter I deal specifically and, in greater detail, with facilitation as a key enabler of PLC effectiveness.

CHAPTER 6 FACILITATION/LEADERSHIP IN THREE PLCS

6.1 INTRODUCTION

Katz et al. (2009) identify "leadership" as a key enabler of learning in networked professional learning communities. In this chapter I identify what is necessary for effective facilitation/leadership, in particular the functions facilitators perform, and the role expectations related to these functions. I describe in some detail how the facilitators of the three PLCs performed these functions. I follow this by describing three approaches to facilitation that the facilitators used and the style they adopted to do so. I refer to speaking turns, speaking time, and a brief analysis of the discourse to identify the style, specifically whether the facilitators are directive or non-directive. I conclude this chapter with a comparison of facilitation in the three PLCs.

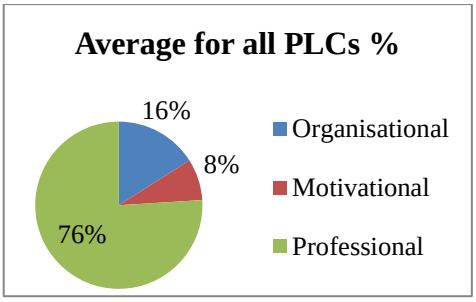
6.2 FACILITATORS' PERFORMANCE OF THEIR FUNCTIONS

According to the TPD model used in this study effective facilitation (i) provides leadership and enables the development of relationships in a PLC that promote trust, collaboration, an enquiry mindset, and accountability; (ii) provides support; (iii) builds capacity; and (iv) provides the necessary organisational and administrative structure (Allen & Cherry, 2000; Firestone & Pennell, 1997; Lieberman & Grolnick, 1996; Borko, 2004; Earl & Katz, 2006; Little, 2005; in Katz et al., 2009, pp. 12-15). The responsibilities of the facilitator can vary but broadly they deal with *organisational, motivational* and *professional* functions (Lassonde & Israel, 2010, p. 90) or structural, process, purpose and agency issues (Hadfield & Chapman, 2009, p. 132) necessary to implementation of the organisational and content focus factors of effective TPD. I use the framework (Figure 2.2) drawn from the literature (see 2.4.4.1) to describe how the facilitators of the Geography, English and Mathematics PLCs carried out these functions and met the related role expectations. Each of the three facilitation functions have related role expectations and the fulfilment of these functions and role expectations demands a number of personal qualities in facilitators which include: "intelligences" (Chapman et al., 2006), skills/abilities/knowledge and personal characteristics. I refer only briefly to the personal qualities that the literature suggests are necessary to fulfil these functions as the focus of this study is on a description of facilitation rather than evaluating the individual personal qualities of the facilitators.

Facilitators of PLCs are sometimes outsiders to the group but in this case study they were the lead subject teachers from the school co-ordinating the NLC project (Table A6.1, Appendix 6.1). The facilitators were not specifically trained for the role. The only preparation they had was a short workshop on the key features of facilitation, the personal qualities and skills required for the role, the concept of collaborative analysis of learners' work, and exposure to protocols that could be used in their PLCs.

In this section I describe how and to what extent the Geography, English and Mathematics PLC facilitators carried out the: *organisational*, *motivational/relational* and *professional* functions. The data suggest that all three PLC facilitators' speaking turns focused mainly on their professional functions (76%), only 16% on organisational functions and 8% on motivational/relational functions (Figure 6.1).

Figure 6.1 Average % of all facilitators' speaking turns focused on the functions



Facilitators may have engaged more in motivational and relationship-building functions outside the formal recorded sessions and certainly some organisational work was done before and after sessions. The organisational functions performed during sessions mainly concerned establishing the PLC's vision and agreeing on the learning goals. Figures 6.2-6.4 show the percentage of turns spent on the different functions in each PLC. See Table A6.2 in Appendix 6.1 for details.

Figure 6.2 % speaking turns focused on the functions

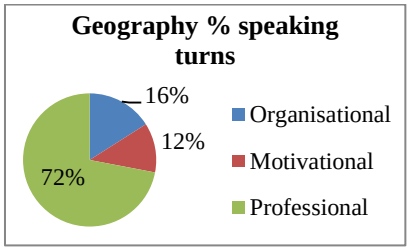


Figure 6.3 % speaking turns focused on the functions

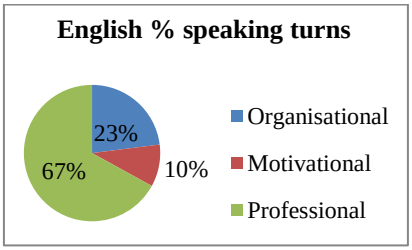
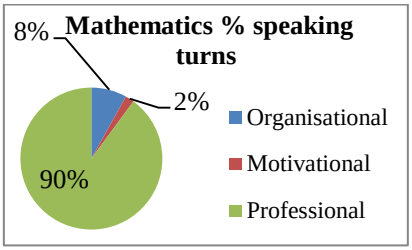


Figure 6.4 % speaking turns focused on the functions



In the following section I describe how each of the facilitators performed the functions and fulfilled the associated roles expected of them (Lassonde & Israel, 2010). I begin with the organisational functions, followed by the motivational functions and conclude with the professional functions.

6.2.1 Organisational functions

These are the functions needed to organise the PLC and its work in order for it to be effective and involve goal-setting, management of structures and processes and ensuring on-going leadership. The Geography facilitator spent 16% of speaking turns on this function, English 23% and Mathematics 8%.

The facilitator is expected to *build and communicate a shared vision* for the PLC work, including identifying the group's goals and learning focus and understanding the purpose of their work. The facilitators outlined the expectations of PLC work and with the participants created a vision for their specific PLCs. Each facilitator described what was expected of participants: the need to contribute from their knowledge and experience, to commit to examining their classroom practices, to enquire about new and better ways of doing things, to try them out and then evaluate their impact on learners' learning with a view to making further changes in their practice. The facilitators emphasised that the overall aim was to learn how to teach better in order for learners to achieve better results.

The facilitators performed a range of *organisational* (management/administrative) responsibilities, which included organising the venue, catering, equipment, learning resources/materials, administration forms (e.g. consent forms, questionnaires, travel claims, registers), and session agendas; managing the reflection journals; keeping a record of their work and sample copies of artefacts used or created.

Amy, the Mathematics PLC facilitator, explained that the process their PLC was following was not a grand vision for school reform but rather a practical, step-by-step, classroom-relevant attempt to do things better for the sake of the learners' learning:

> So let me explain to you what's happening. So I told you that this was a really cool project, right, and what we're doing is up to now we have collected data from learners, ok. So I sent tests with you guys and you got your learners to do them and we brought them back and then we collated the data. Now what we're going to do with that data is well first of all we're going to look at the test and we are actually going to do the test and we're going to look at what are the different ways of doing the test and possibly… ok, because it's a multiple choice test, how did they come up with the 4 answers because sometimes you pick random answers out of thin air, but a lot of the time you deliberately choose specific answers because that can result out of a problem that the kids come up with, ok. So we're going to now look at these test items and we're going to say, 'Ok, why or where could they have discovered this answer and that answer and etc. etc.' Ok, so that's step number 1. (M6T11/05/2011:23-33)

Amy explained the other steps then concluded that the group would look at the effect of their lesson on the learners and whether it met their learning objectives and then they would analyse the reasons for what happened:

> Then… So once we've designed the lesson plan then we're going to discuss the lesson plan and we're going to say, 'Ok, what problems can we foresee with this lesson plan? What do we think the kids' responses are going to be? Which direction do you think we're going to get them to go in etc. etc.?'
>
> And then, hopefully, if one of you is willing, we will film the lesson being taught and then we will discuss, 'Ok, this is what we thought, this is how we thought the lesson was going to go. Did it go this way?' And if it did, that's great, and if it didn't, why didn't it go that way? Ok.
>
> So that's like the bigger picture of where we're going with this whole thing. Does that sound desirable, good, bad, indifferent? (M6T11/05/2011:46-57)

Other facilitators did similar things, with each group interpreting the TPD model slightly differently. Fred articulated the vision loosely for the newcomers to the English PLC:

> Ja I think, um, ja, ja it's meant I think to be a kind of loosely defined as a professional development thing where we explore things that we would like to work on.[88] So, it can, it can very easily fit into what you're doing at school. (E14T/25/01/2012:179-181)

At the beginning of the second year Gay, the Geography facilitator, presented a type of vision for their PLC's work which was practical and based on the day-to-day needs of the teachers:

[88] "work on" in the sense of working out how to teach a topic better so that learners are more successful at demonstrating the desired knowledge and skills.

> Um I looked at some of the things that people have done or would like to do here and one of the things is… that came out is maybe how to teach things differently - if not teach it differently, how to teach it better. Um, and what I was thinking 'cause we're dealing with it at the moment is that a lot of the climate that we teach is abstract and we sort of discussed it last week when I showed you some diagrams that we'd found. So I thought it might be nice to, to say "How would we teach? What is the best way to teach some of the abstract concepts? (G15T/01/02/2012:48-54)

After two years of facilitating Fred observed how difficult it was to stay focused on a goal:

> Teachers are apt to talk a lot but not always productively. To keep participants focused on a goal, a lesson, and outcome was instructive. (Fred/Q2/11/2012)

In all three PLCs in this case study the vision was expressed in terms of an action plan with implied learning goals for the teachers.

In the excerpt below Fred recognised that his failure to do what he had promised could have hindered the group's progress:

> Oh ok, well um I kind of felt a little bit bad because I think we agreed that we were going to email each other and come up with a lesson plan and I don't think I ever did get back to you. I don't know if you've done anything? (E9T/24/08/20111:6-8)

To maximise the effect of learning in a PLC the leader/facilitator is expected to *develop, share or distribute leadership***.** Through enabling leadership transfer the facilitators can potentially empower more teachers to have an impact in the various schools participating in the network (in the case of NLCs) or further within their own schools (in the case of PLCs)[89]. In this study facilitators did not specifically develop teachers' leadership abilities.

The Geography facilitator, Gay, did not share facilitation/leadership of the PLC sessions with anyone. She did not suggest it and no one appeared able or willing to assume the role. Fred was eager to share leadership because he saw himself as one amongst equals. He shared facilitation with Sam. The excerpt below, taken from the last session of the first year, indicates Fred's feeling of not having shared facilitation more widely amongst the group. In his understanding, the concept of "leader" had too much of a link to power/authority/superior knowledge. He favoured the more democratic concept of "chairperson":

[89] This study's model of TPD envisaged the participating teachers replicating the type of work that was being done in the networked subject PLCs in their own school, in school-based subject PLCs. It happened, to a limited extent, only in the English PLC.

> Yes. Ok. Well… And then just around that issue I think the thing that we haven't really got right in this meeting is – and maybe if we're moving it might be a good chance to do that – is to kind of rotate the chairing of the … meetings. (E13T/09/11/2011:122-126)

The Mathematics PLC's main facilitator, Amy, did not prioritise sharing facilitation/leadership but she did share the role with Clara who facilitated sessions which required intensive subject matter/curriculum knowledge.

There is some evidence that although many participants did not actively lead the PLCs or formally lead school-based subject PLCs, they did, in fact, exercise leadership in informal ways in their schools or in other networks of teachers. When the Geography participants were asked whether they were leading learning in their schools or in a broader network they reported sharing resources and learning with colleagues. In the following excerpt a participant describes the eagerness of his school Geography team for professional development which he felt confident to provide because of his learning in the PLC:

> I think I have definitely learned to lead, because even tomorrow [I] am sure of that one [thing], that the whole Geography team at our institution will be knocking at my door wanting to know how the workshop went today, what more did I bring and what information do I have that they don't have. My attending this workshop (on behalf of the Geography Team) has made our Team even more united than it ever was, so that is why I say yes I learned to lead as I am leading the team. (Bal/GR/09/11/2011)

Teachers found that the PLC provided them with knowledge and resources to share with their teams thus empowering them to lead:

> I learnt to lead as I am able to discuss everything we dealt with during our contact session with my colleague in our school and the learners as my school does not have much resources and facilities like a library. (Oupa/GR/09/11/2011)

The English PLC participants took the learning from their PLC back to their schools. Sal, a regular participant, tried to implement the TPD model of this study but experienced structural difficulties at her school such as lack of time and lack of support from her HOD, nevertheless she did have some success which she reported:

> The discussions at the NLC have been very good and I have shared this with English teachers at school. In some cases they have used the exercises in class and we have discussed the outcomes. One challenge for me is that the PLC sessions are not held in a formal manner which has impacted on sharing info. (Sal/ER/09/11/2011)

Sam was encouraged by this: "I have learned that if we lead well, others will learn to lead well too" (Sam/ER/09/11/2011).

Aya and Alph, Mathematics PLC participants describe how they led in their schools:

> Yes! I have learned to lead already at my school; we do team teaching through the skill I have acquired during these meetings although there are challenges like people who are lazy. (Aya/MR/09/11/2011)

> My HOD is not a Mathematics major … I have assumed the role of subject lead teacher where I assist her in the running of the department. … reporting information from the NLC meetings has made us be a team which look up to each other for assistance and information. I also assist her a lot with moderation of tests and I think she has also benefited a lot as well. (Alph/MR/09/11/2011)

The learning from participating in the Mathematics PLC empowered Nomsa to exercise leadership in the district and in a local network of teachers:

> [I have learned to] challenge the way we do in our district where you will find there are restrictions in setting tasks and tests … anyway I got huge experience of working with people and now I can work and lead in a group [sessions in her local network]. (Nomsa/MR/11//2011)

Russ described what he had learned from the processes he experienced in the sessions:

> Learned to lead – definitely yea. I have learnt that if you are leading, you must always have an open mind, you must not quickly brush aside other people's idea/suggestions as they may be quite instructive. (Russ/MR/11//2011)

The above extracts suggest that the facilitators did manage, largely incidentally, to develop leadership skills and confidence which were then transferred from the PLCs to the teachers' schools and communities.

6.2.2 Motivational/relational functions

Facilitators are expected to *build motivation and create the driving force towards the learning goal***.** The facilitators adopted a motivational stance. The turns spent by the PLCs on this do not really reflect this (Geography – 12%; English – 10%; Mathematics – 2%). Facilitators enthusiastically welcomed teachers to each session and then worked in a businesslike, yet encouraging, manner through the programme, directing the PLC participants towards the day's learning objective. Facilitators reported that they occasionally phoned a member who had missed a session and recapped for him/her what the PLC had done and described what was planned for the next session. Amy recognised that one of her strengths was motivating the group but also that she needed to be more sensitive to their needs:

> I learned I am good at getting people to be enthusiastic about things, but I have yet to learn how to develop programmes that cater to everyone's needs rather than programmes about things I think they need. (Amy/Q2/11/2012)

Facilitators worked at *building community, good relationships and collective responsibility***.** When reading through transcriptions of the sessions, the reader had a sense that the PLC was a community: "Is everybody fine? (G2T/23/02/2011:21). The facilitators worked at establishing and maintaining good relationships and reflected on how they managed. Amy identified how difficult it was to build trust:

> Building everyone's trust is a difficult task and not something that can be done quickly. It's very nerve-wracking to have everybody's prof. dev. resting on my shoulders! (Amy/MR/09/02/2011)

Amy felt very positive because "People contribute, there's a high level of trust" (Amy/Q2/11/2012). She identified her ability to motivate, and build relational trust as her strength:

> I think I have been excellent at motivating the group to keep attending … I have developed a sense of trust in the group because the group members all participate at least once in a session if not more. (Amy/Q1/07/2012)

Clara, the co-facilitator, interpreted the group's willingness to speak freely as a sign of a healthy community and good working relationships. She was inspired by this:

> I feel that teachers are at a point where we trust one another's professional opinion and can voice our thoughts on teaching methods and understanding of content freely. This has been inspirational for me and out-weighed the negative feelings that I have felt. (Clara/Q1/07/2012)

There is evidence that the facilitators were not good at insisting that participants play their part, especially by doing session follow-up activities and bringing feedback to the group. Gay was tentative ("But maybe … So maybe"; "I thought …") when she asked teachers to bring resources for test questions:

> But maybe… So maybe I can ask you one, if you can just start collecting some… Like even if you find a diagram that you think might be nice, or an article that we can use because you can bring it and say, 'I thought this might be nice' and we can come up with questions for it. (G7T/01/06/2011:398-400).

She set developing group accountability as an improvement goal for the third year of the project. Fred also recognised his weakness in this area:

> Not being firm enough that people keep to their promises – although I was with a very dedicated and keen group. (Fred/Q2/11/2012).

Facilitators realised that effective communication was key to building good relationships but they found this aspect difficult. This aspect of their leadership required great sensitivity, careful choice of words and timing of inputs as well as empathic and patient active listening. The facilitators felt they talked too much and that had a negative impact on the collaborative learning process. In these excerpts Sam, Amy and Clara acknowledged their difficulties:

> On reflection, I also feel that I talked too much (as usual!) I find it hard to contain my excitement about the project working and about what my learners will do with the lesson that we are planning. I need to allow others to give their ideas more readily. (Sam/ER/13/04/2011)

> As a facilitator I need to learn how to shut up. (Amy/MR/11/05/2011)

> I hated the silences and wanted talking to happen. It was in those sessions that I found myself teaching rather than facilitating. I consciously had to make the transition to listening and asking questions that required a thoughtful response. This has been difficult but beneficial for me and the group. One thing I have learnt is that humility will ensure that you are more effective in leading a group. (Clara/Q1/07/2012)

Gay struggled to obtain participation and hypothesised that because of this she filled up the silences:

> It was very difficult to get discussion going today. I felt I talked too much. I think people were receptive to suggestions and plans but very little comment was forthcoming. I felt I did try and ask the right questions but I need to ensure next time a more specific task is prepared. (Gay/GR/09/02/2011)

When they believed that they achieved the balance between talking themselves and eliciting participants' contributions they felt very pleased with themselves and with the positive impact of such balance. Amy had to deal with people who talked too much but managed to achieve the goals of the day and Gay felt there was improved responsiveness:

> Much better this week! Everybody was much more willing to participate and we had some really good discussion. There are some people who tend to dominate the discussions and sometimes we went off on serious tangents, but we managed to get through everything. (Amy/MR/09/02/2011)

> I am learning to ask more questions and wait for answers/responses from my group and department. (Gay/Q2/11/2012)

Gay experienced a similar difficulty to Amy: "I have to 'manage' a gentleman from Ivy College in order to allow others to talk" (Gay/GR/14/03/12). Sam realised that once she had mastered her own urge to speak too often and too much, managing the communication in the group was one of her biggest challenges:

> Honestly I felt bludgeoned! I do not find it easy to cope with group members who are entirely controlling and don't seem to have any idea of what a "collaboration' is. Perhaps they try but their personality and habits force them to be controlling. (Sam/ER/01/02/12)

Fred summed up the importance of PLC members communicating appropriately: "I learned that just as in teaching if groups listen and share much can be achieved" (Fred/Q2/11/2012).

6.2.3 Professional functions

Facilitators focused mainly on this function: Geography 72%, English 67% and Mathematics 90%. They worked at *building collaborative reflective enquiry focused on learning.* The facilitators helped participants understand that their knowledge and experience were valuable to the group and that if they worked jointly on a particular activity, each contributing his or her knowledge, the PLC would be able to create "new knowledge". They tried to obtain support for norms of collaboration such as having an enquiry stance, being reflective, and thinking deeply/analytically. For the Geography facilitator, however, just getting participation was the greatest challenge. Moving to a higher level of collaboration was not very easy. Gay was critical of herself as a facilitator because she could not successfully do this:

> I do not think I have been effective as a facilitator. On the one hand because I have done so much the group expects me to carry on, but I find they are keen to learn and get information but there is less contribution or active giving of information etc. I think they feel they can maybe not contribute any value to the group; they feel limited by their knowledge or experience. Added to this, I think they do not see it necessary or want to actively prepare things for our sessions, i.e. there is still some concept of wanting to be given. (Gay/Q1/07/2012)

Gay reported that her best PLC experience was: "when more people started participating and sharing ideas" (Gay/Q1/07/2012). One of her improvement goals for the third year of the programme was to:

> Try to get more involvement of the group by asking for contributions but make them 'manageable' requests. (Gay/Q2/11/2012)

The English PLC facilitator established the understanding that the PLC would function collaboratively from the outset and participants did this quite easily. The excerpt below shows how they collaborated on the next step in their lesson design about teaching "tense":

> Sam: And then have a look at it, and then say to them afterwards, 'Right. Now I'm checking on... Really what I'm trying to show you here is tense.' I would like to try that
> S: And in the … we're not going to give verbs because we're just giving…?

Sam: No, I'm going to try and not to give
F: We probably have to have some or ja…
S: Maybe
Sam: You see, you give them specific clues like: alone, dark outside
F: Right
Sam: Noise? Absolutely. So I think that's nice. I think they'll immediately get the idea, 'Ok, I know what I must do.' Then they must string it out into a thing. I'd love to try it with my kids especially because I've done this now. I've introduced them to the idea, they've done specific tenses.
S: It must follow this one.
F: Ja
Sam: Yes I think it must.
S: I think it follows this one.
F: Yes. Yes
Sam: Because that's also a way of seeing whether in actual fact there has been any impact from this exercise. (E8T/27/07/2011:772-790)

Sam expressed her attitude to collaboration and belief in the value of each person's knowledge and experience for the achievement of learning:

> I am a person who enjoys collaboration with colleagues and I try to avoid talking down to them. I hope that I do a decent job of facilitating … I try to encourage as much discussion as possible without intimidating the people in the group. I work hard to create a non-threatening environment so that people can voice their opinions, findings and ideas confidently. (Sam/Q1/07/2012)

She further remarked:

> Those who humble themselves learn the most from other teachers or from the collaborative process. (Sam/Q2/11/2012)

Fred was aware of the need for their learning activities to have an impact on their teaching and learners' performance and of his responsibility as facilitator to make sure that their work was productive. In these excerpts Fred questions the worth of what they were doing:

> So I'm just trying to think. I've got an eye on the overall tasks that we've been doing with the eye to have our lessons achieved what we've set out to do? Have our sentence construction lessons achieved what they have set out to? And is there a link between what we did there and say this tense exercise or are they totally separate things? Or is there a way that we could construct a continuous set of exercises that are testing sentence construction and tense? (E9T/24/08/20111:727-731)

PLC work is expected to move teachers beyond "polite interactions to the kind of thinking, problem-posing, and problem solving" to "authentic talk about real work" (Lambert et al, 1995, in Langer et al, 2003, p. 128). To accomplish this, the facilitator is required to articulate high expectations for the nature of the PLC work, namely that it needs to impact on learners' learning.

In the beginning Amy, the Mathematics facilitator, struggled to get all participants to understand the expectations of collaboration in the PLC:

> I think everyone got a better idea of what the project was about and that it's not just going to be us giving them all the tasks. I still had to field requests for tasks but much fewer this week and I had some good feedback from the people who left at the end. They are I think slowly beginning to realise that reflection and error analysis can be useful in teaching. (Amy/MR/23/02/2011)

Over time participants developed the skills to engage in more than "polite talk". In one example a teacher challenged another teacher's way of explaining the concept of "mode" by using a "rhyme" "mode" means "most" because it could cause a misunderstanding. A third teacher reworded the explanation and the discussion concluded with all teachers being more aware that their use of language could mislead learners.[90]

Clara reported a realisation she had about teachers which presented a challenge to facilitators trying to promote collaborative enquiry and shared learning:

> I have also learned that adults are increasingly stubborn about what they know and how they teach. There is a huge perception that 'I have to be right at all time'. I have not figured out how to break this barrier! (Clara/Q2/11/2012)

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[90] M3: And what… also look because if you work out the mode because the number that appears the most so if you like rhyme mode, most. That's how they remember it: mode, most. That's the easiest one to remember, but when it comes to median and mean, so they don't know which one is which, but that's where the guessing comes, ja.
M5: Can I just comment on what he says?
A: Ja. Yes of course.
M5: Most learners also think when you say mode then you, we say it with the highest frequency.
A: Yes
M5: So they take the biggest number instead of taking that so they just look at the data then they say the biggest number.
A: I never thought about that.
M5: So here it's 120 the biggest, so they
M3: Oh, mode, most, ok the biggest number. I ? , ok
M5: Instead of the data which is appearing
M3: So that's why they chose…
V: But then that would be a good example not to teach mode, most because most could then be misinterpreted as the highest.
M3: The most, the highest number, mmm.
M5: The biggest
M3: Ok.
M5: But if some people are saying most appearing
M2: I think that one appears better than saying the highest frequency. The moment you say highest frequency they will take the highest value in, the highest data value.
V: Ja
M3: But how will you present it?
A: Ja, you see it's difficult. Terminology is difficult and choosing terminology. Ok, any other comments on that one? Then we're good. (M5T/11/05/2011:370-415)

One of the main purposes of PLC work is to build the capacity of teachers to change their instructional practices (Katz & Earl, 2010). The facilitator is therefore expected to *build this capacity and provide the necessary support to participants including accessing external expertise.* In this study building capacity required facilitators to ensure that the PLC focus was on learning and its transfer to classroom practice. While they approached capacity building differently, all the facilitators were focused on it throughout.

The Geography PLC focused on teachers' learning needs in relation to topics that their learners found difficult. They dealt with concepts that both the teachers and the learners struggled with such as climatology, air circulation, and map work. Awareness of the objective that teachers' learning should transfer to their classroom practice was always present. Gay provided resources for teachers and explained how to use them. Teachers were pleased that the learning related to topics that they were currently working on:

> I felt rejuvenated in our Geography workshop. I am happy because as of today I will teach all types of oblique photographs as I was given the simplest way of understanding it but still the monster is still coming that is the GIS. As you have noticed I have never missed a single workshop. This shows clearly that I benefit from these workshops. Hooray I wish this could last forever. (Ian/GR/04/05/2011)

> I think if we discuss GIS and map work especially the cross section in our next session, it will help a great deal. The sessions are very important and informative to us … and will help us improve how we teach these learners. (Bal/GR/13/04/2011)

In later sessions, the teachers worked more collaboratively, with the facilitator's guidance, as they supported one another in building capacity. Both Gay and the teachers reflected on this:

> Today's session was more of information sharing on how best can we … make it simple for our learners to draw a cross section and we tried to put our hands together in making notes for the learners on how to draw a cross section which I think was very good. (Bal/GR/24/08/2011)

> The 'info' sheet we are working on is a good example of covering 'content' knowledge and how to teach a section. I do think we are 'designing' useful 'notes/tools' to help learners and teachers. (Gay/GR/14/03/12)

> I got so many good ideas from the different teachers… I'm going to use those ideas and I'm hoping that it will work with my learners. (S/GR/14/03/12)

The English PLC focused on problems they had identified from learners' writing. They collaboratively devised lessons to improve their knowledge and skills associated with teaching writing. In all cases they tried out the learning with their learners. Sam felt pleased

about bringing an external resource[91] to the PLC which they worked on collaboratively thus building one another's capacity with her support:

> And you'd add things to them. Ja, I think it's stunning. I think it's definitely a tool that we ought to give to our kids. (E13T/09/11/2011:825-826)

Participants' and facilitators' reflections on their PLC experiences indicated that they found the supportive/collaborative learning experience built their capacity as teachers:

> I am quite excited by our discussion today. I feel motivated to teach our lesson in anticipation of the results. I think the specific thinking involved in these lessons has been very worthwhile and useful. (Fred/ER/13/04/2011)

> The exciting part of the process has been using the planned activity/lesson and seeing positive results. (Sal/ER/09/11/2011)

Motivated by their aim to address learners' needs, the Mathematics PLC worked on trying to understand the reasons behind errors in order to teach concepts better. They designed and refined lessons on a Mathematics concept to achieve effective learning. The facilitators enabled and supported this collaborative knowledge and capacity building. Amy considered the discussion in session 17 to be her best facilitation experience:

> … when we were watching the first video and there was great discussion about all the problems we saw. I felt like we were finally achieving what I had set as the goal for the group right at the beginning. (Amy/Q1/07/2012)

In this session (a post-lesson discussion of the video of the lesson on exponents that the PLC had designed) teachers jointly built their capacity to design a lesson which would achieve the intended learning more effectively. They examined the weaknesses of the lesson so that when Aya taught it to his class it would be an improved version. Amy asked questions and guided the discussion. The other PLC participants reported learning from the lesson design process and taking the exponent lessons back to their schools to share with other teachers and use with their classes. Russ particularly appreciated a new way of introducing a concept that could enrich his repertoire:

> The idea of coming up with a number pattern to introduce the concept of exponential form was brilliant and it enriched my other methods I already had of introducing the concept. (Russ/MR/01/02/12)

[91] This resource consisted of a number of mind mapping strategies.

Clara learned how to achieve more learning in the group by listening better and setting up situations for learning:

> I learned to listen and keep quiet. I learned that as a leader it is important to allow questions that "poke holes" in one's methods because this leads to a better understanding of subject matter. (Clara/Q2/11/2012)

She realised that sometimes capacity building happened serendipitously if the conditions in the group were enabling and also that collaborative capacity building extended beyond what happened in the PLC to further sharing of ideas and resources:

> I'm also excited by how discussions start and lead onto other topics that were nowhere in the plan … but which have very positive outcomes. … The willingness to share resources and experiences in the classroom now is another good experience that has come from the NLC. (Clara/Q1/07/2012)

Facilitators focused most of their speaking turns on the functions and roles associated with their professional functions. This indicates that the facilitators understood that the primary purpose of PLC sessions was for teacher learning to take place and that it was their role to ensure that their PLC was productive in this respect.

6.2.4 Facilitators' personal qualities

Effective performance of facilitation functions demands that facilitators possess certain personal qualities (Figure 2.2). They require what Hadfield & Chapman (2006) term "intelligences". All three facilitators demonstrated the five intelligences described by these authors, with their exercise of "contextual intelligence" being particularly noteworthy. Their approach and style of facilitation as well as the choice of the focus of the PLC activities were determined by how they interpreted the needs of their PLC members, that is their context. For example, in the beginning, Gay needed to direct the group and provide most of the knowledge whereas Fred was able to begin immediately with a collaborative enquiry cycle. The facilitators displayed, to a sufficient degree, most of the skills, abilities and knowledge necessary for enabling learning in their PLCs. All three facilitators expressed concern about their communication skills which were tested and developed over the period of the study. The Geography facilitator, in particular, struggled to hold her PLC members accountable for doing follow-up work and she felt that this inhibited the learning of the group. Although the facilitators were not trained in specific facilitation skills for enabling learning and did not have a thorough understanding of collaborative enquiry processes they reported that they

learned the necessary knowledge and skills in the course of carrying out their responsibilities. Each facilitator's unique combination of personal qualities contributed to the way s/he facilitated. For example, all three facilitators established their trustworthiness early in the study: Gay through her knowledge and competence, Fred through his open and democratic stance, and Amy through her honesty, efficiency and focus on the purpose of the PLC. See Appendix 6.2 for a description and evaluation of facilitators' qualities as evidenced in their PLC interactions and activities.

6.2.5 Facilitators' self-evaluation of the performance of their roles

Table 6.1 below is a summary of the facilitators' self-evaluation scores of the extent to which they believe they met the expectations of the role of facilitator using a scale of 1-never, 2-occasionally, 3-fairly often, 4-mostly, and 5-always. The highest average score, 4.3, was for "Build relational trust" and "Ensure that teachers contributed in sessions". This may account for the lowest average, 3.0, being for "Established norms for the group and monitored adherence to them". The facilitators also did not feel they had successfully developed leadership in others. It would appear that the facilitators prioritised relationships to the possible detriment of holding people to account in regard to, for example, doing work between sessions and attending regularly and punctually. It is significant that overall they gave a high rating, 4.3, to "Enabled learning to take place".

Table 6.1 Facilitators' self-evaluation of their performance of their role expectations

	Characteristic	Gay - G	Fred - E	Amy - M	Average rating
Organisational					
1	Provided the organisational functions – the action plan for the group	4	3	5	4
2	Provided the structure of each session - the agenda	3	5	3	3.7
3	Established norms for the group and monitored adherence	2	3	4	3.0
4	Developed leadership in others	4	3	2	3.0
5	Used your power as the group leader to get things done, and succeeded - overall	4	4	3	3.7
Motivational/relational					
6	Motivated the group	3	4	5	4.0
7	Used your influence to get things done, and succeeded	4	4	3	3.7

	Characteristic	Gay - G	Fred - E	Amy - M	Average rating
8	Built relational trust	3	5	5	4.3
9	Ensured that teachers contributed in sessions	4	5	4	4.3
10	Promoted group accountability	3	4	2	3.0
Professional					
11	Provided content expertise	5	4	2	3.7
12	Provided knowledge of curriculum	5	4	2	3.7
13	Provided general useful information for teachers	5	4	3	4
14	Modelled good pedagogy	5	4	2	3.7
15	Provided scaffolding for the learning	4	5	2	3.7
16	Managed the talking turns/participation of members	3	4	4	3.7
17	Helped teachers create new ideas/ways of doing things	4	5	3	4.0
18	Moved teachers beyond where they were when they started (in terms of their teaching confidence/knowledge)	4	4	4	4.0
19	Helped teachers deepen their understanding of topics	5	4	3	4.0
20	Enabled learning to take place	4	4	5	4.3

6.3 FACILITATORS' APPROACH AND STYLE OF FACILITATION

Facilitators adopted different approaches and styles of facilitation. In this section, using a three-category classification of approaches to facilitation and four methods of classifying the facilitators' style, I describe the approaches and styles of the facilitators of the three PLCs.

6.3.1 Facilitation approaches

From an examination of the transcripts of five PLC sessions (one from each quarter between January 2011 and March 2012) I identified the following three main approaches to their functions that the facilitators used in each of their speaking turns:

Discussion leader: leading and organising the PLC work by, for example, making suggestions for the focus of discussion, inviting participants' contributions, developing the ideas, ensuring the focus was sustained, concluding and summing up at the appropriate point;

Fellow learner: participating in the discussion as an equal, contributing ideas of his/her own, forgetting the responsibilities of the facilitation role, sometimes causing the PLC to digress; and

Teacher –telling and demonstrating: directly teaching members of the PLC subject matter knowledge and practical knowledge through explanations and/or demonstrations with visual aids. See Appendix 6.3 for examples of each approach used for classifying the turns.

See Figures 6.5-6.7 below for an overview of the approaches used in the three PLCs and tables A6.3-A6.5 in Appendix 6.1 for more detail. All three facilitators used the discussion leader approach more than the other approaches (Geography - 40%, English - 50%, and Mathematics - 70%) which indicates that they understood that their role as facilitator was to provide leadership to their PLC. All three facilitators also used the fellow learner approach but only the Geography facilitator used the teacher approach extensively (38%).

Figure 6.5

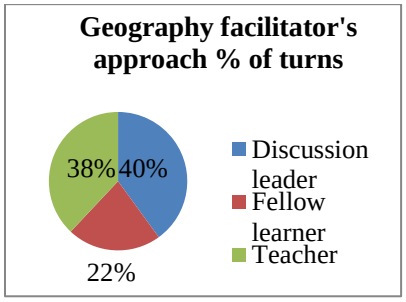


Figure 6.6

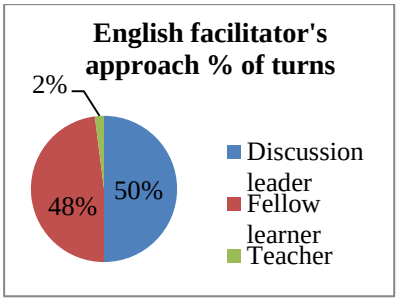
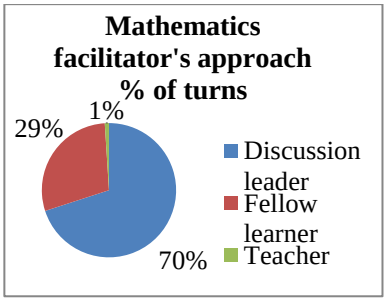


Figure 6.7



6.3.2 Facilitation styles

From an examination of the transcripts of the PLC sessions I noticed that the facilitators, in general, had more speaking turns than the other participants, and when they spoke, in general, they spoke for longer turns.

I used four methods to obtain an understanding of the style of the facilitators. Firstly, I counted and then compared the number of each facilitator's speaking turns with the PLC teachers' turns. I calculated the turns as a percentage of the PLC session (see Figures 6.8-6.10).

Figure 6.8

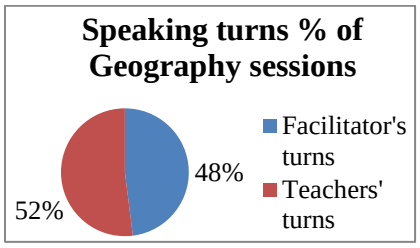


Figure 6.9

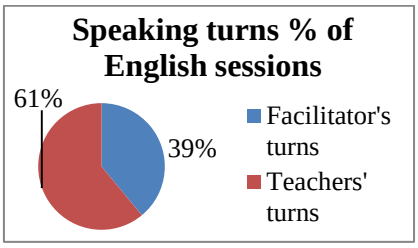
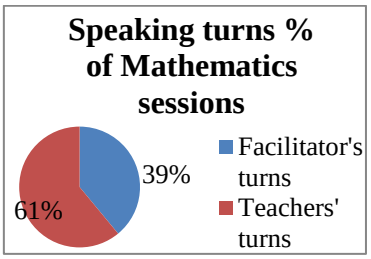


Figure 6.10



Secondly, I counted the length of the facilitators' turns (number of lines in the turn) which I equated to speaking time and compared these turns with the length of the teachers' turns (Figures 6.11-6.13). While the Geography and English facilitators' turns were 48% and 39%, respectively, of the PLC sessions, the length of their turns was longer, and therefore they used more speaking time in the sessions. The Geography facilitator spoke significantly more at 67% than the English facilitator at 43%. Although the Mathematics facilitator had 39% of the turns, their length was shorter so she spoke for only 30% of the session time. See Tables A6.6-A6.8, Appendix 6.1 for further details.

Figure 6.11

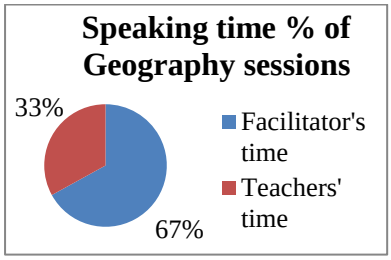


Figure 6.12

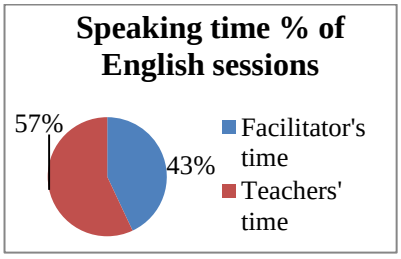
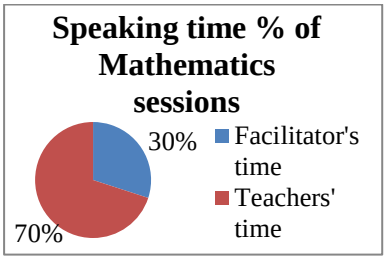


Figure 6.13



Thirdly, using rudimentary discourse analysis (Halliday, 1985; Droga & Humphrey, 2002), I examined the discourse of the facilitators' turns, specifically looking at the use of mood, polarity and modality. See Appendix 6.5 for definitions and examples of these terms. Disproportionately more and longer speaking turns combined with categorical statements or demanding commands and questions using high value modals indicate a directive and dominant style. When the modality is less certain and the speaker offers suggestions, makes statements or asks questions that are modulated, the style is less directive and dominant.

Finally I classified the style of each speaking turn in the five PLC sessions according to the following categories, using descriptions adapted from Langer et al. (2003, pp. 132, 133):

Directive – the facilitator makes the decisions for the PLC (the facilitator was the dominant party in the discussions).

Directive – *the facilitator makes suggestions to the PLC* about what the PLC should or could do.

Non-directive – the facilitator asks the PLC regarding decisions and what the PLC would like to do.

Non-directive – the facilitator participates in PLC discussions as a teacher, an equal member of the PLC (the participants as a group were more dominant).

See Appendix 6.4 for examples of each style used for categorising.

6.3.3 Facilitation approaches and styles in the three PLCs

6.3.3.1 Geography PLC

Gay said her facilitation approach in the PLC was more that of a *teacher* than a *discussion leader*. The data indicate that she adopted the approach of *teacher* for 38% of the speaking turns (teaching GIS, climatology, settlement, curriculum scheduling, and map work content) and as *discussion leader* for 40% of the turns which included a focus on organisational and administration matters, agreeing on the learning goals and session agenda, providing learning materials (visual aids) and accessing external resources (Curriculum and Assessment Policy Statements (CAPS) documents, map work resources) to support teachers in all sessions. Gay participated as a *fellow learner* for 22% of the turns (during the collaborative enquiry processes) (Figure 6.5). The approach that she adopted changed during the sessions depending on the work the group was doing. She was inclined to teach when the teachers did not contribute to the discussion as envisaged in the CALW or PLIC processes and when the topics were chosen by the teachers because these were ones they struggled with such as GIS, climatology, and map work (Table A6.3, Appendix 6.1).

An example of Gay teaching (telling and demonstrating) was when she brought concrete apparatus to the session to follow up on a topic discussed previously in the PLC. She suggested that some learners might understand a concept if the teacher approached it in a different manner, for example through movement or working with a concrete object:

> I don't know if you've picked up sometimes that learners, you do something different and there are those few learners who suddenly click onto it better than they have about anything else. … Some learners learn much better if they move and some of them learn much better if they get something with their hands. (G2T/23/02/2011:547-549; 559-560)

Gay demonstrated how the apparatus (a cut-out shape depicting a mid-latitude cyclone) was used, thus reinforcing *common content knowledge* (factual information about mid-latitude cyclones, meteorological symbols) and *specialised content knowledge* (such as understanding the relationship between the cross-section of the mid-latitude cyclone and the synoptic view of it in order to teach learners how to interpret the type of cyclone by looking at a graph of the pressure gradient in a cross-section). At the same time the facilitator provided a practical *knowledge of content and teaching* technique (use of the cut-out shape that can be folded and manipulated to see the relationship between the cross-section and synoptic view).[92]

Another way Gay engaged in teaching was by showing teachers what learning resources were available and how to use them. She provided resources that she thought would help teachers to teach curriculum topics or help them with other difficulties they had expressed, for example, their learners' poor language ability. The resources provided teachers with practical knowledge (*knowledge of content and teaching* (cardboard slices representing sections through a landform), *knowledge of content and students* (the Geogopaedia)) and in some cases subject matter knowledge (*common content knowledge* and *specialised content knowledge (*model of a volcano)). Each resource was handled very briefly and relied on the facilitator's subject matter knowledge, practical knowledge, and inferential knowledge, when relevant.

---

[92] So I'll show you now how on these pieces of paper… If you want to do it with just one of your copies you fold it down the dash line – so the line in the middle. If you fold it down … [*teachers fold the paper*] I'll show you sort of what we're wanting to land up with. … if you look at it from above, if you look at it straight down you can see the synoptic view of the mid-latitude cyclone. And then if you look at it from the side you can see the relation between the cross-section and the synoptic view. … But I just found there were some girls who just suddenly went, 'Oh, ok.' So it won't necessarily benefit all of them. If you want to you can then also there's a graph there and you can draw for them the fact that in the pressure… you know, in the cold sector the pressure's high, it decreases in the warm sector and increases again. (G2T/23/02/2011:560-581)

The facilitator's suggestion of the use of a "glossary" maintained by learners is an example of a learning resource which can help teachers to help learners with a difficulty they had identified:

> So for example in grade 10 when they're talking about the atmosphere, a temperature inversion or an isothermal layer they say that, 'that layer where the temperature does something.' So what we drew up and we asked them to get a book – some of them have made their own books, some of them went and bought a book that's got the index on it, you know, already – and we came up with this name Geogopaedia. (G4T/13/04/2011:325-328)

When the PLC engaged in CALW and PLIC enquiry cycles Gay used a teaching approach much less. She was more of a *fellow learner* (42%), especially in session 9 when she worked with the teachers, struggling with them to interpret the contour line numbering and sharing her knowledge (how to work out the contour height from clues).

> G: Ja. I'm saying, because number 3 here starts straightaway drawing the cross-section. But what if they don't have all the heights? What if they haven't been able to find?
> MT1: Which is, must get something to explain before number 3?
> G: Ja
> MT1: In case they can't find all the heights.
> G: Ja
> MT2: Because these maps, some of these contour lines are too close together.
> T: Mmm
> MT3: You see…
> G: Or you follow, you can't actually see it. You follow it and it's not labeled and there's nothing close by. Because I think I… You know there are other things that you can tell them when you're teaching them. You know, because if they can't they can look at a spot height nearby and look at other things to help them. But that I don't think we need to put down because as you said too much then gets confusing.
> T: Ja
> G: But just something to say if you can't find all the heights go from the height you have up or down in 20s. (G9T/24/08/2011: 185-199)

In the Geography PLC over all the sessions (averaging 5 - 6 participants per session) Gay spoke for 67% of the time (48% of the turns) and the teachers only 33% (52% of the turns). In the earlier sessions Gay had proportionately more speaking turns than the teachers and when she spoke her turns were much longer than the teachers' turns (Figures 6.8 and 6.11 and Table A6.6 in Appendix 6.1).[93] When the teachers spoke it was for less than a line and at first their turns were limited to asking for items, and murmuring agreement ("mmm", "ja", "yes, yes"). Gay spoke for an average of eight lines per turn in the earlier sessions, extending to 48 lines on one occasion. Most of her longer turns consisted of explanations, modelling how she would teach. The shorter turns were

[93] Gay spoke approximately 50% of the time and the teachers approximately 10% each.

generally to clarify teachers' contributions and to affirm teachers. Even in the later sessions when the teachers had proportionately more turns and speaking time as they contributed to the enquiry processes or general discussion Gay responded to most teacher contributions with longer turns resulting in her still speaking more than the teachers except in session 17 when the teachers discussed more freely. This was the only session in which the teachers spoke more than she did. Gay's contributions provided the majority of the knowledge-for-teaching in all the sessions. She controlled the topic and in the earlier sessions teachers were largely silent most likely as a result of their lack of confidence. In the later sessions teachers spoke freely when they had something to ask or contribute to the discussion. There was no turn-taking system and no one was cut off. Everyone who appeared to want to speak did so.

An analysis of the discourse of the speaking turns shows that Gay used categorical statements, expressed with high positive modality and thus certainty. The PLC participants usually responded with brief signs of acknowledgement, never contradicting or questioning what she said. This style was predominant when Gay used the *teacher* approach. The excerpt below shows Gay teaching teachers a possible way of making the concepts of "vector and raster data" meaningful to learners. She uses an imperative: "You talk about the remote sensing …So ask them" which demands their compliance with the instruction. They respond: "Oh, yes". Gay provides information using the present tense thereby indicating categorical certainty: "Because remote sensing is, one, it's taking the picture from far away …":

> And then the… You talk about the remote sensing. It also just helps to link it to the megapixels and the, um, the kind of picture they take. So ask them if they've ever been on a tall building, if they've ever been on top of a mountain - what does it look like, how far can they see down. Because remote sensing *is*, one, it's taking the picture from far away and then the… depending how far you are will depend what detail you can see. ….
>
> Teachers: Oh, yes. (G7T /01/06/2011:226-233)

The excerpt below shows how Gay led the learning in a directive manner, facilitating using a teaching approach, by showing teachers additional methods that would help them with teaching concepts which they and their learners found difficult. She provided all the ideas and materials. The participants did not contribute anything to the discussion other than appreciation for receiving the material:

> And then before we look at the GIS there was just one thing, two things I wanted to show you. We were talking about map work and teaching it and it's difficult, especially the cross-sections and that, to get them to understand. And I thought maybe this is something which, it will cost a bit, but it's not as difficult to get hold of. What we sometimes do (and I will… I said I will print out for you, so we'll do it in our next session, I'll show you) is to give them a simple contour pattern. So it would look (let me use this) we would give them something like this on a map – just 3 circles or 4 circles and it would have heights on it, so 80, 140. And then what we do is we give them 4 pieces of glass. On the first piece of glass they put down and they trace the first contour, second piece, third piece, fourth piece. And then when they put them together they start getting an idea, especially when it's like that, of the 3-D, what they're looking at, how each contour line makes up a pattern. So I thought I would show you that. (G7T/01/06/2011:15-22)

When Gay was the *discussion leader* she was far less dominant. She asked questions and made statements with much less certainty as can be seen in the excerpt below. Gay asked a series of questions that were not rhetorical. She expressed uncertainty in the incomplete follow-on question: "Does that …?" and the use of "So can I prepare some stuff …?", "If I can ask, can you think … ", "if you look at some test maybe even from last year…" and the tag question "what is it?". The turn ends with a statement expressed with low modality: "And I'll prepare some of these like this that we can look and maybe we can do it." A teacher interprets these questions as genuine ones requiring an answer so he responds thereby moving the group along by identifying a learning focus for the PLC.

> G: Is there anything else you want to query and ask about it? Does that…? Hopefully that will help. I'll have a look now. And then just to see, are we happy in the next session we talked that we want to do cross-sections more clearly. So can I prepare some stuff and we'll have a look at cross-sections? If I can ask, can you think about cross-sections and what part you really… I know it's the whole thing, and if you look at some test maybe even from last year or if you've done one with them this year, what is it that they really do wrong when they draw a cross-section, what is it? And I'll prepare some of these like this that we can look at and maybe we can do it.
> MT3: Ja
> FT2: Contour lines (G7T /01/06/2011:347-355)

When Gay used the *fellow learner* approach she sometimes expressed her knowledge with certainty and authority: "We need this bit" and "must be":

> Ja. So they almost… We need this bit because the lowest height must be 1 vertical interval below the lowest height on your cross-section. The highest. So they need to know the vertical scale, but they need to know if your lowest height is 100 start at 80. (G9T/24/08/2011:27:248-250)

However, on other occasions, Gay shows her uncertainty. She tells the PLC that she does not know how to explain this in a note so that her learners can understand. She does this

by asking a series of questions inviting the teachers to respond in order to help co-construct the necessary knowledge-for-teaching:

> … and they'll get it. But I don't know how to put that in an instruction, you know, for them to understand. Something about 'Work out the difference in height from your lowest point to your highest point.' Can you say 'and then divide by 2'? Or is that going to be…? Because I know for some of my girls this is the part that they struggle with – how they figure out to draw that vertical axis. I know in the exams nowadays sometimes they give it to them. I know they give a drawn axis, but they've still got to understand how we're doing it. So it's this one here. It's the lowest… This whole thing is phrased, is not written nicely. 'The lowest height must be 1 vertical interval below the lowest height on your cross-section.' So we need the lowest… [G reads: The lowest must be 1…] How do you tell them? How do you teach them how to work it out? I know how I say it but I can't think how to write it down. [laughs] If we put it down for them to divide, will that help, or not? Do we just say to them 'Count'? (G9T/24/08/2011:27:279-288)

Gay reported that she was inclined to be directive and dominant but an analysis of the discourse indicates that even when using the *teacher* approach she was not always directive or dominant. The excerpt below shows Gay modifying her categorically expressed statement by inserting "I think" twice thereby reducing the certainty to an opinion:

> The next horrible thing I think is the vector and raster data. And this is where I think the diagrams may help, is this diagram over here; it's about 3 pages on. (G7T /01/06/2011:191-192)

She was dominant and directive when she determined the activities for the group in accordance with what she believed they needed: "The other one I wanted to talk about is the data handling [project]. Are you all using the data handling [project] from last year?" (G2T/23/02/2011:661-662). She was less forceful when she suggested ideas to them (and they did not disagree with her suggestions) using the inclusive first person plural "we" and speaking with less certainty "We'll see - maybe":

> We'll see - maybe one, maybe two sessions as far as we need to go. And then what else is there that we're wanting to look at? Anything really particular that…? Do we want to look at setting some tests? (G7T/01/06/2011:363-365)

When the teachers contributed more, Gay was less directive. When the PLC worked on the CALW process in session 2 (the part of the session dealing with marking projects on global warming) Gay participated as a *fellow learner* and provided information to assist with the process. She only became directive and made decisions or proposed ideas for the balance of the session when the teachers had exhausted the discussion on the topic. When they were engaged in CALW or PLIC learning processes she did not

facilitate in a directive manner. In session 9 (a PLIC process dealing with drawing cross-sections) she was non-directive allowing the group to follow the enquiry process in which she participated as a fellow learner. In the sessions dealing with the topics about which the teachers indicated their own insecurity Gay was much more directive for example, when the PLC learned about GIS and climatology topics.

From the data it appears that Gay took charge in a directive way to focus the group on learning. Gay taught members of the PLC subject content and modelled how to teach it so the learners could more readily understand it.

6.3.3.2 English PLC

The English facilitator, Fred, is quite different in personality from Gay. While being confident in his subject knowledge and understanding of his role in the PLC he was not assertive and suggested a rotation of facilitation, emphasising the collaborative and joint nature of the work:

> So the second thing, just for people who haven't been before, or just to remind, whatever, is that this is meant to be a collaboration, ok. So we are all working together. There's nobody who's meant to really be leading. I'm sort of facilitating because it takes place here, but if we do go to your school then you'd be the facilitator. … So it's not meant to be anybody teaching anybody anything, ok. So that's, that's important to just establish. (E2T/23/02/2011:11-16)

At another time he likened facilitation to chairing a meeting.

Fred identified his dominant facilitation approach as *discussion leader*. He used this approach in 50% of the speaking turns but was also involved as a *fellow learner* in the enquiry processes which were followed in almost all sessions (essay planning, sentence structure, tense use, how to teach interpretation of visual texts) for 48% of the turns. He adopted the approach of *teacher* for only brief periods (2%) when a group member, in his view, misunderstood the concept and purpose of brainstorming/mind-mapping as a planning tool and when the topic was one about which he had particular knowledge and interest (interpretation of visual texts) (see Figure 6.6). Because the PLC averaged three to four teachers per session, Fred's participation as a *fellow learner* was important for the group to have enough input to work with (Table A6.4, Appendix 6.1).

Fred spoke for 39% of the speaking turns and teachers 61%, with his turns and their turns amounting to 43% and 57% of the speaking turns, respectively (Figures 6.9 and

6.12 and Table A6.7, Appendix 6.1).[94] His turns were generally slightly longer than the teachers and included conveying networked learning community (NLC) information and organisation. He did not dominate in terms of knowledge-for-teaching as Gay did but provided useful external resources to assist the PLC's thinking. The teachers in this group (averaging 3-4 per session) were generally able to contribute sufficient knowledge-for-teaching to enable the group to work well with the various topics. There were no rules for turn-taking but it did not appear that anyone was left out or cut off. Fred did not always control the topic. He did occasionally interrupt to remind the group of their focus or of time constraints.

An analysis of Fred's discourse shows little difference between the turns in which he uses a *discussion leader* approach and those in which he uses a *fellow learner* approach[95]. In both approaches he is mainly neither dominant nor authoritative. In the following excerpt where Fred used the *discussion leader* approach and was contributing knowledge-for-teaching about which he was confident and knowledgeable he expressed himself in a tentative manner, counterbalancing his authority with "I think" twice and the tag: "you know" four times:

> Ja, I think… I suppose part of the problem is you know, we all write with different styles but I think it's not a bad thing to teach learners to keep their ideas, you know, one idea, one sentence. Keep it short, to the point and then, you know, once they've got that right they can… One of the problems we have is that it's even worse than this sometimes. They'll just put comma after comma after comma and the sentences just go on forever, you know. So ja, that is often a problem.
> Ok, shall we have a look at the… Which one do you think is the worst one?
> (E2T/23/02/2011:265-271)

In the following excerpt, as *discussion leader*, Fred tentatively suggests what the group "could" or "might" do with resources he provided. He makes the offer to the PLC teachers which they can accept or reject. In the second turn, he proposes what he thinks the PLC could focus on but says this with very little confidence and authority: "I thought maybe" and "you know we might, uh, I don't know". The PLC's focus is arrived at very democratically: "and see what you think":

[94] Fred spoke for approximately 40% of the time and the teachers approximately 20% each.
[95] I counted the turn as "discussion leader" if his contribution led the group further in the process and as "fellow learner" if his contribution was an addition to the general discussion.

F: So I nabbed a few of them and brought them along so we could possibly do something with that, I'm not sure. Um, so I don't know if you want a copy, maybe, there's a copy

Sam: Thank you

F: And ja, the article is on the back. I also brought a copy of Barrett's taxonomy which we might find useful along the way if we're going to be working with a text which we could also have a look at. Then, uh, I was thinking what cartoon shall I bring and I thought well hopefully you'll bring some…

S: Mmm

F: … some cartoons like this, which you have, which is great. And then I just thought I, for tomorrow in fact, I actually made a contextual based on a, on a graphic novel. And I thought maybe that would be interesting to look at and see what you think of it and then you know we might, uh, I don't know, I just brought it because it is a cartoon of a different sort and we've got some questions around it. (E17T/14/03/2012:48-58)

Fred used a *fellow learner* approach in almost half the turns. Again he did not speak with authority inserting "maybe" in his statement which is expressed with greater certainty, indicating a higher degree of probability: "we need to try and think …". He did make one definite unqualified statement expressing high probability: "That would work". When Fred used the *fellow learner* approach he used the first person plural "we" frequently and asked questions which the other teachers were free to respond to. This indicated that he was part of the group and that he did not make all the decisions:

F: Ok, so shall we, shall we say then that that's what we… So we've used these as stimulus for this idea but maybe now we need to try and think about what would be really good adverts and cartoons that would do it well?

S: Mmm

Sam: Ok

F: You know, maybe that would be ok, and maybe one or two, but maybe you know we thought maybe of having an advert with people in it.

…

Sam: Yes. We would need to go away and look for things that we think would represent these well.

F: Ja. That would work.

Sam: And get good varied answers.

F: Ja

S: Ja

Sam: Yes, ok

F: And then are we going to, are we going to come back with this or are we going to try and apply it?

Sam: I think we need to come back before we can apply. What do you think? (E17T/14/03/2012:1342-1358)

Occasionally when focusing the PLC's attention, for example, on what they needed to do for the next session, he was slightly more directive. He obtains agreement from the group first by asking a question and after a teacher's confirmation expressed slightly differently, he instructs the group with more certainty: "So you're going to go away

…". The teacher shows compliance: "Ok", and Fred follows up this response with another more specific instruction: "And bring two lessons".

> F: Ok. All right. So can we agree for next time that we will come with… we can come with as many ideas, but let's say two lessons on teaching sentence structure and two lessons on teaching tense?.
> K: Well we don't actually teach them, we think about it and discuss it the next time?
> F: No, come with… So you're going to go away to your school and then with your teachers you discuss how you would teach tense
> K: Ok
> F: And bring two lessons, ok. It doesn't have to be a detailed thing with aims and objectives, but what would you, how would you teach this. (E2T/23/02/2011:632-640)

Overall Fred's style was non-directive and non-dominant throughout the sessions. He facilitated the PLC sessions less authoritatively than did Gay perhaps because the PLC members were knowledgeable and willing to contribute ideas.

6.3.3.3 Mathematics PLC

The Mathematics PLC was facilitated by Amy who, as a participant in the DIPIP, had experienced facilitated collaborative enquiry in a PLC. While Amy was confident and forthright in manner she realised that she could not facilitate effectively using that style. Although her Mathematics knowledge was fairly strong, she was not the subject knowledge leader of the group. Other members of the group had more experience and were confident of their Mathematics knowledge for teaching.

Amy used the *discussion leader* approach for 70% of the turns. In the excerpt below she tells the participants what they will do in the next session and how they will approach the activity. She also mentions that she will confirm details via email:

> Ok. So this has been a very good discussion. And then the next time we see you guys we are going to be watching Aya's video and we are going to be watching Ang's video. And we'll discuss things like questioning and see how the kids respond to the worksheet and discuss that a little bit more. And in the meantime I'm going to email you. (M17T/14/03/2012:826-829)

She guided the PLC enquiry processes, for example, by probing:

> Ok, and you don't think that this suggests that if we get them to follow the rules, if they actually see that they are doing something wrong and they can change it themselves?" (M2T/23/02/2011: 72-73)

Amy motivated and built relationships by encouraging and welcoming teacher's contributions, for example Viv's rhyme, to help learners remember a concept:

> Do you all know the little poem to teach them the difference between area and circumference? (M9T/24/08/2011:915)

Amy used a *fellow learner* approach in 29% of the speaking turns and a *teacher* approach for only a short input in one session (1%) (Figure 6.7 and Table A6.5, Appendix 6.1).

As the facilitator of the Mathematics PLC (averaging 7 - 8 participants per session) Amy spoke proportionately more than the PLC teachers. She spoke for 39% of the turns and the teachers for 61%. Amy responded in some way to approximately every second teacher contribution. Unlike Gay's responses, her turns were generally very short. She spoke an average of only 30% of the speaking time and the teachers 70%[96] (Figures 6.10 and 6.13 and Table A6.8, Appendix 6.1). Amy did invite participants to have speaking turns and actively encouraged contributions. Except in a few instances when Amy completed the speaker's idea, teachers spoke without interruption. Viv and Clara did speak more than the others probably because of the confidence in their knowledge and their desire to learn from others about aspects with which they had difficulties.

Amy selected her facilitation style depending on the activity and she varied it throughout the sessions. When using the *discussion leader* approach she slightly favoured a non-directive style. This was seen in her frequent checking that the teachers were satisfied with the choices she or the group had made concerning what they were doing in the PLC. The excerpt below shows her using low and median value modality: "might", and "can" and asking a question that is not rhetorical:

> So that actually might be a better direction to go is looking at questioning techniques and setting assessment tasks. So… But it's up to you guys. So we've got… We can look at a topic. We can look for instance at fractions or we can look at integers, or we can look at setting assessment tasks. What do you guys think? (M12T19/10/2011:150168)

Amy's style was more directive when establishing the learning focus and plan of action for the session and when she was carrying out the organisational and administration functions of the facilitator. The excerpt below demonstrates how she followed up after giving teachers the academic reading about analysis of learners' errors which provided the theory and knowledge base for the PLC's enquiry focus. She is authoritative and in

[96] Amy spoke for approximately 30% of the time and the teachers approximately 10% each.

control of the PLC session and dialogue, using the present tense she makes a categorical statement which permits no contradiction: "What we're going to do today …" and another one is expressed with a high degree of probability: "you'll answer the questions on the computer":

> Progress, that's right, Progress, ok. So I hope that you managed to read the article that I gave you last week and got something out of it. What we're going to do today is last week I gave you questions that you were going to answer about the article. And what I'm going to do today is we are going to divide you into two groups … so that you don't have to shout across the room and you'll answer the questions on the computer. (M2T/23/02/2011:7-11)

Once the group started to explore the reasoning behind learners' incorrect answers and began designing and presenting a lesson, Amy adopted a *fellow learner* approach and was non-directive. She participated as a member of the PLC, making contributions but not more frequently than the others although she admonished herself for talking too much:

> Next year I will not "overrun" the discussions. I learnt the hard way this year and have already started to change track. (Amy/MR//01/12/2011)

The excerpt below shows Amy as a *fellow learner* sharing her classroom difficulty which she expresses with a high degree of certainty: "It is really interesting to see how you assume that they know something as basic as the equal sign and they actually have no idea" and "Ja, they struggle with that". She works with other PLC participants to learn a better way of teaching the concept. She is not dominant and does not speak frequently. She waits for eleven turns before making her next contribution after the teacher asks: "So how do we work out that misconception?":

A:	We actually did 6 months' work – or not even 6 months – like a year's work on this stuff in the last project that I did with this. It is really interesting to see how you assume that they know something as basic as the equal sign and they actually have no idea. I had a child ask me today, the question was 3 + 4 = 7 – 2. And she said, 'But Ma'am, that's true.' So I said, 'So what about the -2?' 'Ja, 7 – 2 is 5.' I said, 'Ok.'
MT3:	7 minus 2 is 5 [*chuckles]*
MT2:	Another one that I find common it's the where you have a -4 + 7 when you say that they cannot relate that it equals to 3. They know that 7 – 4 is equals to 3
V:	But to turn it round
MT2:	But when it starts with -4 it's something else.
A:	Ja, they struggle with that. We had that. We had done in a test recently they got down, it was a BODMAS test and they got it down to 1 – 48. And they all swopped it around and they said 48 – 1
MT3:	-1
A:	They said 'You can't do 1 minus 48. It's not possible.'
MT3:	They wanted the bigger number to be positive.

A: Ja
V: Ja
MT1: The bigger numbers.
MT2: So how do we work out that misconception?
V: Ja, well that's a good question. (M2T/23/02/2011:1332-1364)

That participants' spoke for 69% of the turns indicates that Amy was not dominant. Remembering her role as facilitator, she interjected from time to time to encourage the group to move to the next question or make a decision about items in the worksheets, sum up their progress, and complete the organisational duties, including sometimes setting a question to guide participants' reflections at the end of the session. On these occasions Amy was more directive and dominant .

Facilitators chose a particular approach for a number of reasons, the most important of which appear to have been the nature of the learning activities and the professional competence and confidence of the group. The approach selected influenced the style used. For example, the Geography PLC required a more directive style and *teacher* approach in the earlier stages of the study because the participants were less confident than the English or Mathematics participants whose knowledge and confidence enabled the facilitator to use a less directive style and *discussion leader* or *fellow learner* approach. The important point is that the approach and style selected was one which the facilitator believed could enable learning to take place.

6.4 EVALUATION OF PLC FACILITATION

The teachers and facilitators completed an evaluation of the quality of facilitation/leadership of their PLCs at the end of the project. See Appendix 6.6 and Table A6.12 for the full presentation of the findings.

6.5 COMPARISON OF THREE PLCs

In Table 6.2 below I briefly compare the three PLCs.

Table 6.2 Comparison of PLCs

	Aspect	Geography	English	Mathematics
1	Facilitation functions	Organisational – 16% Motivational – 12% Professional – 72%	Organisational – 23% Motivational – 10% Professional – 67%	Organisational – 8% Motivational – 2% Professional – 90%
2	Explanation for the above	Gay spent time on organising things such as learning resources for the teachers and	Fred spent time explaining the PLC collaborative way of working and that the	Amy had participated in a facilitated PLC in the DIPIP project so she directed the PLC almost

	Aspect	Geography	English	Mathematics
		arranging a visit to a school to do a demonstration lesson; teachers in this PLC came mostly from schools with difficult contextual conditions so time was spent developing a positive approach to PLC work and obtaining commitment.	leadership could be shared. This PLC also discussed ways of taking the PLC ideas back to their schools. The PLC also discussed how they would compile a portfolio of the work they had done in the sessions. These reasons accounted for more time spent on organisational matters.	immediately into doing error analysis. She did not spend time on organising or motivating. This PLC focused on their learning work.
3	Approach to facilitation	Discussion leader – 40% Fellow learner – 22% Teacher – 38%	Discussion leader – 50% Fellow learner – 48% Teacher – 2%	Discussion leader – 70% Fellow learner – 29% Teacher – 1%
4	Possible Reasons for the approach choices	The teachers in this PLC asked to focus on topics which they found difficult. They did not have the knowledge to contribute to discussion so this facilitator did more teaching than the other facilitators. In later sessions when teachers were more confident the facilitator was able to change her approach.	This PLC did not need Fred to teach them knowledge as the teachers were sufficiently knowledgeable. Fred understood his role as facilitator so he led the discussion and ensured that the PLC work was focused and had the process of enquiry moved along. Because there were only a few teachers in this PLC, it was necessary for Fred to participate and share his ideas.	Amy understood that her role as facilitator was to ensure that the PLC was focused on learning and that they made progress each session. In some sessions she was able to participate as a fellow learner because she could rely on Clara, the expert teacher, or other knowledgeable teachers to lead the group's learning.
5	Style	Largely directive either deciding for the PLC or making suggestions for 63% of the turns.	Non-directive for 62% of the turns.	Amy used all the styles more or less equally but was inclined to be more non-directive (55%).
6	Possible reasons for style choices	The participants were not sufficiently confident for the first year of the project resulting in the facilitator having to adopt this style in order to reach a focus for the PLC and to accomplish some learning.	Fred recognised that the teachers in his PLC were knowledgeable and that it would be inappropriate to tell them what to do. Fred was determined from the outset to be democratic and to share leadership. He believed that all the members of the PLC were equal.	Amy selected the style most appropriate at the particular stage of the PLC's work. In the interests of being professional and productive she would become directive at times but when the topic was agreed upon she would participate as fellow learner and from time-to-time as needed become the discussion leader.

6.6 SUMMARY

The findings presented in this chapter have demonstrated that facilitation impacts on the focus of learning in a PLC and how the learning happens. They have also demonstrated that how the facilitator performs his or her role is influenced by who the participants in the PLC are. The facilitator is therefore a key agent performing a key role. The Framework for Effective Facilitation of a PLC (Figure 2.2) enabled me to identify what the main functions of a facilitator are and what the role expectations associated with each of these. The findings showed that each facilitator in this study carried out the three functions and their associated roles differently. The English facilitator, for example, spent more speaking turns on building and achieving the shared vision, setting up the structure for how the PLC would work and who would lead the PLC than the Mathematics facilitator who spent less time on this but more on her professional functions of achieving the focus for the learning and providing an external resource as a key reference for this work. The Geography facilitator needed to spend more turns on motivating the PLC members, building the community, developing trust and collective responsibility because the teachers in her PLC found the collaborative active participation expected of them new and difficult (9.2.1.2).

The Framework also identified personal qualities ("Intelligences", skills/abilities/knowledge, and personal characteristics) that facilitators need to perform their complex role in a manner that is appropriate for a particular PLC. The three facilitators in this study happened to have enough of the qualities to be effective for their particular PLCs and they developed their skills as the project progressed. All three, for example, displayed "Contextual intelligence" in that they assessed what was needed by the teachers in their PLC and selected the approach and style that was appropriate.

These findings point to the importance of facilitators having a range of personal qualities and that they fully understand the functions they are expected to perform and the roles they are expected to play are in order to maximise the benefit of working in PLCs. Not everyone is likely to make a good facilitator. Those setting up PLCs will have to pay careful attention to the selection of facilitators. Facilitators will need, for example, sufficient subject matter knowledge and practical knowledge and an

encouraging and supportive disposition. Also training in facilitation is likely to help facilitators to be more effective sooner.

6.7 CONCLUSION

In this chapter I have described how facilitation/leadership, a key factor enabling functioning and learning in a PLC, was demonstrated and experienced in the PLCs. The data indicate that although the facilitators were not specifically trained for their roles, they performed these roles sufficiently well to sustain the functioning of the PLC and for teacher learning to take place. In the next chapter I describe what the PLCs focused on.

CHAPTER 7 FOCUS OF LEARNING IN PROFESSIONAL LEARNING COMMUNITIES

7.1 INTRODUCTION

The literature on PLCs indicates that for these to be effective participants have to agree jointly on a focus and that this focus should be on teachers' learning in response to learners' learning needs (McLaughlin & Talbert, 2010, pp. 36, 38; Darling-Hammond & Richardson, 2009, p. 47) (2.4.3). Katz et al. (2009) require PLCs to have "a clear and defensible focus". In this chapter I describe in broad outline what the Geography, English and Mathematics PLCs focused on in their PLC work. I identify eight *focus areas*, five of which I call *learning focus areas* because it is within these areas that the PLCs focus their learning of knowledge-for-teaching. I then identify the *subjects of discussion* handled in each *learning focus area* and briefly describe what appears to have influenced the PLCs to choose particular *subjects of discussion* for the focus of their learning. In conclusion I provide information about the number of different *subjects of discussion* covered per session as an indication of the depth to which the PLCs explored the *subjects of discussion*.

7.2 *FOCUS AREAS* IN THE PLCS

To assist with analysis, eight dominant themes are used to classify the *focus areas* covered in the activities and discussions of the PLC sessions and, where relevant, to align these with Ball et al.'s (2008) domains of knowledge discussed in 3.2.4. They are:

1. *curriculum general matters* – sequencing (teachers discussed the order in which curriculum topics/skills were taught and the rationale for the choices made); and structure (teachers identified changes in curriculum content assigned to the various grades as a result of the introduction of the CAPS in 2012 and the implications of these changes) (knowledge of content and curriculum; horizon content knowledge);
2. *assessment matters* – demand (teachers analysed prescribed assessments and determined the type of learning that learners should demonstrate; they discussed and refined the assessment criteria; they suggested creative or alternative ways of demonstrating learning and meeting the assessment criteria); development (teachers set assessments and followed this up by analysing learners' performance on the assessments set); validity and reliability (teachers discussed threats to the

requirement that assessments be valid and reliable, for example, they identified the re-use of previous year's tasks where solutions were available on the internet and "common tests" being set on work that they had not yet taught their learners); and feedback (teachers discussed the manner and content of feedback to learners) (knowledge of content and teaching);

3. *learning resources* – teachers discussed the use of published learning resources for teachers and learners and/or teacher- or learner-created learning resources, or the teachers created and/or used learning resources during the PLC session (knowledge of content and teaching; knowledge of content and curriculum);
4. *curriculum content topics* – teachers learned subject matter knowledge about a curriculum topic, such as a concept or a skill, and/or how to mediate it (common content knowledge; specialised content knowledge; knowledge of content and teaching);
5. *learners' learning needs* – from experience and analysis of learners' work, teachers identified curriculum content topics and skills that learners find difficult, that is where they make mistakes and reveal misconceptions and lack of knowledge and understanding (knowledge of content and students);
6. *NLC issues* – teachers discussed matters related to the functioning of the NLC, including their learning reflection journal writing and administration issues;
7. *contextual matters* – teachers talked about factors outside their control that they believed hindered their and their learners' success, for example, GDE requirements that they write the "common tests", lack of textbooks, and inadequate relevant support from the GDE; and
8. *teachers' learning focus* – teachers identified curriculum content topics and skills in the curriculum about which they needed more subject matter knowledge and/or pedagogic content knowledge which became the focus of subsequent PLC sessions.

See Appendix 4.5 for examples of PLC session segments focused on these *focus areas.*

The PLCs engaged with learning knowledge when they focused on the first five *focus areas*: *curriculum general matters, assessment matters, learning resources, curriculum content topics*, and *learners' learning needs* (hereafter referred to as *learning focus areas*). When the PLCs focused on *focus areas* 6-8 they were discussing NLC

organisational issues, contextual difficulties, or deciding what they needed to learn. These are referred to as *general focus areas*.

While each PLC's pattern of focus is very different, all three PLCs spent the largest amount of time (measured by the length of segments) focusing on *curriculum content topics*[97] (see Figures 7.1- 7.3 for specific percentages for each *focus area* for each PLC). However, how each PLC dealt with *curriculum content topics* differed. The Geography PLC dealt with subject matter knowledge at the same time as they focused on how to mediate this knowledge, thus helping the participants with weaker subject knowledge. The English PLC, using their existing subject knowledge, mostly used collaborative enquiry processes to discover new and better ways of teaching topics. The Mathematics PLC used error analysis to understand learners' errors and at the same time teachers with weaker subject matter knowledge could identify their own misconceptions. They also used a collaborative enquiry process on "exponents" which provided subject matter knowledge for participants who needed it while they worked on how to teach this topic to the learners. This process is described in greater detail in chapter 8.

Except in the Geography PLC, the second highest amount of time was spent on identification of *learners' learning needs*.[98] This is in line with the model of TPD used in this study, which requires the collaborative analysis of learners' work in order to identify learners' learning needs and consequently to identify what the teachers' learning needs are. The Mathematics PLCs spent more time on this than the other PLCs because the first eleven sessions focused on analysing learners' errors and trying to understand learners' reasoning.

The Geography PLC spent a quarter of the PLC time on *assessment issues*[99]. The teachers at priority schools were compelled to write common district assessment tasks and examinations about which they felt uncertain for a number of reasons, thus prompting a focus on setting tasks and helping learners answer questions and respond to project demands. The English PLC spent time on evaluating whether the tasks they set effectively evaluated what the PLC designed lessons aimed to teach. The Mathematics PLC co-facilitator suggested that the PLC should work on learning how to set a task

[97] Geography – 40%, English – 55%, and Mathematics – 50%;
[98] Geography - 9%, English – 14%, Mathematics - 23%;
[99] Geography - 25%, English – 7%, Mathematics - 2%;

because she identified this as a teachers' learning need. However, although the teachers from the priority schools complained about the common tasks imposed on them because they were perceived to be unable to set their own, they spent very little time on this focus area.

The Geography and Mathematics PLCs focused for a similar amount of time on *curriculum general matters*[100] when they discussed the implementation of the Curriculum and Assessment Policy Statements (CAPS) and its implications. Both PLCs also discussed the order in which particular curriculum topics should be introduced. The Mathematics PLC examined a curriculum map and the CAPS documents systematically while the Geography facilitator referred only to specific aspects of the CAPS that were new or changed. The English PLC spent only a small amount of time discussing when to teach a particular concept and did not refer to any curriculum document at all.[101]

All three PLCs spent a similar amount of time on *learning resources*[102] but used them in different ways. The Geography facilitator provided resources in order to help the teachers and learners understand curriculum content. These included notes with definitions or instructions on how to follow a conceptual process. The English and Mathematics PLCs used a resource (a chapter from an instructional book and an article on error analysis, respectively) to inform teachers about the subject of discussion in their PLC. This provided teachers with both subject matter knowledge and practical knowledge. These two PLCs also designed learning resources for their learners on specific curriculum content topics that they discussed in the PLCs.

With respect to the *general focus areas,* the English and Mathematics PLCs spent much more time than the Geography PLC dealing with *NLC issues*,[103] including developing an understanding of the model of teacher development that this research study was based on. At the end of most sessions the Mathematics facilitator posed a specific question for reflection which she explained briefly. The Geography facilitator did not record the time

[100] Geography - 6%, English - 1%, Mathematics - 8%;
[101] The English teachers did not experience the successive curriculum changes as problematic, probably because the changes were minimal in their subject.
[102] Geography - 6%, English - 4%, Mathematics - 5%;
[103] Geography - 1%, English - 10%, Mathematics - 7%;

spent on reflection journals so that may have contributed to the lower percentage of time this PLC spent on NLC issues.

Teachers in all three subject PLCs spent time discussing *contextual matters*[104] and expressing their frustrations. Both the Geography and Mathematics PLCs' teachers' frustration centred on the GDE's strategies for helping the priority schools to improve. They found these to be inhibiting. The strategies included requiring schools to follow a prescribed work schedule and to write common examinations. The teachers also focused on their contextual difficulties, such as large classes, lack of resources, including lack of text books, and learners' poor understanding of English. They expressed their insecurity concerning the imminent introduction of the CAPS[105] in Grade 10 for which they had not received any training or any information about the new text books to be used. Both these PLCs covered this latter issue in some depth in their sessions. The English and Mathematics groups also expressed frustration with the levels of knowledge and skills of some of their learners, blaming the learners' previous teachers and the learners' home background for this. The other frustration related to lack of time. Firstly, they did not have enough time to teach properly, for example, "process writing". Secondly, they complained about some schools not having scheduled TPD time when teachers could do subject development work, making teachers reluctant to attend subject PLCs.

The Geography and English PLCs spent almost the same amount of time on identifying the *teachers' learning focus*.[106] The facilitators tried to ensure that the learning focus was relevant to teachers' needs and so time was spent agreeing on this. The Mathematics PLC quickly identified their two main activities (error analysis and collaborative enquiry into teaching "exponents"). Tables 7.3 – 7.5 provide detail of the eventual choice of focus in each PLC.

Figures 7.1 – 7.3 provide a visual representation of the time spent on the *learning focus areas* and on the *general focus areas* in each of the three PLCs. Tables 7.1 – 7.2 provide a summary and comparison. More detail on the focus of each PLC is provided in the sections that follow.

[104] Geography - 5%, English - 2%, Mathematics - 1%
[105] In 2012
[106] Geography - 8%, English - 7%, Mathematics - 4%;

Figure 7.1 Geography PLC focus areas %

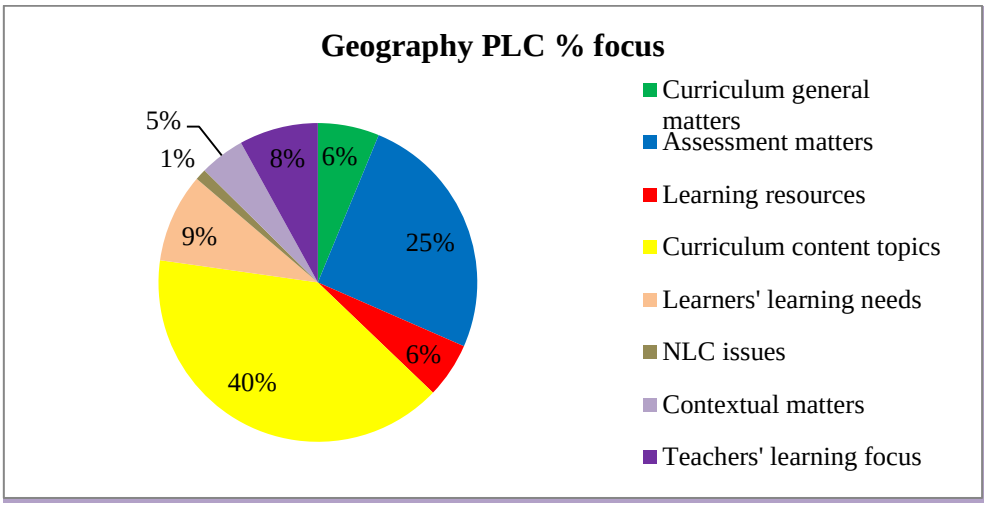


Figure 7.2 English PLC focus areas %

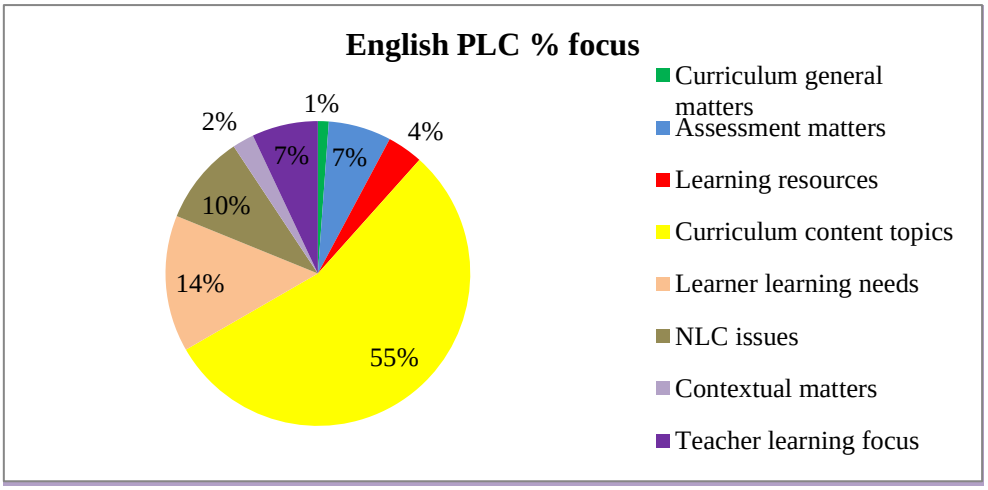


Figure 7.3 Mathematics PLC focus areas %

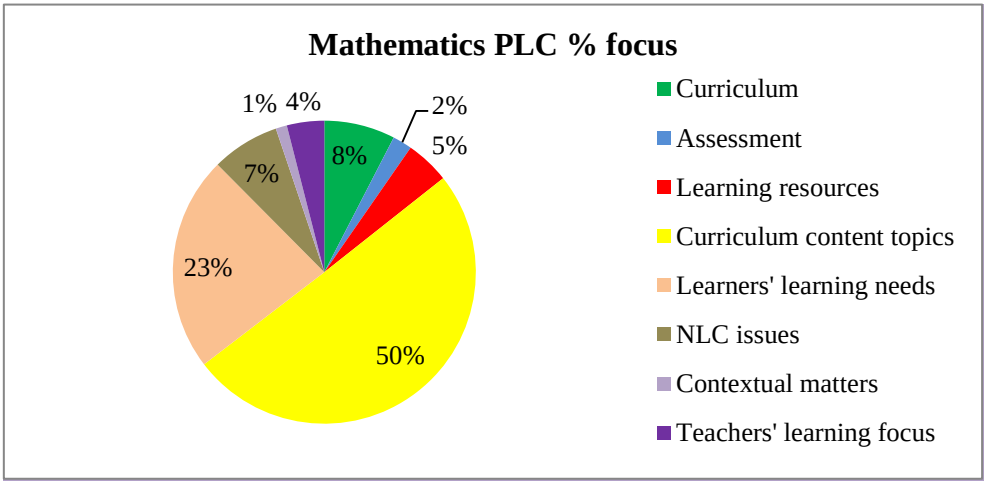


Table 7.1 Summary of *learning focus areas* covered in the PLCs

No.	Knowledge area	Geography time % (minutes)	English time % (minutes)	Mathematics time % (minutes)
1	Curriculum general matters	6 (49)	1 (10)	8 (95)
2	Assessment matters	25 (199)	7 (58)	2 (26)
3	Learning resources	6 (44)	4 (33)	5 (59)
4	Curriculum content topics	40 (315)	55 (480)	50 (630)
5	Learners' learning needs	9 (71)	14 (126)	23 (288)

Table 7.2 Summary of *general focus areas* covered in the PLCs

No.	Knowledge area	Geography time % (minutes)	English time % (minutes)	Mathematics time % (minutes)
6	NLC issues	1 (9)	10 (83)	7 (91)
7	Contextual matters	5 (36)	2 (20)	1 (15)
8	Teachers' learning focus	8 (63)	7 (61)	4 (50)

7.2.1 *Focus areas* in the Geography PLC

The Geography PLC "Learning Tree" (Figure 7.4) shows that, in sixteen sessions, averaging 49 minutes each, the PLC focused its learning predominantly on: *curriculum content topics* (40% of the PLC time), *assessment matters* (25%), *curriculum general matters* (6%), and *learning resources* (6%).

At the lowest level are the *contextual matters* (5%) discussed by teachers in the PLC. The lower branches, *teachers' learning focus* (8%), and their *learners' learning needs* (9%), provide the foundations and structure for the rest of the tree. The focus on *learning resources* is also placed at the base of the tree because teachers depend on these in their teaching of curriculum content topics. The Geography PLC has a larger branch and sub-branches dealing with *assessment matters* than the other PLCs. At the top of the tree are the *curriculum content topics* branches (five of them) which are fewer and less dense than for the other PLCs. It can also be seen that the *curriculum content topics*, for example, "map work", were covered in different sessions for a few minutes at a time in sessions 5, 8, 9 and 17. See Table 7.3 below for details of the *learning focus areas* and *subjects of discussion* and the time spent on them.

Figure 7.4 Geography "Learning Tree"

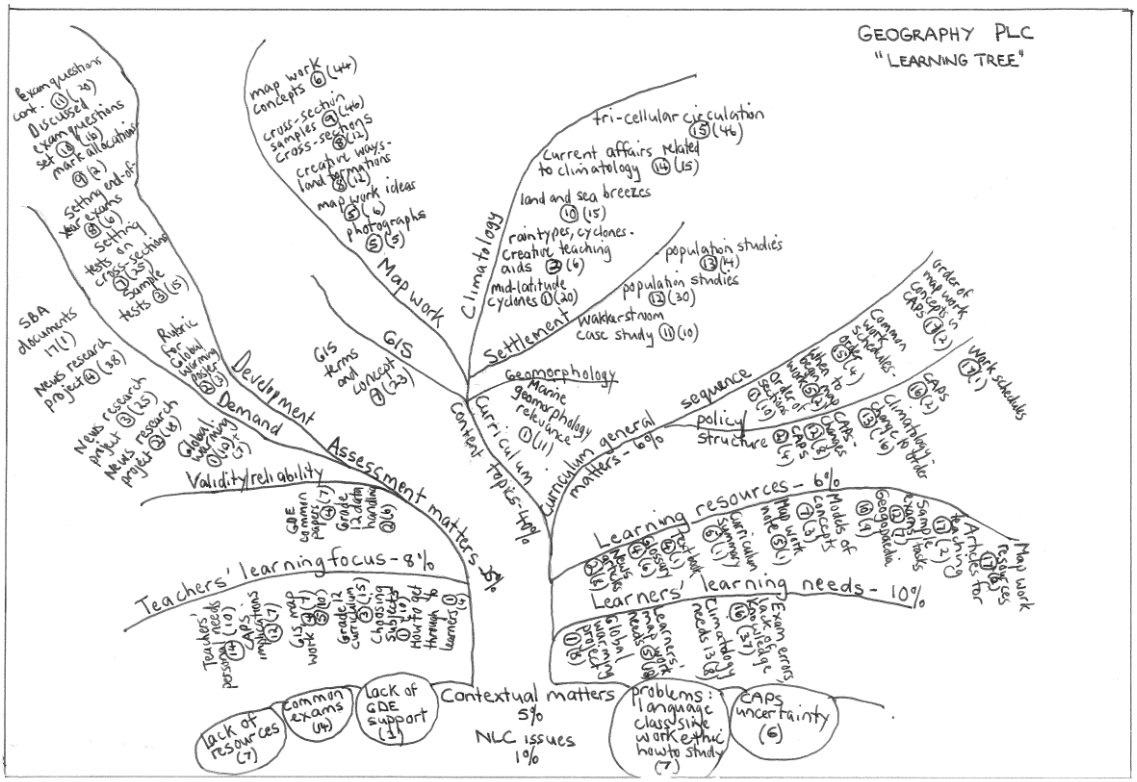


Table 7.3 Geography learning focus areas: *subjects of discussion* and time in minutes

No.	Learning focus areas	Subjects of discussion	Time (approx. minutes)
Curriculum content topics (40%)			
1	Geomorphology	Discussed how to teach marine geomorphology through news articles	11
2	GIS	Discussed terms and diagrams used in GIS and how to teach them (GA3)[107]	23
3	Map work	Discussed how to teach contours, cross-sections, calculations, and interpreting photographs, using land form models, designing teaching notes on map work concepts (GA4 – GA7)	125
4	Climatology	Discussed how to teach mid-latitude cyclones, tropical cyclones, tri-cellular circulation, orographic and convection rain, land and sea breezes; in some cases used concrete teaching aids (GA1, GA2, GA8)	102
5	Population studies and settlement	Discussed the census; population issues; a case study of the Wakkerstroom area (GA9)	54
Assessment matters (25%)			
6	Demand	Identified what learners were required to do for three projects	99

[107] Geography artefact 3 - See Appendix 8.3 for the artefacts created or used in the three PLCs.

No.	Learning focus areas	Subjects of discussion	Time (approx. minutes)
7	Validity/reliability	Discussed difficulties with the common paper's memorandum	13
8	Development	Setting tests and exams	87
Learners' learning needs (9%)			
9	Difficulties with doing projects	Global warming; News research	8
10	Errors and lack of knowledge	Map work; climatology; GIS	63
Curriculum general matters (6%)			
11	Sequence	Work schedules, order of curriculum content topics	19
12	Policy/structure/content	CAPS changes, management and requirements	30
Learning resources (5%)			
13	Documents	Glossary, GIS booklet, map work notes, summary of curriculum for grade 12, Geogopaedia, sample articles (GA3, GA4, GA6, GA8 – GA12)	41
14	Equipment	Models of Geography concepts (GA5)	3

7.2.2 *Focus areas* in the English PLC

The English PLC "Learning Tree" (Figure 7.5) shows that, in the fifteen sessions, averaging 58 minutes each, the PLC focused its learning predominantly on how to teach six *curriculum content topics* (55%) and on understanding *learners' learning needs* (14%). A small amount of time was spent on discussing *assessment matters* (7%). Only 1% of the time was spent on *curriculum general matters* while 4% of the time was used to examine and create *learning resources* which helped to structure teachers' teaching, such as a programme for teaching writing skills and a lesson plan template. The English "learning tree" also has *contextual matters* (2%) at the base but the lower branches are longer indicating that this PLC spent more time focusing on identifying *learners' learning needs* (14%) as a result of the enquiry processes they used when they focused on *curriculum content topics*. Although the total amount of time spent on identifying *teachers' learning focus* (7%) was almost the same as for Geography, this PLC focused on this more frequently for shorter periods. The focus on *assessment matters* in the English PLC is very different from that of Geography. The latter focused on how to work with actual assessment tasks (GDE common tasks or tasks set by the PLC), whereas the former was concerned with issues of principle such as the demand of the task, standards, validity, credibility and giving meaningful feedback. The *learning resources* branch reflects the materials the PLC used or created in their learning

activities. Although knowledge of the requirements of the curriculum are considered essential for teaching, this PLC only spent 1% of its time on *curriculum general matters* and that was on an issue of sequencing of learning content. The *curriculum content topics* branches at the top of the tree vary in length but most are longer than for the other PLCs. The English PLC worked on activities related to "sentence construction" and "tense use" systematically for a number of sessions as they went through the steps in collaborative enquiry processes. They also used external resources to bring in some formal knowledge. See Table 7.4 for details of the *learning focus areas* and *subjects of discussion* and the time spent on them.

Figure 7.5 English "Learning Tree"

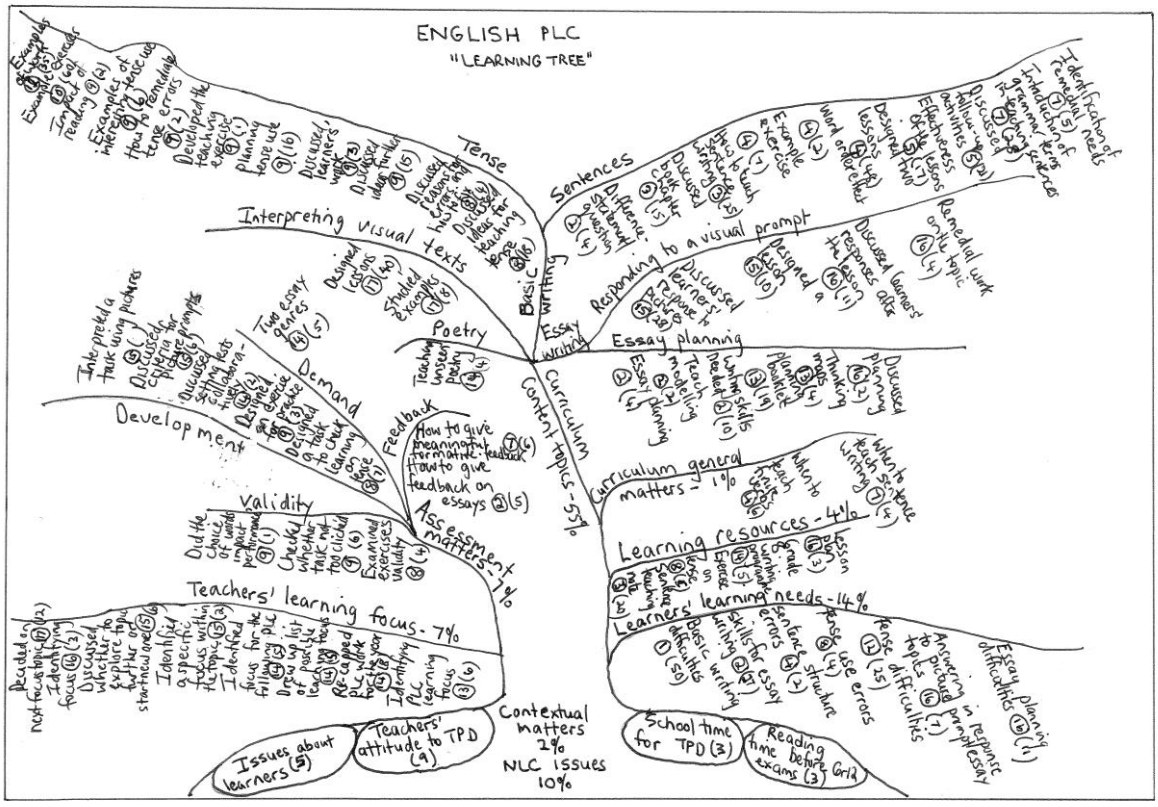


Table 7.4 English *learning focus areas*: *subjects of discussion* and time in minutes

No.	Learning focus areas	Subjects of discussion	Time (approx. minutes)
Curriculum content topics (55%)			
1	Basic writing (mostly syntactic focus)	Designed lessons and tasks to teach sentence construction and tense usage; analysed learners' work in response to these lessons and tasks (EA2 – EA13)	334
2	Essay writing	Designed lessons to help learners respond to a visual essay topic prompt and how to plan an essay (EA14-EA16)	94
3	Visual literacy	Designed lessons and tasks to teach learners how to interpret a visual text (EA17, EA18)	48
4	Poetry	Discussed a lesson on interpreting an unseen poem	4
Learners' learning needs (14%)			
5	Basic writing difficulties	General errors in writing; sentence structure errors, tense errors	81
6	Essay writing difficulties	How to respond to a visual prompt and plan an essay	45
Assessment matters (7%)			
7	Demand	Standards, interpretation of questions	5
8	Validity/reliability	Authenticity, relevance, validity of the tasks they designed in the PLC	11
9	Development	Considered joint setting of tests, but did not do it	31
10	Feedback	Discussed how to give meaningful feedback, short tasks for formative assessment and immediate feedback	11
Learning resources (4%)			
11	Documents	Book chapter on sentence writing; notes on the curriculum content topics worked on in the PLC, thinking and planning maps, a suggested writing teaching programme, a lesson template (EA1, EA11, EA19)	33
Curriculum general matters (1%)			
12	Sequence	When should items of grammar and sentence writing be taught?	10

7.2.3 *Focus areas* in the Mathematics PLC

The Mathematics PLC "Learning Tree" (Figure 7.6 below) shows that, in the twenty[108] sessions of the case study, averaging 63 minutes each, this PLC focused its learning predominantly on the analysis of errors in learners' work which led to brief discussions of seventeen *curriculum content topics* and a long enquiry process on lesson and assessment design on the *curriculum content topic* of "exponents" (50%). This PLC did not spend much time on *contextual matters* (1%). Like the Geography teachers, participants were frustrated by certain policies, including having to write common tests.

[108] An additional 4 sessions (18-21) were analysed in the case of the Mathematics PLC in order to include the complete learning cycle on exponents.

The two lower branches spread widely and cover many topics indicating that the teachers spent a large amount of time trying to understand *learners' learning needs* following their PLC activity of analysing learners' errors in a test (23%). In this process teachers identified *their teachers' learning focus (4%)* as they struggled to find out how to teach the *curriculum content topics* better so that the learners did not make the errors (4%). The PLC discussed appropriate *learning resources* (5%) and by following a process similar to Japanese Lesson Study (Lewis & Hurd, 2011, p. 2; Lewis & Tsuchida, 1998, pp. 12, 14) on "exponents" they created resources. They spent 8% on *curriculum general matters* dealing with the new CAPS policy and how to sequence the teaching of topics. Very little time was spent on *assessment matters* (2%).

Curriculum content topics were handled very differently in this PLC. The "Learning Tree" shows a number of short *curriculum content topics* branches and one very long one. These represent, firstly, the seventeen mathematical topics identified in their analysis of the learners' errors and, secondly, after a year of working on this, the PLC pursued "exponents" systematically and thoroughly for a number of sessions. See Table 7.5 below for details of the *learning focus areas* and *subjects of discussion* and the time spent on them.

Figure 7.6 Mathematics "Learning Tree"

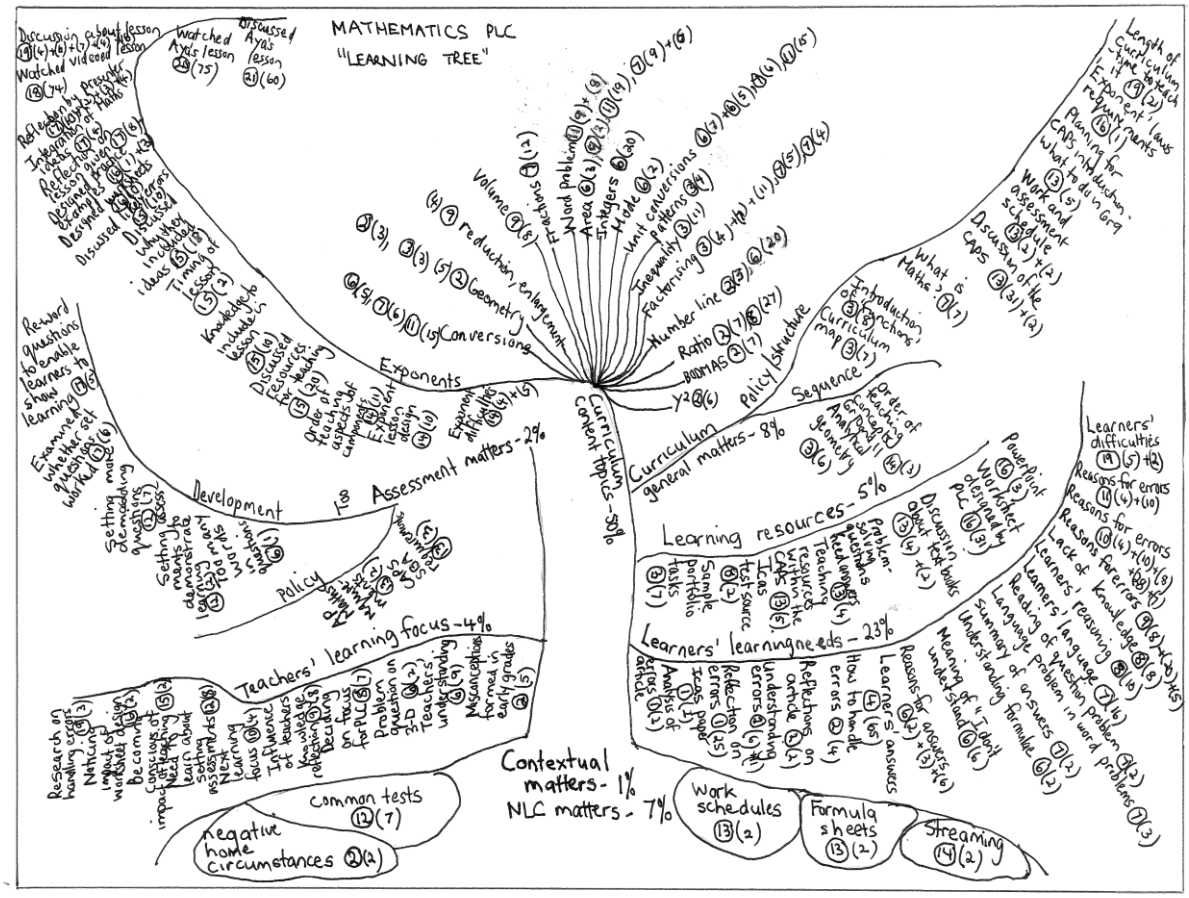


Table 7.5 Mathematics *learning focus areas*: *subjects of discussion* and time in minutes

No.	Learning focus area	Subjects of discussion	Time (approx. minutes)
Curriculum content topics (50%)			
1	y^2	y^2 as a representation of area	6
2	BOMDAS/BODMAS	Are they the same thing?	7
3	Number line	Negative numbers	23
4	Geometry	Types of angles	10
5	Inequality	How this topic fitted into the curriculum map	11
6	Patterns, linear, exponential, quadratic and link with functions	How these fitted into the curriculum map	4
7	Factorisation	Trinomials	18
8	Unit conversions	How to teach learners to identify the factor by which they must multiply or divide	7
9	Mode	How to teach the difference between mean, mode and median	2
10	Integers	Magnitude and direction of change	20
11	Fractions	How to teach fractions using concrete shapes	12
12	Factorisation	How to teach this using a game and concrete shapes	9

No.	Learning focus area	Subjects of discussion	Time (approx. minutes)
13	Ratio and similarity	How to teach so that learners could answer questions relating to proportion	34
14	Reduction, enlargement and dilation	Clarified the terms	4
15	Conversions	How to do and teach conversions	20
16	Word problems	Teachers' strategies for teaching learners how to solve word problems	26
17	Area	The difference between "total surface area" and "surface area"	38
18	Exponents	How to teach this concept by showing a pattern (MA6 - MA10)	379
Learners' learning needs (23%)			
19	Understanding learners' Mathematical errors	Discussed the value of error analysis, identified the errors learners made and discussed the reasons for them (MA3, MA4A, MA4B)	270
20	Understanding errors possibly caused by language and comprehension difficulties	Discovered that learners cannot understand the questions because of the language used and inability to read and comprehend well (MA3, MA4A, MA4B)	18
Curriculum general matters (8%)			
21	Sequence	Facilitator advised on sequencing	17
22	Policy (structure, content, and pacing)	Facilitator explained the CAPS document and work schedules, identifying pertinent changes and difficulties (MA2, MA5)	78
Learning resources (5%)			
23	Documents	ICAS test, sample tasks, examples for teaching curriculum content topics, text books on the internet, worksheets, PowerPoint (MA1A, MA3, MA5, MA6, MA7A, MA7B)	59
Assessment matters (2%)			
24	Policy	Discussed the implication CAPS document assessment requirements, AP Maths requirements	5
25	Development	Discussed the language use in questions, how to set questions, application questions, and exponents tasks	21

7.3 INFLUENCES ON CHOICE OF LEARNING FOCUS

Each PLC developed its unique identity influenced by the personal attributes and facilitation style of the facilitator and factors related to the participants, such as the level of their professional knowledge and experience and the context in which they taught. There were three main influences on teachers' choice of learning focus:

- *learners' learning needs* as demonstrated in samples of learners' work examined in PLC sessions (for example, cross-sections of topographical maps and essays) or problems teachers identified from experience (for example, problems they have understanding questions and diagrams in the common tests);

- *teachers' learning needs* for knowledge-for-teaching (for example, teachers were uncertain how to teach Geographic Information Systems or how to teach learners to respond to a visual essay prompt); and
- the *facilitator's choice/influence* and involvement (chapter 6).

Figures 7.7 to 7.9 below indicate the main influences on the PLCs' choice of learning focus in each learning unit and do not relate to the amount of time spent on these choices.[109]

Figure 7.7 Influence on choice of focus in the Geography PLC - % of learning units

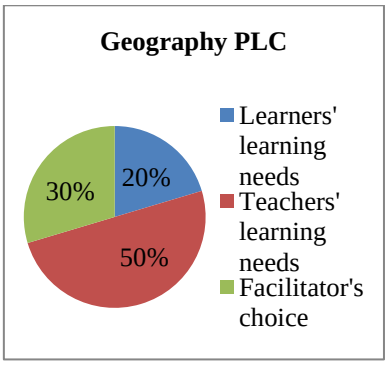


Figure 7.8 Influence on choice of focus in the English PLC % - of learning units

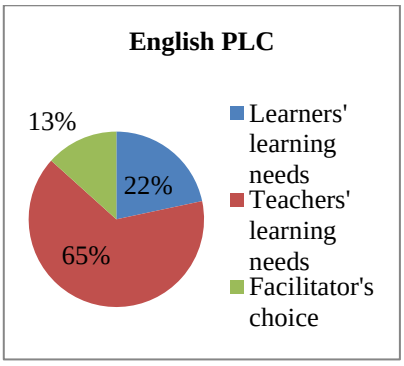
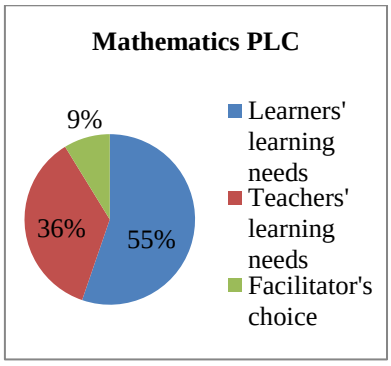


Figure 7.9 Influence on choice of focus in the Mathematics PLC - % of learning units



While the literature describes teachers in PLCs mainly choosing a learning focus as a result of the analysis of their learners' learning needs this was not always the case for the PLCs in this study. In only 20% of the Geography PLC learning units was the focus influenced by learners' needs. Learners' needs influenced the focus in the English PLC (22%) as they examined the samples of work produced in response to lessons designed by the PLC. Learners' needs was the main influence in the Mathematics PLC (55%) which began its work by examining learners' errors and then went on to design lessons mindful of what they had learned. For the Geography and English PLCs the main influence was the teachers' learning needs (Geography 50% and English 65%). In order for the PLC work to be meaningful to the participating teachers, the PLCs decided by consensus what they wanted to focus on. The Geography teachers identified their needs

[109] The percentage for "learners' learning needs" as an influence on choice of PLC discussion focus differs from the percentage for "learners' learning needs" as a *focus area* because the calculation for influence excludes "*general focus areas*" issues and is based on the number of learning units and not on the amount of time spent on discussing the *subject of discussion.*

and the steps followed in the collaborative processes helped the English teachers to identify theirs. The Mathematics teachers from time to time helped one another with techniques or processes to teach concepts that were discussed as they studied learners' errors. They also focused on their teaching needs as they designed lessons on exponents.

The research literature (Hadfield & Chapman, 2009; Katz et al., 2009) also does not describe the facilitator influencing the choices to the extent that happened in the Geography PLC where the facilitator intervened in 30% of the learning units. However, her influence became less as the teachers grew more confident and were more willing to share knowledge and contribute ideas (6.3.3.1). She suggested *subjects of discussion* for the PLC that she believed would be useful to the teachers, arising from her knowledge of what teachers needed and what she observed as they worked. The English and Mathematics facilitators influenced the PLC much less, 13% and 9%, respectively. The English facilitator's involvement was mainly at the beginning in order to get the PLC learning process going when he proposed that the PLC use the CALW enquiry process to get the PLC started and the Mathematics facilitator suggested that their PLC begin by looking at learners' errors.

These findings indicate that the knowledge-for-teaching that PLCs chose to focus on depended to a large extent on who the participants in the PLC were and what their needs were as they began the PLC work. Although PLC literature suggests that a PLC's focus should be driven by data about learners' needs and that these needs should influence teachers' choice of learning focus (Earl & Katz, 2006; Katz et al., 2009; Brodie, 2013) this is not what happened in the Geography and English PLCs. The Geography teachers brought to the PLC their already identified learning needs: curriculum topics that they found difficult to teach. These problematic topics appear to have been common to all the participants and so they became the focus of PLC learning. Although not following the dominant model in the PLC literature, what the Geography PLC did in its sessions met the needs of the Geography teachers. This PLC focused on the "tasks, questions, and problems of practice" which, according to the literature (e.g. Ball & Cohen, 1999), are a necessary focus for effective TPD. The English PLC engaged in a number of collaborative enquiry processes which entailed identifying learners' needs as the first stage in the process. The second stage required the teachers to investigate what

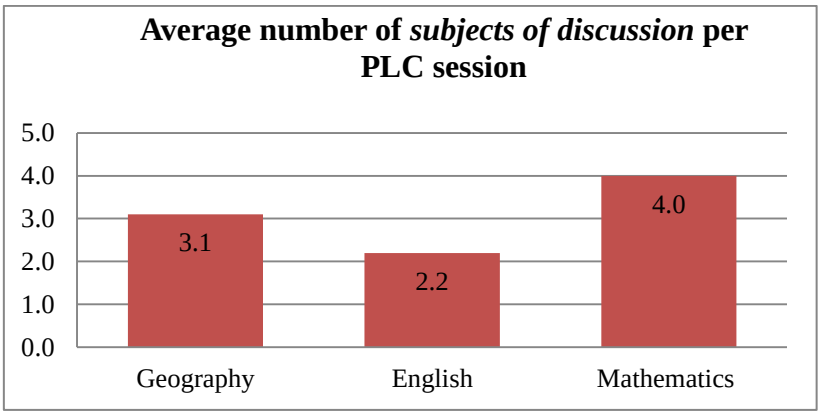
knowledge and skills they needed to address the learners' needs and to teach more effectively. As the teachers progressed through the enquiry stages they began to use data derived from samples of learners' work to direct their learning focus and subjects of discussion in the PLC sessions. The Mathematics teachers worked through the reasons for learners' errors in response to a multiple choice test and then designed lessons on a topic which learners found difficult, keeping in mind what the learners' needs were. The English and Mathematics PLCs followed the PLC model described in the literature more closely and also focused on "problems of practice".

7.4 DEPTH OF FOCUS ON *SUBJECTS OF DISCUSSION*

Each PLC functioned differently and dealt with their learning in different ways. These differences are described and shown visually in the "Learning Trees" (Figures 7.4 - 7.6). PLC sessions focused on the chosen *subjects of discussion* but teachers were often side-tracked. While focusing on, for example, designing a lesson to teach sentences, the English PLC digressed to answer a teacher's question on curriculum sequencing. Figure 7.10 shows the average number of *subjects of discussion* dealt with in a PLC session. Some *subjects of discussion* were dealt with in a few seconds and others occupied the PLC's attention for much longer. The Mathematics PLC covered many *subjects of discussion* per session in sessions 1-13 (an average of 6.1) from which it can be inferred that each was dealt with in limited detail and depth. However, when they began the focus on "exponents" (sessions 14-21) the average was 1.1 per session. The overall average was 4.0. By contrast the Geography PLC covered few *subjects of discussion* per session, 3.1, and from that it could be inferred that they were more focused in their approach. However, this may not have been the case. The Geography teachers were less confident about contributing to the discussion so did not introduce many divergent *subjects of discussion*. The average number of subjects of discussion per session of 2.2 in the English PLC reflects this PLC's more sustained focus on a few subjects over the fifteen sessions analysed. The nature of the enquiry processes engaged in by the English and Mathematics PLCs provided more opportunities for teachers to challenge ideas and often divert to other *subjects of discussion* (discussed in greater detail in chapter 8). The number and range of *subjects of discussion* are an indication of the interactive and spontaneous manner in which teachers engaged in learning. These findings point to the

rather unsystematic and unstructured process of learning that is likely to take place in PLCs.

Figure 7.10 Average number of *subjects of discussion* per PLC session



7.5 COMPARISON OF THREE PLCS

In Table 7.6 below, I briefly compare the PLCs with respect to PLC session time, focus areas, number of topics covered, influence on the choice of focus and depth of coverage.

Table 7.6 Comparison of PLCs

	Factor	Geography	English	Mathematics
1	Time spent in PLC activities[110]	16 sessions totalling 13 hours	15 sessions totalling 15 hours	20 sessions totalling 21 hours
2	Focus areas covered	This PLC focused on curriculum content topics (40%) and assessment matters (25%) with the facilitator's extensive help. They discussed curriculum general matters (6%) with a view to managing it in a relevant way and understanding changes because of the CAPS, and examined resources to help learners (6%). They discussed contextual matters for 5% of the PLC time. These activities led to the identification of learners'	The English PLC focused mainly on curriculum content topics (55%) as a result of identifying learners' learning needs (14%), and teachers' learning focus (7%). They looked at resources and created some of their own (4%). The PLC discussed validity, credibility and standards of assessment as well as meaningful feedback on it (7%). Only 1% focused on curriculum general matters and 2% on contextual matters.	This PLC spent 50% on curriculum content topics. These arose largely from the error analysis which used most of the first 11 sessions. 23% of time was spent on identifying learners' learning needs and 4% on teachers' learning focus. The PLC spent 8% on curriculum general matters, mainly on the CAPS and work scheduling. Lesser amounts were spent on resources (5%) as they only created materials in the last few sessions,

	Factor	Geography	English	Mathematics
		needs (9%) and teachers' learning focus (8%).		assessment (2%) and contextual matters (1%).
3	Curriculum content topics covered	Five topics (one only as an example for making topics relevant) – 15 subjects of discussion on *curriculum content matters*	Four topics – 6 subjects of discussion on *curriculum content matters*	Eighteen topics – 18 subjects of discussion on *curriculum content matters*
4	Influence on choice of focus	Teachers' learning needs for 50% of the learning units; facilitator's choice in 30% of the units	Teachers' learning needs for 65% of the learning units; learners' learning needs in 22% of the units	Learners' learning needs in 55% of the learning units; teachers' learning needs for 36% of the units
5	Depth/detail[111] of coverage	Map work and climatology were covered in greater detail and with more teacher participation but the approach was not systematic until after session 10. An average of 3.1 subjects of discussion per session.	All topics, except the interpretation of an unseen poem, were done systematically and in considerable depth. An average of 3.1 subjects of discussion per session.	The first seventeen curriculum content topics were covered very superficially and only in relation to the errors seen in learners' answers on the ICAS tests. The last one, "exponents", was done in considerable depth when they followed a form of Japanese lesson study.[112] An average of 4.1 subjects of discussion per session (1.1. in the last 8 sessions when dealing with "exponents").

7.6 SUMMARY

The teachers in the PLCs in this study were free to choose their own focus areas. All three PLCs focused mainly on *curriculum content topics*. When the PLCs used samples of work in their collaborative enquiry cycles or discussion they also looked at *learners' learning needs*. The choice of *focus areas* was influenced by teachers' needs, learners' needs and the facilitator's choice. Teachers' contextual conditions and their own knowledge impacted on how and what they chose to focus on in their PLCs. More knowledgeable teachers were influenced more by their and their learners' needs. The less knowledgeable teachers at first relied on the facilitator to make the choices. Teachers did not focus on certain areas of knowledge-for-teaching which they

[111] Depth is judged according to how comprehensively/thoroughly (amount of detail in terms of depth and breadth of examining a concept relative to the curriculum requirements) the PLC dealt with the concept/skill.

[112] Japanese lesson study (Doig & Groves, 2011, pp. 77-93) appears to be an effective activity for PLCs' learning, provided there is sufficient expertise among participants.

acknowledged they were not strong in. The focus of the learning was not always sustained and systematically handled.

7.7 CONCLUSION

In this chapter I have identified eight *focus areas* of the PLC sessions, five of which were *learning focus areas*. I identified the *subjects of discussion* that the PLCs handled within these *learning focus areas* and briefly outlined the depth to which they handled them.

In the next chapter I describe in greater detail WHAT knowledge the PLCs covered when participants handled the *subjects of discussion.* I then describe HOW they learned the knowledge.

CHAPTER 8 KNOWLEDGE AND LEARNING IN PROFESSIONAL LEARNING COMMUNITIES

8.1 INTRODUCTION

TPD research indicates that for PLC work to be effective it should focus on what teachers need to learn in order for learners to learn more effectively (Katz et al., 2009, pp. 29, 70-71). In chapter 7, I provided an overview of the *focus areas* and the *subjects of discussion* covered in the learning units.

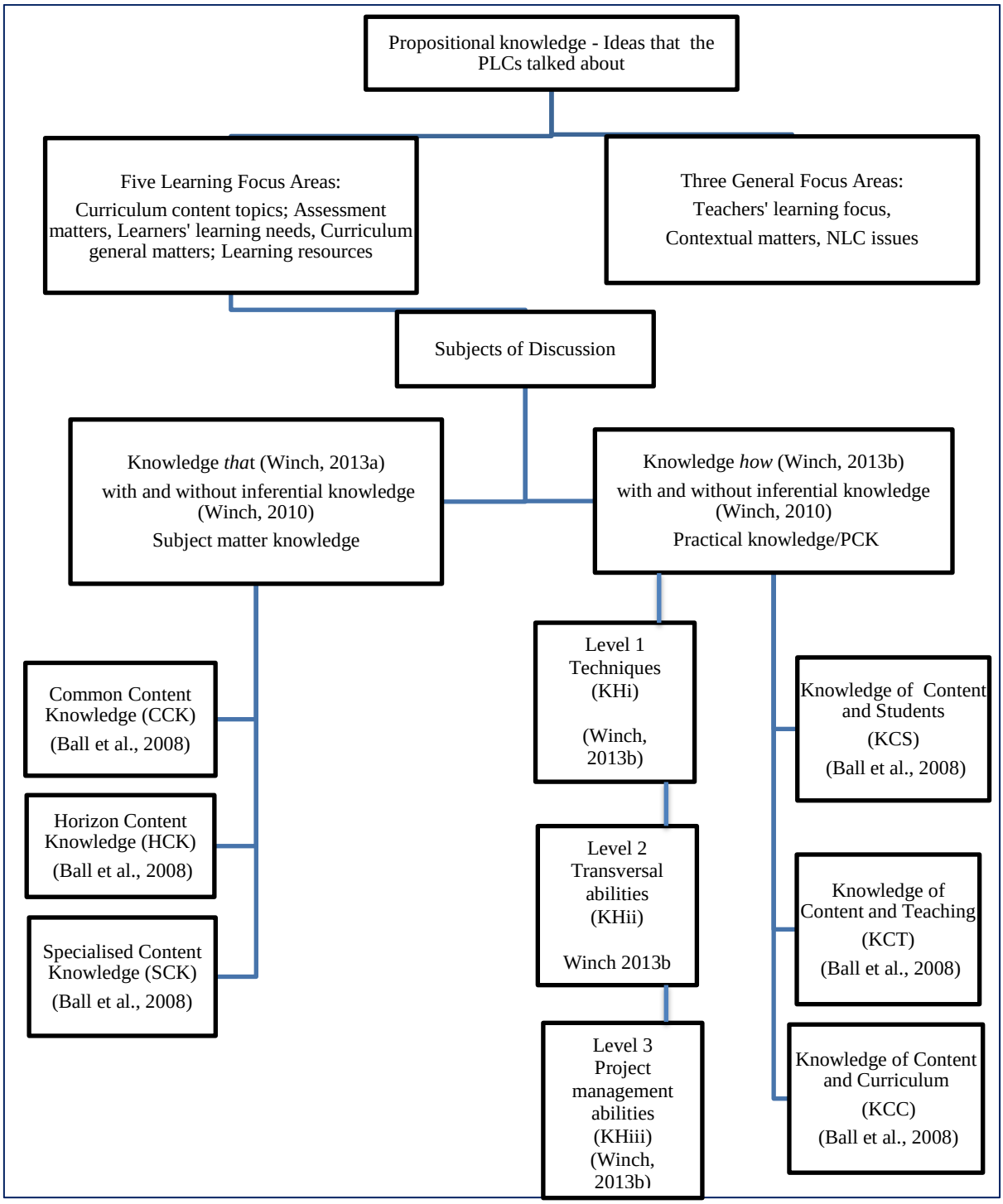
In this chapter I aim to show WHAT knowledge the PLCs focused on, their ideas (propositional knowledge) about 'what' and 'how' to teach. I examine in detail the *types* and *domains* of knowledge (Ball et al., 2008)[113] teachers worked with in their PLCs and how they did so.

Firstly, following Winch's (2013a; 2013b) distinction between *types* of knowledge,[114] I use the terms "knowledge *that*" (KT), to classify the learning units which relate to the PLCs' discussion of content or subject matter knowledge, and "knowledge *how*" (KH), to classify the learning units which relate to the PLCs' discussion of practical knowledge of how to teach certain subject matter knowledge included in the curriculum (PCK). I also analyse all the learning units in relation to Winch's "inferential knowledge" (IK), the concept he uses to define epistemic know-how or the ability to make inferences (2010; 2013a). I also use Winch's (2013b) three levels of "skills" – skills (techniques[115]), transversal abilities and project management abilities[116] to obtain a finer grained understanding of the practical knowledge (KH) that the PLCs worked with as some forms of practical knowledge are more difficult to learn than others. When classifying for practical knowledge I specifically examined whether the PLC dealt with all levels of skills and whether they included inferential knowledge (IK) or not in all the levels. Secondly, I further classify all the learning units according to the *domains* they focused on. See Appendix 4.5 for overview tables of the *types* and *domains* of knowledge

[113] See 3.2.4 for a discussion of Ball et al.'s *domains*.
[114] See the discussion in 3.2.
[115] Winch (2013b) uses the term "skills" for level one skills which are techniques combined with the requisite ability to apply them in a context and to enact them with appropriate character (p. 283). Hereafter, to avoid confusion, I use the term "techniques" for this level of skills.
[116] See 3.2.2.2 for a discussion on the three levels of skills.

focused on in the PLCs. I present the findings with examples from PLC sessions. Figure 8.1 shows the process of analysis used.

Figure 8.1 Outline of analysis of WHAT knowledge PLCs focused on



In section 8.3 I show HOW the PLCs worked with knowledge and give examples of the PLCs' use of collaborative *processes*. This is followed by teachers' perceptions of learning and support in the PLC learning processes. The chapter concludes with a comparison of the characteristics of teachers' learning in each PLC and between the PLCs.

In section 8.2 calculations are based on learning units because I wanted to find out what knowledge was focused on whereas in section 8.3 calculations are based on time because the focus was on how the PLCs worked with knowledge and time is relevant to this.

8.2 KNOWLEDGE FOCUS IN THE PLCS

This section describes what knowledge-for-teaching the PLCs focused on in the learning units (WHAT they learned in the PLCs). I classified the learning units in five ways according to the *types* and *domains* of knowledge:

1. theoretical knowledge/subject matter knowledge/"knowledge *that*" (KT) and practical knowledge/"knowledge *how*" (KH) (which largely refers to Shulman's PCK);
2. use of inferential knowledge (IK) in KT;
3. practical knowledge classified into
    - level one skills - techniques (KHi),
    - level two skills - transversal abilities (KHii),
    - level three skills - project management abilities (KHiii);
4. use of inferential knowledge (IK) in KH at three levels; and
5. *Domains* of knowledge (KT- CCK, SCK, HCK; KH- KCS, KCT, KCC).

From this classification it was possible to draw conclusions about what knowledge was mainly focused on in the PLCs' learning units. See Appendix 8.1 for the knowledge classification instrument.

8.2.1 Learning units classified according to *types* of knowledge (KT and KH)

When the PLCs discussed curriculum content topics and how to teach them, the creation and/or evaluation of assessment tasks, curriculum documents, and the creation and/or use of learning resources the dominant focus was on practical knowledge, with Geography focusing 89% of the learning units on this, English 93% and Mathematics

95%. In Shulman's terms, most of the units focused on learning how to turn teachers' subject matter knowledge into knowledge that learners could understand (pedagogical content knowledge). Teachers explored a limited amount of subject matter knowledge as an explicit object of discussion: the Geography PLC focused 11%[117] of the learning units on subject matter knowledge with the English PLC spending 7%[118] and the Mathematics PLC 5%.[119] Most PLC activities focused on subject matter knowledge incidentally as the need arose, rather than systematically.

In the analysis that follows I examine the two types of knowledge – "knowledge *that*" (KT) and "knowledge *how*" (KH) – covered in the PLC sessions and I provide examples of how the PLCs dealt with these *types* of knowledge. Figures 8.2 – 8.4 below show the percentage of PLC learning units focused on the different *types* of knowledge.

Figure 8.2 Knowledge *types* focused on the Geography PLC

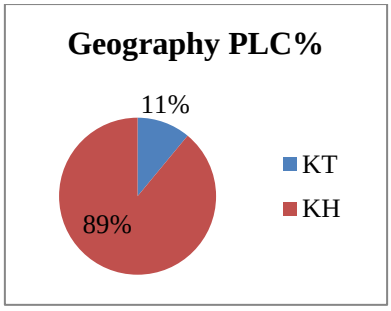


Figure 8.3 Knowledge *types* focused on the English PLC

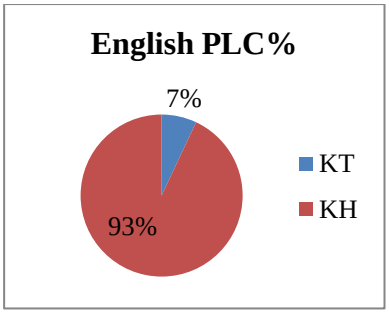
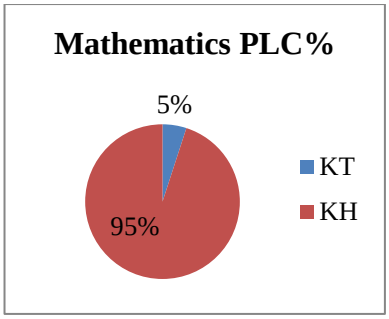


Figure 8.4 Knowledge *types* focused on the Mathematics PLC



8.2.2 Learning units that focused on subject matter knowledge (KT) with or without inferential knowledge (IK)

In the discussion that follows I provide two examples of how PLCs dealt with KT. I then provide three examples to illustrate how some units included inferential knowledge and some did not.

The Mathematics PLC provides an example of subject matter knowledge (what "y^2" is) being dealt with incidentally as participants considered practical knowledge (how to teach it). The teachers blamed previous poor teaching for errors and misconceptions

[117] 6 of 54 learning units
[118] 4 of 60 learning units
[119] 5 of 114 learning units

(about which they had been reading) prompting Clara to describe a concrete way of teaching the concept of "y^2":

> C: … You've got to show them what the squared means. So for argument's sake, we've just bought the algiblocks where you can actually show them what the squared looks like. So you can actually take squares, let's say it's 6 squares, and make 36. … I don't know, I'm just thinking for that particular child. They don't have a clue that the squared is actually…
> A: A square
> C: Ja, it's a square and the y is actually a thin strip.
> V: But I don't think any of the learners, even the bright ones, I don't think they realize that that $y^2 – 5y + 6$ represents an area.
> C: So is it something we're doing wrong then? As teachers are we not doing something wrong by not making it, making the abstract tangible to them? (M2T/23/02/2011:503-519)

Clara provided subject matter knowledge for the PLC, namely that "y^2" represents area. Immediately after this, and only linked by the fact that many learners' errors stem from not applying BODMAS correctly, a teacher was prompted to obtain clarity for himself about this concept which is essential for many mathematical processes (KT). He asked whether there was such a concept as BOMDAS: "If I may ask, is there anything like BOMDAS? ... I mean how does it operate alongside BODMAS? (M2T/23/02/2011:701)". This led to two of the teachers explaining why BODMAS and BOMDAS were the same. They drew on their subject matter knowledge.

> A: Can I also just say another point about BODMAS is that if you've got these 2 and these 2 it doesn't mean because the D comes first that division must be done first. These two are done whichever comes first. And the same with this – it's whichever comes first. So if you've got 3 – 2 + 1 it doesn't mean that addition must be done (although in this case it doesn't matter) but you can do subtraction and then addition. It doesn't mean because A comes first that you have to do the addition, it's whatever comes first, just work along the line. So the same with 3 divided by 3 times by 3. You can do the division first and then do the multiplication and if it's the other way round you can do the multiplication first and then because it's whatever comes first for division or multiplication, addition and subtraction.
> C: But it's because multiplication and division and addition and subtraction are commutative.
> A: The same operation, ja. They're actually the same operation. (M2T/23/02/2011:807-818)

Clara and Amy emphasised the knowledge which underlies the BODMAS/BOMDAS order of operations concept, namely that the operations of multiplication and division give the same result regardless of the order in which they are placed, as do addition and subtraction.

When the Geography PLC discussed how to teach learners how to interpret contours which are an abstract representation of height on a map (KH),[120] the facilitator proposed using concrete representations of landforms to help the learners. She used pieces of card in the pattern of the contours stacked on one another to enable teachers (and learners) to see the shape of the landform in 3-D.[121] She used a sweet potato (representing a landform – an irregular shaped hill, for example) cut in slices which were then stacked to show height increases.[122] As the facilitator showed these techniques for teaching contours, the teachers discussed the content related to this curriculum topic, namely that contours are lines joining places of equal height and that their patterns indicate specific landforms. For example, the facilitator pointed out that contours that are extremely close together or on top of one another indicate a cliff or waterfall and those that are far apart indicate a slight incline. The teachers also discussed how to help learners work out what height each contour represented (not every contour is labelled and learners have to work out the heights from the nearest labelled one). The facilitator needed to explain lighter and darker shaded contours and the height interval between each contour, for example, units of 20 metres and the darker contours being 100 metres apart. Working with the concrete representations provided KH but also assisted the teachers who did not understand the content (KT).

Once a *subject of discussion* had been decided on the PLCs worked with practical knowledge reasonably systematically. Some teachers reported in their reflection journals that they had felt insecure in their subject knowledge but had learned subject matter knowledge at the same time as they were learning how to teach it. The above examples did not include IK.

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[120] The lines on a topographical map that link points of equal height, the pattern of which indicates the gradient of the area and type of landform;

[121] "Again we would give them that on a piece of paper, they bring in, it's just cardboard boxes (corrugated cardboard of approximately 3-5mm thick at least, not thin cardboard) that they find – these ones coloured them in. Draw the first one, cut it out; draw the second one, and they just add it together like that. So again it's easy enough for them. When they look at that they just see a flat piece of paper. When they look at it like that they start getting an idea of what it looks like. So then when we ask them to do a cross-section through it, it's sometimes a bit easier and they understand." (G7T/01/06/2011: 25-29)

[122] "I mean even like a sweet potato would have a funny bit of an irregular shape which would make it quite nice. So all they have to do is, even if you just said to them 'Cut a big… You know, cut it in slices and make each one a bit smaller.' And then they just put it one on top of the other. And straight away you're going to say to them 'That's exactly like a mountain. So there's the one level of the contour line.' So it did explain it." (G8T/27/07/2011:93-96)

The literature on teacher knowledge shows that in order to teach effectively it is necessary for teachers to have substantial propositional knowledge of what and how to teach, (3.2). Having inferential knowledge (IK), the ability to make inferences, (Winch, 2010; Winch 2013a, p. 130), is indicative of stronger teacher knowledge (3.2.2.1). In order to obtain an understanding of the depth to which knowledge-for-teaching was covered in the three PLCs I classified the learning units that focus on subject matter knowledge. I classified the units according to those that included inferential knowledge and those that did not (Figures 8.5 – 8.7). Although the number of learning units focusing on subject matter knowledge in all the PLCs was small, the Geography PLC included inferential comprehension in 50% of these units, Mathematics in 60%, and English in 75%. When inferential knowledge was evident in the Geography PLC discussions it was the facilitator who contributed the ideas. The English and Mathematics PLC participants spent less time working with subject matter knowledge but when they did so there was greater use of inferential knowledge in their discussions.

When the Mathematics teachers discussed the solution to a ratio problem[123] they mostly worked with KT without IK. Clara used mathematical knowledge that: "It should be more kilometres than miles" because as Amy had said earlier "a kilometre is less distance than a mile". Clara argued: "So if you've got 1 000 miles you should have 1 600 kilometres" and then Amy understood and completed the formula correctly: "So it's 1.62 times 118000". The PLC did not deal with this concept in any depth.[124]

[123] "Jake read that most people walk about 118000 miles in their lifetime. One kilometre is approximately equal to 62% of a mile. About how many kilometres will most people walk in their lifetime? (A) 73000, (B) 118000, (C) 120000, (D) 190000.

[124] A: Because it should be less than 118 000 because a kilometre is less distance than a mile.
V: 1 kilometre is 62% of a mile…
A: So it's 62% of 118 000…
C: So I've got 1 kilometre as equal to 0,62 miles
After further discussion Clara says:
C: It should be more kilometres than miles.
V: Ja
Al: It should be more because…
C: So if you've got 1 000 miles you should have 1 600 kilometres
V: Yes
Al: That's what it means, yes.
A: Ok, I take it all back. *[laughs]*
Al: Because if you are teaching proportion and ratio that should actually lead to an answer that is more, yes.
…

Figure 8.5 Geography learning units involving KT with and without IK

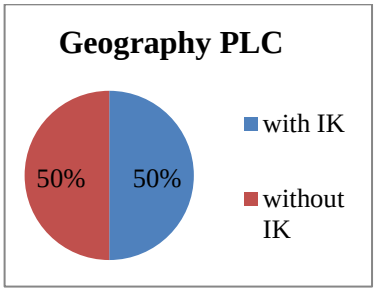


Figure 8.6 English learning units involving KT with and without IK

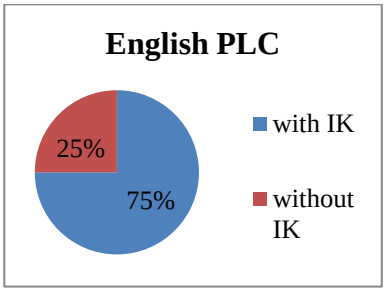
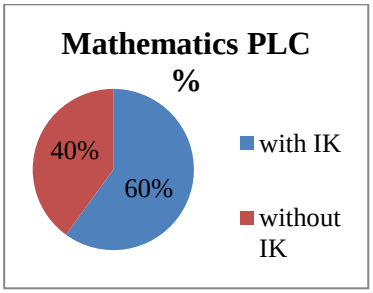


Figure 8.7 Mathematics learning units involving KT with and without IK



In the next example from the Mathematics PLC Clara explains how she teaches patterns in a way that makes functions understandable. Demonstrating inferential knowledge, she links knowledge of the Cartesian plane with knowledge for solving a quadratic equation:

> They don't make the link. And I think we as teachers are definitely at fault. And I know this year I tried a different tack and last year I tried a different tack as well. Actually, when we were doing algebra in grade 11, I started a different idea of well what is an equation? Why would I need to solve a quadratic equation? And we hadn't done the parabola yet at all, but I said to them, I said, 'Well you understand the Cartesian plane, so this is what we're actually doing. The equals zero is actually a y value. This is where it is in the Cartesian plane (because they'd done straight lines in grade 9 and grade 10, so I was able to actually put that all together for them). (M3T16/03/2011:104-109)

Sam used inferential knowledge in the English PLC when she referred to various types and uses of mind-maps and thinking skills when explaining to the PLC how to teach learners how to plan an essay. Her explanation included reference to using thinking skills and applying the different types of mind-maps to knowledge and skills in the English curriculum that the learners need to know and demonstrate. Her explanation covered knowledge of mind-mapping and thinking skills (*common content knowledge* – examples of types of mind maps; *specialised content knowledge* – how to choose a type of mind map that would be suitable for comparing characters from a literary work; and *horizon content knowledge* – topics in the curriculum (e.g. literature study) where mind maps would be useful).

8.2.3 Learning units that focused on practical knowledge (KH) with or without inferential knowledge (IK)

In the discussion that follows I provide examples of learning units that focused on:

A: So it's 1.62 times 118000 …
C: So the answer's actually D
Al: Ja. (M11T/21/09/2011:86-257)

- KHi with and without inferential knowledge;
- KHii with and without inferential knowledge; and
- KHiii with inferential knowledge.[125]

The practical knowledge that the PLCs covered in their discussions was multi-layered and complex. Figures 8.8 – 8.10 show the spread of the PLCs' focus on the three levels of practical knowledge across all the learning units. From these representations it can be seen that the PLCs dealt with a range of skills levels (see Appendix 4.5.1 – 4.5.3 for the classification of each unit). The Geography and English PLCs did not spend any time on project management ability (KHiii). The Mathematics PLC drew on this knowledge *type* in 2% of the learning units when they discussed how the Mathematics curriculum was organised to cover the various topics at varying degrees of depth at different grade levels. The Geography PLC used more knowledge of techniques (KHi) than the other PLCs (Geography – 42%, English – 33%, Mathematics – 28%). All three PLCs used knowledge of transversal abilities (KHii) in almost half of the learning units involving practical knowledge (Geography – 58%, English – 67%, Mathematics – 70%).

Figure 8.8 Geography Three levels of KH %

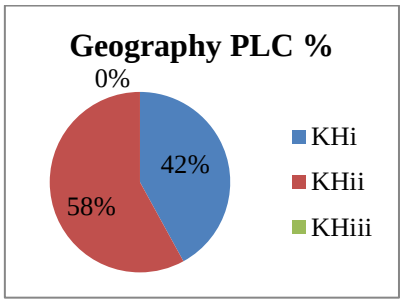


Figure 8.9 English Three levels of KH %

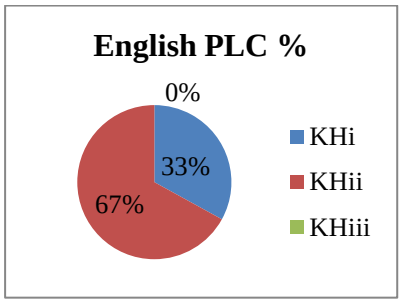
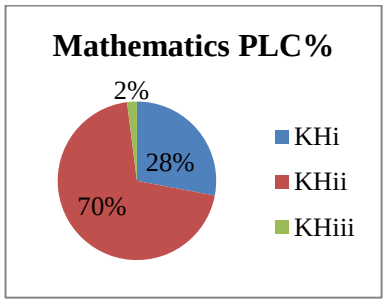


Figure 8.10 Mathematics Three levels of KH %



In order to find out about the depth at which practical knowledge was dealt with in the PLCs, and based on the assumption that learning units that used inferential knowledge dealt with knowledge at a deeper level,[126] I examined the learning units that focused on practical knowledge to see whether participants used inferential knowledge or not. Figures 8.11 – 8.13 show the percentage of learning units in which inferential knowledge at the different levels of practical knowledge was or was not used. The

[125] All KHiii learning units used inferential knowledge.
[126] See the discussion in 3.2.2.1.

Geography PLC used more inferential knowledge (39%) when participants worked with techniques, first-order practical knowledge skills (KHi), than they did when working with second-order transversal abilities (27% - KHii). The participants in the English PLC employed inferential knowledge in almost half of their learning units, when they covered knowledge of techniques (KHi) and when they covered knowledge of transversal abilities (KHii). The Mathematics PLC employed inferential knowledge in 37% of their learning units on knowledge of techniques (KHi). This PLC relied on more inferential knowledge when using transversal abilities and project management abilities. Participants used inferential knowledge in 57% of the units using KHii. Inferential knowledge was especially critical to the Mathematics learning units that focused on knowledge of project management abilities (KHiii) where it was used in 100% of them.

In short, the Geography PLC used less inferential knowledge than the English and Mathematics PLCs at both the knowledge of techniques and knowledge of transversal abilities levels. The English and Mathematics PLCs increased their use of inferential knowledge as they worked with second- and third-order practical knowledge skills (KHii and KHiii).

My explanation for these results is that the Geography teachers were less able to use inferential knowledge to help them with their practical knowledge. They relied on their facilitator to provide both subject matter knowledge and practical knowledge. On the other hand, there were sufficient teachers in the English and Mathematics PLCs who could draw on their deeper subject matter knowledge to make inferences which helped the PLCs as they worked with practical knowledge.

Figure 8.11 Geography PLC learning units involving KH with and without IK

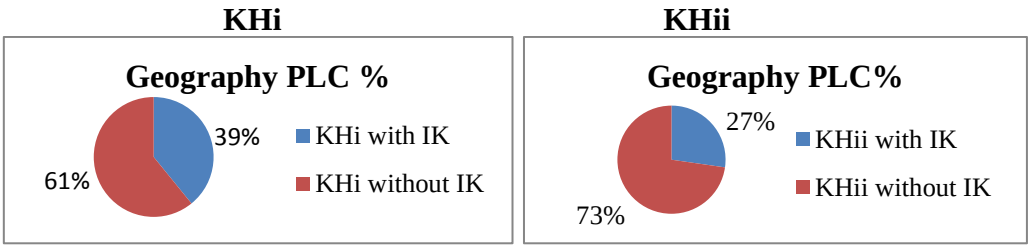


Figure 8.12 English PLC learning units involving KH with and without IK

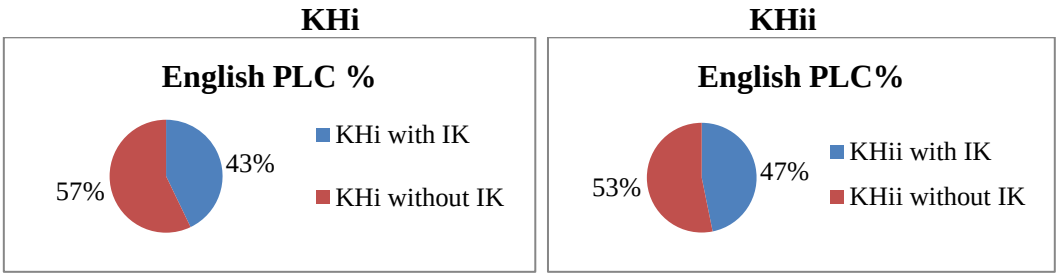
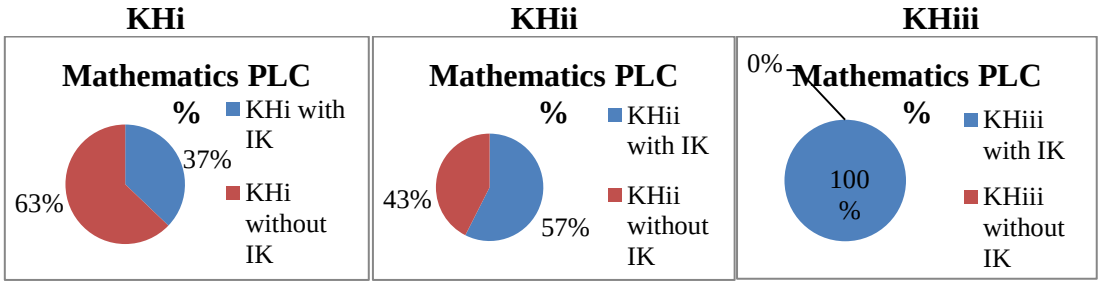


Figure 8.13 Mathematics PLC learning units involving KH with and without IK



The Geography facilitator's description of a technique (KHi) for helping learners understand the concept of the earth's revolution around the sun and rotation on its own axis is an example of a learning unit using inferential knowledge. The technique involves using a light bulb to represent the sun and showing the effect of it on objects moving around it or using a person to represent the sun and another to represent the earth which rotates on its own axis (the person spins) at the same time as he/she revolves (moves) around the person representing the sun. The discussion shows that practical knowledge is more than performing a technique. In order to be able to think of this concrete representation the facilitator needed to understand the concept well herself; her subject matter knowledge needed to be sound so that she could make the inferences that gave rise to the practical technique. The facilitator wanted the learners to see that the earth is lit up for half the time and in shadow for half the time (day and night) as it rotates.[127] These techniques required inferential knowledge based on the Geography teachers' subject matter knowledge about the effect of the earth's daily rotation on its own axis and about the annual revolution around the sun.

[127] "Something I found which works quite nicely and it might not be too difficult to get for the seasons is to get a light bulb … on a stand … Because to tell them the earth's moving around the sun, they need to see it shining."(G15T/01/02/2012:311-315)

On the other hand when the Mathematics PLC worked with a problem related to "area" a teacher's explanation for teaching learners how to remember the difference between "circumference" and "area" did not involve inferential knowledge. She described her technique, a rhyme,[128] which was simply a practical technique (KHi) to teach learners particular terms. The teacher did not link this with other subject matter knowledge:

> V: Do you all know the little poem to teach them the difference between area and circumference?
> A: No
> V: It goes: Twiddly dum, twiddly dee a ring around the moon is π times d. If a hole in your sock to want repaired, use the formula πr^2. So ring around the moon is the circumference (π times d) and a hole in your sock you're filling in the area, you're sewing up the hole, is πr^2.
> A: That's cool.
> V: It is, they love that. (M9T/24/08/2011:915-925)

The complexity of practical knowledge can be seen in the session where the English PLC teachers used second-order practical skills, transversal abilities (KHii), to design lessons for teaching learners how to write essays in response to visual prompts. This involved a number of steps. Firstly, the teachers acknowledged that they lacked the practical knowledge to help learners: "I'm not confident about how to teach children to understand how to respond to a quote or a picture. And I do the usual talking thing and I think it's ineffective" (E15T/01/02/2012:11-13). Fred then evaluated the difficulties they had observed in learners' work and they tried to understand these:

> And often people can interpret a picture so loosely that it could almost be anything. And so somehow for me I like to try and get them to identify what they think the theme or the emphasis of the picture is which is not always easy to do and it's always a bit of a grey area for me" (E15T/01/02/2012:38-40).

Teachers evaluated solutions (potential steps which could guide learners), including a technique (KHi) such as getting learners to look at the prompt and asking them to interpret it literally and then figuratively:

> I'll tell you what I wrote down for what I think I would try and do…. So what is actually happening in this photograph? So they need to write down for me what is literally happening. Ok, what is literally happening?" (E15T/01/02/2012:129-132).

They planned the steps (the group work discussion on literal and figurative interpretations of the picture, reaching consensus in a class discussion on symbolism, class discussion on possible themes and topics, assigning the homework), timing of the lesson (for example, they would need about 10 minutes for that at least), and determined how they would evaluate/monitor its success (the essay plan learners had to do for homework which the teachers would assess):

F: I think you've got a sort of lesson plan there.
A: Ja, I, I now have a lesson plan which I think would cheerfully take an hour. I'm serious.
Sam: Yes, absolutely
A: By the time you've divided them up – that's the first group work - they would need about 10 minutes for that at least.
F: Which is the literal interpretation of the picture?
A: Literal and figurative.
F: Ok
A: So that would be, you know, discussed.
F: Ok
A: Then come back and just get consensus that we all agree on what's going on (which I think is not a problem) and then symbolism is going to be a problem.
F: Ja
A: What is symbolised by this picture? Depending on what you show them. So at least another 10 minutes for feedback.
Sam: Mmm
A: Then you're going to say to them [*coughs]* Sorry, what did we say next? Ja. Number 2 was: Suggest themes, topics, titles of an essay that a child could plan around – one descriptive, one narrative and one opinionative. So let's try and cut that to 5 minutes, but I think we're being cheerful. (E15T/01/02/2012:559-579)
…
Sam: But then what do you envisage as homework?
A: Well I thought perhaps we could give them something either as homework or in the next lesson. Then you say, 'Here is a picture…
Sam: Go and interpret
A: 'I want you to mind-map this picture. Don't write the draft…
Sam: Yes, absolutely
A: … because we actually need to look at what you're planning to write. And sift again.' (E15T/01/02/2012:639-645).

The above excerpt shows that considerable subject matter knowledge and pedagogical content knowledge are involved in designing lessons and required teachers to use inferential knowledge. Teachers need knowledge of all aspects of writing essays as well as inferential understanding of what would constitute legitimate content in an essay based on a picture. They need a vast range of knowledge including what examiners find acceptable. The English teachers used their knowledge of learners' approaches to writing essays (mainly their errors in interpreting visual prompts, for example, not having a clearly visible link between the essay content and the picture, choosing to write on something very obscure,

choosing a minor detail of the picture to focus on) to identify the difficulties their learners had.

The following example shows the Mathematics PLC working with KHii without inferential knowledge. When the teachers tried to understand the reasons for learners' inability to apply formulae correctly, they drew on their practical knowledge, using transversal abilities (KHii) (evaluating), in particular, to explain possible reasons but did not use inferential knowledge, for example, subject matter knowledge about other mathematical processes involved in calculations using a formula:

> M5: But I think that this question is all about the usage of the formula …
> A: Ok, so it's understanding (a) that you have to substitute, (b) understanding how the formula is built up so that you can break down again and (c) what substitution is… M6T/11/05/2011:869-873)

They limited their discussion to operational steps involved in using a formula rather than trying to understand other mathematical issues affecting understanding, concluding that learners did not understand what the formulae meant:

> But I don't know if any of you have found this. When you do shapes do they just spew formulas at you? They know it's a formula and they know it's linked to a rectangle but they have no idea what it means. So when they see a formula like this and all they do is plug in numbers – it doesn't matter what the numbers are – they see two numbers, they're going to assume that it's length and breadth, so they just plug in for length and breadth and they get an answer. (M6T/11/05/2011:888-891)

Only the Mathematics PLC explored third-order practical knowledge skills, project management abilities (KHiii). Inferential knowledge was necessary in this process. The practical knowledge required for this sort of project is complex and relies extensively on a range of propositional knowledge and the inferences that can be made from that knowledge. The PLC discussed curriculum mapping which involved seeing the whole curriculum and then breaking it up into smaller manageable units without losing sight of the bigger picture. To do this required second-order practical knowledge skills, transversal abilities (KHii), such as planning (the order of concepts to be taught), communicating (making the plan/curriculum document known to the implementers) and monitoring (checking to see whether the plan has been carried out and the correct pace has been maintained) and evaluating its success. Along the way, first-order practical knowledge skills, techniques (KHi) were also used to accomplish aspects of the project, for example, listing the concepts to be taught in a particular grade on chart paper.

The facilitator and teachers relied on their knowledge of mathematical concepts (for example, "patterns" and "functions") to make inferences about when concepts were actually introduced in simple form in the curriculum in lower grades and to point out the continuum between concepts. The Mathematics co-facilitator, Clara, presented a map of the Grade R-12 curriculum on large sheets of paper (the project plan). The teachers discussed how the teaching of the Mathematics curriculum across the grades was planned and managed. They focused on the Grade 8-12 part of it but realised how concepts such as "patterns", "fractions", and "BODMAS" were brought in at earlier grades but formalised in Grades 9 and 10. "Trigonometry", and "analytical geometry", for example, were not separate entities but built on "algebra" and "geometry and shapes". They evaluated how the concepts were introduced. Clara told the PLC about a conversation with her young son. He had to choose a number (an independent variable) and do something with it to get an answer. This related to functions which were formalised in grade 10:

> It's also for me interesting because with my son being in grade 4 now I'm seeing the beginnings of the development of where they're going to go with the Cartesian plane. So in grade 4, if you look in your document, they actually start with input output diagrams. So he came home the other day and he said, 'Oh Mom, I've got to do a spider diagram.' And I said to him, 'What are you doing with the spider diagram?' And he said, 'Well the body of the spider tells me to add 3 and the left leg I have to choose a number and the right leg I have to tell them what the answer is.' And he had to do a whole lot of these (obviously with different instructions in the body). And actually that's beginning of functions. That's the beginning of the idea of an input which we choose the independent variable, having an expression that tells you what to do and the output. And it was very interesting for me to chat to him to say, 'But why can't you choose the other way? Why can't I choose the right arm first?' And for him he doesn't understand that if it says plus 2 in the body, to choose the right arm means he's got to subtract 2. He obviously hasn't got to that stage yet. But very soon I think they're going to get there. (M3T/16/03/2011:36-46)

Clara emphasised the extent to which concepts were linked with one another:

> I think that it's important for us to realise that actually they've been doing this for a long time. So by the time they get to grade 10 they should be pretty proficient in functions or the idea of the function. But unfortunately that isn't the case. (M3T/16/03/2011:47-49)

The process of teaching the curriculum, bearing in mind the links that the curriculum map makes clear, entails use of transversal abilities such as planning: "Did you say you teach the inequality after?..." (M3T/16/03/2011:427), evaluating and monitoring progress as well as the application of techniques for teaching functions:

> So here's what I did, because I said to them, 'Ok, we'll go and colour our line. Ok? And now for bigger than it's got to be which side?' And we decide on a side. And they all get

> that this is the plus and this is the minus side. Ok. And then we'll colour (because they tend to like doing that). So we colour - for argument's sake for a plus and then they do the other for the minus … (M3T/16/03/2011:411-414)

Clara also evaluated how concepts have traditionally been presented:

> C: And what I think is very sad in the FET phase is that we teach it in sections. 'Let's teach patterns now.' We teach patterns. Ok, we're done with patterns. 'Let's teach functions now.' And we don't see the continuum between the two.
> A: And the kids don't see the continuum between the two, so when you say this, 'What does this link to?' …
> C: They don't make the link. And I think we as teachers are definitely at fault. (M3T/16/03/2011:91-97)

and proposed an alternative technique of linking the concept to the Cartesian plane:

> And I know this year I tried a different tack and last year I tried a different tack as well. Actually when we were doing algebra in grade 11 I started a different idea of well what is an equation? Why would I need to solve a quadratic equation? And we hadn't done the parabola yet at all, but I said to them, I said, 'Well you understand the Cartesian plane, so this is what we're actually doing. The equals zero is actually a y value. This is where it is in the Cartesian plane (because they'd done straight lines in grade 9 and grade 10, so I was able to actually put that all together for them). (M3T/16/03/2011:91-109)

The discussion continued as Clara gave further examples of how concepts were linked and the need to teach in such a way that the learners saw these links.[129]

From this example it can be seen that the more complex the practical knowledge (KHiii or even KHii) required for carrying out a teaching task, the greater the need is for extensive use of inferential knowledge which demonstrates underlying strong subject matter knowledge.[130]

Having looked at how various *types* of knowledge were evident in the work of PLCs, in the next section I examine the *domains* of content and practical knowledge on which the PLCs mainly focused.

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[129] We can then take the pattern section and work it out for them. Patterns – it's very simple. We've got a linear, an exponential and a quadratic. And what they need to see is the picture that corresponds to it because the questions are becoming more and more intertwined these days. A patterns question about I think it was 2 years ago asked them to prove that a, the um, I think the pattern mix sort of -2, 2, -2, -6 and it went on like that. And they had to prove that it would never give more than 2 or something. It was one of those. And it was a quadratic pattern. And the answers to that were shocking. The answers to that were shocking. What they didn't understand was that quadratic patterns had a picture. So it needed to actually be left with a turning point. So the minimum and the maximum value they have from there. And that comes from the equation that they get. So it was quite a… It was an interesting eye-opener for the, for certainly the marking section, to see that we hadn't actually taught it to the left (?). And the exams are becoming such that we actually need to interlink all of these. A patterns question will be asked in functions and a functions question will be asked in patterns. (M3T/16/03/2011:514-525)

[130] This was not demonstrated in the Geography PLC.

8.2.4 Learning units classified according to subject matter knowledge, practical knowledge and *domains*

In order to obtain a more detailed understanding of the knowledge-for-teaching that the PLCs focused on I further classified all the learning units according to knowledge *domains* (3.2.4). To illustrate these domains I refer to examples provided in Appendix 8.1. Figures 8.14 – 8.16 below show that of the 11% of the learning units in which the Geography PLC focused on subject matter knowledge 27% focused on *common content knowledge* (CCK), 37% on *specialised content knowledge* (SCK) and 36 % on *horizon content knowledge* (HCK).[131] The English PLC focused on subject matter knowledge in 7% of the learning units of which 16% was on *common content knowledge*, 67% on *specialised content knowledge*[132] and 17% on *horizon content knowledge*.[133] Of the Mathematics PLCs 5% of learning units focused on subject matter knowledge 20% was on *common content knowledge*,[134] 40% on *specialised content knowledge*[135] and 40% on *horizon content knowledge*. The majority of the subject matter knowledge learning units of all three PLCs focused particularly on *specialised content knowledge*.

Figure 8.14 Geography KT *domains*

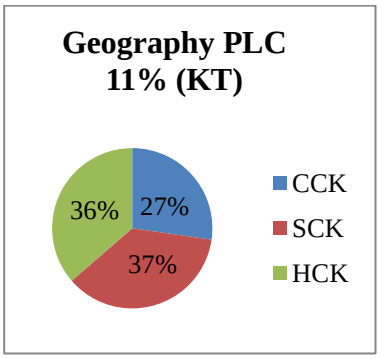


Figure 8.15 English KT *domains*

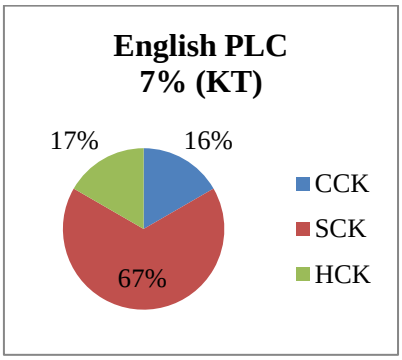
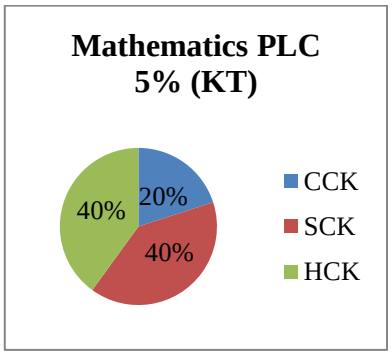


Figure 8.16 Mathematics KT *domains*



Figures 8.17 – 8.19 below show that the majority of the practical knowledge learning units of all three PLCs focused mainly on *knowledge of content and teaching* (KCT) (Geography – 76%, English 84%, and Mathematics – 68%). Examples of *knowledge of content and teaching subjects of discussion* include: how to teach the topic of a mid-

[131] Appendix 8.1, example 5.
[132] Appendix 8.1, example 3.
[133] Appendix 8.1, example 6.
[134] Appendix 8.1, example 1 and 2.
[135] Appendix 8.1, example 4.

latitude cyclone using cut out shapes;[136] how to advise learners what kinds of news articles would be suitable for their research project based on news articles; how to teach the concept of the earth's rotation around the sun;[137] how to teach learners methods for planning their essays based on visual prompts;[138] how to teach learners, using a process, to write in grammatically correct sentences;[139] a concrete way of remembering the difference between area and circumference.

Figure 8.17 Geography KH *domains*

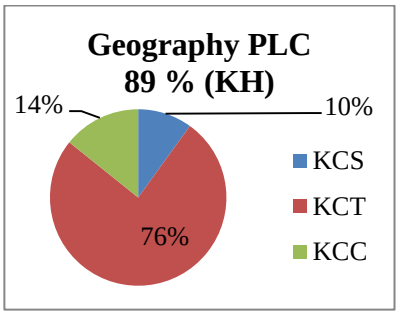


Figure 8.18 English KH *domains*

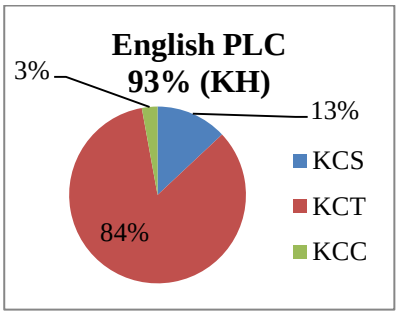
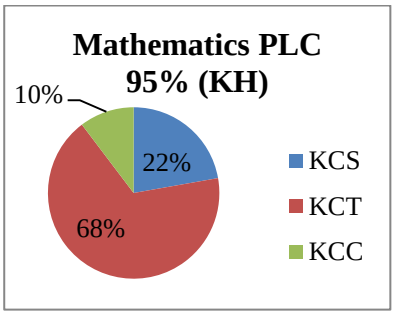


Figure 8.19 Mathematics KH *domains*



The Mathematics PLC focused more on *knowledge of content and students* (KCS) (22%) than the other PLCs (Geography – 10% and English – 13 %). In their coverage of *knowledge of content and students* the three PLCs examined learners' work and tried to understand their errors and difficulties, for example when the Mathematics PLC discussed learners' errors/misconceptions when working with exponents.[140] When the English and Geography PLCs worked this *domain* they did not explore the topic very deeply as envisaged by Ball et al. (2008). The English PLC, for example, discussed the types of errors learners made when choosing essay content, why they made them and then how to avoid them.[141]The *subjects of discussion* in the Mathematics PLC which involved examining learners' errors gave this PLC an opportunity to focus on *knowledge of content and students* more than the other PLCs.

The English PLC spent the least percentage of learning units on *knowledge of content and curriculum* (KCC) (3%) with Geography spending 14% on this and Mathematics 10%. Examples of *subjects of discussion* that focused on *knowledge of content and*

[136] Appendix 8.1, example 10.
[137] Appendix 8.1, example 9.
[138] Appendix 8.1, example 12.
[139] See the PLIC process in 8.3.1.2.
[140] Appendix 8.1 example 8, and the JLS process in 8.3.1.3.
[141] Appendix 8.1, example 7.

curriculum include the Geography and Mathematics PLCs discussing the implications of the imminent introduction of the CAPS, for example, a change in the order in which topics in the curriculum are taught.[142], [143] They also discussed examples provided in the CAPS and text books that would be helpful to support the curriculum. The English PLC was more concerned about the sequencing of content and learners' readiness to learn it.[144]

Figures 8.20 – 8.22 below show that all the PLCs only focused on knowledge of *content and students* using KHii indicating that a discussion of this *domain* required a number of practical abilities. Knowledge of *content and teaching* was dealt with at both KHi and KHii levels. The majority of learning units involving knowledge of *content and curriculum* used KHii, with only Mathematics using KHiii when participants dealt with the complex task of curriculum mapping.

Figure 8.20 Geography KH *domains* at three levels

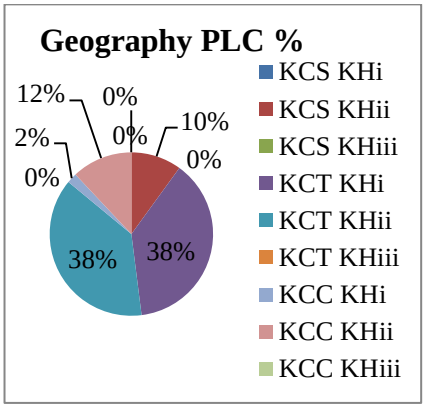


Figure 8.21 English KH *domains* at three levels

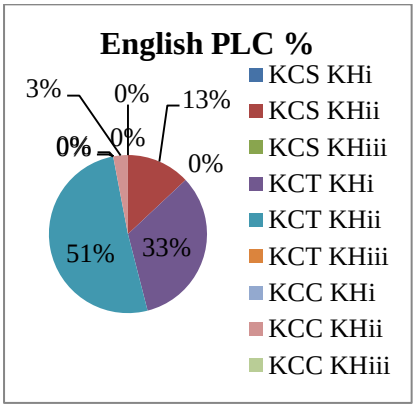
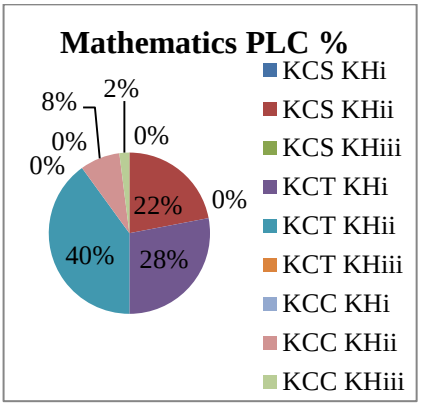


Figure 8.22 Mathematics KH *domains* at three levels



8.2.5 Summary

The Geography PLC focused more on subject matter knowledge than the other PLCs but used less inferential knowledge in their learning units. The facilitator provided most of the subject matter knowledge and inferential knowledge. This PLC also focused more on knowledge of techniques than the other PLCs. The English and Mathematics PLCs reflect a similar pattern of focus on subject matter knowledge and practical knowledge. The main difference between them is that only the Mathematics PLC focused on knowledge of project management (KHiii). The *domain* most PLCs focused on was *knowledge of content and teaching*. How the PLCs worked with this *domain differed* in the extent that they used inferential knowledge, the percentage of learning units that

[142] Appendix 8.1, example 13.
[143] Appendix 8.1, example 15.
[144] Appendix 8.1, example 14.

dealt with second- and third-order practical knowledge skills, and how the PLCs focused on *subjects of discussion* which I describe in 8.3.

Tables 8.1 – 8.2 below provide a summary of the spread of domains of knowledge focused on in the learning units. Table 8.3 provides a summary of the percentage of *domains* focused on across the three levels of practical knowledge.

Table 8.1 Summary of spread of KT *domains* of knowledge in the PLCs in %

KT *domains*	Geography %	English %	Mathematics %
KT - CCK	27	16	20
KT - SCK	37	67	40
KT - HCK	36	17	40

Table 8.2 Summary of spread of KH *domains* of knowledge in the PLCs in %

KH *domains*	Geography %	English %	Mathematics %
KH - KCS	10	13	22
KH - KCT	76	84	68
KH - KCC	14	3	10

Table 8.3 Summary of spread of KH *domains* of knowledge at three levels in the PLCs in %

KH at three levels - *domains*	Geography %	English %	Mathematics %
KCS - KHi	0	0	0
KCS - KHii	10	13	22
KCS - KHiii	0	0	0
KCT - KHi	38	33	28
KCT - KHii	38	51	40
KCT - KHiii	0	0	0
KCC - KHi	2	0	0
KCC - KHii	12	3	8
KCC - KHiii	0	0	2

This section has identified the percentage of PLC learning units that focused on the different *types* and *domains* of knowledge and has demonstrated that work in all three PLCs focused mainly on practical knowledge that dealt with *knowledge of content and teaching* and to a lesser extent *knowledge of content and students*. In the next section I describe HOW the PLCs focused on the various *types* and *domains* of knowledge.

8.3 LEARNING IN THE PLCS

The literature argues that collaboration is a key feature of functioning PLCs (Little, 1990; Katz & Earl, 2010; Stoll, 2011). The model of teacher professional development underpinning this study is that teachers, using a structured collaborative *enquiry process* involving reflection, analyse learners' learning needs and then formulate the learning focus for the PLC. Teachers engage in professional learning to acquire new knowledge and skills, try new instructional practices, evaluate their success and then begin the process again.

This section describes how the PLCs worked with the *types* and *domains* of knowledge using collaborative processes as well as other ways. It also evaluates briefly the role of reflection in each PLC's work and the extent of learning and support perceived by PLC participants. In this section I use percentage of time spent on the processes (calculated by using the approximate time spent on each learning unit (Appendix 4.5)) rather than percentage of learning units which reflects more accurately how the PLC used its time in the sessions as some learning units were one minute long and another 70 minutes long.

I classified the learning units according to whether the PLCs handled the knowledge focus using:

- *collaborative enquiry cycles*: PLCs learned new knowledge through structured processes such as Collaborative Analysis of Learners' Work (CALW) (adapted from Langer et al., 2003, in Katz et al., 2009, pp. 74-84), Professional Learning Inquiry Cycles (PLICs) (Timperley et al., 2008, in Katz et al., 2009, p. 71), and Japanese Lesson Study (JLS) (Lewis & Tsuchida, 1998; Cerbin & Kopp, 2006; Lewis & Hurd, 2011);[145]
- *collaborative discussion*: PLCs used unstructured discussion to share their knowledge to solve problems of practice and provide explanations for teaching dilemmas or learners' problems without following an *enquiry cycle* process, specifically without trying out their new learning and evaluating whether it was effective; or

[145] See 2.5.2.1 for a discussion on these processes.

- *other ways of working:*

  concrete apparatus/representations: a PLC participant suggested a technique for teaching a concept that involved using concrete apparatus or physical demonstration; *conceptual steps*: a PLC participant suggested a step-by-step process for teaching a concept; and *learning resources*: PLCs worked with resources to obtain content and practical knowledge but not as part of a collaborative process or discussion.

8.3.1 Collaborative ways of working in PLCs

An analysis of the learning units shows that participants in all three PLCs worked in a collaborative way in the majority of learning units. Figures 8.23 – 8.25 below indicate the percentage of PLC session time that each PLC spent on *collaborative processes* and the percentage on *other ways* of working. The English and Mathematics PLCs used *collaborative processes* extensively (100% and 88%, respectively) whereas the Geography PLC used these less (84%). Of the time spent using *collaborative processes* the English PLC used *enquiry cycles* 96% of the time with the Geography and Mathematics PLCs using them less (50% and 44%, respectively) and the balance of the time in each PLC was spent in *collaborative discussion*. The Geography PLC used *other ways* of working in 16% of units and the Mathematics PLC in 12%. The English PLC did not use *other ways*. From this it can be seen that PLC session time was mostly spent working collaboratively.

Figure 8.23 Ways of learning

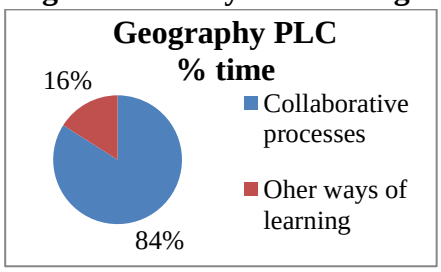


Figure 8.24 Ways of learning

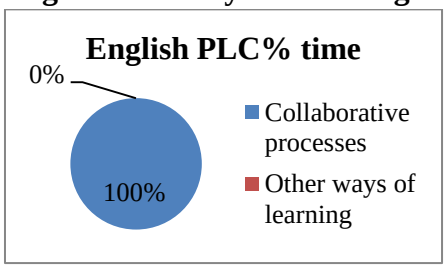
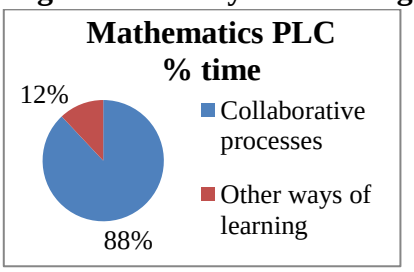


Figure 8.25 Ways of learning



The sections that follow show that each PLC worked collaboratively in different ways. Firstly, because the PLC model of this study envisages PLCs using *enquiry cycles* I describe how the Geography PLC used a CALW cycle, the English PLC a PLIC cycle and the Mathematics PLC a PLIC process that was very similar to the Japanese Lesson

Study model. Secondly, I provide examples of how the three PLCs used *collaborative discussion*.

8.3.1.1 Geography PLC

The Geography PLC used *enquiry cycles* 44% of the time. Participants completed two cycles over the sixteen sessions. I describe the CALW process the PLC engaged in over sessions 2 to 4 for a total of 89 minutes to identify why learners failed to demonstrate the required learning in their News Research projects (see Figure 8.26 for cycle stages). In these sessions the PLC did not focus exclusively on this *subject of discussion* but also briefly handled a number of other subjects. The learning target for this *enquiry cycle* was for teachers to learn how to teach the learners about the steps in the research process, effectively *knowledge of content and teaching* at the techniques level, so that the learners would be able to demonstrate the steps in their project (Stage 1). Teachers identified the errors that learners had made in this project in the previous year (Stage 2) and discussed briefly how they could help learners select an appropriate News Research idea. This discussion carried over to session 3 where they discussed how they would advise the learners to approach the project, including finding data sources, describing and analysing their findings and arriving at a conclusion (Stage 3). Learners were assigned the task (with teachers preparing the learners in the way that they had discussed) and asked to produce their rough drafts (Stage 4). In session 4 teachers examined samples of learners' drafts of their News Research Project. They identified samples of work where learners had demonstrated an understanding of the research process and discussed other learners' difficulties in interpreting the requirements of the project, such as how to choose an idea and how to find articles with Geography relevant content (Stages 5 and 6). At this point the collaboration decreased and the facilitator did much of the talking and advising. She proposed ways of teaching learners the necessary skills in earlier grades so they would be ready for this type of project in grade 12. When the teachers examined the learners' work in Stage 4, after they had learned new knowledge for teaching in Stages 3a and 3b, they worked with *knowledge of content and students* at the transversal abilities level. The process of evaluating learners' work involved transversal abilities and the use of inferential knowledge, a more complex practical ability than identifying the list of research steps (Stage 2). After completing Stage 6 the PLC intended to begin a second cycle which would start by looking at

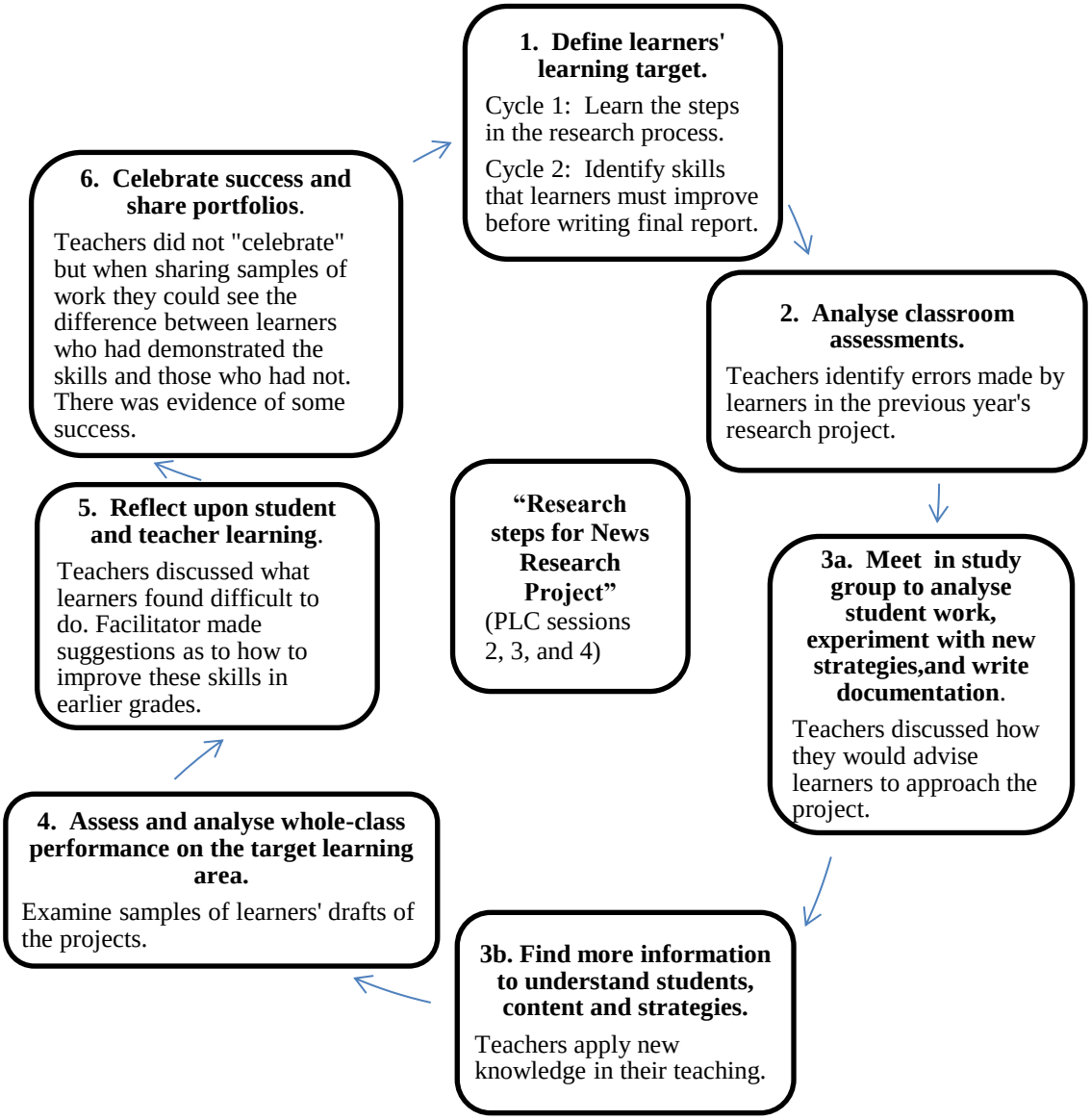
samples of work to identify skills that still needed to be improved before learners wrote the final report.

Geography PLC focused on their *subject of discussion* (Research steps for News Research Projects) in a less systematic and focused way than the other PLCs. In the three sessions (2-4) they averaged only 30 minutes learning enquiry conversation per session on the subject of the enquiry, whereas the other PLCs focused on the subject for the whole session, averaging 50 minutes per session in the English PLC and 59 minutes in the Mathematics PLC. The Geography teachers worked collaboratively but contributed less knowledge than the facilitator who spoke more and provided the subject matter knowledge and practical knowledge as well as inferential knowledge. The teachers contributed *knowledge of content and students* at a fairly superficial level. They discussed what they perceived were the reasons for their learners being unable to score well in the News Research Project.

The Geography PLC digressed and spent half the session time on other focus areas such as contextual matters which often led the facilitator to introduce new *subjects of discussion* unrelated to the subject of the enquiry process, for example, the use of alternative text books and sample tests.

I describe an example of the PLC engaged in a PLIC process in Appendix 8.2.1.

Figure 8.26 Geography PLC: CALW cycle for teaching research steps for the News Research Project (after Langer et al., 2003, p.13)



The Geography PLC used *collaborative discussion* for 34% of their time. The PLC's working with the topic of Global Information Systems (GIS) is an example of this. The facilitator provided most of the knowledge-for-teaching at the beginning of the learning unit which included a learning resource with definitions of the terms and diagrams which she referred to. The teachers engaged with this new knowledge (*common content knowledge* – GIS concepts; *specialised content knowledge* – examples of the concepts that learners can relate to; and practical *knowledge of content and teaching* – examples

of the use of GIS in practice) collaboratively to make it understandable for their learners. They realised that they could use knowledge by acquaintance to mediate the knowledge. The following excerpt shows how they worked together to do this.

G: And she said she'd jumped from there [Orlando cooling tower] and what it looked like. So I find that the easiest thing to do with them is to try and show them and link it to what they know and what they don't know, ok. Obviously grade 10's a bit easier.
MT2: You know, one other thing which I do when it comes to this section, I link it to, you know, James Bond films and all that. Like what happened with Osama, how they found him. So that if they see how important GIS is and how practical it can be, then the interest is…
G: That's actually a very good example.
MT2: Ja, ja. Like there's this film 'Enemy of the State' where they were able to trace a person on top of a building with a satellite and all that. So if you show them that it is possible, you know, and real people use real…
G: That it's current
MT2: Ja, they don't know that they're using GIS, but they actually use it.
G: Ja
MT2: And you know with the phones when they started they would tell you are in this area, you are in that area…
G: Oh yes
MT2: And, you know, link that to the cells and say look…. Ja.
G: Ok
MT2: So I find that that works. (G7T/01/06/2011:234-252)

When working in this manner, teachers did not try out their new knowledge and evaluate its effect on learners. There was also little opportunity for reflection.

8.3.1.2 English PLC

The English PLC's main way of working with knowledge was to investigate the best ways of teaching curriculum content topics using *enquiry cycles* (96% of their time). They completed four of them. I describe how they enquired into teaching "sentence structure" using the PLIC process which took the PLC 301 minutes over six consecutive sessions (1-5 and 7[146]) (Figure 8.27). The PLC focused almost exclusively on this *subject of discussion* in these sessions.

In session 2 the teachers briefly discussed the lists of aspects of essay writing that learners needed to write well and then they individually and collaboratively looked at the sample essays for evidence of which aspects needed attention (Stage 1). They identified the aspects of essay writing where learners demonstrated gaps or errors, for example, sentence structure errors, incorrect use of concord and tense, lack of planning,

[146] The English PLC did not meet on the session 6 day.

focus, coherence and flow of ideas, so that they could teach better (*knowledge of content and teaching*) rather than trying to understand why the learners made the mistakes (*knowledge of content and students*). The teachers' learning focus became clear. They realised that they had to teach these aspects more deliberately and more effectively (Stage 2). The PLC decided to focus on "sentence structure" and "tense" and agreed that they would bring ideas for teaching these to the next session. They focused on subject matter knowledge in the form of *common content knowledge* (for example, the grammar rules for a complete sentence that everyone has to know) and *specialised content knowledge* (what teachers specifically need to know because learners have difficulty with these aspects, for example, being able to differentiate clearly between finite verbs and participles, not joining clauses with commas) and *knowledge of content and teaching* in the form of techniques and transversal abilities): "So can we agree for next time that we will come with … We can come with as many ideas, but let's say two lessons on teaching sentence structure and two lessons on teaching tense" (E2T/23/02/2011: 632-635).

The first *enquiry cycle* focused on "sentence structure" and teachers agreed to gather knowledge on how to teach it from various sources. They used the knowledge and experience of the PLC members and two external resources, a chapter from the book, "*The Creative Teacher of Language*", by John Farrell, entitled: "Writing begins with a sentence" (EA1[147]) and a teaching poster Sam had seen in a colleague's classroom that taught sentence structure in steps by adding, for example, adjectives, clauses and phrases (*knowledge of content and teaching* – technique). Sam's suggestion of extending a sentence progressively to have more detail prompted Sal to raise her concern about long sentences, thus highlighting the need to teach learners when to end a sentence, in other words, define what makes a sentence, a sentence, and a paragraph, a paragraph (subject matter knowledge in the form of *common content knowledge* and *specialised content knowledge*, and practical knowledge in the form of *knowledge of content and teaching* at transversal abilities level):

> S: It's just… I think that's so nice. I like that. But my… I'm finding too that they, with sentence structure, their sentences are extremely long.
>
> …

[147] English Artefact 1 - see Appendix 8.3.2 for the artefacts used in this PLC.

S: Because it definitely, as you say, the idea becomes then eventually the paragraph, you know. So I think it's also important when looking at the sentence structure that you look at when to stop it.
F: Ja, so like one idea, finish. (E4T/13/04/2011:143-153)

The PLC used ideas from the book chapter (EA1) for the exercises (EA2-4) that they designed (PLIC Stage 2) (*specialised content knowledge* – aspects of sentence writing, including grammar rules that teachers emphasise such as grammatical connections between clauses and identifying where one thought ends and another begins; and *knowledge of content and teaching* – techniques, for example, how to write descriptively by observing carefully and describing what they see using vivid words, and transversal abilities, for example, planning what to include in the lesson and evaluating which aspects of sentence writing to focus on in each lesson.[148] They found that what the writer said helped them understand why the learners wrote as they did (*knowledge of content and students*).

Collaboratively and step-by-step, teachers designed two lessons for teaching sentences, including an exercise and a teaching note on the topic (EA2, EA3). They checked whether their exercise would help the learners avoid the errors of "sentence structure" that they had identified. They also discussed the kind of feedback they would give the learners once they had done the exercise (Stage 3). After designing the lessons teachers tried out their new ways of teaching "sentence structure" (Stage 4). Following this, in session 5, the teachers evaluated whether the lessons they had designed had worked (*knowledge of content and teaching*, transversal abilities level, with inferential knowledge) (Stage 5). Sal reported on how her learners had managed the task successfully: "The process I think is excellent" (E5T/04/05/2011: 13). She began to

[148] *[Reads from the book]* "Just as an athlete may need to do push-ups in preparation for playing football, so a writer may need to do verbal calisthenics in preparation for writing stories or essays. Ask each student to take a blank sheet of paper, have him look at the wall of the classroom, the pictures on the walls, the furniture, his fellow students, the world outside the windows and, if you feel bold, have him look at you. Have him observe. Really observe. Tell him not to look but to see. Have him see for the first time the colour of the walls, the location of the radiators, the shape of another student's nose, the size and colour of another person's eyes. Then a student tries in definite, not woolly terms, to describe on paper what he sees in a single sentence. The student tries to use vivid words, he tries to think of comparisons in order to convey exactly what he sees". And then other types of sentences. Ok, so there are 3 different exercises. That was the first one. And then here's a third one down here. "Write 1 or 2 or 5 or 10 descriptive sentences based on your own observation. Try to use colour words or sound words or feeling words or comparison in the sentences". Ok. And then he's got other types of sentences. Narrative sentences, rhetorical questions, exclamatory sentences, balance sentences. Ok, so he's spending quite a lot of time working with sentences and different kinds of sentences. (E5T/04/05/2011:312-3326)

understand learners' difficulties and realised that sentences did not have to be complicated in construction and detailed in content but should rather focus on one idea:

> So I started off with the animal one, you know, x is an animal. Yes, and they giggled a lot through it all, they thought it was quite funny. And then I got them to define this, from this group here. But immediately you picked up little, little issues that they battle because in their minds already they believe that they need to write, I found them, they think they must be very elaborate. It has to have a lot of detail. And they're weak writers so I think that's where, you know, they're also slipping up. Some of them would say (like if you look at some of these): A doctor is a human being. A doctor has a medical degree and assists the injured or the sickly. (E5T/04/05/2011:20-26)

Fred was interested in how Sal had instructed her class (*knowledge of content and teaching*, techniques level) because he felt his instructions had not been clear. He asked Sal to explain how she had instructed the learners. Fred and other PLC members realised that their instructions needed to be precise:

> What were your instructions, because I'm quite interested in that? What did you tell them that they had to do? Because remember we agreed that we weren't going to talk about sentence structure in any kind of parts of speech kind of way?
> …
> Because I, I found … I don't know if it was my instructions or what it was, but they … They, they weren't using sentences…. So while I was walking around I kind of, I noticed that. So I said to them again, 'Let me repeat my instruction. Write a sentence, ok. I want a sentence.' And some of them sort of re-wrote it or thought about it a bit more. (E5T/04/05/2011:38-73)

Teachers needed to know exactly what they wanted the learners to do. From their evaluation the teachers identified some of the learners' difficulties (EA6, EA7) (the PLIC began again with Stage 1, second cycle (EA5)). Following this, and after referring to the book chapter on sentence writing, they designed another lesson which would involve the learners in correction of errors in sentences. They identified which errors they would focus on and how they would teach the learners not to make them (Stage 2, second cycle (EA8)). They designed a "correction of sentences" exercise (Stage 3, second cycle) and gave it to their classes (Stage 4, second cycle).

In the final session on sentence writing (session 7) the teachers reflected on the whole process and the value of teaching sentence writing (Stage 5, second cycle) (*knowledge of content and teaching* – transversal abilities). They noted that learners needed to know relevant grammar terms and rules in order to do the exercise:

> Sam: They don't really realise that a sentence must have a subject … Otherwise it just does not make sense. And that's why they're putting these random things into their writing.
> …

F: And I think maybe that's where we go wrong, like saying – not wrong, but in like a formal grammar lesson we say it must have a subject and it must have a thing [predicate] and they see them as separate and they don't kind of get the idea that it's because it's a… it must have it because that's a complete thought. (E7T/01/06/2011:347-356)

They concluded the cycle by identifying two follow-up actions: identification of learners in need of remediation and implementation of the next stage of writing, namely writing expanded sentences of different types.

The English PLC focused on their first *subject of discussion* "sentence structure" in a sustained manner. The participants worked collaboratively, contributing practical knowledge consisting mostly of *knowledge of content and teaching* - techniques and transversal abilities, more or less equally. The facilitator provided *specialised content knowledge* when he introduced the teachers to a chapter in a book on how to teach sentence writing. The PLC facilitator and participants frequently used inferential knowledge in this process which helped them gain a deeper understanding of how to teach "sentence structure".

The English PLC also used the CALW enquiry process (Appendix 8.2.2).

The English PLC used *collaborative discussion* for only 4% of the time. For example, when the PLC discussed how teachers marked essays they worked in this way. The problem the PLC wanted to solve was that teachers did not have enough time to give learners many opportunities to write and receive feedback (*knowledge of content and teaching*):

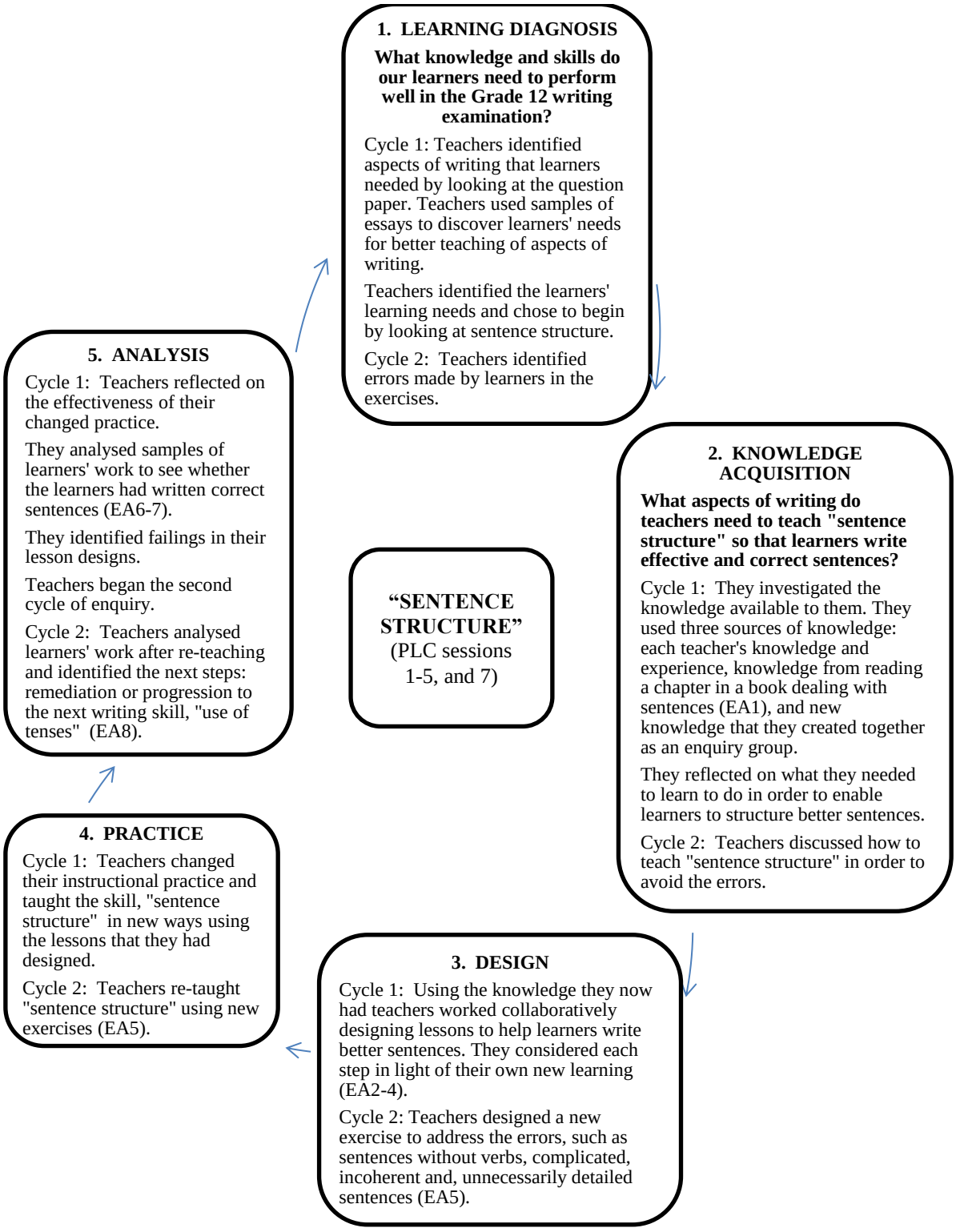
> Ja, because what we used to do, even though it took time, they used to write it as they've written it, then I mark it and then I return it back. I just underline, I don't write spelling or whatever, I don't write them the correct spelling. I just underline, underline, circle, underline. And then I take it back to them and say, 'Go and rewrite.' They must find out why I have underlined or why I have circled. And then they correct it … But it took time because you have many learners. (E2T/23/02/2011:336-345)

Fred, as a PLC participant, suggested that teachers use peer editing to help with this:

> You know the other way to get it is to try and get them to help each other which is a different, you know … They can't necessarily help with grammar but they can help with the ideas, you know, introductions and things like that … (E2T/23/02/2011:351-355)

This example of collaborating is not an *enquiry cycle* as the teachers did not try out these suggestions, evaluate their effectiveness, and design new strategies in response to what they discovered as they did when completing the structured cycles.

Figure 8.27 English PLC: Professional Learning Inquiry Cycle for teaching "sentence structure" (after Timperley et al., 2008, in Katz et al., 2009, p. 71)



8.3.1.3 Mathematics PLC

The Mathematics PLC spent 88% of their time on *collaborative processes.* This PLC only began to use an *enquiry cycle* from session 14 when they discussed how to teach "exponents" (44% of the PLC time). They focused on this *subject of discussion* exclusively for 472 minutes over 8 sessions using a process similar to Japanese Lesson Study (JLS) so I describe the process in terms of JLS (Figure 8.28). The process used a range of subject matter knowledge and practical knowledge, mostly related to *knowledge of content and teaching*, but some understanding of *knowledge of content and students* was covered, specifically the common misconceptions that are encountered on the topic, for example multiplying the exponent when it should not be multiplied or adding unlike terms:

> A: I think if we can come up with the idea of how to get that misconception of the times and divide versus the plus and minus through to them…
> C: It's 5x squared.
> A: … in different ways
> C: I purposely made the mistakes
> A: Purposely making mistakes, ja. And they also do this if it's $2x^2 \times 3x^3$ they do $6x^6$.
> C: Ja, and then the other problem we came was… because I then drummed into their head that we only add like terms but we don't add unlike terms was if you've got $2x^2 \times 3y^2$… um ja, there was $2x^2 \times 3y^2 \times 3 \times$ say $3x \times 2y$ ok, so then they'd multiply and get $6x^3$
> A: Yes
> C: Times 6y.
> A: Cubed.
> C: Cubed. And then they didn't want to multiply those because they are unlike. (M14T/25/01/2012:295-303)

The large number of PLC participants provided a wide range of knowledge for the group to use.

Teachers spent some time in session 14 identifying the topic of the lesson they were going to design collaboratively. They identified the goal/learning target from the curriculum and evidence from their practice that learners needed to understand "exponents" better. They asked themselves what exactly they expected the learners to do and what grade level they were targeting (JLS Stage 1, setting goals):

> C: In fact if we can come up with a way to teach exponents properly… so the first time round the kids get it for ever.
> T: That would be amazing. (M14T/25/01/2012:233-235).

The next stage was "planning the lesson" (JLS Stage 2) (sessions 15 and 16) during which teachers developed the lesson plan in detail (transversal abilities related to

knowledge of content and teaching). They identified the learning gap (what learners needed to know about "exponents") and the rationale for what they were planning to teach. They put the plan together by looking at curriculum requirements (knowledge of content and curriculum) and ideas from outside sources, such as the PowerPoint presentation (MA6) suggested by a teacher to introduce the topic, a technique related to *knowledge of content and teaching*. The PLC decided to watch it together and to evaluate whether it would contribute to achieving their lesson goal (transversal abilities related to *knowledge of content and teaching*):

> Ang: It takes exponents from like something you apply rules to like a concrete…
> …
> C: And I don't think the kids conceptualize this size
> T: And also how quickly things increase exponentially.
> C: Ja
> A: It gives a good perspective of how, you know, only up to like 10^{20}. (M15T/01/02/2012: 123; 136-139)

The PLC also discussed how they thought the learners would respond (*knowledge of content and students*) in order to make adjustments to the plan or in order to observe the learners as they did the activities. Through this engagement they broadened their perspective on teaching "exponents". To a limited degree at this stage they identified what they wanted an outsider to observe about how the learners were learning, and to try to understand how they were thinking.

As they progressed with the lesson design the teachers debated whether to give learners a definition or allow them to work it out for themselves based on prior learning. Clara made a suggestion based on research she had done, providing external subject matter knowledge and practical knowledge at transversal abilities level:

> C: Can I throw a spanner in the works? …
> C: Won't we instead of going… Ok, we have to give them the definition.
> A: Ja
> C: We have to give them the definition, but instead of doing that, start with the number 2 and multiply it by itself – it did form a pattern?
> G: Mmm
> C: They're very good at patterns; they have been doing patterns since ...
> G: Mmm
> C: So multiply it by itself and keep going. And there's the start here at 2. And so, ok, if I take 2 and multiply it by 2, I get 4. So if I take 2, it's just 2, right? Then I multiply it by itself, and I get 8. And I keep going, all right? And then maybe what we can do to conceptualize the understanding of this…
> …
> C: And when I was doing a bit of research, um this is one of the ways to explain to them, how 1 is actually 1. So it could be a way to get around the definition and to explain to them what it

is, I don't know. I've never tried it. I've never tried it so I don't know if it conceptually gets them the understanding. (M15T/01/02/2012:256-271; 287-290)

Part of planning in JLS involves teachers anticipating errors the learners might make (transversal abilities related to *knowledge of content and students*). The PLC did this as is shown in the following excerpt when they identified the error of multiplying the base by the power, and discussed ways of teaching to lessen the likelihood of this error being made:

C: 'Cause maths is essentially a language, and if you don't understand… Like if you read in French… if you read a French sentence and you don't know what's going on, I mean how can you answer the question? If you read a mathematical sentence and you don't understand what's going on, how can you answer the question? So it's also about getting the kids to read that 2^3 and 2×3 are two different instructions.
Some teachers: Mmm
C: And although they both mean multiplication, they mean multiplication in different ways.
Al: Ja, I think the best thing is to avoid using the example 2^2 because it confuses them, because if you say 2^2 they think you get 4, then you say 2×2 you get 4.
…
Ay: They must always know that. So that your… in a, in a situation whereby now there is a problem of 2^2, they will always have a problem if we avoid that one. They always need to know as to the exponent is telling how many times the base is supposed to be multiplied by itself.
Ci: By itself.
Ay: We don't multiply by our exponent, but we repeat the base, we multiply the base by itself…
A: I think using this example is detrimental for us rather than the kids because we can't tell whether they actually know what's going on or whether they are making a mistake and getting the right answer by looking. So I think you're right. I don't think we should avoid any… like particularly any examples, but I think that for us this is a problem, not for the kids. (M15T/01/02/2012:1002-1010; 1053-1061)

The third stage of JLS "conducting the research lesson" began in session 17. Ang taught the lesson using the worksheets (MA7A, MA7B) that the group had co-designed and was videoed while doing this.[149] She reflected on the lesson and the problems she and the learners had experienced with the instructions for the worksheets, the timing of the lesson, and the extent to which she felt the learners had learned what was intended.

This was similar to the first step of the JLS debriefing after the teachers had watched the research lesson. Unlike in the JLS model, teachers did not observe the live lesson but watched the video (MA8) of it in session 18 using a guide sheet for observations (MA9). In session 19 the debriefing continued with teachers discussing their

[149] Videoing of lessons was not intended as part of this case study but was part of the NLC Project (1.4.4) which continued beyond the sessions which form part of this study. They are reported on here for the sake of presenting a complete picture.

observations of the learners' thinking and learning in the lesson. From these observations teachers suggested changes to be made before the next person, Aya, taught the revised lesson. This was the fourth stage of JLS: "revising and re-teaching". Aya was also videoed (MA10) and teachers repeated the process of observation (session 20) and debriefing (session 21). The PLC completed the JLS research lesson cycle Stage 5: "reflecting and sharing results". One of their findings for sharing, for example, was that trying to save time by not showing the "exponents PowerPoint" was probably more time-consuming in the end. All of these activities involved subject matter knowledge and practical knowledge at techniques and transversal abilities level, with inferential knowledge, primarily focused on *knowledge of content and teaching* and *knowledge of content and students*. Figure A8.3 in Appendix 8.2.3 depicts this collaborative process in the form of a PLIC process.

Once the Mathematics PLC decided to focus on "exponents" they focused on this *subject of discussion* exclusively and intensively without diversions to other subjects. They used eight sessions to achieve their learning goal, namely: well-designed lesson plans for teaching "exponents" that they hoped would enable the teachers to teach "exponents" so that learners understood and would not make the errors that the teachers had encountered previously in learners' work on this concept. The PLC worked collaboratively with teachers engaging in the learning conversation and contributing knowledge of different *types* and *domains*.[150] Some explained the theory that needed to be taught (*common content knowledge* and *specialised content knowledge*); others contributed practical knowledge in the form of a technique[151], for example, a PowerPoint to illustrate exponential growth (*knowledge of content and teaching*). A number of teachers contributed inferential knowledge especially in sessions 14 and 15 when the PLC discussed how to teach the concept and began designing the lesson and when they reflected on the first videoed lesson. Two teachers volunteered to be videoed teaching the lesson so that the PLC could observe the learners' working and thinking processes and thus gain practical *knowledge of content and students* which helped the

[150] Some teachers contributed more than others based largely on their confidence and knowledge.
[151] The technique of using a PowerPoint was to help learners conceptualise the exponential difference in size (how big) between 10^{1} and 10^{10}, the former is 10 and the latter 10 000 000 000 and the difference (how small) between 10^{-1} and 10^{-10}, where the former is 0,1 and the latter 0,000 000,0001 by showing images to represent these different exponents.

PLC redesign the lesson to be more effective. When the PLC planned their lesson and evaluated their lesson design they used transversal abilities related to *knowledge of content and students*, *knowledge of content and teaching* and *knowledge of content and curriculum*.

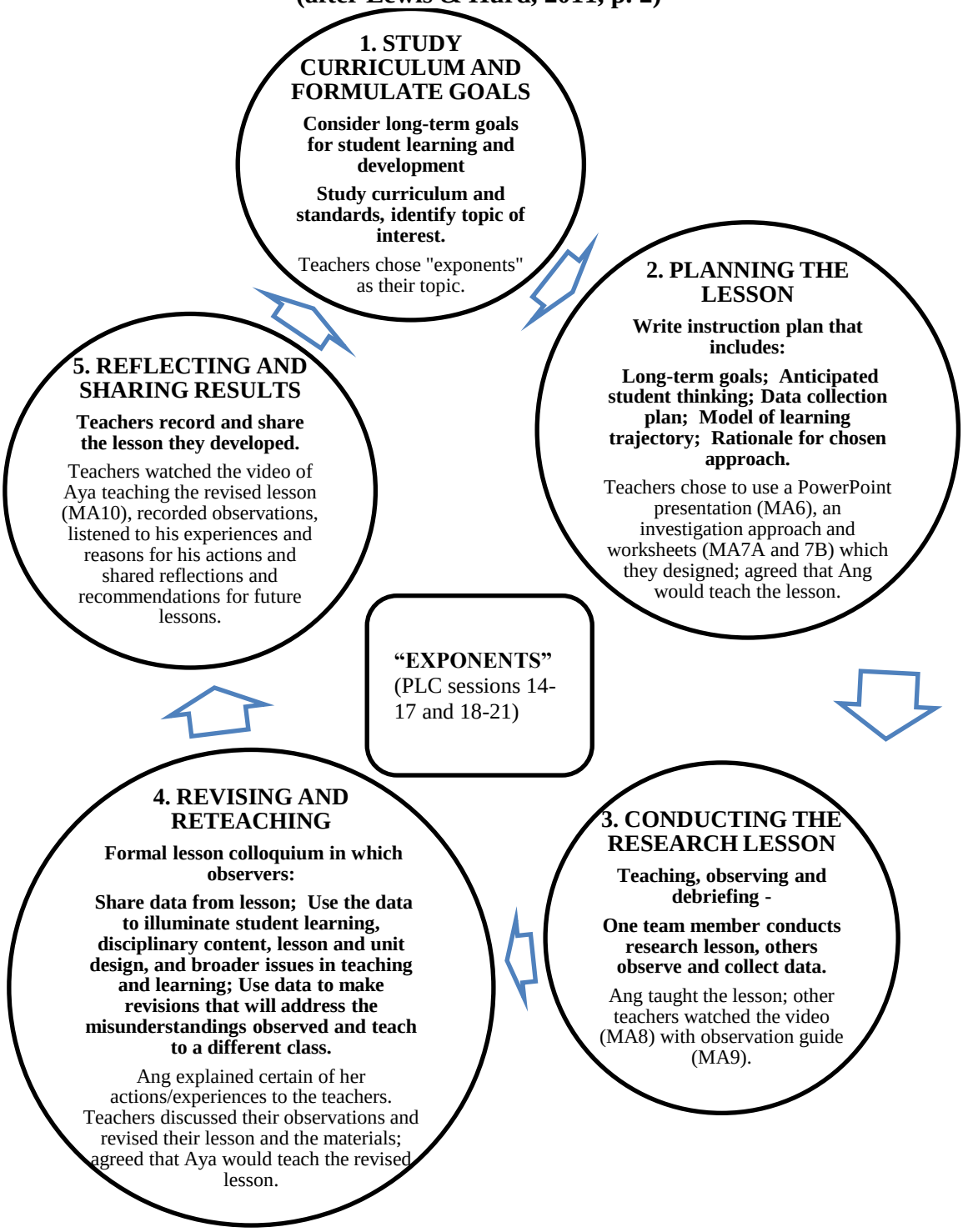
The Mathematics PLC used *collaborative discussion* in the first year of the project (44% of the time). Their learning focused on errors learners made in their answers to a multiple choice Mathematics skills test (MA3[152]). The conversation involved problem-solving discussion or explanation on discrete subjects of discussion rather than following a systematic and structured enquiry process (10 sessions). The following description of teachers' learning about working with word problems is representative of how the Mathematics PLC worked collaboratively on many *subjects of discussion*.

The Mathematic PLC began their learning by reading a journal article on the value of errors in teaching Mathematics: "Exploring Mathematics through the Analysis of Errors" by Raffaella Borassi (MA1A) and discussing questions related to it in order to gain a better understanding of how looking at errors could provide teachers with the type of knowledge that would enable them to re-think their teaching of concepts and change their teaching practices. Teachers realised they needed to restructure learners' knowledge in cases where they were thinking erroneously, for example, when working with fractions, but they did not necessarily know how to do this. One teacher expressed this concern: "Ok, well that's where I would battle. I wouldn't know how to?" (M2T/23/02/2011: 114).

In the sessions that followed, this PLC spent time trying to work out the reasons for learners' wrong answers in response to the test questions and they discussed how they could "restructure the knowledge".

[152] Mathematics artefact 1 - see Appendix 8.3.3 for artefacts used in this PLC.

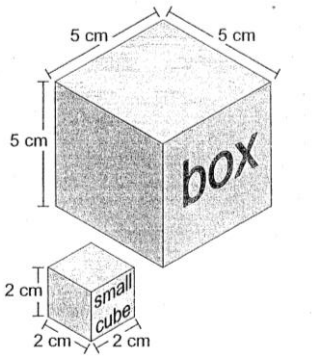
Figure 8.28 Mathematics PLC: Japanese Lesson Study Cycle on "exponents" (after Lewis & Hurd, 2011, p. 2)



In the following example teachers learn practical knowledge from one another. When the PLC examined learners' answers to question 10[153] they realised that some participants had difficulty themselves with the question and were not surprised that the learners did not answer it correctly (only 29% did). Viv did what many learners did: she used the formula for calculating volume and divided the volume of one box into the total volume and arrived at 15. This was incorrect because she failed to take note of what the questions asked, namely that the boxes had to be kept whole. Teachers who used the picture (a concrete representation) and simple calculations involving dimensions such as length, breadth and height calculated of the small and large box, arrived at the correct answer. These discussions helped teachers learn *knowledge of content and students* – in this case understanding students' errors resulting from not reading a question precisely, and *knowledge of content and teaching* - how to teach the concept of volume both mathematically[154] using relevant formulae and operations and concretely by looking at the problem presented visually and applying logic and calculations.

A: So it's 8. I worked it out the volume way as well and I got 15
V: Ja, but I didn't take that into account at all.
A: Ja, but it says 'wholly'.
V: Ja, no I didn't even look at the size whether it fitted. I just looked at the volume. So there's basically um…
N: [speaks very softly] So you divide the volume by the ?

[153] Question 10 Khalid has a box and a number of small cubes



What is the largest number of small cubes he can fit wholly within his box?
(A) 16; (B) 15; (C) 8; (D) 6;

[154] For example by writing out the problem and using mathematical operations:
Let # small cubes per length be x
$x = 5 \div 2 = 2{,}5$ but $x \in N \therefore x = 2$
Let # small cubes per breadth be y
$y = 5 \div 2 = 2{,}5$ but $y \in N \therefore y = 2$
Let small cubes per height be a
$a = 5 \div 2 = 2{,}5$ but $a \in N \therefore a = 2$
Total # of small cubes = $axy = 2^3 = 8$ Answer (C)

V: … space that's left.
A: So if you divide the volume by the volume you're not taking into account the fact that you'll have to break up the cubes
V: … you'll have to break up one of the small boxes to fit into the spaces.
A: [drawing on the board] So here I can only fit half a cube because it's only a little…ug, sies, my drawing is horrible!
V: Ja, you can't fit a whole through
A: Anyway, it can only be 1 cm by 2 cms. So I have to break it up. But it says I have to fit them in as a whole.
C: So…
A: So I'm pretty sure that kids did not do so well on this one.
V: Well if we didn't get it then… (M9T/24/08/2011:295-325)

The teachers worked with subject matter knowledge (*common content knowledge* – the formula for calculating volume, and *specialised content knowledge* – understanding the formula in a manner that only a teacher needs, knowing aspects of it that would trouble learners, for example, substituting numbers into the formula) and with practical knowledge (techniques and transversal abilities related to *knowledge of content and students* – for example, ways of getting learners to identify the important words in a question so that they answer what is asked and do not miss the key point of the question [the boxes must fit wholly in the large box] and *knowledge of content and teaching* – techniques to calculate volume using a mathematical formula[155] and techniques to calculate by using drawings, doing it visually and concretely) to understand the mathematics as well as learners' misconceptions and other mathematical difficulties. The following excerpts show how teachers tried to understand why the learners answered as they did. At the same time they also reflected on their own thinking:

N: Maybe they didn't care about the statement of the question. (M9T/24/08/2011:335)

W: So what concept would be lacking there for somebody to use the volume and how can you assist a learner that way because the learner is looking at the box ? (M9T/24/08/2011:350-351)

…
V: Well the fact is that I made the same mistake, so what concept am I lacking? I'm using maths; I'm not looking at the picture…
A: Ja

[155] For example:
Let the number of friends be x
Let the number of strawberries be y
$y > 5$
$xy + 5 = 40$
$xy + 35$
$\therefore x = 5$ and $y = 7$ or $x = 7$ and $y = 5$
But $y > 5$
$\therefore y = 7$ and $x = 5$
$\therefore$ Alice has 5 friends – answer (D).

V: … whereas those kids were looking at the picture and seeing, 'Ah, that's 2 cms across, I can only fit two.' I mean I think they looked at it physically and didn't even do the maths. If you'd asked them the question like 'How many volumes of leaves?' or whatever, I wonder how many would have got it right, you know, because they would have had to divide the one volume by the other volume? (M9T/24/08/2011:351-363)

A: So I think that that shows that our kids tend to look at things as pictures
V: Concrete
A: More concrete stuff. So the more concrete stuff they will actually do ok on. M9T/24/08/2011:371-376)

A teacher's admission that he could not answer the question: "Actually I failed to understand the question. It's now that I understood it whilst you were doing it" is used to help teachers understand learners' difficulties. The facilitator asked: "What was it that was so difficult, because maybe that's something that the kids also didn't …" (M9T/24/08/2011:487-491). From this interaction teachers realised that the language of the questions could hinder learners who actually knew the mathematics.

In session 11 Clara asked the PLC to look at test question 20[156] because she said she would work out the answer by using the possible answers given in the question rather than by using an equation. She explained how she would do it. The teachers identified a teaching problem, namely: teaching learners how to answer a mathematical problem given in words. The PLC looked at the questions and the percentage of learners who gave each answer and a "no response". As they did this they surmised what the learners were thinking, including identifying their not reading the question properly and struggling with two unknowns (learners needed to be able to write out the problem mathematically[157] - a technique related to *knowledge of content and teaching* and transversal abilities related to *knowledge of content and students* and knowledge related to *knowledge of content and teaching*).

[156] Question 20 - Alice had 40 strawberries to share.
She gave each of her friends the same number of strawberries and had five left over for herself. Alice had fewer strawberries than each of her friends. How many friends did Alice share strawberries with? (A) 8; (B) 7; (C) 6; (D) 5.

[157] For example:
Let the number of friends be x
Let the number of strawberries be y
$y > 5$
$xy + 5 = 40$
$xy + 35$
.. $x = 5$ and $y = 7$ or $x = 7$ and $y = 5$
But $y > 5$
.. $y = 7$ and $x = 5$
.. Alice has 5 friends – answer (D).

The teachers tried to understand learners' and their own thinking, especially how they failed to read the question properly and answer correctly. They referred to another word problem in the test, question 33,[158] to illustrate some of the difficulties. Viv pointed out that in her step-by-step plan for teaching word problems the last step is to check that the question that had been asked has been answered:

A: Which is why when I was doing word problems with my kids I said to them make what you're looking for x
C: Ja. Ja
A: But it doesn't always work out so nicely like that.
V: No, in my step plan with word problems the last step is always 'Answer the question.' The last step in trigonometry and like 2D and 3D, 'Answer the question'. And they think I'm stupid when I say that, but I say no, but go back and read what it says. Sometimes you can't make what you are looking for equal to x. (M11T/21/09/2011:654-660)

The PLC continued the discussion of why learners found word problems difficult: "They hate word problems. They hate word problems so much. Um, ja, word problems are a huge problem. Why do you think that is though?" (M11T/21/09/2011:697-698). Some teachers identified the possibility of it being a language problem:

Al: Isn't it the language issue again?
A: Do you think? But even kids who have first language…
V: I, I, I battle with… The only time I started understanding word problems was when I was a teacher and I started teaching it. (M11T/21/09/2011:701-704)

To assist learners Viv reiterated her belief in a step-by-step plan for answering word problems which she said would not solve all problems but which did provide a tool for learners to approach the questions. Viv suggested a practical knowledge technique but did not expand on it and the PLC did not try it out:

V: I still think teaching the learners a few types of word problems and how to tackle them, even if it's in types set up a table, or whatever the story is, just gives them a tool to deal with other, other types, to warn them.
A: No, I agree
V: It's not always going to work, but it just sort of sets you up and gives you some form of tool. (M11T/21/09/2011:753-757)

The main difference between the use of *enquiry cycles* and *collaborative discussion* is that when the PLC followed a cycle teachers tried out their new knowledge and then

[158] Question 33 - A space station has three robots that make repairs. The Marp robot can make 12 repairs in 10 minutes. The Orti robot can make 10 repairs in 8 minutes. The Eddi robot can make 8 repairs in 6 minutes. The space station needs 100 repairs. Approximately how long will it take the three robots working together to complete the 100 repairs? (A) 27 minutes; (B) 34 minutes; (C) 41 minutes; (D) 83 minutes.

had an opportunity to reflect on its impact on learners' learning and, depending on what they concluded, to make further adjustments to their lessons and practice.

8.3.2 Other ways of working with knowledge in the PLCs

The Geography PLC worked with knowledge in ways that did not involve collaboration 16% of the time and Mathematics for 12%. The English did not use *other ways*. As the facilitators usually led the discussion or presented the ideas when they worked in *other ways* I describe how they did so in chapter 6 which deals with facilitation.

8.3.3 Perceptions of learning and support in the PLCs

In this study there is no empirical evidence of teachers' learning. Evidence is inferred from teachers' statements and contributions to the PLCs. Several of these are included in this section.

In the Geography PLC Eve said in session 2 that she had tried teaching mid-latitude cyclones using the teaching aid they made in the PLC in session 1 and that: "It worked very … nicely" (a technique related to knowledge of content and teaching) (G2T/23/02/2011:608-610).

JC's reflection indicated that PLC participation had the effect of improving his morale and confidence because he learned subject matter knowledge and how to teach it (content and practical knowledge). It also indicated that he had expectations of learning something valuable from each session which motivated his on-going attendance:

> I am happy because as of today I will teach all types of oblique photographs as I was given the simplest way of understanding it but still the monster is still coming that is the GIS. As you have noticed I have never missed a single workshop. This shows clearly that I benefit from these workshops. Hooray I wish this could last forever. (JC/GR/04/05/2011)

Bal's experience is similar and, in addition, he encourages colleagues to attend so they too can benefit:

> Today we did touch the vertical exaggeration and [I] am happy because it is the topic that always gave me problems. I can now freely, without fear explain how we go about explaining it which is why I always tell my other colleagues the importance of attending the NLC[159].
> (Bal/GR/19/09/12)

[159] The participants refer to their PLC as NLC as their attendance at the subject PLC sessions is seen as participation in the NLC.

There appear to have been significant learning opportunities for most participants. The facilitator learned about other teachers' contexts and teaching challenges rather than knowledge-for teaching Geography. The participants reported learning new knowledge that had an impact on them personally and in their classroom practice: "Because every time I attend NLC, I go back a better educator than when I left for the NLC" (Selby/G/TQ2). The learning may not have happened in a very structured and systematic manner as participants jumped from one topic to another and then returned to it in a later session (see The Geography "Learning Tree", Figure 7.4). However, there was coherence for the teachers because the content of the session's learning was determined by the needs identified in relation to their own knowledge or from their analysis of learners' work. When they returned to a topic it was to complete their understanding or obtain another perspective on it. Throughout the sessions teachers reported feeling supported in their learning and knowledge acquisition: "(Speaking of the facilitator) ... she was always on hand to assist where we had some challenges, and believe you me, she was … very resourceful" (Oupa/G/Q2).

In the English PLC teachers' regular participation suggests that they found the sessions meaningful. When asked in an interview whether he had learnt anything from the PLC sessions, Fred said that from the PLC processes he had learned to be more open about his teaching, to admit weaknesses, and to listen to other people's ideas:

> And just even stating the obvious is important because … you know you come across other ideas as well you know, so to just think about it and strip it apart and … And I think also part of that was being willing to talk about weaknesses in one's teaching, you know. And then you suddenly see that another teacher has also got the same weaknesses, or, you know, they are worried about the same kind of things is also useful. (Fred/Lake/I/28/09/2011)

When asked whether it had changed the way he taught in the classroom he responded that it had made him more conscious of his actions and forced him to think about what he did:

> Yes, it certainly made me think about it. But it has made me think about how important this whole sentence thing is and to think how we can incorporate it in the grade 8 syllabus… So it is moving me to think about how we can change, or if not change, at least maybe emphasise certain aspects more … (Fred/Lake/I/28/09/2011)

Sal also spoke about becoming more aware of her practices after trying one of the exercises the PLC had designed:

> … but like we looked at sentence structure – that was really exciting. And immediately one saw when we came back to school and did the exercise and saw the impact on the kind of sentences they write … For me it made me aware of the fact that it's something we take for granted … so that was very good. (Sal/Ivy/I/28/10/2011)

She also appreciated the value of designing lessons, trying them out and seeing their impact:

> The exciting part of the process has been using the planned activity/lesson and seeing positive results. (Sal/Ivy/I/09/11/2011).

Sam found the processes involved in PLIC/CALW helpful, for example those regarding the impact of a lesson on learners:

> The session today was very helpful: we read extracts from a teacher's work on sentence analysis … The items Sal brought were also interesting to analyse and the next task will be helpful. (Sam/ER/07/09/2011)

From the excerpt below we can infer teachers' learning: the exercise the PLC designed collaboratively and then used with the class has had the desired learning outcome. After examining samples of the learners' work they said:

> Sam: So ja, I think some of them got the idea
> F + S: Ja
> Sam: And did it quite nicely. (E8T/27/07/2011:546-549)

Sam provided a further two samples, including her weakest learner's effort, and both learners demonstrated that they had grasped the idea of tense and managed to use it correctly.

From Sam's experience of previous sessions she anticipated learning in the PLC how to teach topics she found difficult to teach:

> I enjoyed today's session. I feel that we were able to thrash out some difficult teaching issues efficiently and in a non-threatening environment. Issues such as tone, intention, style etc. are difficult to teach even after years of experience. Collaboration should assist in improving this. (Sam/ER/14/03/12)

Sal's experience of learning was sufficiently worthwhile for her to share it with colleagues at her school:

> The discussions at the NLC have been very good and I have shared this with English teachers at school. In some cases they have used the exercises in class and we have discussed the outcomes. (Sal/ER/09/11/2011)

In the following excerpt Juno describes the learning benefits she experienced through participation in the PLC and she speaks particularly about support and mentorship:

> I am so sad that this is the last NLC! [for the year] I have enjoyed the interaction in our group. I feel that I have benefited from the support and mentorship I have received and I have come away with new strategies that I am excited to use in practice. (Juno/ER/31/10/12)

There did not seem to be many occasions where teachers shifted their beliefs (personal knowledge/"ontological commitments" (Desforges, 1995, in Bertram, 2011, p. 9) (see 3.2.1) to accommodate the new knowledge, except perhaps a realisation that they could make learning easier for their learners by creating visual aids quite cheaply, like using a sweet potato to teach contours and land formations. To some extent they may have shifted their belief that they could not teach well because they did not have resources. This learning happened as a result of working collaboratively, mindful of the contexts of the teachers concerned. Bal initially believed that only experts could create learning and assessment materials until he joined the Geography PLC and worked with his colleagues to produce notes for learners and to set examinations (Bal/Field/I/03/02/2012).

One belief that was challenged through this collaborative process was the belief that mother tongue learners learned their home language naturally (through daily use from infancy and copying the adult speakers in their lives) and therefore explicit teaching of a topic such as tense usage was redundant. Through doing the exercises on tense and identifying usage errors teachers experienced the need for and the effectiveness of specific teaching of tense (and other skills) even to mother tongue speakers. Another belief was that most learners did not plan their writing or if they showed a plan it had often been constructed after the event. Teachers believed that the learners preferred writing spontaneously. While this might be true for some learners, teachers discovered, through their learning about how to teach essay planning, that learners did not plan properly because they did not have the knowledge and skills to do so, not because they refused to. Learners did not know how to use a plan effectively. Some learners struggled to take ideas from a plan, order them, and develop them in a structured way. The revelation for the teachers was that learners were not unwilling to plan; they just could not see how the plan would help them.

The Mathematics teachers' reported in their reflection journals that they learned subject matter knowledge and ways to teach it:

> I have struggled with the concept of raising a base to zero, but using patterns to help learners see that $2^0 = 1$, for example, is very clever. I feel challenged to interrogate my own understanding of exponents. (Taz/MR/01/02/12)

> The idea of coming up with a number pattern to introduce the concept of exponential form was brilliant and it enriched my other methods I already had of introducing the concept. (Russ/M/R/01/02/12)

> I liked the higher order questions that link aspects from different sections such as the one that links patterns and functions. I now have a better idea of how to link these sections in my own teaching. (Taz/MR/22/08/12)

Teachers reported some changes in their practice as a result of looking at learners' errors and understanding the importance of knowledge of content and students:

> After marking an exercise I record all the common mistakes and highlight them to the learners and yes, it helps them, as they appreciate they could have scored higher if they hadn't committed the errors. (Russ/MR/23/02/2011)

> It has changed my way of presenting any topic to learners; it has also helped me to understand my learners better, so that helps me to accommodate them for their better understanding …, even translating English statements into mathematical symbols. (Aya/MR/24/08/2011)

> I've changed by giving them easier strategy and connecting some relevant topics like topic of functions where you need to connect linear and quadratic. … in all there has been a lot of change after spending time with discussion group. (Sasa/MR/24/08/2011).

There was, however, no way of knowing the impact of the teachers' "learning". They reported they had learned and made changes in their practice. Anecdotally this seems to be supported as teachers shared informally with the facilitator what they had done and how their learners had responded. From the discussions it can be inferred that teachers felt supported because they were prepared to share their teaching difficulties and anticipated a supportive and helpful response from colleagues who shared their knowledge.

8.3.4 Summary of PLCs' learning activities

From teachers' feedback it is clear that the Geography PLC focused on subject matter knowledge and practical knowledge, especially *knowledge of content and teaching*. Even when dealing with general curriculum issues teachers' learning focused on how to teach topics in the curriculum which they felt lacked relevance to their learners. When teachers focused on assessment the learning was directed at subject matter knowledge such as understanding Bloom's Taxonomy as well as how to use this practically when setting tests and examinations. They were given five resource artefacts as supplementary learning material (GA3, GA4, GA9, GA11, GA12), practised using five

visual aid artefacts (GA1, GA2, GA5, GA8, GA9), and collaboratively developed three artefacts for teaching (GA4, GA6 and GA10). They also spent time learning from their analysis of learners' work samples (projects and cross-sections GA7).

Mab sums up briefly what teachers in the Geography PLC believed the benefits of participation in the PLC would be for other teachers: "… improve subject matter knowledge of the subject, know more teaching methodologies/strategies" (Mab/G/TQ1).

The English PLC appears to have functioned efficiently, to have worked at a reasonable pace and to have been productive. As the group was usually small, everyone was able to have his or her say and make regular contributions, contributing his or her subject matter knowledge and practical knowledge. Teachers seemed to have been fully engaged in the work. They discussed in considerable depth the requirements of each topic they enquired into as well as the challenges of teaching them. They worked with four resources (EA1, EA14, EA18, EA19). They created their own teaching and learning materials (EA2 –EA5, EA9, EA11, EA13, EA15, EA17, EA18), tried them out with their classes and then analysed samples of work to ascertain whether their changed approach/practice had had any effect on the quality of work (EA6A, EA6B, EA7, EA8, EA10, EA12).

Learning appears to have happened in a reflective and collaborative manner as envisaged in the model of TPD used in this study. The extent of new knowledge created was limited; knowledge learned was more of a practical nature, mostly *knowledge of content and teaching*, that enabled teachers to change their practice to be more effective for helping learners to demonstrate necessary knowledge and skills.

In the Mathematics PLC the majority of the new knowledge came from the teachers sharing their subject matter knowledge (mainly *common content knowledge* and *specialised content knowledge*) and their practical knowledge (all *domains*) in the discussions on the eighteen topics. Some teachers' personal knowledge shifted as a result of the influence of new subject matter knowledge and practical knowledge. Teachers learned from fellow participants who made their practical knowledge explicit in the course of collaborative processes. They did not obtain new or deep knowledge in

a systematic manner. Being able to use the new practical knowledge did not require a deep understanding of the subject. From time-to-time Clara, who had deep content, inferential and practical knowledge, did try to show relationships between topics so that teachers could see the links and teach with them in mind.

Learning in the earlier Mathematics PLC sessions was limited by the range of subjects of discussion that arose as the teachers analysed learners' erroneous responses to questions. It was not systematic but rather shallow and spontaneous with respect to what subject matter knowledge and practical knowledge teachers chose to share with the PLC. They did not summarise the types of learning errors for later use or create any artefacts. The main benefit would appear to have been sharing *specialised content knowledge*, some inferential knowledge, practical knowledge (all *domains*) but mostly at the first and second levels, and exposing teachers' beliefs for critical review. However, from session 14 the learning was undertaken systematically using a defined enquiry process.

The PLC used five externally produced artefacts (MA1A, MA2, MA3, MA5, MA6), collaboratively created three of their own (MA4A, MA7A, MA7B), and used five created by the facilitator, learners, and individual teachers (MA1B, MA4B, MA8, MA9, MA10

8.4 COMPARISON OF THE PLCS

In Table 8.4 below I present a brief comparison of the three PLCs.

Table 8.4 Comparison of PLCs

	Factor	Geography	English	Mathematics
1	Knowledge *types*	KT (11%); KH (89%);	KT (7%); KH (93%);	KT (5%); KH (95%);
1	% of inferential knowledge (IK) in learning units	KT - 50% with IK; KHi – 39% with IK KHii – 27% with IK	KT - 75% with IK; KHi – 43% with IK KHii – 47% with IK	KT - 60% with IK; KHi –43% with IK KHii –57% with IK KHiii – 100% with IK
3	% of knowledge *domains* in learning units	KT mostly SCK (37%) KH mostly KCT (76%);	KT mostly SCK (67%) KH mostly KCT (84%);	KT equally SCK and HCK (40%) KH mostly KCT (68%);
4	*Curriculum*	Five topics;	Four topics;	Eighteen topics;

	Factor	Geography	English	Mathematics
	content topics covered			
5	Average number of *subjects of discussion* per session to infer depth/detail of coverage	3.1; Map work and climatology were covered in greater detail and with more teacher participation but the approach was not systematic until after session 10.	2.2; All topics except the interpretation of an unseen poem were done systematically and in considerable depth.	4.0; The first seventeen topics were covered very superficially and only in relation to the errors seen in learners' answers on the tests questions. The last one, "exponents", was done in considerable depth and at the conclusion of the case study sessions they were still busy and, in fact, spent a further four sessions on the topic (moving into a form of Japanese lesson study).
6	Learning intention	To learn how to teach certain topics more effectively and to create the appropriate supporting learning and teaching materials, including visual aids; to deepen their KT – CCK and SCK as well as the relevant KH – mostly KCT; Some teachers learned what they did not know before, others learned new mediation strategies. The learning in most cases was for the teacher as well as for the learner.	To learn how to teach certain foundational knowledge and skills more deliberately and effectively and how to assess their effectiveness (KH – mostly KCT)	To learn more about how learners think in Mathematics and about how errors can reveal learners' faulty thinking and misunderstanding of topics mostly KH (KCS) but also some KT (CCK and SCK); To learn how to create a series of effective lessons on "exponents" and assess their effectiveness KT – CCK and SCK and KH – KCT)
7	Predominant ways of working with knowledge (% of learning units)	*Collaborative discussion* (40%), followed by *collaborative enquiry cycles* (44%) and *other ways* (16%)	*Collaborative enquiry cycles* (96%) followed by *collaborative discussion* (4%) and *other ways* (0%)	*Collaborative enquiry cycles* (44%) followed by collaborative discussion (44%) and other ways (12%)
8	Design of new teaching resources	The PLC created a note on map work calculations and cross-sections as well as most of the questions for two examination papers.	Teachers designed lessons and accompanying learning materials for teaching "sentence structure", "tense", "essay planning" and "interpretation of visual essay prompts". They discussed the lessons for interpreting visual texts and unseen poetry but did not produce written materials, teachers took their own notes.	The PLC designed the lessons on "exponents" and the accompanying learning materials, including the introductory discovery worksheet.

8.5 SUMMARY

All three PLCs focused mainly on practical knowledge at all levels and on subject matter knowledge in an incidental manner. Inferential knowledge was used more in units that dealt with subject matter knowledge and practical knowledge at the second and third levels (transversal abilities and project management abilities). All *domains* were covered in the PLC learning activities but the *domain* most focused on was *knowledge of content and teaching*. The PLCs that used samples of learners' work in their collaborative discussion or enquiry cycles also focused on *knowledge of content and students*. PLCs with knowledgeable teachers were able to participate actively and confidently in the learning process, contributing knowledge. These teachers were able to use their inferential knowledge, based on sound subject matter knowledge, to help them create new knowledge in the form, for example, of new instructional practices. When the PLCs worked in a structured manner using *enquiry cycles* the learning focus tended to be sustained and the *subjects of discussion* were dealt with in greater depth than when the PLCs discussed collaboratively or used other ways of learning.

8.6 CONCLUSION

In this final data presentation chapter I have described what knowledge-for-teaching the PLCs focused on and how they worked with this knowledge. In the following chapter I answer the research question by discussing claims derived from the findings in relation to claims in the literature.

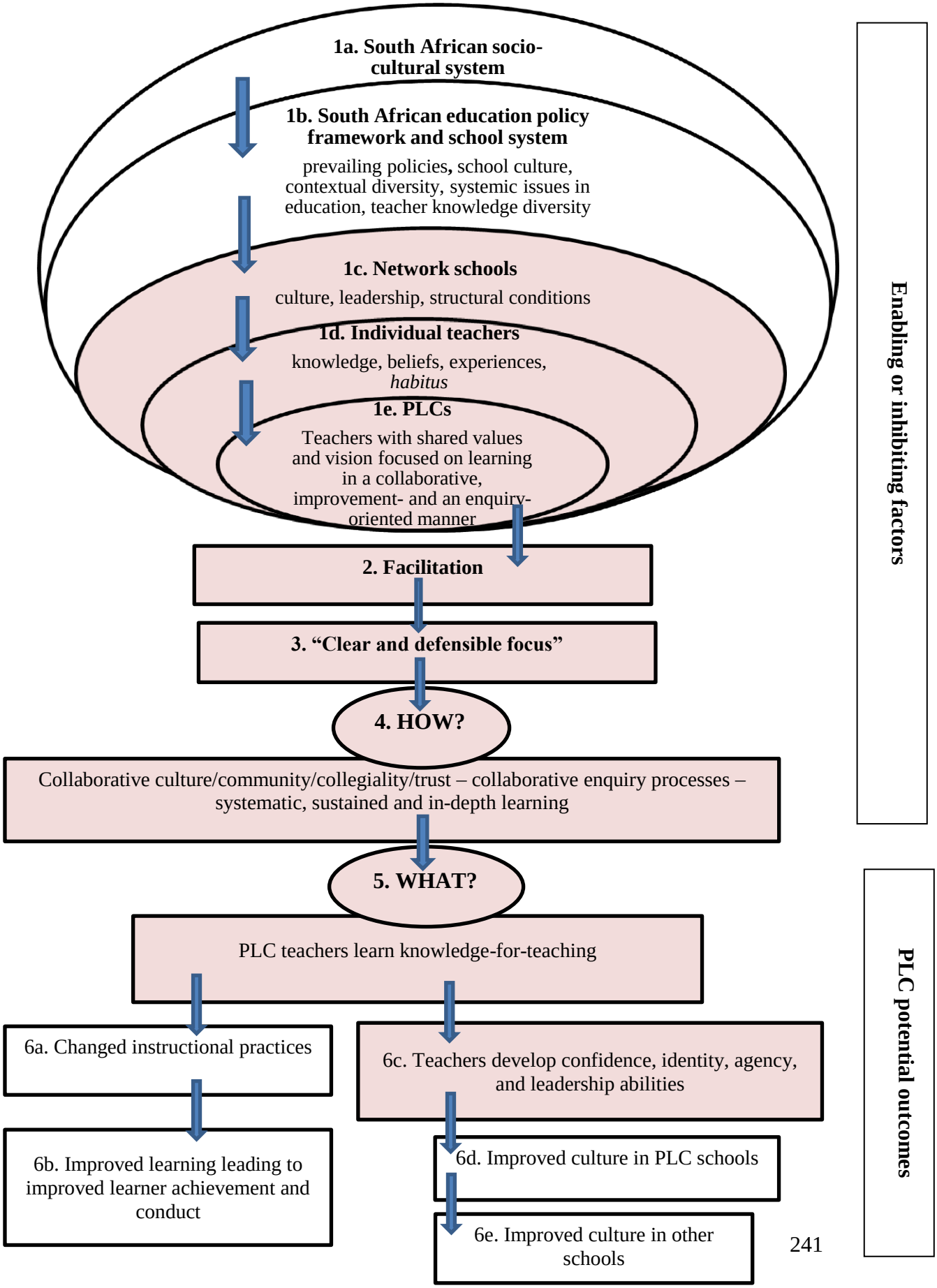
CHAPTER 9 DISCUSSION OF FINDINGS

9.1 INTRODUCTION

This chapter seeks to answer the main research question of this study: **What and how did teachers learn in three professional learning communities?** This is done through discussion of the findings of the sub-research questions and claims arising from them. The chapter concludes with a discussion of the main research question in the context of whether PLCs have the potential to be effective for teachers in South Africa learning knowledge-for teaching.

Chapters 5-8 presented findings which answered the sub-research questions at a descriptive level. From these findings I constructed a Framework for Learning in PLCs (see Figure 9.1) which I use to discuss the findings of the sub-research questions and to respond to the main research question. I constructed this Framework as I analysed the data gathered in response to the questions and in doing so it became apparent that it would not be possible to answer the first part of the main research question about *what* teachers learned in the three PLCs before the conditions that enable or inhibit learning in PLCs had been identified and understood. It also emerged that *how* teachers learned in PLCs, the second part of the main research question, was also an enabling or inhibiting factor and impacted on *what* was learned. The Framework firstly identifies the enabling or inhibiting factors and then secondly the potential outcomes of learning in a PLC. The shaded factors are those that the study has explored, the findings of which were described in chapters 5-8 and which will be discussed in this chapter. The unshaded factors were referred to by participants in the study but were not specifically investigated and evidence for these has not been provided. Using the Framework (Figure 9.1) I discuss what this study found about each enabling factor in relation to what is claimed in the literature.

Figure 9.1 Framework for Learning in PLCs



Two issues were not emphasised in the literature but emerged from the study. The first was the central role that teachers' knowledge played in each factor that enabled or inhibited learning in PLCs. Teachers' knowledge impacted on what the PLCs chose to focus on, which approach and style the facilitator used, how the PLCs worked in their sessions, and what knowledge the PLC worked with. The second, and related issue, was the diverse range of knowledge, experience, beliefs and expectations evident in each PLC. Teachers were located in diverse contextual situations, and diverse school cultures resulting in a diverse range of needs that PLCs needed to address. I discuss the impact of these two issues as I discuss each enabling factor and identify the assumptions made in the literature as a result of not taking these issues into account.

9.2 FACTORS ENABLING AND INHIBITING LEARNING IN PLCS

This section responds to the first sub-research question: **What factors enabled or inhibited the work of three PLCs?** Four factors were identified: school-level and teacher-related factors operating in the PLCs (factors1c-1e, Figure 9.1), facilitation (factor 2), choice of focus (factor 3), and *how* the PLC worked with knowledge (factor 4).

9.2.1 School-level and teacher-related factors

The teachers in the PLCs are located in schools (factor 1c, Figure 9.1) which have been impacted upon in diverse ways by the South African socio-cultural system, including its historical legacy, (factor 1a), and the South African education policy framework and school system, past and present, (factor 1b). The teachers have been influenced by these factors in different ways and these factors, amongst others, have influenced the knowledge, beliefs and experiences of the individual teachers in the PLCs (factor1d). Although factors 1a and 1b were not researched in this study their impact was evident in the diversity of school contextual backgrounds from which the teachers came and in teachers' different levels of knowledge, confidence and self-agency. In this study I have identified conditions at the schools where the participants taught and the *habitus*[160] of

[160] Although I use Bourdieu's term to sum up "a *way of being, a habitual state … a predisposition, tendency, propensity or inclination*" of teachers (Maton, 2008, p. 51) which is "structured" by past and present circumstances and "structuring" in the sense that habitus influences present and future practices, *habitus* is not a concept specifically explored in the study. The structure comprises a "system of dispositions which generate perceptions, appreciations and practices" (Maton, 2008, p.51, citing Bourdieu, 1990c, p. 53).

the participants in the PLCs and have reflected on how these enabled or inhibited the work of three PLCs. This factor is discussed in two claims arising from data presented in chapter 5 and in relation to sections 2.3.1 and 2.4.4.2-2.4.5.3 of the literature review.

9.2.1.1 Claim 1:

Supportive school leadership, a school culture of trust and collaboration, and allocation of sufficient time for PLC related activities are key enabling conditions for PLC work.

The literature offers a range of positions on the enabling influence of formal school leaders. One view (Chappuis et al., 2009; Earl & Katz 2010; McLaughlin & Talbert, 2010; Hord, 2010b) recognises the centrality of the principal in establishing a school culture that is supportive of PLC work and in providing the necessary time and resources to enable PLCs to function well. For example, Hargreaves (2007, p. 189), citing Spillane (2006) is emphatic that: "[S]uccessful and sustainable PLCs hinge on having an outstanding and supportive school principal at the helm". Other authors state that school leaders must give up their belief in their 'omnicompetence' (Carmichael, 1993, p. 393, in Hord, 1997b, p. 2) and become fellow learners rather than see themselves as having a leadership role. For proponents of this view authority in PLCs rests not in the power of position but in "shared ideas" (Sergiovanni, 1994b, p. 214, in Hord, 1997b, p. 2). In this study the practices of principals were similar to those described by Hargreaves and Spillane (see 5.3.1). Principals enabled PLC participation by promoting the benefits of attending, making time for teachers to report back on their PLC activities, role-modelling attendance by participating in the principals' PLC, and organising transport for their teachers. Principals played an important part in motivating participation and creating the conditions that support PLC work, which are discussed below. However, it was the HOD rather than the principal who appeared to have the most influence on teachers' participation in PLCs. Of significance is the finding that in a school with an unsupportive HOD, and/or unsupportive culture and/or union activism which discouraged participation in school-related activities after 15:00, the principal was not able to motivate participation in PLCs despite being enthusiastic him/herself and being a regular attender at the principals' PLC. The findings of this study suggest

that in South African schools the absence of support from the formal leaders of a school, particularly at the HOD level, inhibited teachers' participation in PLC work.

Another school-level condition that was found to enable PLC work is a school culture of trust and collaboration (see 5.3.2.1). Much of the PLC and TPD literature foregrounds the enabling influence of a collegial school culture that promotes trust, openness, sharing, teamwork and collaboration amongst teachers and that is supportive of teachers' learning (Little, 1999; Stoll & Louis, 2007; Smith et al., 2009). When the teachers in the PLCs were asked what advice they would give to the DBE as it began to initiate PLCs nationwide in terms of the ISPFTED, they identified a number of issues. Amongst these were the need to address the lack of trust amongst colleagues in schools, fear of or disrespect for school management, and competitiveness (as a result of IQMS scoring and other teacher awards that reward individuals rather than schools and teams within schools). Teachers also identified colleagues' unwillingness to share what they learn in other contexts such as workshops, and especially the refusal to open up their classroom and instructional practices to scrutiny by others.

The final school-level factor identified as enabling PLC work concerns time allocated to PLC-related activities. The literature (Chappuis et al., 2009; Smith et al., 2009) emphasises the importance of the school designating time specifically for PLC work. Time for doing this work is a very significant enabler and the lack of it is a significant inhibiting factor. A finding from this study is that teachers' participation in PLCs was inhibited if too many competing demands were placed on them, including those made by the department of education. Both the literature (e.g. McLaughlin & Talbert, 2010) and the participants in the study warn of the inhibiting effect of simultaneous externally imposed initiatives that divide teachers' attention and demand more time than they have available or are willing to give. Requiring teachers to be involved in multiple support or school improvement programmes at the same time distracts teachers from their PLC work and disrupts attendance and participation. Lack of time to work together was the cause of the greatest frustration amongst teachers who had, in all other respects, a supportive school culture and who were willing to learn. PLC participants were particularly grateful to school leaders who protected PLC time from external pressures such as unplanned meetings.

Teachers found it enabling when there was dedicated time for reporting back on what was learned in the networked PLCs, for example, formal subject meetings which, in effect and given more structure, could become school-based PLCs. They also found that the extra classes for learners after school that were built into the school timetable enabled them to use new knowledge learned in the PLCs, as time during school hours was insufficient both to keep up with the prescribed work schedules and to use new strategies learned in the PLCs.

This claim has dealt with school-level factors impacting on PLC functioning. In the next claim I focus on the impact of teacher-related factors.

9.2.1.2 Claim 2:

PLC work is enabled when teachers understand that collaborative learning in PLCs requires commitment, active participation involving contributing knowledge and experience and working collegially, and an improvement- and an enquiry-oriented mindset.

As teachers are the key role players in PLCs it stands to reason that PLC functioning will be impacted upon by teachers' ability to adopt the participative learning characteristics required. Learning in PLCs is dependent on teachers contributing their social, emotional, and intellectual knowledge and skills and other personal qualities in a collaboration aimed at acquiring knowledge and skills that can lead to new instructional practices for the benefit of the learners (McLaughlin & Talbert, 2007). Teachers who demonstrate willingness to participate collaboratively enable PLC work (Katz et al., 2009 pp. 44-46). This discussion focuses on three characteristics of collaborative participation: voluntary commitment to the PLC, active participation in a context of genuine collegiality, and an improvement- and an enquiry-oriented mindset.

The first enabling characteristic of collaborative learning, commitment, is demonstrated in teachers' voluntary participation in PLCs. Much literature stresses the importance of participation being voluntary and not an add-on imposed obligation (e.g. Chappuis et al., 2009, p. 59; Hargreaves, 2007, p. 183). Failure to recognise the importance of voluntary participation could result in "corrupted communities" and "mandated teams" or at worst "instruments of technocratic surveillance and oppression turning school staffrooms into Asperger's' factories" (Hargreaves, 2007, p. 184). PLC work is enabled when teachers recognise for themselves the need for improvement and want to

participate in activities for that purpose. They join groups of like-minded colleagues (Grossman & Wineburg, 2000, p. 47), are prepared to give up time to do the professional work necessary (Smith et al., 2009, p. 23), and even feel that they are part of something special (Parker, 1997, p. 7, in Lieberman & Grolnick, 1999, p. 293). Such teachers believe that continuous learning is part of their professional responsibility and that learning requires them to pursue areas of development they have identified for themselves and which might entail giving more time than they were previously accustomed to doing when attending workshops was the main source of their development (Chappuis et al., 2009, p. 57). Commitment to a PLC entails attending meetings regularly and punctually, contributing in the sessions, doing follow-up work between sessions if required, and generally adhering to the norms of conduct agreed to by participants.

Teachers in this study showed their commitment by attending voluntarily – a core group of them consistently for the three years of the project. Most of them arrived punctually but some were constrained by factors such as school closing time and the distance they had to travel to the host school. Teachers attended because they wanted to learn in order to improve the performance of their learners: "There are learners whose work/writing has dramatically changed and I believe it is because of the NLC [the teacher's learning in the English PLC]" (Matsie /P/Q1). They wanted to learn relevant knowledge that would make them more effective teachers: "I am always at the NLC because I like the skills and method of how we discussed the content" (Selby/G/Q1). Commitment was demonstrated further by their participation in the PLC sessions, some more actively than others.

A second enabling characteristic of collaborative learning in a PLC is active participation which entails teachers sharing their professional knowledge, opening up their classroom and instructional practices, and exposing them to scrutiny such as permitting the video-recording or observation of their teaching, providing samples of their work or their learners' work for analysis, trying out new ideas with classes and reporting on the experiences, sharing knowledge, and contributing to discussion (Hord, 1997; Kilpatrick et al., 2003; Chappuis et al., 2009). Participants need to understand that this exposure is not for evaluative purposes but for sharing and learning that can,

through debate, discussion and feedback, lead to improving practices (Hord, 1997a, 23, 24). Obtaining active participation is essential because there are no accountability measures in place other than group accountability. Although the expectations of participants in the study were explained to them, these were not always understood or fulfilled.

Active participation is an enabler of learning but for teachers to have the confidence to participate in the ways described above there needs to be genuine collegiality in the PLC. Confidence also depends on teachers' knowledge which I discuss further below. Genuine collegiality (community) is not easy to accomplish. It depends on teachers working together willingly and productively because they see the value of doing so. The members of the community respect and care for one another and have established trusting and honest relationships that result in their being prepared to risk exposing their practice and to engaging with one another in a truly collegial manner (Stoll, 2011, p. 106). Bolam et al., (2005, p. 89) add to these qualities the readiness of members of the community to support one another while not necessarily having friendships with or even liking one another. The literature alerts us to the potential for "contrived collegiality" when collaborative practices are implemented for the purposes of others , including accountability pressures (Hargreaves, 1994, pp. 195-196; Datnow, 2011), or "pseudocommunity" (Grossman et al, 2001, pp. 20-22) when the 'illusion of consensus" is maintained because participants are afraid to challenge others or ask for clarification for fear of introducing conflict, thus restricting conversations to generalities rather than critical and probing discussion which can lead to new insights and new knowledge. Exploring how to create the collegial relationships that enable teachers to participate in PLCs in helpful ways is therefore a key issue.

Teachers joined the PLCs in this study to meet their own needs and not those imposed by others. They worked together willingly and developed collegiality slowly over time but probably did not achieve overall the level of trust in all the PLCs necessary for the robust engagement that assists learning. Some PLC members of the Mathematics and English PLCs could engage with some colleagues in a challenging way but, sensing their insecurity, they did not speak in the same way to other colleagues. For example, in the following excerpt everyone politely approves of a suggested technique:

V: But once you know how to do it, then it's easy.
A: Ja. No, that's quite cool because they do struggle with this conversion. Ok, anymore comments about question 1 or questions or… Alph, you happy?
Al: I'm happy. It's a very novel way of doing it.
A: Ja. It's quite a nice way, quite a nice way of doing it. (M6T/11/05/2011: 261-265)

On the other hand in the excerpt that follows teachers debate suggestions, although not robustly, in order to reach a conclusion which will produce the best worksheet design for the learners:

A: I wonder if the layout… What do you think if we put equals signs? Do you think…
V: Um, what if we put questions after the first page?
A: Um, these questions?
V: Well, maybe simpler questions which will force them to connect the two, you know like…
A: For example?
V: Write 3 to the minus 2 as a fraction. Or how would you put it? You know, so that they should write the answer as 1 over 9? Or even as 1 over… No, but then they would probably do 1 over 3 times 3.
A: Ja, maybe.
V: Some question that forces them to notice the link.
T1: The link
Ang: Unless you just like, I don't know, if maybe like shading, or not? Like shading and then leaving open, then shading and leaving open. (M14T/14/03/2012:98-110)

Bryk & Schneider (2002) assert that "Relational trust" within the community is a precursor to collaborative practices because teachers develop confidence to participate if there is sufficient trust and respect to allow for differences of opinion (Lieberman & Grolnick, 1996, in Katz & Earl, 2010, p. 30). This is important for PLC learning because without confidence teachers may be unable to participate in the "intensive interaction that engages in opening up their beliefs and practices to investigation and debate" (Katz & Earl, 2010, p. 30) which is necessary for collaborative learning.

This study found that teachers' active participation was influenced by their confidence or lack of it and that confident and knowledgeable teachers contributed more ideas to the PLC than other participants. If teachers lack confidence they are unlikely to participate fully in the community which results in, "unequal participation" (Grossman et al., 2001) where some participants have more turns than others. This is what happened in the Geography PLC when the facilitators dominated the turns and in the Mathematics PLC when the knowledgeable and confident teachers sometimes conversed amongst themselves leaving other participants outside the conversation, lost in terms of understanding and learning and even alienated from the community:

"Sometimes I feel like my partners indulge in discussions that are concerning them too long, because they are from the same area, and have the same challenges and I'm just an outcast" (Nomsa, M/TQ2).

Developing confidence is a complex matter because not only does it depend on the knowledge that teachers bring to the PLC but also on whether the teachers trust their PLC colleagues sufficiently to be willing to share. While teachers gave a high score, in the evaluation of the PLC facilitation questionnaire, to the item "the level of trust and respect shown in the group", two of the facilitators rated this quality slightly lower.[161] The PLC with the lowest rating was the Geography PLC which struggled the most to achieve the type of collaboration envisaged in the literature. Overall, my impression from listening to the audio-recordings of the PLC sessions was that the level of trust in this community that would enable honest and rigorous learning conversations had not been developed sufficiently. There was great respect and over time trust amongst participants grew but I sensed the sensitivity that participants exercised in order not to upset the precariously established relationship and this sensitivity may have restricted their freedom to challenge and probe ideas. Participants appeared to grow in confidence and willingness to engage more robustly as the project progressed, indicating that trust and respect can be developed as PLCs work together. In the following excerpt Will challenges Clara's technique (measuring) for answering a question. After his challenge she concedes that her technique would not have worked. This type of exchange became frequent in the Mathematics and English PLCs:

> Will: Ja, I wanted to follow the argument of measuring. Are we saying in the context of the pictures we see here, or we are saying in general terms, because… because if you say… For me, I'm thinking that in the context of the pictures I see here I think that is very clear. But in general terms what if, what if I decide, as an examiner, when I'm putting the distractors that the length should equally be the same for A B C D but the structure picture should stay the same.
> C: Then I would have got it wrong using measurement … (M7T/01/06/2011:448-455)

This confirms Bolam et al.'s (2005) findings that mutual trust, respect and support, key characteristics of effective PLCs, can be developed over time (pp. iii, 138-139).

[161] Teachers' rating on a scale of 1(low) – 5 (high) with facilitators' scores in brackets: Geography – 4.7 (3.5); English – 4.7 (4); Mathematics – 5 (5).

Teachers in this study initially experienced active participation as uncomfortable and challenging because it was unlike many of their previous TPD experiences where they passively received information and then left without having any responsibilities to do follow-up work. The Geography PLC managed least well in obtaining active participation. Over the entire study period, teacher participation was limited to sharing of knowledge and asking questions with only two teachers bringing samples of work to the sessions. This limited participation was probably a result of teachers' lack of confidence in their knowledge and experience. Teachers' contributions increased in the later stages of the study but the sharing of samples of work and more active exposure of their practice did not happen. Their opportunity for learning would have been substantially curtailed had the facilitator not contributed samples of work and other resources for the *collaborative processes*. However, because their own work samples were not the object of scrutiny the learning is likely to have been remote and not both individual and collective as envisaged in the PLC literature (Mc Laughlin & Talbert, 2010, p. 35; Stoll, 2011, p. 106). The participants were not aware of their limited participation because in their responses to the questionnaire items "The amount of collaboration (working together on activities) that happened in the group" and "The extent to which group members took collective responsibility for the activities in the PLC" they gave a score of 4.3 (out of 5) for both items while the facilitator rated these items at 3 and 2.5.

The English and Mathematics PLCs managed to obtain active engagement in the sessions more readily because of the confidence and knowledge levels of the participants. The English PLC required participants to do follow-up work after most sessions which the participants usually did. They brought practical ideas for teaching, samples of work, their analysis of their experiences using the lessons designed in the PLC sessions, and resources. Less was required of the Mathematics participants: because there was sufficient contribution from some participants others did manage to avoid doing any follow-up work and only participated in sessions. The contributions of some participants were excellent models for their fellow participants, for example, practical ideas for teaching, explanations of concepts, and video-recorded lessons for discussion. Teachers' contributions were missing from the Geography PLC. Despite the participants' commitment shown in their consistent attendance and participation in

sessions for three years, the Geography facilitator rated the item: "The extent to which group members took collective responsibility for the activities in the PLC" at a 3. The Mathematics facilitator also gave a rating of 3 to "The amount of collaboration (working together on activities) that happened in the group".

The final factor enabling collaborative learning in PLCs that I wish to discuss is teachers' having an improvement- and an enquiry-oriented mindset. The collaborative learning processes used in PLCs involve reflection which the literature refers to variously as: an "Inquiry Habit of Mind" (Katz & Earl, 2010, pp. 43-49) "reflective professional enquiry" (Stoll, 2011, p. 106), and "reflective dialogue" (Louis & Kruse, 1995, in Hord, 1997b, p. 3). An "Inquiry Habit of Mind" according to Katz et al. (2009) is: "A mindset of being in charge of one's own destiny, always needing to know more and creating or locating the knowledge that will be useful for reflection and for focused planning and decision-making along the way" (p. 47). Reflecting collaboratively involves teachers in a new set of skills combining "rigorous and joint work with inquiry" (Katz et al., 2009, p. 69). Using *enquiry cycles* (discussed in 9.2.4.1) provides a structure for promoting reflective dialogue that moves the PLC beyond comfortable cathartic "story swapping" (Katz et al., 2009). An improvement- and an enquiry-oriented mindset promotes questioning, looking for alternatives and evaluating options, leading to participants being more critical of their practice. Being able to work in this way depends on teachers' knowledge and the level of trust in the PLC that enables teachers to contribute confidently.

In this study a key enabler of PLC functioning was the fact that most teachers attended voluntarily and participated to the best of their ability within the constraints of their not fully understanding the PLC model of TPD. While they participated in the PLCs because they wanted to bring about improvements in their learners' results at first they did not all understand that learning in a PLC required them to participate actively with an enquiry-oriented mindset. Many teachers needed to adjust to the collaborative ways of working such as posing problems, sharing practice, and doing joint work to create materials rather than being passive recipients of knowledge-for-teaching and being given hand-outs to take away with them. For example, teachers contributed samples of work, participated in the sessions by sharing knowledge, responded to suggestions of

colleagues, tried out lesson material prepared in the PLC and gave feedback on it. Once the teachers understood the model, they started to operate in ways similar to those described in the literature. Facilitators found it inhibiting when teachers were not able to change their mindsets and way of participating and to begin functioning in the new ways required in PLCs, as was evident when they wanted the Geography facilitator to keep providing resources and creating materials for them to take away. However, when the change of mindset occurred these same teachers felt empowered and they began to participate in new ways thus enabling the PLCs' functioning. Participants in the English PLC understood the PLC model and from the outset easily approached their PLC activities with an enquiry mindset. The use of *collaborative processes* such as the CALW, PLIC and JLS processes and the focus on error analysis (see 9.2.5.2) provided a structure for teachers to enquire into their knowledge and practices using "reflective dialogue".

I have discussed two claims related to the enabling conditions identified in the study: supportive school-level conditions and teachers' collaborative participation. However, I argue that these are necessary but not sufficient conditions for PLCs to play a key role in teacher learning. Further enablers are required and these are discussed in the following claims.

9.2.2 Facilitation

The ISPFTED envisages PLCs functioning across the length and breadth of South Africa but little attention has been given to how they will be facilitated. In this study I used school-based teachers as facilitators to see whether they were able to facilitate in a manner that enabled learning in their PLCs and if so how they did so and what approaches and styles they used. I answer the second sub-research question: **Did the facilitation of each PLC's work contribute to what was achieved, and if so, how?** by making a claim from data presented in chapter 6 which I discuss in relation to section 2.4.4.1 and Figure 2.2 in the literature review.

9.2.2.1 Claim 3:

Appropriate facilitation is a key enabler of PLC sustainability and of teachers' learning. If facilitators perform their facilitation functions in a contextually sensitive manner exercising leadership intelligences to select approaches and styles

that meet the needs of the participants, then the PLC is likely to be sustained and teacher learning is likely to be enabled.

There is limited literature on facilitation specifically related to PLCs. From what has been written it is clear that facilitation is a key enabler of PLC functioning, sustainability and teachers' learning through PLC work. Often the facilitator is also the leader, or shares leadership with informal leaders, and is called upon to provide assistance, usually in the form of expertise related to the topic under discussion in the PLC (Katz et al., 2009). The literature on PLCs does not describe approaches and styles of facilitation other than to suggest various learning processes that could be used such as enquiry cycles and protocols. From the literature (e.g. Lassonde & Israel, 2010; Chappuis et al., 2009; Brodie 2014a) I identified three key strategic functions (*organisational*, *motivational* and *professional*) of facilitators and three key roles that they need to play (building and communicating a shared vision for the PLC, building motivation towards a learning goal, and developing collaboration directed towards enquiry focused on this learning goal). I argue that facilitators can take a variety of approaches to performing these functions and roles while still performing them in a contextually sensitive manner.

The three facilitators focused most of their speaking turns in the PLC sessions on their *professional* functions. They spent time outside PLC sessions performing their *organisational* and *motivational* functions. The fact that the facilitators particularly focused on their *professional* functions points to their understanding of the importance of their role as a key enabler of teachers' professional learning and their need to ensure appropriate structure and focus for accomplishing this. It is interesting to note that the Mathematics facilitator, Amy, who had experience of facilitation in the DIPIP project, focused on *professional* functions to a greater extent than the other two. The English facilitator, Fred, focused least on the *professiona*l function and he involved the participants in much of the *organisational* and *motivational* work of the PLC such as building the shared vision and establishing the learning goals. The overall result of this was that proportionally fewer speaking turns were focused on the actual PLC work.[162]

[162] This does not, however, mean that the work done was less meaningful for participants. The English teachers were more involved in the other aspects of PLC functioning. In fact, some of the speaking turns covered what the teachers tried to do at their own schools as follow-up activities from PLC sessions. The

Findings of the study indicate that the way the facilitation functions were carried out had an impact on the outcomes of the PLCs' work. For the Geography and Mathematics PLCs the outcomes related mainly to teachers' learning knowledge-for-teaching but the English PLC also developed teachers' leadership ability.

To perform their roles facilitators are expected to use, in a contextually sensitive manner, a demanding repertoire of complex personal qualities such as network "leadership intelligences", for example, "social intelligence" and "contextual intelligence" (Chapman et al., 2006, in Hadfield & Chapman, 2009, p. 76), skills/abilities/ knowledge, and personal characteristics (Oehrtman et al., 2009). Facilitators in the study used "leadership intelligences" to select the approach and style that were appropriate for the PLC that they facilitated.

The facilitators adopted three main approaches to their responsibility. I classified them broadly as *discussion leader*, *fellow learner,* and *teacher*. Which approach they used at a given time in the PLC was determined by who the participants in the PLC were, what their needs were, and the type of work they were doing. These factors are not dealt with in the literature which assumes that teachers in PLCs are mostly homogeneous with respect to learning needs, are competent practitioners, and have adequate subject matter knowledge as well as professional commitment to and understanding of learning in a collaborative enquiry-oriented manner. The Geography facilitator, Gay, adopted a *teacher* approach more frequently than the other facilitators. She not only provided expertise, the necessary knowledge, for the group to work with, but also modelled how she would teach topics. She also taught the participants, for example, how to use teaching aids to convey concepts. Gay's approach would have been inappropriate in the English or Mathematics PLCs where the teachers demonstrated greater subject knowledge and confidence to share it and to open their practice for the PLC's benefit. Fred and Amy adopted either a *discussion leader* or *fellow learner* approach in most speaking turns.

Broadly the facilitators' style can be classified as *directive* when they decide or make suggestions for the PLC and *non-directive* when they ask the PLC to decide or they

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English teachers spoke about sharing leadership and leading school-based PLCs which were not mentioned in the other two PLCs.

participate as a fellow learner. The facilitators changed their style over the course of the project. This confirms Langer et al.'s (2003, pp. 132-133) observation that facilitators would be more *directive* when participants in the PLCs lack the necessary skills and knowledge but *non-directive* as PLC participants became "autonomous". Gay decided for or made suggestions to the PLC for more than half the speaking turns. Fred and Amy's overall style was *non-directive* in more than half the speaking turns. They asked the teachers what they wanted to do or participated equally with them. They spoke proportionately less often and for less time than Gay did, thus allowing the other participants opportunities to contribute their knowledge. Amy's overall style was similar to Fred's in being *non-directive.* Both were *directive* at the beginning of the project, when they performed some of the PLC organisational functions, and when the PLC work reached a stage where a decision needed to be taken on how to proceed. Gay was *directive* in most speaking turns in the first year of the project but as participants began to understand the PLC model and what was required of them, gained confidence and developed trust in the community, they became more willing to contribute, allowing Gay to become *non-directive.*

The characteristics of the teachers in the Geography PLC, their contextual conditions, and how they interacted in the PLC sessions (the ways they worked and the types of activities they did) indicated that they needed more support from the facilitator than teachers in the other PLCs. Gay used her "network leadership intelligences" to discern what approach and style she needed to adopt to enable the PLC to function and to enable teachers to learn. Fred and Amy also used "leadership intelligences" which resulted in their doing different activities and in different ways from the Geography PLC because they understood their teachers' needs.

The complexity of the functions facilitators were expected to perform required the subtle application of the facilitators' range of personal qualities in order to enable PLC functioning and teacher learning. For example, Gay required relationship building skills so that trust could develop within the group which would then enable it to function as the model intended and she had to hold teachers to account to bring follow-up work to the PLC sessions in order for the enquiry processes to happen. Her productive work ethic served as a model for teachers in the PLC. Fred's democratic and inclusive

disposition and desire to encourage shared leadership enabled an enthusiastic teacher to act as facilitator in two sessions. Fred managed a situation involving dominant teachers that had potential for conflict using "social intelligence" and conflict management skills. Amy used motivational and relationship building skills to maintain consistent attendance of participants for the full duration of the project. Her management and administration skills ensured that all sessions were structured and productive and at the same time addressed the needs of the teachers.

In the case of all the facilitators their trustworthiness was established on the basis of their observed competence as well as their willingness to learn. They were all seen as genuinely caring and supportive and motivated by the same desire to learn as the teachers were. When the facilitators lacked knowledge they acknowledged this and willingly accessed necessary resources and expertise. Of all the qualities a facilitator is expected to have, knowledge is probably the easiest to deal with because it can be sought elsewhere provided the facilitator is willing to access it. Amy relied frequently on Clara, a teacher in the PLC with greater expertise. It is more difficult to compensate for a lack of the sensitively enacted "leadership intelligences" and other personal qualities. If a facilitator does not have the personal skills or characteristics necessary to perform the functions and meet the expectations of the role, the work of the PLC is likely to be severely inhibited. Where teachers' past experience created a disposition that was disinclined to be open, sharing and participative, as discussed in claim 2, the facilitator needed to adapt her approach. Teachers' knowledge levels also impacted on the approach and style facilitators used.

This study explored whether school-based teachers[163] could provide facilitation that enabled PLC functioning and teachers' learning. A noteworthy finding was that while each facilitator, who had received extremely rudimentary and limited training for the role, carried out the facilitation functions and met the role expectations as described in the literature, each one did so using different approaches and styles. Exercising sensitivity to the contextual factors operating in their PLCs they drew on their range of personal qualities to do so. What focus for learning the facilitators established for their PLCs and how they did so is the next enabling or inhibiting factor that I discuss.

[163] In the case of these PLCs two were HODs and the other had been a participant in a DIPIP PLC so had experienced facilitation.

9.2.3 A "Clear and Defensible Focus" for PLC work

This study investigated what teachers in PLCs chose to focus on when a structured agenda or formal programme was not imposed on them. It explored factors that influenced their choice of focus. It also explored whether the focus on a particular topic was sustained and covered in depth or whether the PLCs dealt with many topics for shorter periods in a superficial manner. The third sub-research question: **What did teachers in three PLCs choose for the focus of their learning of knowledge-for-teaching and how did they arrive at that focus?** is discussed in relation to sections 2.3.1 of the literature review and two claims based on the data analysis presented in chapter 7.

9.2.3.1 Claim 4:

Establishing a meaningful focus that is sensitive to the needs of participants and their contextual conditions, and which is sufficiently complex to engage their interests, gives purpose and direction to PLC work and promotes PLC sustainability. The choice of focus is influenced by three general factors: teachers' learning needs, learners' learning needs, and ideas suggested by the facilitator.

Broadly speaking, PLCs focus on professional learning (Stoll, 2011). For PLCs to be effective for teacher learning which has the goal of improving student achievement, Katz et al. (2009) argue that they require "A Clear and Defensible Focus" (p. 23) based on an identified real need (p. 25). Katz & Earl (2010) argue for a "compelling and high-leverage" focus which is sufficiently challenging to cause teachers to rethink and even unlearn their existing practices. Elmore (2002b) argues similarly for a TPD focus on improving student learning by improving instructional practice. For other writers the focus could be on any of the "concrete tasks" of teaching and learning (Darling-Hammond & McLaughlin, 1995, pp. 597-604), learning how students think about concepts and how they learn them (Borko, 2004, p. 6) or learning subject matter knowledge and content-specific pedagogy (Borko, 2004, p. 6; Ball et al., 2008, Brodie, 2013). A number of writers argue for an evidence-based focus (Boudett et al., 2008; Katz et al., 2009; Brodie 2013). In discussing sustainable PLCs Hargreaves (2007) identifies the importance of focusing on what matters; he refers to this as "depth". Critical of moves to use PLCs for raising scores on standardised assessments, Hargreaves argues for a focus on "improving learning beyond the basics", "intelligent and ethical deliberations about what kind of learning counts as achievement", and

"courageous questioning and even creative subversion of the mandates and measurement tools that diminish this deeper sense of achievement" (p. 185).

At the heart of all the above suggestions is the idea that establishing a meaningful focus gives purpose and direction to the work of a PLC. If the focus is not directed appropriately PLCs would be engaged in what Katz et al., (2009) term an "activity trap" (p. 24). An appropriate focus is an enabler of PLC functioning, sustainability and teachers' learning. In this study the PLCs focused on what mattered to the teachers concerning their subject matter knowledge and instructional practice. They also pursued issues related to how their learners think and perform.

- The findings indicate that the PLCs, which were free to choose their own focus for their work, arrived at eight "*focus areas*". Five of them which I termed "*learning focus areas*" focused on learning. More than 80% of the PLC time focused on these areas. The focus was:
- based on teachers' real needs (Katz et al., 2009) (e.g. knowledge about GIS);
- aimed at improving instructional practice (Elmore, 2002b) (e.g. how to teach sentence structure), and subject matter knowledge and PCK (Borko, 2004) (e.g. knowledge of BOMDAS/BODMAS and a method for teaching factorisation);
- on "concrete tasks" of teaching and learning (Darling-Hammond & McLaughlin, 1995) (e.g. how to teach exponents or map work); and
- aimed at trying to understand how students think and learn (Borko, 2004) (e.g. doing error analysis).

It is interesting to examine the appropriateness of the *focus areas* selected by the three PLCs on the basis of the criteria for a "definite and defensible" focus. Huffman and Hipp's (2010, pp 44-49) diagnostic tool, the Professional Learning Community – Innovation Configuration Map, provides descriptors of PLCs at different stages of establishing focus. They identify three stages.

At the "Initiating" stage teachers address any area of teaching and learning without linking the focus to what learners are required to be able to learn and do according to the curriculum and assessment demands. In this study the main focus area of teachers' learning needs in all three PLCs' was on *curriculum content topics*. This is

understandable because the core function of teachers is to teach the content specified in the curriculum and their expressed motivation for voluntarily participating in the PLCs was to improve their instructional practice, so that their learners could perform better, which is consistent with Elmore (2002b) and McLaughlin & Talbert (2010). The Geography PLC focused on teachers' needs related to *assessment matters* more than the other PLCs as a result of these teachers' individual knowledge needs and their context. They came from "priority" schools and the education district required them to write the common assessments. This PLC focused to a limited degree on learning how to set questions for an examination paper and the facilitator exposed them to examples of good practice in order to enable them to appeal to the district to be allowed to set their own tasks. The Geography and Mathematics teachers' individual knowledge needs and context prompted them to focus on *general curriculum matters* because of their concerns about the imminent introduction of the CAPS. The Geography teachers, for example, were uncertain about changes in the sequencing and selection of topics because they might have to teach a topic that was new to them. The Mathematics teachers had similar concerns because the curriculum changes for them were very significant. They also worried about resources available for teaching the CAPS curriculum. The English PLC hardly bothered with this focus area because the CAPS made no new demands on them.

At the "Implementing" stage teachers have high expectations of the learners to perform in terms of the curriculum and assessment demands and they focus on priority areas of teaching and learning to meet these demands. In the case of the three PLCs in the study the teachers responded to external drivers such as national examinations (the English PLC examined what knowledge and skills learners needed to achieve well in the writing examination and used this information to determine their focus) or district-set common tasks (the Geography teachers struggled with diagrams in these tests that looked different from the one/s in the textbook they used which led the facilitator to provide diagrams for the teachers to work with) in choosing a focus that would assist them to help their learners meet expectations. The education authorities hold all teachers accountable for their learners' performance but teachers in "priority" schools experience this accountability pressure more onerously because of additional measures imposed on them such as providing reasons for poor achievement of their learners, providing

improvement plans, termly detailed analysis of results (recently extended to all teachers in Gauteng), monitoring of adherence to a prescribed work schedule, and compulsory writing of common tests and examinations (Taylor et al., 2013, pp. 263, 264). Teachers from all schools have to take responsibility for their learners' performance in the NSC examinations and English and Mathematics teachers must also do so for the Annual National Assessments. This pressure has made teachers more aware of not only their own learning needs but also their learners' needs.

The influence of learners' learning needs during the implementing stage on the choice of PLC focus was most evident in the Mathematics PLC. This PLC specifically focused on looking at samples of learners' work and the errors learners made. They tried to understand the root of misconceptions and to understand learners' thinking. This focus is consistent with one of Borko's (2004, p. 6) identified objectives of PLC work, specifically learning how learners think about concepts and how they learn about them. This focus is also consistent with the literature that argues for improvement initiatives to be based on evidence (Earl & Katz, 2006; Katz et al., 2009). It is supported by literature which presents models for collaborative enquiry in PLCs where the first stage is establishing what learners' needs are based on evidence from learners' work, for example, Collaborative Analysis of Student Work (Langer et al., 2003) termed Collaborative Analysis of Learners' Work in this study (CALW). The Geography and English PLCs were also influenced by learners' needs but focused on this in fewer learning units than the Mathematics PLC.

Finally at the "Sustaining" stage teachers with high expectations for their learners' learning agree on priority areas for teaching and learning: they are not driven solely by external demands (the Mathematics teachers focus on "exponents", a core concept in Mathematics). Both the Mathematics and English PLCs analysed why learners made errors and how to teach essential concepts and skills better in order for learners to achieve better results. However, they were not driven by external performance accountability pressures to do this.

What the PLCs in this study focused on and how they arrived at the focus is generally consistent with PLC literature. One deviation related to the assumption made in much of the literature that PLC participants homogeneously possess a substantial body of

knowledge-for-teaching. Teachers in the three PLCs in the study varied greatly with respect to their knowledge. How teachers arrived at the focus and what they focused on in the English and Mathematics PLCs accords more closely with international literature where the teachers are knowledgeable and more confident about their practice. In the case of the Geography PLC, where teachers demonstrated less confidence related to their knowledge, the facilitator played a greater role in the choice and content of the focus. She began by suggesting that the PLC look at learners' projects and then work on designing a rubric that would better assist learners to demonstrate their learning. Her influence did not stop at this point, unlike in the other PLCs. This PLC continued to rely on the facilitator for ideas for their PLC focus. The facilitator influenced the PLC in a manner more like that described in Brodie's (2013, 2014a, 2014d) recent studies which identify the facilitator's active role in determining and directing activities in Mathematics PLCs, although the Geography facilitator was not as systematic. The influence of the English and Mathematics facilitators was largely limited to the early learning units when they suggested the choice of what the PLC could do, thus giving professional and organisational leadership (Lassonde & Israel, 2010, p. 90).

By the end of the project all the PLCs had established a focus for their learning which meets the description of a focus at the "Sustaining" stage. While the Geography PLC spent considerable time at the "Initiating" stage the English and Mathematics PLCs did not. The teachers in the Geography PLC had many knowledge needs of their own and did not begin by focusing on topics that would help their learners perform better. Only later on in the project did they work in a focused and sustained way on learning how to teach better so that their learners could understand essential concepts better or perform better in assessments.

Should the PLC teachers' needs, as identified by themselves, have had as much influence as they did? Were the teachers in all cases able to identify their own needs? Was the Geography facilitator perhaps acting more accountably by influencing her PLC to a greater extent by presenting topics she felt the PLC teachers needed? Was this action on her part contrary to the theory on effective TPD/PLCs that teachers determine their own learning needs (Day, 1992) in accordance with their development needs (Cohen & Hill, 2001)? Was she performing her professional strategic function of

building capacity and providing support in a proactive manner? On the other hand, were the facilitators of the English and Mathematics PLCs being less accountable for performance of their functions by handing over responsibility for choice of focus to the teachers? As a result of this were teachers in these PLCs not choosing the easier and more obvious options rather than having their learning focus targeted at something that was more demanding? Was their PLC work not as effective for learning because it lacked the challenge necessary to compel change in beliefs and practices (Katz & Earl, 2010)?

It must also be noted that the knowledge-for-teaching areas in which teachers expressed the least confidence/knowledge (designing summative assessment tasks; constructing diagnostic assessments tasks; analysing learners' results and deciding on remedial/extension strategies; and helping struggling learners to overcome their learning difficulties (see Appendix 5.2) were in most cases covered incidentally, if at all, rather than in a targeted and systematic manner. When Clara, a teacher with expertise in setting summative assessment tasks suggested the PLC spends time on this focus area, the PLC chose rather to design the lessons on "exponents". The Geography PLC spent a few learning units on gathering sample questions but teachers did not work with them. It was mainly left to the facilitator to give brief feedback on the few submissions and then assemble a question paper for the PLC teachers to use. In sum, the focus of the PLCs in the study was not always systematic in terms of developing knowledge focus, structured in how learning focus was organised, or sustained in terms of length of time the topics were focused on before another topic was introduced into the discussion.

The analysis[164] of the number of different *subjects of discussion* on average per session indicates that the English PLC (2.2 *subjects*) sustained its focus the most consistently over the period of the study from which it may inferred that the subjects were covered in greater depth and breadth. The Geography PLC averaged 3.1 *subjects of discussion* over the sixteen sessions analysed which reflects the relatively shallower covering of most of them. The nature of the Mathematics PLC's choice of focus in the first thirteen sessions resulted in superficial coverage of subjects of discussion, averaging 6.1 per session. While a range of knowledge types was used in these discussions participants did not

[164] The analysis was only of the learning units that focus on the *learning focus areas*.

explore deeply the underlying conceptual understandings needed for interpreting learners' errors with a view to teaching in a way to promote conceptual understanding. In the last eight sessions when the PLC focused on "exponents" the average of only 1.1 subjects per session indicated a sustained and in-depth focus on this curriculum topic.

The final enabling or inhibiting factor identified, the processes PLCs use for learning, is discussed in the next claim.

9.2.4 *How* learning takes place in PLCs

The literature on PLCs describes extensively how knowledge can be learned in PLCs. Writers suggest that the most useful processes are collaborative and involve participants in enquiry or research combined with reflection. In this study I explored whether the PLCs worked in collaborative ways and used processes described in the literature. I answer the sub-research question: **What learning processes did the three PLCs follow to address their learning focus choices?** and the second part of the main research question: **… *how* did teachers learn in three professional learning communities?** by making two claims from the findings presented in chapter 8.3-8.5. I discuss these claims in relation to section 2.5 of the literature review.

9.2.4.1 Claim 5:

Collaborative discussion and cycles of enquiry help PLCs to sustain focus and to achieve deeper learning than other ways of working in PLCs, particularly when the participants are confident and there is sufficient knowledge available to the PLC.

There is extensive literature describing how teachers learn in PLCs. The learning processes described in the literature are based on an iterative, enquiry-oriented process (Earl & Hannay, 2011, p. 188). I found three enquiry cycle processes described in the literature useful for analysing how the PLCs in this study worked with knowledge: Professional Learning Inquiry Cycles (PLICs) (Timperley et al., 2008, in Katz et al., 2009, p. 71), Collaborative Analysis of Learners' Work (CALW) (adapted from Langer et al., 2003), and Japanese Lesson Study (JLS) (Lewis & Tsuchida, 1998, pp. 12, 14; Stigler & Hiebert, 2009; Cerbin & Kopp, 2006, pp. 250, 251) (see 2.5.2). Most of the literature assumes that the teachers have already acquired sufficient subject matter knowledge (Winch's KT, 2013a) and practical knowledge (Winch's KH (2013a; 2013b)), along with inferential knowledge (Winch's IK (2010; 2013a)) that they will be

able to contribute to the collaborative process and that they have the confidence to do so.

Key enablers of collaborative learning in PLCs are the availability of knowledge and teachers' confidence to share knowledge and experience in the PLC. One model of learning in a NLC (PLC) envisages "Thee Fields of Knowledge", namely: "What we know" (PLC participants' knowledge), "What is known" (theory, research and best practice – Winch's KT, KH and IK), and "New knowledge" (what the PLC can create collaboratively) (Jackson & Temperley, 2006 in Katz et al., 2009, pp. 66-67). This model relies on participants contributing their knowledge and the PLC accessing knowledge that is available to the public in order to create new knowledge. If the first two sources of knowledge (KT, KH, and IK) are unavailable or available only to a limited extent it is likely to be difficult for a PLC to collaboratively create new knowledge which could lead to changed teaching practices and improvement in learning. Therefore, having sufficient knowledge and experience, at a minimum level of expertise, available to a PLC is crucial. McLaughlin and Talbert (2010) suggest that about one out of three members with strong instructional skills is necessary (p. 36).

In this study, the analysis of how the PLCs worked showed that the different PLCs adopted different ways of working at different stages in the project and did not always use the *collaborative processes* in the manner described in the literature. However, the PLCs used *collaborative discussion* (unstructured *collaborative discussion*) and *enquiry cycles* (structured cycles of enquiry) for the majority of the PLC session time. The main difference between *collaborative discussion* and the *enquiry cycles* is that while there may have been "joint work" as described in the literature (McLaughlin &Talbert, 2007, p. 161), the former did not produce systematic reflection and evaluation of what had been discussed nor was the focus sustained. There was limited critical engagement and it could not always be said that the product of the discussion led to developing new knowledge which could change instructional practice or build organisational capacity. From its first session the English PLC made the greatest and most systematic use of *enquiry cycles* as described in the literature. This PLC had sufficient knowledge to explore the selected *subjects of discussion* using complete CALW (adapted from Langer et al., 2003) or PLIC (after Timperley et al., 2008, in Katz et al., 2009) processes in

most of its sessions. The Mathematics teachers used only one full *enquiry cycle*, a form of Japanese Lesson Study (see 2.5.2.1.iii), in the second year over eight sessions. They completed all stages of the process, including rethinking, redesigning and re-evaluating the lessons. The way the English and Mathematics PLCs worked closely resembled how the literature describes learning through an *enquiry cycle*. There was a high level of participation, knowledge contribution, reflection, and collaborative interaction sustained over a lengthy period all of which enabled in-depth learning about teaching a topic. Teachers reported in their questionnaire responses that they had learned to think differently, indicating a deeper conceptual understanding of, for example, teaching "tense" or "exponents" at a subject matter knowledge and practical knowledge level thus enabling them to teach the concept better. This learning was enabled because the participants in the PLC had adequate knowledge and consequently confidence.

The Geography PLC was less systematic and sustained in its collaborative work than the other two. This PLC used *enquiry cycles* for half the PLC time, completing two full *enquiry cycles.* A third process dealing with "tri-cellular circulation" was attempted. It was not completed as the lesson designed was not tried out and evaluated. Although the *enquiry cycles* were followed over a number of sessions, only about thirty minutes of the fifty minute session involved collaborative enquiry focused on the identified *subject of discussion*. During each of these cycles the PLC digressed to focus on other *subjects of discussion* and *general focus area matters*. Even when following a collaborative enquiry focus the Geography teachers contributed less than the facilitator upon whom they relied for most of the knowledge. The equal collaborative sharing of knowledge described in the literature (Hord, 1997a; Hipp & Huffman, 2010) was not often evident in this PLC, although teacher participation was greater in the later sessions of the study. The Geography facilitator suggested at the end of the project that her PLC might have benefited from using protocols. Datnow (2011, pp. 156-157), however, cautions that protocols could either promote or inhibit learning and that their use could signify contrived collegiality.

C*ollaborative discussion*, the second process used in the PLCs, was the main way the Mathematics PLC worked for the first thirteen sessions. This PLC's focus on analysis of learners' errors prompted discussion dealing with seventeen different *curriculum*

content topics and a large number of other *subjects of discussion* focused on other learning focus areas, an average of 6.1 subjects of discussion per session. Teachers collaborated to understand the reasons for the errors; they explained learners' possible reasoning but from time to time they also collaboratively developed ways of explaining concepts to learners. When this PLC used *collaborative discussion* teachers were more systematic than the Geography teachers in that they remained focused on the *curriculum content topic* until they had worked out reasons for the erroneous answer to multiple choice questions and discussed ways of teaching the *topic* to avoid the error. However, it cannot be said that the learning was sustained or deep as these subjects were dealt with briefly. Effectively this PLC completed the first three stages in an *enquiry cycle* but did not reach the point of designing a lesson, trying out their new knowledge (usually a technique), evaluating its impact and then rethinking the situation and, for example, redesigning the lesson. There was limited reflection and enquiry stopped when a teacher proposed a way to avoid the error.

The facilitators of all three PLCs also accessed external knowledge resources. The type of knowledge accessed determined to a large extent how the PLC progressed with its collaborative learning work. The Mathematics PLC began its work by reading a journal article by Raffaella Borassi (1987) on the value of error analysis for teaching Mathematics which provided research-based knowledge (subject matter knowledge and practical knowledge focusing on domains related to common content knowledge, specialised content knowledge, knowledge of content and students and knowledge of content and teaching) to contribute to the PLC's new knowledge. The teachers in this PLC referred to Borassi's ideas throughout the sessions dealing with error analysis. These ideas contributed to the Mathematics PLC having deeper and more systematic discussion than the Geography PLC. The English PLC's collaborative enquiry cycle on "sentence structure" was enriched by the facilitator's sharing of a chapter from a book "*The Creative Teacher of Language*", by John Farrell (1996), entitled: "Writing begins with a sentence" which contributed knowledge similar to that in Borassi's article. While the Geography facilitator brought in external resources they were mostly practical items such as visual aids for teaching (practical knowledge) and education department provided documents (mostly subject matter knowledge). She did not access

research-based materials or theoretical subject matter knowledge. It is likely that the depth would have been enhanced in this PLC if other resources had been accessed.

The findings of this study suggest that the quality of learning is likely to be enhanced when PLCs used external resources, such as research articles or books written by subject experts. Much of the literature on PLCs describes PLCs which operate with considerable external expertise because they have been part of university-led research studies or have been set up by well-resourced school districts with designated professional development officials whose role it is to support school PLCs (Grossman et al., 2001; Hadfield & Chapman, 2009; Hipp & Huffman, 2010). In South Africa, this level of support is likely to be difficult to harness or unavailable for the majority of PLCs as envisaged in the ISPFTED. McLaughlin & Talbert's (2007) finding that insufficient support resources were available to enable PLC learning is a warning that cannot be ignored in the South African context where the supply of expertise is limited. Their study found that: "… all high schools struggled to locate effective content support providers; their needs far outstripped supply" (p. 163).

Having identified and discussed the key factors that enabled or inhibited learning in PLCs, the first part of the main research question dealing with *what* teachers learned in PLCs can be addressed in the next section.

9.3 KNOWLEDGE LEARNED IN PLCS

The first part of the main research question asks: ***What* … did teachers learn in three professional learning communities?** The sub-research question asks more specifically: **What knowledge-for-teaching did teachers choose to focus on in the three PLCs?** This study explored what knowledge the learning in the three PLCs focused on. It also explored whether PLCs were an effective vehicle for developing teachers' knowledge as, for example, envisaged in the ISPFTED, which aims to address the knowledge deficiencies that teachers identify through "diagnostic self-assessments" and to assist teachers "to integrate their own professional knowledge with the latest research-based knowledge about content and practice" (p. 14). The above questions are answered in the claim based on data presented in chapter 8.1-8.2 and 8.4-8.5 which is discussed in relation to chapter 3.

9.3.1 Claim 6:

PLCs learn more practical knowledge than subject matter knowledge through their PLC activities, sometimes using inferential knowledge to do this.

The literature is not specific about the types of knowledge PLCs focus on but the content focus areas suggested in the literature (Darling-Hammond & McLaughlin, 1995, pp. 597-604; Cohen & Ball, 1999; Borko, 2004, p. 6; Brodie, 2013) indicate that there are expectations that both subject matter knowledge (SMK, in Winch's terms KT (2013a)) related to *common content knowledge, specialised content knowledge and horizon content knowledge* (Ball et al., 2008) and practical knowledge (PCK, in Winch's terms KH (2013a, 2013b)) related to *knowledge of content and students, knowledge of content and teaching, and knowledge of content and curriculum,* can be learned in PLCs. The ISPFTED also expects this. This policy envisages, for example, teachers self-diagnosing their weaknesses and seeking expert assistance in the PLC as well as teachers learning the "latest research-based knowledge about content and practice" (p. 14).

While there are expectations in the literature and policy that PLCs are able to develop subject matter knowledge a key finding from this study is that there was only limited focus on subject matter knowledge and PLCs made limited use of inferential knowledge (Winch's, 2013a, IK). In some learning units the PLCs focused on subject matter knowledge with inferential knowledge and in some units they did not. The PLCs which appeared to have greater subject matter knowledge at their disposal used more IK. On average across all learning units the PLCs used inferential comprehension in less than half of the units. This is understandable as the ability to use inferential comprehension depends on sound subject matter knowledge and not all teachers in the PLCs had this. The limited use of IK suggests that the PLCs were probably unable to work with knowledge at the deep level that required substantial inferential knowledge and subject matter knowledge.

Examination of what knowledge was focused on in each session showed that often subject matter knowledge and practical knowledge were handled in the same learning unit. While teachers were working with practical knowledge, they were simultaneously learning subject matter knowledge, albeit in many of the learning units this learning was

incidental and unsystematic. Teachers in the PLCs reported learning both subject matter knowledge and the practical knowledge to teach curriculum content topics which they had previously lacked. This phenomenon has been reported in the literature. Brodie (2013) describes how teachers in the DIPIP PLCs were able to deepen their conceptual understanding of mathematics topics as well as their knowledge of how to teach the subject while working practically on interpreting and understanding learners' errors (pp. 9-14). Similarly, Brodie (2014a) reports on a teacher shifting his mathematical position, deepening his understanding of mathematics and his pedagogical understanding as the PLC worked with error analysis (p. 236). Muvhanga & Rollnick (2013) demonstrated in their study that when teachers learned topic specific practical knowledge (chemical equilibrium), they also developed their subject content knowledge on the topic. Brodie & Sanni (2014) also found that when teachers worked with pedagogical content knowledge and practice this had an effect on subject matter knowledge (p. 9):

> … interpretations of teachers' knowledge or 'lack' of knowledge need to be considered in relation to their practice; second, that considerations of how to develop teachers' knowledge must be strongly linked to practice; and third, that building teachers' practices and their pedagogical content knowledge can build their content knowledge. (p. 2)

Shalem et al. (2014) note that teachers in a PLC working with learners' errors only partially developed procedural and conceptual explanations for these errors (p. 9). They found that providing full explanations depends on teachers' mathematical knowledge as well as on "the degree of teachers' familiarity with learners' common ways of thinking when choosing an incorrect answer" (p. 9).

In this study teachers in the Geography PLC learned how to teach drawing cross sections of a topographical map. As they developed practical knowledge (*knowledge of content and teaching*), they learned the subject matter knowledge *(common content knowledge* or/and *specialised content knowledge*) needed for interpreting maps and for understanding how contours indicate various landforms. From this finding and from the literature it can also be suggested that PLCs can, to some extent, be a vehicle for teachers' learning of subject matter knowledge, specifically the subject matter knowledge *domains*, albeit not in a structured or systematic manner. The findings of this study show that a limited amount of this type of deep learning took place but with trained facilitators and a more structured and planned programme for the PLCs it might

be possible for both conceptually deep subject matter knowledge and practical knowledge to be learned in PLCs. These findings would, however, seem to indicate that, in the South African context, PLCs may not be the best vehicle for developing teachers' subject matter knowledge because PLCs do not easily focus on subject matter knowledge at a deep conceptual level.

Winch's (2013b) understanding of practical knowledge helped me to see that the practical knowledge (KH) that PLCs in the study covered in their discussions was multi-layered and complex. His three levels of practical knowledge enabled me to examine the complexity of the practical knowledge that the teachers in the PLCs were learning. As he argues, knowledge of techniques is easier to learn because of its stable nature across different contexts and because there are criteria for evaluating whether it was performed correctly. The other two levels of practical knowledge (transversal abilities and project management abilities) are more difficult to learn because they are context dependent and cannot be said to be done correctly or incorrectly but rather are evaluated in terms of whether they accomplished the intended purpose.

The practical knowledge that the Mathematics and English PLCs worked with in the learning units was more complex than in the Geography PLC. The type of learning activities these PLCs worked with (for example, error analysis and lesson design) required greater use of a variety of transversal abilities and more use of inferential knowledge. The implication of this finding is that PLC activities such as designing lessons, evaluating text books and curriculum mapping require PLC participants to have sound subject matter knowledge in order for them to make the inferences necessary to inform the exercise of their practical knowledge. Without this level of knowledge PLC learning is likely to be inhibited. As already stated, in this study the knowledge 'levels' of teachers in the PLCs were found not to be homogeneous. As a result only some PLCs had sufficient knowledge available to them to use the inferential knowledge necessary to work with practical knowledge requiring transversal abilities and project management abilities. The ISFPTED envisages teachers having this practical knowledge ability when it expects teachers to be able to analyse ANA results and identify their learning needs or to learn from video recordings of lessons (p. 14).

The study indicated that the main *domain* that all PLCs focused on was the practical knowledge *domain* of *knowledge of content and teaching*. This would seem to indicate that PLCs' choice of knowledge focus was on their core responsibility of instruction with the focus on the content aspect. Participants wanted to teach curriculum topics such as "Geographic Information Systems", "sentence construction" and "exponents" more effectively. The learning activities appeared to meet teachers' knowledge needs and resulted in their developing knowledge and confidence. This focus accords with what the literature identifies as a useful focus for TPD (e.g. City et al., 2011) as it deals with what teachers need to learn in order to improve their instructional practices.

The second highest knowledge *domain* focus for the Mathematics and English PLCs was on *knowledge of content and students* which is connected with their choice to focus on learners' errors or samples of learners' work (data analysis). The literature also regards this learning focus as worthwhile (Borko, 2004; Boudett et al., 2008; Katz et al, 2009). The fact that the PLCs focused on this *domain* does not, however, mean that they did this successfully. While some teachers reported that they had gained new understandings about their learners as a result of the learning activities, the discussions in the Mathematics sessions indicated that in some cases the topics were dealt with very superficially and that the learning was quite shallow. Discussions usually concluded with seeking a teaching solution/instructional technique to avoid the error rather than in seeking understanding of why the error was made. Because the English PLC focused on this *domain* as part of a sustained enquiry cycle their learning was more focused; it was directed towards achieving the objectives of each stage in the enquiry cycle before moving on. If the Mathematics PLC had pursued their objective (identifying the concept that underlies the error) through a full enquiry cycle it is likely that they would have arrived at a deeper understanding of the learners' thinking and the reasons for the error. Learning *knowledge of content and students* is possible in PLCs, as reported in findings from the DIPIP project (Brodie & Shalem, 2011, Brodie, 2013; Brodie 2014d), provided the enablers are in place, for example, careful structuring of the learning process, commitment and skilful facilitation. In light of the literature's emphasis on teachers' working with evidence (samples of learners' work and learners' errors in this study) it is important to identify the difficulties PLCs are likely to encounter when they work with *knowledge of content and students.* If teachers are not taught what this knowledge

domain entails and what they are supposed to learn, and if they do not have sufficient subject matter knowledge, PLC learning that focuses on this *domain* is likely to be partial at best (Shalem et al., 2014). The learning needs to be sustained and deep to be effective.

The Geography PLC's second highest knowledge *domain* focus was on *knowledge of content and curriculum* and was connected to their concerns about the introduction of the CAPS and the impact of the new curriculum on them and on their learning needs. The Mathematics PLC had similar concerns and spent some time on CAPS as well as on mapping the curriculum to understand the links in the curriculum across grades and topics. Working with this *domain* also provided opportunities for teachers to clarify their conceptual understandings of items in the curriculum; however, this did not happen often. It did lead to teachers making connections to the curriculum content taught earlier or to be taught in later years thus exposing teachers to the KT *domain* of *horizon content knowledge* but in a superficial way.

From these findings it can be said that PLCs can be a vehicle for teachers learning all *domains* of practical knowledge. However, spending time on a particular knowledge *domain* does not automatically mean that the learning will be deep and useful. To assist teachers to engage with *knowledge of content and students* in a deeper way teachers could be taught methods and given structures or a framework for looking at learners' errors.

The findings addressed in this claim prompt the question: "If so much time in PLCs is spent on practical knowledge are PLCs effective for learning subject matter knowledge and specifically are PLCs a useful model of TPD in South Africa where many teachers' subject matter knowledge has been found to be inadequate?" The findings of this study suggest that a PLC that has participants with stronger subject matter knowledge is also going to have stronger practical knowledge available to it. This advantage is likely to make such a PLC more effective for teachers learning knowledge-for-teaching. From this it can be deduced that if there is insufficient subject matter knowledge and practical knowledge available in a PLC such a PLC is unlikely to be an effective vehicle for teachers to learn knowledge-for-teaching, of any type.

In the next section I answer the main research question in the form of a discussion of the claims in relation to one another and an evaluation of the effectiveness of PLCs for teacher professional development in South Africa.

9.4 ANSWERING THE MAIN RESEARCH QUESTION

Having answered the main research question: **What and how did teachers learn in three professional learning communities?** in the discussion of the six claims made in response to the sub-research questions, in this section I briefly show the relationship between the claims using the Framework for Learning in PLCs (Figure 9.1) and then identify key issues which require attention or further exploration. I conclude with a discussion of criteria for evaluating the effectiveness of PLCs for teacher professional development and an evaluation of whether PLCs are a suitable model for teacher professional development in the South African context.

Before it was possible to answer the research question about *what* was learned in PLCs, this study first identified four factors which enabled or inhibited *how* learning activities happened in PLCs. Figure 9.1 sums up the framework in which learning in PLCs takes place; it identifies the enabling/inhibiting factors and potential outcomes of effective PLCs. As the Framework shows, *what* PLCs learned took place in an enabling or inhibiting framework. The enabling and inhibiting factors (items 1-4 in Figure 9.1) influenced *what* the PLC learned (item 5).

Analysis of the first factor, school-level and teacher-related factors, established that PLCs comprised participants from a network of schools and did not operate in a contextually neutral environment but were situated within other systems. The study did not focus on the impact of the South African education system as a contextual enabler or inhibitor. Nevertheless, this factor could play an important role when PLCs are implemented nationally as the ISPFTED envisages. The low level of learner achievement in the South African education system (as evidenced in the Annual National Assessment and National Senior Certificate results) is likely to impact on what PLCs are persuaded to focus on by education officials. The highly politicised nature of the South African education environment and sensitivity to the demands and interests of the major teacher union has the potential for impacting on whether PLCs will be enabled to function in certain school environments and may dictate when and how PLC

work could be done: for example, within school hours rather than after school. The broader South African socio-cultural system also cannot be overlooked as recent research in Singapore (Hairon & Dimmock, 2012) and China (Wong, 2010) points out. The impact of the hierarchical and patriarchal organisation of society in South Africa and citizens' expectations that others (often the government) make decisions for them and provide for them has resulted in a population generally lacking in personal agency. These factors are likely to have impacted on the ways South African teachers engage with learning. This factor was not investigated in this study but it does merit further investigation. What emerged from the findings on school level and teacher-related factors was the diversity (or absence of homogeneity) amongst participants in PLCs, particularly with reference to their knowledge, their approach to collaborative learning, and the contexts from which they came. This diversity impacted on the other enabling/inhibiting factors for learning in PLCs.

The second factor, facilitation, was influenced by the knowledge that teachers brought to the PLC and their varying contextual needs and it was evident that the facilitators were required to be contextually sensitive and highly skilled in order to adapt their facilitation approaches and styles to suit the teachers in their PLCs. The implication of this claim is that the role of facilitators in South African PLCs may be different from that described and assumed in the literature. Facilitators may need to be more directive. They may need to plan, structure the work, and take control of the learning programme if teachers lack sufficient subject matter knowledge and the kind of confidence and trust needed for participation in the manner required of collaborative enquiry learning (the PLC model of learning).

The third factor, choice of focus, was also influenced by teachers' knowledge needs and their contextual situation, for example whether they came from a "priority school" which was subject to more accountability measures than other schools. The problematic implication of this for PLC learning is that if the needs of teachers and their learners differ greatly from one school to another it might be difficult to establish a focus that would meet the learning needs of all the participants. A focus is "clear and defensible" if it deals with what matters to the teachers in the PLC. Failure to achieve the agreed, worthwhile focus is likely to result in teachers leaving the PLC. If the topic chosen is

too remote from a teacher's existing subject matter knowledge s/he is likely to be unable to participate in PLC activities. If the topic is too basic for another teacher s/he is unlikely to learn anything from participation and his/her contribution would be to provide knowledge for the group. This, however, is not the purpose of the teacher's participation in a PLC where the model of TPD assumes more or less equal sharing of knowledge and experience in the process of creation and learning of new knowledge. While the literature and theory of action of PLCs assume that participants are relatively homogeneous in most respects, including their knowledge levels, and consequently an agreed shared focus is easily found, this is unlikely to be the case in South African PLCs. Another assumption made in the literature is that all teachers have the capacity to identify a worthwhile learning focus. In the study this was found not to be true. The Geography facilitator, in order to enable meaningful learning, frequently suggested the focus for the PLC. The implication of these realities is that PLCs may not be an appropriate vehicle for learning knowledge-for-teaching for all teachers. A different form of TPD may be better than a PLC for sustained and systematic learning of particular subject matter knowledge where that is the need.

The final enabling factor, *how* learning knowledge happened in the PLC, was also impacted on by teachers' knowledge, their level of trust and approaches to active participation. Collaborative *enquiry cycles*, which both the literature and the study argue are the most effective way of achieving sustained and deep learning in PLCs, were enabled when teachers had sufficient knowledge and experience to share with the PLC and the confidence and willingness to do so. This included participating actively and opening up their practice and, for example, providing samples of their own and their learners' work. The study found that many teachers were unable to participate in the manner needed. The implication of this is that before PLCs are advocated as the means of TPD for South African teachers the reality of teacher diversity has to be acknowledged and appropriately addressed. PLCs may not be the most suitable TPD vehicle when teachers do not have knowledge to contribute and if their *habitus* cannot accommodate the ways of working required in a PLC.

All the factors discussed above influenced *what* knowledge the teachers learned in the PLCs. While both subject matter knowledge and practical knowledge can be learned in

the PLCs and were learned, the PLCs focused mostly on the latter, in particular, *knowledge of content and teaching* and *knowledge of content and students*. The knowledge available in the group and the extent to which PLC facilitators or participants accessed external knowledge determined what knowledge the group learned. The Geography group relied heavily on the PLC facilitator's knowledge. The English teachers were knowledgeable and confident resulting in deeper learning but still at a practical level. While research in South Africa has shown deep conceptual knowledge learning is possible in carefully structured PLCs with knowledgeable and skilled facilitators (Brodie, 2013), the reality is that PLCs across South Africa as envisaged in the ISFPTED are unlikely to have the necessary knowledge or expert facilitation available to them. The implication of this is that PLCs in South Africa are currently unlikely to enable deep conceptual learning of subject matter knowledge.

The discussion of the enabling/inhibiting factors has highlighted what enables learning and *what* can be learned in PLCs and points to criteria for evaluating whether PLCs can be effective for teachers' learning knowledge-for-teaching.

9.5 EVALUATION OF PLC EFFECTIVENESS FOR LEARNING KNOWLEDGE-FOR-TEACHING

9.5.1 Criteria for evaluating effectiveness of PLCs

The literature on PLCs foregrounds impact on learner performance as a criterion for judging PLC effectiveness (Bryk & Schneider, 2002; McLaughlin & Talbert, 2007; Katz et al., 2009; City et al., 2011). Welch (2012), however, cautions that too great a focus on learner performance inhibits innovation and suggests that other criteria could be explored. The criteria for evaluating PLC success are complex and include more than learner performance improvement as the measure of such success. I use the three criteria for judging a PLC's effectiveness identified by Bolam et al. (2005) as a framework for this discussion: "ultimate impact" focused on learners' results and conduct, "intermediate impact" focused on learning knowledge-for-teaching, aspects of professionalism and morale, and "operational performance", a criterion related to PLC functioning/sustainability (p. 150).

While the "ultimate impact" purpose of PLC work is improvement in learners' results (and social conduct such as improved attendance, reduced drop-out rate) (identified as

potential outcomes in 6a and 6b, Figure 9.1), this is not the only measure of success. Earl & Katz (2005) in their key features of NLCs identify "Impact on pupil learning engagement and success in a knowledge society" as the final outcome of the NLC process (in Katz et al., 2009, p. 10). This study did not explore the impact of PLC work on learners' learning so it is not possible to make any claims with respect to Bolam et al.'s (2005) first criterion. This impact would have been difficult to explore in the context of the study as the teachers and learners in the schools were subject to a number of improvement efforts. Principals and teachers in their responses to questionnaires and in their journals, however, attributed improvement in their learners' performance to their participation in the PLCs. This effect was not empirically tested.

The "intermediate impact" criterion is two-fold. Firstly, PLC work is effective if it impacts on the participants' professional learning. This impact is described in the literature in many ways, for example, teachers learn new knowledge-for-teaching (Easton, 2008), specifically "substantive content and pedagogy" (Huberman, 1995), they change their knowledge and beliefs and do different things in the classroom (Katz et al., 2009; City et al., 2011), they reflect more (Hord, 1997b) and gain new perspectives and a voice to express these (Lieberman, 1995b). Earl & Katz (2010) describe this impact as "Professional knowledge creation and sharing" and "Distributed, deep, and sustained changes in practice and structures in school".

In the study it was possible to see the "intermediate impact" of PLC participation. Teachers reported changing their knowledge and beliefs as a consequence of their extending their professional knowledge. Teachers' ability to reflect was improved through participation in collaborative enquiry processes. The English PLC's *enquiry cycles* and the Mathematics PLC's JLS on "exponents" provided a structure for teachers to try out their new learning, reflect on it, work out how to give useful feedback, and to change their views on teaching their subject. This impact cannot be measured and it cannot be said that all teachers benefited to the same degree with respect to learning how to transfer new knowledge to their classroom in the form of changed and long-lasting instructional practices. The study did not include classroom observation so it is not possible to say whether they changed their practices although many reported in questionnaire responses and journal entries that they did do so.

Secondly, effective PLCs have an impact on morale, specifically resulting in changes in behaviour that enable further learning in PLCs, for example: self-efficacy, motivation to change, learn and apply new skills, commitment, confidence, reduced classroom isolation, and leadership development (Hord, 1997b). The study showed that there was a positive impact on the morale, professional identity and agency of teachers, particularly those in schools located in challenging contexts. The evidence for this claim comes from the participants' learning journals and statements made in sessions as well as from noting the frequency and content of their speaking turns. The collaboration enabled many participants to develop their professional identity as competent and committed teachers with the confidence to create their own materials, share their new knowledge with colleagues at their schools and their neighbouring schools and even to adopt leadership roles. Participation in PLCs had an impact on teachers' *habitus* (another potential outcome identified in 6c of Figure 9.1)

The teachers' participation in the PLCs had an impact on the culture of their schools, for example opening up their practice, sharing of knowledge, establishing structures that support learning such as subject committees at their schools and even their neighbouring ones (6d and 6e, Figure 9.1). Whereas the impact of PLC participation on the English teachers was noted particularly in their professional knowledge learning, the impact on the Geography and some Mathematics PLC participants was on the development of their professional identity and development of personal agency which enabled them to become self-efficacious. They became less dependent on external providers of teaching resources and less submissive to education department officials' instructions because they were able to challenge them with educationally sound arguments, for example, regarding the pacing of the common work schedules and the quality of the common tasks.

The last criterion which focuses on the "operational performance" of PLCs highlights supporting factors that enable PLC effectiveness such as sustainable leadership (distributed and shared), a focus on what matters rather than what is imposed (learning put before achievement), enablers of collaboration including collegiality, trust, an improvement- and an enquiry-oriented mindset, and professional dialogue, (Hargreaves, 2007, pp 185-193) (1-4 in Figure 9.1). The study showed that the PLCs were enabled by

their choice of focus, facilitation, and to a large extent by the community that was established and the collaborative learning processes used. Earl & Katz's (ibid) seven key enablers accord with these (p. 10). Bolam et al. (2005) argue for a means of monitoring and evaluating impact of the PLC. However, Lieberman & McLaughlin (1992) regard this as a problematic issue because, in their opinion, monitoring could inhibit learning. In this study there was limited monitoring and evaluation of the PLCs but progress questionnaires reported on meaningful work being done, albeit in some PLCs at quite a slow pace and not very systematically.

As this criterion deals with sustainability of PLCs as a measure of their effectiveness it is appropriate to discuss whether the model of PLC functioning adopted for this study could be sustained. When participants were asked whether they would continue attending beyond the three years of the project, they said they would. They were, in fact, disappointed when the project came to an end. On the other hand, the Geography facilitator was reaching burn-out because of the burden of responsibility she carried. Participants in her PLC did not share leadership or even contribute significantly in terms of ideas and resources. The other two facilitators would have been prepared to continue on condition that leadership/facilitation was shared with other participants. The three facilitators agreed that they would like to facilitate again and to contribute their experiences to anyone designing PLC training material. They believed they would do some things differently, for example, insist on active participation from the start, and would benefit from ongoing direction and support. The support of the project co-ordinator who assisted with practical matters such as refreshments and reminders of meetings was viewed as essential if the PLCs were to continue. From these findings it can be said that PLCs can function in clusters of school but that support, in various forms, is required. The key factors for operating and sustaining PLC functioning discussed above were for the most part evident in all three PLCs.

9.5.2 Evaluation of the effectiveness of PLCs in this study

Were the PLCs in the study effective in terms of the three criteria? Setting aside the first criterion of impact on learner results, I argue that in this study, participation in a PLC enabled teachers to learn new knowledge-for-teaching, empowered them to see themselves as competent professionals capable of creating their own learning and

teaching material and helping other teachers to do so, and provoked some teachers to change their beliefs about learners and learning and teaching. A few became leaders of PLC-like groups in other contexts. The impact was not equal for all participants. The English and Mathematics teachers probably learned more knowledge-for-teaching and integrated it into their practice and the Geography teachers and some Mathematics teachers developed their professional identity more. In the context of our previously racially divided South African society, working together with teachers of other racial groups from different types of schools in PLCs had the potential to contribute towards social cohesion by breaking down barriers and negative stereotypes. Is all of this enough to say that PLCs are an effective model for teacher development, particularly in the South African context? This question is discussed further in chapter 10.

Having examined the criteria for judging PLC effectiveness I argue that PLCs - set up in a similar way to those in this study - are likely to focus mainly on practical knowledge and on subject matter knowledge only to a limited extent. The more knowledgeable the participants are, the more appropriate this model of TPD will be as deeper knowledge is an enabler of deeper learning. The learning is not likely to be sustained or systematic unless the facilitators are well-trained in handling collaborative enquiry processes, in fulfilling their roles with the kind of "leadership intelligence" needed to select the approach and style that are appropriate for the PLC and in making the expectations of participants clear. The learning process in PLCs is slow and is unlikely to result in learner improvement in the short term. PLCs can effectively develop teacher morale, agency and professional identity. This is important in the South African context of endemic despondency as a result of negative public perception of education quality and teachers' level of professionalism, teachers' view of themselves as objects within the system rather than agents, and a culture of dependency.

9.6 CONCLUSION

In this chapter I have made six claims in response to the main and sub-research questions. I have claimed that for PLCs to function effectively certain enabling conditions are necessary because in their absence PLC work is inhibited. I have argued that:

- PLCs can function when enabling school-level conditions are present and when participating teachers display the characteristics which enable them to collaborate effectively in PLCs;
- effective facilitation is a key enabler because of the strategic functions that the facilitators perform and the social and contextual intelligence they need to perform their role flexibly;
- for PLC sustainability the PLC focus should be on what matters to teachers in their daily practice and what they need to learn rather than be imposed by external agents, often for accountability purposes; and
- structured collaborative enquiry cycles are effective for ensuring that the focus is sustained, deep and on learning knowledge-for-teaching that matters.

The purpose of working in PLCs was for teachers to learn the knowledge-for-teaching that they needed in order to improve learners' learning. I have argued that:

- teachers mainly focused on learning practical knowledge related to *knowledge of content and teaching* and *knowledge of content and students* with a lesser focus on *knowledge of content and curriculum*; and
- the limited focus on subject matter knowledge was on *common content knowledge*, *specialised content knowledge* and *horizon content knowledge*.

The chapter concluded with a discussion of the criteria for evaluating PLC effectiveness. I have claimed that the PLCs in this study met the criteria except for the criterion that PLC participation led to changes in teachers' instructional practices that led to improved learner results. The study did not investigate this outcome of PLC work. I have argued that:

- overall PLCs could be a useful model of TPD in South Africa but that expectations of what can be achieved in PLCs need to be considered carefully;
- PLCs are likely to work well for teachers who have sufficient subject matter knowledge to participate in the collaborative manner expected;
- teachers are likely to learn knowledge-for-teaching, mainly of a practical kind and develop their professional identity and agency; and

- teachers' participation in PLCs could contribute towards building social cohesion.

In the next chapter I reflect on the implications of these findings for policy and practice related to PLCs and for further research.

CHAPTER 10 CONCLUSION AND IMPLICATIONS OF THIS STUDY

In this concluding chapter I identify implications of the findings of this study firstly for PLC practice and secondly for national teacher professional development policy on PLCs. Lastly I reflect on the limitations of this study and suggest possibilities for future research.

10.1 IMPLICATIONS OF THE FINDINGS FOR TPD AND PLC PRACTICE

Reflection on the findings of this study and their significance suggests four main implications for PLC practice.

10.1.1 The PLC model of TPD is best suited to teachers who have sufficient subject matter knowledge that is adequate in depth and similar in nature

The impact of teachers' diverse knowledge levels on how the PLCs in this study functioned was discussed in chapter 9. The greater the depth of teachers' knowledge, the more likely it was that PLCs could be a vehicle for teacher learning. Even when the teachers in the PLCs needed subject matter knowledge the focus of the learning was still mainly on practical knowledge and teachers learned subject matter knowledge mostly in an incidental, superficial, non-systematic and incomplete manner. An implication of this finding is that the PLC model of TPD is more suited to teachers with sufficient and similar subject matter knowledge than for those who lack such knowledge. Teachers who require subject matter knowledge need access to structured and specifically focused programmes designed for learning deep conceptual knowledge in a sustained and systematic manner. Where there are diverse knowledge and other interests and needs it is unlikely that a PLC's particular focus could meet the needs of each teacher and this situation could be frustrating for teachers whose needs were not being addressed. PLCs are likely to work better for teacher learning when they are relatively homogeneous in terms of shared knowledge and skills (no group of teachers is fully homogeneous). Such relative homogeneity is unlikely in many South African contexts and in fact the DBE views PLCs as a vehicle for distributing knowledge resources and getting teachers with stronger knowledge to share with those whose knowledge is weaker. Circular Letter S1 of 2015 from the DBE and a Press statement released on 2 February 2015 announced that teachers of Grade 8 and 9 Mathematics across South

Africa would work in PLCs one day each week to learn the content and pedagogy to teach for the next four days of the week (known as "1 + 4"). This strategy to improve Mathematics teaching by using PLCs indicates a lack of understanding of what is required for effective PLC functioning, for example, that participation should be voluntary, that the focus of the PLC work should be on what teachers need, and that there should be a sufficient level of relational trust present in the community. By instructing all teachers of these grades to attend and prescribing the content and focus the DBE is potentially inhibiting the likelihood of collegial learning and joint work happening if the principles of effective learning in PLCs are ignored.

10.1.2 Suitable facilitators need to be found and prepared for the facilitation role

What the facilitator does can determine the outcomes of PLC activities. An implication of this finding is that facilitators should be adequately prepared for their role and supported as they fulfil their responsibilities. Facilitators therefore need to be trained in all the role expectations and assisted to develop the knowledge and skills necessary to perform a range of functions. They need specific training in:

- how to reach a worthwhile focus, to explore it in depth, and to sustain it so that deep learning is accomplished;
- how to use effective learning processes such as enquiry cycles and protocols;
- how to enable members of a PLC to achieve a deep understanding of why learners make errors or have misconceptions and to prevent teachers from rushing to a teaching solution that bypasses understanding why an error was made; and
- how to encourage honest and robust challenging discussion that moves teachers from their current practice to new ways of thinking and working while promoting a trusting relationship that enables collegiality and opening up of practice.

Facilitation is a demanding role that requires planning and organising for each session. It is not easy for a teacher/HOD to perform the role continuously and still carry out his/her normal teaching and HOD responsibilities. The expectations of and demands on the facilitator are likely to differ according to the membership of a PLC. In relatively homogeneous groups facilitation could be rotated as envisaged in much of the PLC

literature thus easing the burden of an individual facilitator. In South African contexts this may not always be possible leaving a single facilitator responsible for every aspect of the PLC's functioning. Skilful facilitation is complex and requires sensitive "contextual intelligence". It cannot be assumed that all teachers have the skills and personal qualities required for fulfilling this role. This implies that the choice of the facilitator for each PLC is also a key factor enabling learning in a PLC. In South African, and probably elsewhere, finding sufficient facilitators with the required qualities and willingness to perform this role is likely to be a challenge.

10.1.3 Teachers need to be prepared for active participation in PLCs

The study found that teachers struggled to adapt to the ways they were expected to work in PLCs. Their previous TPD experiences had not required them to participate actively and do follow-up activities. An implication of this finding is that teachers may need to be helped explicitly to understand the ways of working required in PLCs. Specific training in, for example, what is expected of them in and between the sessions and how to engage with colleagues in the sessions may be needed. Teachers need to understand that what is shared is not for evaluative purposes but is a contribution to everyone's learning. It needs to be pointed out how TPD using the PLC model is different from other types of TPD. The new ways of working require a mind shift. It is likely that if these expectations are spelled out before the sessions begin active participation is more likely to be achieved early in the life of a PLC.

10.1.4 Protected time for PLC work is necessary

PLC work takes time. The findings of the study identified lack of time as the factor that most inhibited learning in PLCs. An implication of this is that school leadership needs to designate and protect time for PLC activities. In addition, the principal or HOD must not attempt to implement multiple improvement strategies (self-chosen or imposed externally). If PLCs have been chosen as the means for improving teachers' knowledge in order to enable better instructional practice aimed at improvement in learner achievement, they should be the only intervention operating at the time. This implies that if the DBE implements the "1 + 4" Mathematics PLCs, all other programmes for those same teachers would have to be suspended.

10.2 IMPLICATIONS OF THE FINDINGS FOR THE ISPFTED POLICY

PLCs as a vehicle for teachers' professional development are advocated in The Integrated Strategic Planning Framework for Teacher Education and Development in South Africa 2011-2015 (ISFPTED) (2011) Activity 3.3 (p. 14) (Appendix 10.1). Following a national colloquium on PLCs held in September 2014, the DBE released a draft document entitled: "Professional Learning Communities: A Model for South African Schools" (28 November, 2014) (hereafter referred to as the Draft Model) which expands on the ideas only briefly expressed in the ISPFTED. I discuss five areas of findings of this study that have implications for the ISPFTED policy and the Draft Model.

10.2.1 Supportive but non-directive school leadership

The literature and the findings of this study emphasise the need for supportive school leadership particularly at the HOD level. This implies that the policy should recognise the key role of school leadership. It is concerning therefore that the ISPFTED is silent about the role of school leaders. Although the Draft Model recognises that "Supportive school management is a major condition for effective PLCs" and describes the kinds of support envisaged from school leaders, it suggests that school management would be involved in "setting and monitoring the agenda". This might not be seen by teachers as supportive but as interference and is contrary to how the literature suggests PLCs should choose their focus. Limited assistance to help PLCs select a focus might be needed if teachers are unaware of their own learning needs. However, supervisory and monitoring actions of leaders may inhibit PLC functioning. The importance of school leadership to drive and support PLCs by motivating teachers to participate, making resources available and allocating time cannot be underestimated.

10.2.2 The role of facilitator

The ISPFTED does not recognise the complexity of the role of facilitators. It merely states that PLCs will need "external input through well-trained facilitators" (p. 14). It does not specify the role facilitators will play or how they will become well-trained. The Draft PLC Model identifies some of the functions and role expectations and acknowledges the likelihood of different approaches and styles being required at different stages in a PLC's development depending on the needs of the participants (p.

12). The concluding suggestion: "This discussion on what the role of the facilitator is, can best be organised when the PLC is established" might be difficult to carry out as PLC participants might not have sufficient understanding of PLC functioning and the intended objectives of PLC work. In the study this strategy might have worked for the English PLC but the Geography PLC participants might easily have determined that the facilitator's role was to provide resources and demonstration lessons. The collaborative and enquiry-oriented nature of PLC work that required participants' active participation could have been entirely ignored, thus making the PLC merely another type of transmission workshop.

10.2.3 Choice of learning focus

A key enabler of learning in PLCs is the choice of a focus that is "clear and defensible" (Katz et al., 2009). The ISPFTED does not deal with how focus is achieved or what it should be on beyond suggesting in Activity 3.3b that teachers should diagnose their learning needs using self-assessments or suggest areas of weakness for the PLC to assist them with. The Draft Model does not address this aspect. The findings in the study indicate that not all teachers are able to arrive at a worthwhile focus of learning without assistance. This aspect needs to be addressed because it would also not be right for the focus to be imposed by, for example, subject advisors, who also may not know the teachers' needs.

10.2.4 Expectations of PLCs

The ISPFTED Activity 3.3d and the activities listed in Activity 3.3 e indicate an expectation that teachers will be able to learn substantial subject matter knowledge and practical knowledge in PLCs yet this study found that teachers in PLCs focused mostly on learning practical knowledge-for-teaching. An implication of this finding is that policy-makers and education officials should not expect extensive and systematic learning of subject matter knowledge in PLCs.

10.2.5 Effective learning processes

When the PLCs in the study used collaborative enquiry cycles it emerged that learning was more effective as it was focused, in-depth and sustained. The ISPFTED identifies a number of "activities" for PLCs to focus on which include learning how to analyse standardised assessments such as the annual National Assessments (ANAs) and NSC

examination results and determining teachers' learning needs from what is identified in the analysis. The policy also envisages teachers learning how to interpret and implement the curriculum, CAPS. What learning processes PLCs could use is not addressed. The Draft PLC Model extends the list of "activities" to include more enquiry-oriented topics such as "Discuss, critique and adapt the Curriculum and Assessment Policy Statements to their own circumstances" (p. 14). Additional guidance on how to use effective learning processes in order to accomplish meaningful learning will be needed to give effect to the intentions of the policy.

At this stage in South Africa's education environment the policy on PLCs as it stands is ambitious. However, if the difficulties identified are addressed it is possible that PLCs can be an effective vehicle for learning for teachers who have sufficient subject matter knowledge and practical knowledge to contribute to the learning processes.

10.3 LIMITATIONS OF THIS RESEARCH AND POSSIBILITIES FOR FUTURE RESEARCH

10.3.1 Limitations of the study

The first main limitation of this study is the small sample. Only three PLCs involving 26 teachers who participated regularly for the duration of the project (January 2011 – October 2013) comprised the case study. I believe the findings can be generalised to some extent because the PLCs involved three subjects with different teacher and learner learning needs and because the teachers were located in schools which faced different accountability pressures. The teachers came from a range of secondary schools (six township, three suburban, one inner city, and one new housing settlement) and had received their initial teacher education at a range of institutions. Some had studied further in recent years. The absence of teachers from rural or semi-rural schools in the sample does mean that the findings do not reflect what these teachers might experience in PLCs and whether or how PLCs would or would not work in these schools. The challenges faced by the teachers in the three PLCs appear reasonably representative of all other teachers and the various subjects they teach. The PLCs in the study were facilitated by school-based teachers or HODs and in this respect are similar to the PLCs that the ISPFTED envisages. The study consequently does not provide an understanding of how PLCs might work differently if they were facilitated by external persons such as subject advisors, university lecturers or representatives from subject professional

associations. A second major limitation is the fact that all participants were volunteers. This study can therefore provide no insight into how PLCs would function if participation in them became obligatory for teachers. The third major limitation is that in this study the evidence consists mainly of perceptual self-reported data and analysis of PLC meetings. The evidence does not include classroom observations and other ways of testing the validity of claims about the increase of knowledge-for-teaching among the teachers who participated in the PLCs.

10.3.2 Areas of further research

At least six areas of further research are suggested by this study.

10.3.2.1 Development of knowledge in PLCs

This study has found that PLCs are beneficial for teachers with strong knowledge. The reality is that many South African teachers lack this knowledge. Research into whether PLCs could develop teachers' subject knowledge at a deep conceptual level if they were differently organised would be worthwhile in light of this great need. Studies could investigate models of PLCs for the South African context, for example:

i. *"1 + 4" model as envisaged by the DBE for the training of Mathematics teachers*

   The DBE is knowingly trying this model without it having been researched. It would therefore be helpful to undertake a formal study of, for example, three different PLCs using this model to see the impact. In this model teachers with diverse knowledge and experience from a cluster of schools work in a PLC for seven hours once a week with an "expert" teacher or subject advisor (the facilitator) who uses standardised materials (subject matter knowledge and PCK) specifically prepared for this programme by the DBE. Participation by the identified teachers is compulsory. The facilitator is likely to have to use a teacher approach and directive style. Teachers' knowledge is tested before the day's learning begins and at the end of the day's session. This model does not envisage linking teachers' participation with their learners' ANA results or observing whether the learning in the PLC translates into changed classroom practices but these measures could be included in the study.

ii. *Teachers choose the focus and expertise is accessed to address these learning needs*

In this model teachers voluntarily choose to meet in a PLC to address their learning needs. Their knowledge and experience is likely to be diverse. The teachers jointly agree on the focus for their learning activities and the facilitator works with outside expertise to design a structured programme, where the knowledge learned is organised hierarchically as in formal programmes, to cover the subject matter knowledge and PCK related to the chosen focus. The facilitator would be likely to use a discussion leader approach and largely non-directive style once the learning programme had been worked out and explained to the teachers. The teachers would work in active and collaborative ways as described in the PLC literature. The impact of the learning could be gauged by the materials teachers produce in the PLC.

iii. *Knowledgeable teachers investigate learners' errors*

In this model volunteer teachers (probably Mathematics or Science teachers) with sound subject matter knowledge, a relatively homogeneous group, meet in a PLC to try to understand why learners make errors. The research would investigate what type of knowledge the teachers work with and whether they show deep conceptual knowledge when they explain the reasons for learners' errors. In other words, the research would investigate whether teachers with sound knowledge have the ability to truly understand the reasons for learners' errors and are able to explain these reasons. At the same time the nature and content of the deep conceptual knowledge needed for explaining learners' errors could be explored and the findings used to draw up the content of a learning programme to help other teachers develop the required knowledge.

10.3.2.2 What teacher learning actually occurs in PLCs and how does it impact on teachers' practice

This study did not collect evidence of exactly what teachers learned in their PLCs and how this learning impacted on their classroom practice. It did not collect data from classroom observations and so could not make any claims based on reliable evidence. Teachers self-reported that they had learned useful knowledge for their teaching practice but this could not be tested. Further research that includes observations of

teachers using their new knowledge in the classroom would increase understanding of whether PLCs are effective for developing teachers' knowledge-for-teaching. Such a study could also assess what was learned and whether it was 'correct' knowledge, and whether it was taught correctly.

10.3.2.3 Teachers' attitudes to TPD.

The ISPFTED Activity 3.3 assumes that teachers subscribe to the notion of lifelong learning and the professional obligation to engage in professional development. It could be argued that there are three main types of teachers in South African schools: those who ask for TPD but want to do it during school time, those who do not believe they have learning needs and are reluctant to participate in TPD activities at any time, and those who are willing to engage in TPD activities in their own time (after school, weekends and holidays) provided the programme meets a personal learning need. An investigation of these attitudes and other attitudes and their likely impact on PLCs and TPD policy is worth undertaking. In light of teachers' attitudes towards TPD are they likely to voluntarily participate in PLCs which require active participation over a long period of time?

10.3.2.4 The impact of school culture firstly at a school level and secondly at a national level.

A question to investigate is how enabling or inhibiting is the culture of school for the functioning of PLCs? Teachers in the study reported that many of their colleagues and schools operated with a mindset that was individualistic and private and which promoted competitiveness rather than openness, collaboration and teamwork which were needed in a PLC. Research could investigate what would be needed to bring about changes in school culture to enable PLC functioning. Research could also explore whether teachers who had participated in PLCs and had learned new ways of working could influence their schools' culture to the extent that PLCs could function effectively and, if they had been able to do so, how could this positive impact of PLC activities be replicated and extended.

More complex, but also related to culture and teachers' ability to participate in PLCs in the manner described in the international literature, is to understand the impact of national culture or systemic culture on the functioning of a PLC in a particular country

and its schools. Researchers investigating the impact of socio-cultural factors on PLCs in Singapore (Hairon & Dimmock, 2012) and China (Wong, 2010) indicate that PLCs operating in different cultures from those in the political north do not have the same objectives or use the same criteria for judging PLC effectiveness. Characteristic of the culture of many South African schools is fear of authority, submissiveness or deference towards authority or alternatively arrogant disregard for authority, malicious compliance, and secret privatised practice all of which present challenges to adopting a PLC model for this country. South African schools operate in a culture which has characteristics that are inimical to PLC functioning such as hierarchical structure, dependency mentality and a low level of professionalism or belief in personal agency (Taylor et al., 2012, p. 10). Research could explore whether or not the South African education system is in a position to adopt a PLC model as described in the literature which mostly originates from parts of the world in which different socio-cultural factors prevail. A study could investigate whether a South African model of a PLC with different characteristics and expected outcomes from those described in the literature from the political north might be more appropriate for meeting the needs of teachers and learners.

10.3.2.5 The impact or outcomes of teacher participation in PLCs

This study identified positive changes in **teachers' morale, identity and agency** but only briefly dealt with this outcome of their participation in a PLC. Further research into the impact of such participation could also be useful.

i An outcome of teachers' learning in PLCs emphasised in the literature is **changed teaching practices that lead to improved learner performance**. This study did not attempt to investigate this outcome. In light of limited empirical evidence to support the view, particularly in South Africa, research into the impact of teachers' participation in PLCs on learner performance would also be most useful.

ii An additional possible impact of teachers' participation in networked PLCs (teachers from clusters of diverse South Africa schools) is that teachers of different racial groups, languages, cultures and religions with different social, political and economic histories might, through working together towards a

common goal, forge a better understanding of one another that contributes to **building social cohesion** in South Africa's still divided society. Research into this might also prove useful and provide added justification for pursuing PLCs as a model of TPD.

10.3.2.6 Teachers and schools in South Africa that have not been the subject of PLC research studies: the rural teachers and schools.

As stated above this study investigated PLCs in urban areas that had easy access to resources and technologies that could support PLC work and where distances between schools in the networked PLCs were relatively small. Other research on PLCs in South Africa has also focused mostly on urban teachers and schools. The ISPFTED envisages the roll out of PLCs for all teachers in South Africa. Research into how this will be possible for teachers outside urban areas is needed. Adaptations to the model, for example, on-line PLCs, might be possible providing the necessary services were available. Many aspects of this unresearched area merit investigation including how the barriers of distance and absence of knowledge support could be overcome.

10.4 CONCLUDING REFLECTIONS

As a believer in lifelong learning I undertook this study with a personal view that continuing professional development was part of a teacher's professional obligation. However, as a professional, I believed that the focus of the TPD should be determined according to the professional needs of the individual teacher and pursued voluntarily. The focus should not be imposed on the teacher by someone else nor should the teacher be compelled to attend the programme, more so if it were likely to be of poor quality and irrelevant to the teachers' needs. I had reached this view after being subjected to extremely bad TPD[165] in generic content using inappropriate methodologies for adult learners by presenters who did not understand their materials and whose facilitation and presentation skills were woefully inadequate. The one-size fits all programmes met none of the participating teachers' needs.

I believed in a teacher-led model of professional development. My reading about PLCs and their characteristics led me to consider PLCs as a potentially appropriate means of

[165] Training for the implementation of the C2005 and then the NCS; I declined to attend the CAPS training.

TPD for professional teachers. I thought that the research or enquiry-based processes to explore topics of concern to relatively like-minded teachers who had the objective of learning how to teach more effectively so that their students could achieve better results would be intellectually stimulating and fruitful.

With this view of the potential of PLCs I initiated a networked learning community comprising teachers and principals from eleven different schools who met approximately every second week for three years to work in eight subject PLCs and a principals' PLC. This PhD study investigated three of the subject PLCs for approximately half this period. The intention was that lead subject teachers would attend the networked PLCs and then during the intervening week replicate PLC type activities at their schools. Teachers at the coordinating school were to be the first facilitators but they were free to share this responsibility with others.

Not everything went according to plan and early on in the study it became apparent that most lead teachers saw no need to participate in the PLCs but rather instructed or invited less experienced teachers to do so. The transfer of learning from the networked PLCs did not happen except in the case of one of the PLCs in the study because the teachers who attended did not have sufficient influence at their schools to implement them. In many cases, as reported by the participating teachers, the culture of the school was not supportive of the type of engagement required in PLCs such as being open about one's practice and sharing knowledge. Nevertheless, within these limitations the participants met regularly and carried out various PLC activities which they reported were useful for learning knowledge-for-teaching. The three PLCs studied revealed different ways of working and even different outcomes. From the findings I have made claims which have been discussed in chapter 9 and I have articulated implications for TPD practice and policy in this chapter.

I learned that the PLC model of TPD described in the research literature, based largely in a very different educational environment with teachers who have a different and stronger professional identity and enough subject matter knowledge to be able to share with colleagues, might not work in the same way in the South African context where there is great diversity in these factors across the system.

I did, however, reach the end of the study with sufficient evidence in the findings for me to retain a belief in PLCs as a vehicle for effective TPD in a qualified form. PLCs will work well for teachers with knowledge and confidence to work collaboratively in a manner that challenges their past instructional practices and leads to new learning and new practices. The implications discussed in this chapter have identified aspects of PLC functioning that need to be addressed in order to achieve the most benefit from PLC activities. The use of PLCs for TPD in South Africa is just beginning and there is much still to be learned before PLCs can be used widely and with confidence that they will be an effective means of teacher development for South African teachers.

At the time of writing these concluding remarks I am involved in ELRC consultation processes related to the DBE's planned extensive roll out of PLCs[166] as a vehicle for teaching all grade 8 and 9 Mathematics teachers the content and pedagogy for implementing CAPS with the aim of improving the grade 9 ANA results. It is of great concern to me that the DBE's plan honours neither the principles of effective TPD (e.g. the DBE requires all teachers to participate whether they need the knowledge or not) nor the principles of effective PLCs (e.g. the focus should be chosen by participants who should be volunteers – In the DBE programme the materials have been prescribed, namely: subject matter knowledge for a week's worth of teaching and the accompanying pedagogical content knowledge in a scripted format). I fear that regardless of what research studies on PLCs in South Africa can teach the DBE officials, the plan may go ahead and it will become another ineffective TPD programme, costly in human resources and disruptive to school's functioning. It may also further discourage teachers from continuous professional learning. My hope would be that the findings of this study and similar ones would be given serious attention. If just one finding were noted it would be that deep conceptual knowledge, the type of knowledge which is needed to teach Mathematics, is unlikely to be learned systematically in a PLC of the nature envisaged by the DBE.

[166] Teachers meet in clusters of 10-15 schools (which could involve 20-30 teachers) every Monday to learn the work to be taught in the next four days. The PLCs will be facilitated by "expert teachers" and subject advisors using prepared materials but without having been trained in the materials or facilitation responsibilities and skills.

REFERENCES

Adler, J. & Reed, Y. (2000). Researching teachers' "take up" from a formal in-service professional development programme. *Journal of Education* (25), 192-226.

Adler, J. & Reed, Y. (2002) Researching teacher's take up from a formal in-service professional development programme. In J. Adler & Y. Reed (Eds.), *Challenges of Teacher Development: an investigation of take-up in South Africa*. Pretoria: Van Schaik.

Adler, J. & Reed, Y. (Eds). (2002). *Challenges of teacher development. An investigation of take-up in South Africa*. Pretoria: Van Schaik.

Adler, J., Slonimsky, L, & Reed, Y. (2002). Subject-focused INSET and teachers' conceptual knowledge-in-practice. In Adler, J. & Reed, Y. (Eds), *Challenges of teacher development. An investigation of take-up in South Africa*. (pp. 135-152). Pretoria: Van Schaik.

African National Congress. (2007). Resolutions of the 52nd Conference. Polokwane: ANC. Accessed at: http://www.anc.org.za/ancdocs/history/conf/conference52/main.html

Allen, D. (Ed.). (1998). *Assessing Student Learning: From grading to understanding*. New York: Teachers College Press.

Allen, D. & Blythe, T. (2004). *The facilitator's book of questions: Tools for looking together at student and teacher work.* New York: Teachers College Press.

Allen, K. & Cherry, C. (2000). *Systemic Leadership: Enriching the meaning of our work.* Boston University Press of America.

Argyris, C. & Schön, D.A. (1974). *Theory in Practice: Increasing Professional Effectiveness.* New York: Jossey-Bass.

Atkinson, L., Cate, J., O'Hair, M. & Slater, J. (2009). K20 model. Creating Networks, Professional Learning Communities, and Communities of Practice that Increase Science Learning. In S. Mundry & K. Stiles (Eds.), *Professional Learning Communities for Science Teaching: lessons from research and practice*. Arlington, Virginia: NTSA Press.

Babbie, E. & Mouton, J. (2001). *The practice of social research*. South African Edition. Oxford: Oxford University Press.

Babbie, E. (2005). *The Basics of Social Research*, 3rd edition. Belmont: Thomson Wadsworth.

Ball, D. (1996). Teacher learning and the mathematics reforms: What we think we know and what we need to learn. *Phi Delta Kappan*. 77(7), 500-508.

Ball, D. & Cohen, D. (1999). Developing Practice, Developing Practitioners. In Darling-Hammond, L. & Sykes G. (1999). *Teaching as the learning profession: Handbook of policy and practice*. San Francisco, CA: Jossey-Bass.

Ball, D. & Forzani, F. (2009). The work of Teaching and the Challenge of Teacher Education. *Journal of Teacher Education, 60*(5), 497-511.

Ball, D., Thames, M. & Phelps, G. (2008). Content Knowledge for Teaching: What Makes It Special? *Journal of Teacher Education, 59*(5), 389-407.

Bantwini, B. (2009). District professional development models as a way to introduce primary-school teachers to natural science curriculum reforms in one district in South Africa. *Journal of Education for Teaching, 35*(2), 169-182.

Barber, M. & Mourshead, M. (2007). *How the world's best performing school systems come out on top*. London: McKinsey and Company.

Bascia, N. & Hargreaves, A. (Eds.). (2000). *The Sharp Edge of Educational Change: Teaching, Leading and the Realities of Reform*. London: Routledge.

Bassey, M. (1999) *Case study research in educational settings.* Buckingham: Open University Press.

Beeby, C.E. (1980). The thesis of stages fourteen years later. *International Review of Education*, *26*(4), 451-474.

Beeby, C.E. (1986). *The Quality of Education in Developing Countries*. Cambridge, MA: Harvard University Press.

Benner, P. (2004). Using the Dreyfus Model of Skill Acquisition to describe and interpret skill acquisition and clinical judgment in nursing practice and education. *Bulletin of Science and Technology,* (24), 188.

Bernstein, B. (1999). Vertical and horizontal discourse: an essay. *British Journal of Sociology of Education*, *23*(1), 157-173.

Bertram, C. (2011). What does research say about teacher learning and teacher knowledge?: Implications for professional development in South Africa. *Journal of Education.* 52, 3-26.

Billett, S. (2001) Learning through work: workplace affordances and individual engagement, *Journal of workplace learning*, 13(5), 209-214.

Birman, F., Desimone, L., Porter, A., & Garet, M. (2000). Designing professional development that works. *Educational Leadership, 57*(8), 28-33.

Bloch, G., Fleisch B., Chisholm, L., & Mabizela, M. (2008). *Investment Choices for South African Education.* Johannesburg: Wits University Press.

Blythe, T., Allen, D. & Powell, B. (2007). *Looking together at student work: A companion guide to assessing student learning.* New York: Teachers College Press.

Bogdan, R. & Biklen, S. (1992). *Qualitative Research for Education: An Introduction to Theory and Methods*. Needham Heights, Mass: Allyn and Bacon.

Bolam, R., McMahon, A., Stoll, L., Thomas, S., Wallace, M., Greenwood, A., Hawkey, K., Ingram, S., Atkinson, A. & Smith, M. (2005). *Creating and Sustaining Effective Learning Communities.* Nottingham: Department for Education and Skills.

Booth, W., Colomb, G. & Williams, J. (2003). *The Craft of Research*. Chicago: Chicago University Press.

Borassi, R. (1987). Exploring Mathematics through the Analysis of Errors. *For the Learning of Mathematics*, *7*(3), 2-8.

Borko, H. (2004). Professional development and teacher learning. Mapping the terrain. *Educational Researcher*, *33*(8), 3-15.

Botha, E. (2012). Turning the tide: creating Professional Learning Communities to improve teaching practice and learning in South African public schools. *Africa Education Review*, 9(2), 395-411.

Boudett, K., City, E. & Murnane, R. (2008). *Data-wise: A step-by-step guide to using assessment results to improve teaching and learning*. Cambridge, MA: Harvard Education Press.

Boyd, V. (1992). *School context: Bridge or barrier to change?* Austin, TX: Southwest Educational Development Laboratory.

Boyd, V. & Hord, S. (1994). Schools as learning communities. *Issues ... about Change, 4*(1). Austin, TX: Southwest Educational Development Laboratory.

Bransford, J., Brown, A. & Cocking, R. (Eds.). (2000). *How People Learn*. Washington, D.C.: National Academy Press.

Brodie, K. (2013). The power of professional learning communities. *Education as change, 17*(1), 5-18.

Brodie, K. (2014a). Learning about learner errors in professional learning communities. *Educational Studies in Mathematics, 85*(2), 221-239.

Brodie, K. (2014c). Using Assessment Data to Improve Practice. *Findings from the DIPIP project (2011-2013).* DIPIP and University of the Witwatersrand.

Brodie, K. (2014d). A model for continuous professional development for facilitators of professional learning communities. *Findings from the DIPIP project (2011-2013).* DIPIP and University of the Witwatersrand.

Brodie, K., Molefe, N. & Lourens, F. (2014b). Learning to Lead Professional Learning Communities in Mathematics. *NCSM Journal of Mathematics Education Leadership*, Winter/Spring, 2-11.

Brodie, K. & Sanni R. (2014), 'We don't know it since we don't teach it': Interactions Between Teachers' Knowledge and Practice. African Journal of Research in Mathematics, Science and Technology Education, DOI: 10.1080/10288457.2014.930980.

Brodie, K. & Shalem, Y. (2011). Accountability conversations: mathematics teachers' learning through challenge and solidarity. *Journal for Mathematics Teacher Education*, (14), 419-439.

Brown, S. (Ed.). (2006). *2006 Transformation Audit: Money and Morality*. Cape Town: Institute for Justice and Reconciliation.

Bryk, A., Camburn, E., & Louis, K. (1999). Professional community in Chicago elementary schools: Facilitating factors and organizational consequences. *Educational Administration Quarterly*, (35), 751-781.

Bryk, A., Easton, J., Kerbow, D., Rollow, S. & Sebring, P. (1994). The state of Chicago school reform. *Phi Delta Kappan*, *76*(1), 74-78.

Bryk, A. & Schneider, B. (2002). *Trust in schools: A core resource for improvement*. New York: Russel Sage Foundation.

Bullough, R.V. & Pinnegar, S. (2001). Guidelines for quality autobiographical forms of self-study research. *Educational Researcher, 30*(3), 13-21.

Caine, G. & Caine, R. (2010). *Strengthening and Enriching Your Professional Learning Community.* Alexandria, VA: Association for Supervision and Curriculum Development.

Calhoun, E. & Joyce, B. (1998). "Inside-out" and "outside-in": learning from past and present school improvement paradigms. In A. Hargreaves, A. Lieberman, M. Fullan & D. Hopkins (Eds.), *International Handbook of Educational Change. Part Two.* Dordrecht: Kluwer Academic Publishers.

Carmichael, L. (1982). Leaders as learners: A possible dream. *Educational Leadership*, *40*(1), 58-59.

Carnoy, M. (1999). *Globalisation and educational reform: what planners need to know*? Paris: UNESCO.

Carnoy, M. (2008). Lessons from the past two decades. Investment choices for education and growth. In G. Bloch, B. Fleisch, L. Chisholm & M. Mabizela (Eds.), *Investment Choices for South African Education.* Johannesburg: Wits University Press.

Carr, W. & Kemmis, S. (1986). *Becoming Critical. Education knowledge and action research*. Lewes: Falmer.

Cerbin, W. & Kopp, B. (2006). Lesson Study as a model for building pedagogical knowledge and improving teaching. *International Journal of Teaching and Learning in Higher Education, 18*(3), 250-257.

Cereseto, A. (2009). *Caught in the nest: Teachers' experiences of layered regulation of quality improvement.* (Unpublished Masters Dissertation, University of the Witwatersrand, Johannesburg.)

Chapman, C. (2006). *School Improvement Through external Intervention?* London: Continuum.

Chapman, C., Ainscow, M., Bragg, J., Gunter, H., Hull, J., Mongon, D., Muijis, D. & West, M. (2008). *Emerging Patterns of School Leadership: Current Trends and Future Directions.* Nottingham: NCSL.

Chapman, J. & Aspin, D. (2003). Networks of Learning: A new construct for educational provision and a new strategy for reform. In B. Davies & J. West-Burnham (Eds.), *Handbook of Educational Leadership and Management* (pp. 653-659). London: Pearson.

Chappuis, J. (2007). *Learning team facilitator handbook*. Portland, OR: Educational Testing Service.

Chappuis, S., Chappuis, J. & Stiggins, R. (2009). "Supporting Teacher Learning Teams". *Educational Leadership*, *66*(5), 56-60.

Charmaz, C. (2002). Qualitative interviewing and grounded theory analysis, In J.F. Gubrium & J.A. Holstein (Eds.), *Handbook of interview research: context and method*. London: Sage.

Chauraya, M. (2012, March). Mathematics Teachers' Knowledge Growth. Retrieved from http://www.qucosa.de/fileadmin/data/qucosa/documents/8243/Proceedings-394pages-SA2011_075-080.pdf

Chisholm, L. (2000). *A Curriculum for the Twenty First Century: Report of the Review Committee on Curriculum 2005* (presented to Prof Kader Asmal, Minister of Education, 31 May 2000).

Christie, P., Butler, D. & Potterton, M. (2007). *Schools that Work*. Report to the Minister of Education. Pretoria: Department of Education.

Church, M., Bitel, M., Armstrong, K., Fernando, P., Gould, H., Joss, S., Marwaha-Diedrich, M., Torre, A., & Vouché, C. (2002). *Participation, Relationships and Dynamic Change: New thinking on evaluating the work of international networks*. London: University College London.

City, E., Elmore, R., Fiarman, S. & Teitel, L. (2011). *Instructional Rounds in Education: a network approach to improving teaching and learning*. Cambridge, MA: Harvard Education Press.

Cochran-Smith, M. (2010). 'Re-culturing' Teacher Education: Inquiry, Evidence, and Action. *Journal of Teacher Education*, *60*(5), 458-468.

Cochran-Smith, M. & Little, S. (1995) The teacher research movement: A decade later. *Educational Researcher*, *28*(7), 15-25.

Cohen, D. (1995). What is the system in systemic reform? *Educational Researcher*, *24*(9), 11-17.

Cohen, D. & Ball, D. (1999). Instruction, Capacity, and Improvement. *CPRE Research Report Series RR-43*. Philadelphia, P.A.: Consortium for Policy Research in Education, University of Pennsylvania.

Cohen, D. & Hill, H. (2001). *Learning policy: When state education reform works.* New Haven, CT: Yale University Press.

Cohen, L., Manion, L. & Morrison, K. (2000). *Research Methods in Education*. London: RoutledgeFalmer.

Collins, J. & Porras, J. (1997). *Built to last: Successful habits of visionary companies*. New York: Harper Business.

Connelly, F. & Clandinin, D. (1995). Narrative and education. *Teachers and Teaching: Theory and Practice*, *1*(1), 73-85.

Corcoran, T. (1995). *Transforming professional development for teachers: A guide for state policymakers*. Washington, DC: American Educational Research Association.

Cordingly, P. & Bell, M. (2007). *Transferring learning and taking innovation to scale.* London: The Innovation Unit.

Crouch, L. (2005). *Disappearing schoolchildren or data misunderstandings? Dropout phenomena in South Africa*. Pretoria: Department of Education.

Crouch, L. & Patel, F. (2008). South African education investment. A rights and skills agenda? In G. Bloch, B. Fleisch, L. Chisholm & M. Mabizela, M. (Eds.), *Investment Choices for South African Education.* Johannesburg: Wits University Press.

Darling-Hammond, L. (1995). Changing conceptions of teaching and teacher development. *Teacher Education Quarterly*, *22*(4), 9-26.

Darling-Hammond, L. (1995b). Policy for restructuring. In A. Lieberman (Ed.), *The work of restructuring schools: Building from the ground up.* New York: Teachers College Press.

Darling-Hammond, L. (1996). What matters most: A competent teacher for every child. *Phi Delta Kappan.* 78(3), 193-201.

Darling-Hammond, L. (1997). *The right to learn: a blueprint for creating schools that work*. San Francisco: Jossey-Bass.

Darling-Hammond, L. & Bransford, J. (Eds.). (2005). *Preparing Teachers for a Changing World: What Teachers Should Learn and Be Able to Do*. San Francisco: Jossey-Bass.

Darling-Hammond, L. & McLaughlin, M. (1995). Policies That Support Professional Development in an Era of Reform. *Phi Delta Kappan* 76(8), 597-604.

Darling-Hammond, L. & Richardson, N. (2009). "Teaching learning: What matters?" *Educational Leadership*, *66*(5), 46-55.

Darling-Hammond, L. & Sykes G. (1999). *Teaching as the learning profession: handbook of policy and practice.* San Francisco, CA: Jossey-Bass.

Datnow, A. (2005a). The Sustainability of Comprehensive School Reform Models in Changing District and State Contexts. *Educational Administration Quarterly, 41*(1), 121-153.

Datnow, A. (2005b). Collaboration and contrived collegiality: Revisiting Hargreaves in an Age of accountability. *Journal of Educational Change,* (12), 147-158.

Datnow, A. (2011). Collaboration and contrived collegiality: Revisiting Hargreaves in the age of accountability. *Journal of Educational Change*. DOI: 10:1007/s10833-011-9154-1.

Davies, B. & West-Burnham, J. (Eds.). *Handbook of Educational Leadership and Management*. London: Pearson.

Day, C. (1993). Reflection: a necessary but not sufficient condition for professional development. *British Educational Research Journal, 19*(1), 83-93.

Day, C. (1999). *Developing Teachers: The Challenges of Lifelong Learning.* London: Falmer Press.

De Berg, K. & Grieve, C. (1999). Understanding the siphon: An example of the development of pedagogical content knowledge using textbooks and the writings of early scientists. *Australian Science teachers' Journal,* 45(4), 19-26.

De Clercq, F. (2007a). School Monitoring and Change: a critical examination of the Whole School Evaluation. *Education as Change*, *11*(2), 97-113.

De Clercq, F. (2007b). Teacher Appraisal Monitoring: the problem of the IQMS. *Perspectives in Education*, *26*(1), 7-18.

De Clercq, F. & Shalem, Y. (2014). Teacher knowledge and employer-driven professional development: A critical analysis of the Gauteng Department of Education programmes. *Southern African Review of Education*, *20*(1), 129-147.

Denzin, N. & Lincoln, Y. (Eds.). (1998). *Collecting and interpreting qualitative materials*. Thousand Oaks, CA: Sage.

Denzin, N. & Lincoln, Y. (Eds.). (2000). *The Handbook of Qualitative Research*. Thousand Oaks, CA: Sage.

Department of Education. (2001, July). *The National Policy on Whole School Evaluation Policy*. Pretoria. (Government Gazette, Vol. 433, No. 22512).

Department of Education. (2006, 11 December). *Revised National Protocol on Recording and Reporting. (*Government Gazette, 29467).

Department of Education. (2007). *National Framework Policy for Teacher Education and Development*. Pretoria.

Department of Education. (2008). *DoE Strategies to Strengthen IQMS Processes*. Presentation to HEDCOM.

Department of Basic Education. (2009). *Report of the Task Team for the Review of the Implementation of National Curriculum Statement*. Pretoria.

Department of Basic Education. (2012a). *National Policy Pertaining to the Programme and Promotion Requirements of the NCS Grades R-12*. Pretoria.

Department of Basic Education. (2012b). *National Protocol for Assessment Grades R–12*. Pretoria.

Department of Basic Education. (2014a). *Professional Learning Communities: A Model for South African Schools.* Draft version, November 28, 2014. Pretoria.

Department of Basic Education. (2014b). *Report on the Annual National Assessment of 2014*. Pretoria.

Department of Basic Education and Department of Higher Education and Training. (2011). *Integrated Strategic Planning Framework for Teacher Education and Development in South Africa: 2011-2025*. Pretoria.

Department of Education, South Africa. (1997). *Curriculum 2005. Learning for the 21st Century.* Pretoria.

Desforges, C. (1995). How does experience affect theoretical knowledge for teaching? *Learning and Instruction*, (5), 385-400.

Development Bank of South Africa. (2008). *Education Roadmap*. Midrand: DBSA. Accessed at: http://www.dbsa.org/Research/Documents/education_10%20point%20plan_131108.pdf

Dexter, L. (1970). *Elite and Specialized Interviewing*. Evanston, Ill: Northwestern University Press.

Doig, B. & Groves, S. (2011). Japanese Lesson Study: Teacher Professional Development through Communities of Inquiry. *Mathematics Teacher Education and Development, 13*(1), 77-93.

Droga, L. & Humphrey, S. (2002). *Getting started with functional grammar*. Berry, NSW: Target Texts.

DuFour, R. (2002). The Learning-Centered Principal. *Educational Leadership*, *59*(8), 12-15.

DuFour, R. (2004). What is a "Professional Learning Community? *Educational Leadership*, *61*(8), 6-11.

DuFour, R., DuFour, R. & Eaker, R. (2006). *Learning by Doing: A handbook for professional learning communities at work*. Bloomington, IN: Solution Tree Press.

DuFour, R., DuFour, R. & Eaker, R. (2008). P*rofessional Learning Communities at Work: New Insights for Improving Schools*. Bloomington, IN: Solution Tree Press.

DuFour, R. & Marzano, R. (2009). High-Leverage Strategies for Principal Leadership. *Educational Leadership*, 66(5), 62-68.

Earl, L. & Katz, S. (2005). *What makes a network a learning network?* Nottingham, UK: National College for School Leadership.

Earl, L. & Katz, S. (2006). *Leading Schools in a Data-rich World: Harnessing data for school improvement.* Thousand Oaks, CA: Corwin.

Earl, L. & Katz, S. (2007). Leadership in networked learning communities: Defining the terrain. *School Leadership and Management, 27*(3), 239-258.

Earl, L. & Katz, S. (2010) Creating a Culture of Inquiry: Harnessing Data for Professional Learning. In Blankstein, A., Houston, P. and Cole, R. (Eds.) *Data Enhanced Leadership Series: The Soul Of Educational Leadership*. Thousand Oaks, CA: Corwin Press.

Earl, L. & Hannay, L. (2011). Educators as Knowledge Leaders, In J. Robertson & H. Timperley (Eds.). *Leadership and Learning* (pp.186-201). London: Sage.

Earl, L. & Katz, S. (2010) Creating a Culture of Inquiry: Harnessing Data for Professional Learning. In Blankstein, A., Houston, P. and Cole, R. (eds.) *Data Enhanced Leadership Series: The Soul Of Educational Leadership*. Thousand Oaks, CA: Corwin Press.

Earl, L. & Timperley, H. (Eds). (2008). *Professional Learning Conversations: Challenges in using evidence for improvement*. Toronto: Springer.

Easton, L. (2008). From Professional Development to Professional Learning. *Phi Delta Kappan, 89*(10), 755-761.

Easton, L. (2009). *Protocols for Professional Learning*. Alexandria, VA: Association for Supervision and Curriculum Development.

Education Labour Relations Council. (2003). *Integrated Quality Management System (IQMS) for School-based Educators.* Resolutions 1 and 8 of 2003: Centurion.

Education Labour Relations Council. (2010). *Perfecting the Art of Teaching. Report of the Teacher Development Summit 29 June-2 July 2009*. Centurion.

Eisner, E. (1985). *The Educational Imagination*. London: Collier-Macmillan.

Elmore, R. (2000). *Building a new structure for school leadership*. New York: The Albert Shanker Institute.

Elmore, R. (2001). *Professional Development and the Practice of Large-scale Improvement in Education.* Consortium for Policy Research in Education.

Elmore, R. (2002a). *Unwarranted intrusion*. Education next. (online). http://www.educationnext.org/20021/30.html (accessed 2005/09/28).

Elmore, R. (2002b). *The price of accountability*. National Staff Development Council. (online). http://www.nsdc.org/library/publications/results/res11-02elmore.cfm (accessed 2005/09/28).

Elmore, R. (2003). *Politics and policy in education*. An interview with Anrig Professor Richard Elmore. Harvard Graduate School of Education, January 1, 2003. (online) http://www.gse.harvard.edu/news/features/elmore01012003.html (accessed 2005/09/28).

Elmore, R. (2006). *School reform from the inside out: Policy, practice, and performance*. Cambridge, MA: Harvard Educational Press.

Elmore, R. (2007). Professional networks and school improvement. *School Administrator*, *64*(4), 20-24.

Elmore, R. & Burney, D. (1997). Investing in Teacher Learning: staff development and instructional improvement in community school District #2 New York City. National Commission of Teaching and America's Future. Consortium for Policy and Research in Education.

Eraut, M. (1995). Developing professional knowledge and competence. In T. Guskey & M. Huberman (Eds.), *Professional Development in Education*: New Paradigms and Practices. Columbia University: Teachers College Press.

Eraut, M. (2000). Non-formal learning and tacit knowledge in professional work. *British Journal of Educational Psychology*, (70), 113-136.

Falk-Ross, F. & Cuevas, P. (2008). Getting the Big Picture: An overview of the research process. In C. Lassonde & S. Israel (Eds.). *Teachers taking action: A comprehensive guide to teacher research*. Newark, DE: International Reading Association.

Farrell, J. (1996). *The Creative Teacher of Language.* Toronto: McGraw Hill.

Firestone, W. (1987). Meaning in method: The Rhetoric of Quantitative Research and Qualitative Research. *Educational Researcher*, *16*(7), 16-21.

Firestone, W. & Pennell, J. (1977). State-initiated teacher networks: A comparison of two cases. *American Educational Research Journal*, *34*(2), 237-268.

Fleisch, B. (2008). Introduction. In G. Bloch, B. Fleisch, L. Chisholm & M. Mabizela (Eds.), *Investment Choices for South African Education.* Johannesburg: Wits University Press.

Flick, U. (2002). *Managing Quality in Qualitative Research*. Thousand Oaks, CA: Sage Publications, Inc.

Fraser, C., Kennedy, A., Reid, L. &Mckinney, S. (2007). Teachers' continuing professional development: contested concepts, understandings and models. *Journal of In-service Education*, 33(2), 153-169.

Frost, D. & Durrant, D. (2003). *Teacher-Led Development Work.* London: David Fulton Publishers.

Fuhrman, S. (2003). Redesigning accountability systems for education. *CPRE Policy Brief No. RB-38.* Philadelphia, P.A.: University of Pennsylvania, Consortium for Policy Research in Education.

Fullan. M. (1993). *Change Forces: Probing the Depths of Education Reform*. London: The Falmer Press.

Fullan, M. (1994). Coordinating top-down and bottom-up strategies for educational reform. In R. Elmore & S. Fuhrman (Eds.), *The governance of curriculum*. pp.186-202. Alexandria, VA: Association for Supervision and Curriculum Development.

Fullan, M. (2001). *The new meaning of educational change.* London: RoutledgeFalmer.

Fullan, M. (2003). *The Moral Imperative of School Leadership*. London: Sage.

Fullan, M. (2006). Turnaround Leadership. San Francisco, CA: Jossey-Bass.

Fullan, M. (2007). *The new meaning of educational change* (4th ed.). New York: Teachers College Press.

Fullan, M. (2008). *The Six Secrets of Change*. San Francisco: Jossey-Bass.

Fullan, M. & Hargreaves, A. (1992). *What's worth fighting for in your school?* Buckingham: Open University Press.

Gamble, J. (2009). *The relation between knowledge and practice in curriculum and assessment. A concept paper commissioned by Umalusi*. Pretoria: Umalusi

Gardner, J. (Ed.). (2006). *Assessment and Learning*. London: Sage.

Garet, M., Porter, A., Desimore, L., Birman, B., & Yoon, K. (2001). What Makes Professional Development Effective? Results from a National Sample of Teachers. *American Educational Research Journal, 38*(4), 915-945.

GCIS. (2012). *South African Year Book*. Pretoria: GCIS.

Giles, C. & Hargreaves, A. (2006). The sustainability of innovative schools as learning organisations and professional learning communities during standardised reform. *Educational Administration Quarterly, 42*(1), 124-156.

Glaser, B. & Strauss, A. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*. New York: Aldine De Gruyter.

Goleman, D. (2002). *Primal Leadership: Realizing the power of emotional intelligence.* Boston: Harvard Business School.

Goodson, I., Moore, S. & Hargreaves, A. (2006). Teacher Nostalgia and the Sustainability of Reform: The Generation and Degeneration of Teachers'

Missions, Memory, and Meaning. *Educational Administration Quarterly*, *42*(5), 42-61.
Graesser, A. (2009). Inaugural editorial. *Journal of Educational Psychology*, *101*(2), 259-261.
Graham, P. (2007). The role of conversation, contention, and commitment in a professional learning community. Connexions Project. Accessed at http://cnx.org/content/m14270/1.1 on 22/01/2012.
Grant, C. (2008). 'We did not put our pieces together': exploring a professional development initiative through a distributed leadership lens. *Journal of Education*, (44), 85-107.
Grenfell, M. (Ed.) (2008). *Pierre Bourdieu: Key Concepts*. Durham: Acumen.
Griffiths, M. & Tann, S. (1991). Ripples in the reflection. In P. Lomax (Ed.). *BERA Dialogues*, (5), 82-101.
Grossman, P. & Wineburg, S. (2000). What makes teacher community different from a gathering of teachers. An occasional paper co-sponsored by the Centre for the Study of Teaching and Policy and the Centre on English Language and Achievement (CELA) accessed at: http://www.tolerance.org/tdsi/sites/tolerance.org.tdsi/files/assets/general/What_Makes_a_Teacher_Community.pdf on 3/04/2013.
Grossman, P., Wineburg, S. & Woolworth, S. (2001). Toward a theory of teacher community. *The Teachers' College Record,* (103), 942-1012.
Guba, E. & Lincoln, Y. (1981). *Effective Evaluation*. San Francisco: Jossey-Bass.
Guskey, T. (1999). *Evaluating Professional Development*. Thousand Oaks, CA: Corwin Press.
Guskey, T. & Huberman, M. (Eds.). *Professional Development in Education: New Paradigms and Practices.* Columbia University: Teachers College Press.
Guskey, T. & Yoon, K. (2009). What works in professional development? *Phi Delta Kappan*, 90(7), 495-500.
Hadfield, M. & Chapman, C. (2009). *Leading School-based Networks*. London: Routledge.
Hairon, S. & Dimmock, C. (2012). Singapore schools and professional learning communities: teacher professional development and school leadership in an Asian hierarchical system. *Educational Review*, *64*(4), 405-424.
Hakkarainen, K., Palonen, T., Paavola, S. & Lehtinen, E. (2004). *Communities of networked expertise: Professional and educational perspectives.* Amsterdam: Elsevier.
Halliday, M. (1985). *An introduction to functional grammar*. London: Edward Arnold.
Handal, G. (1990). Promoting the articulation of tacit knowledge through the counselling of practitioners. Keynote paper at *Amsterdam Pedalogisch Centum Conference*, Amsterdam, Holland, 6-8 April, 1990.
Hargreaves, A. (1994). *Changing teachers, changing times: Teachers' work and culture in the post-modern age*. London: Cassell.
Hargreaves, A. (2007). Sustainable professional learning communities. In L. Stoll & K. Louis (Eds.). *Professional Learning Communities Divergence, Depth and Dilemmas.* (pp. 181-195). New York: Open University Press.
Hargreaves, A. (2009). Presentism, Individualism, and Conservatism: The Legacy of Dan Lortie's Schoolteacher: A Sociological Study. *Curriculum Inquiry*, *40*(1), 143-154.

Hargreaves, A., Earl, L., Moore, S., Manning S. (2001). *Leaning to change*. San Francisco: Jossey-Bass Inc.

Hargreaves, A. & Fink, D. (2008). Distributed leadership: Democracy or delivery? *Journal of Educational Administration*. *46*(2), 229-240.

Hargreaves, A. & Goodson, I. (2006). Educational Change Over Time? The Sustainability and Non-sustainability of Three Decades of Secondary School Change and Continuity. *Educational Administration Quarterly, 42*(5), 3-41.

Hargreaves, D. (1994). The new professionalism: The synthesis of professional and institutional development. *Teaching and Teacher Education, 10*(4), 423-438.

Hargreaves, D. (1999). The knowledge-creating school. *British Journal of Educational Studies, 47*(2), 122-144.

Hawley, W. & Rosenholtz, S. (1984) Good Schools: A Synthesis of Research on How Schools Influence Student Achievement. Special Issue. *Peabody Journal of Education, 4*(1), 178.

Hawley, W. & Valli, L. (1999). The Essentials of Effective Professional Development, A new Consensus. In L. Darling-Hammond & G. Sykes (Eds.). *Teaching as the learning profession: handbook of policy and practice*. San Francisco, CA: Jossey-Bass.

Heller, M. & Firestone, W. (1995). Who's in charge here? Sources of leadership for change in eight schools. *Elementary School Journal, 96*(1), 65-86.

Henning, E. (2004). *Finding Your Way in Qualitative Research.* Pretoria: Van Schaik.

Heritage, M., Kim, J., Venlinski, T. & Herman, J. (2009). From Evidence to Action: A Seamless Process in Formative Assessment. *Educational Measurement Issues and Practice. 28*(3), 24-31.

Hiebert, J. (1999). Relationship between research and the NCTM standards. *Journal for Research in Mathematics Education, 30*(1), 3-19.

Hiebert, J., Carpenter, T., Fennema, E., Fuson, K., Human, P., Murray, H., Olivier, A., & Wearne, D. (1996). Problem solving as a basis for reform in curriculum and instruction: The case of mathematics. *Educational Researcher, 25*(4), 12-21.

Hipp, K. & Huffman, J. (Eds.). (2010). *Demystifying professional learning communities: school leadership at its best.* Plymouth, UK: Rowman and Littlefield Education.

Hirsch, S. & Killion, J. (2007). *The Learning Educator: A New Era in Professional Learning*. Oxford, Ohio: National Staff Development Council.

Hirsch, S. & Killion, J. (2009). When Educators Learn, Students Learn. *Phi Delta Kappan, 90*(7), 464-469.

Honig, M. & Hatch, T. (2004). How Schools Strategically Manage Multiple, External Demands. *Educational Researcher, 33*(8), 16-30.

Hord, S. (1997a). *Professional Learning Communities: Communities of Continuous Inquiry and Improvement*. Austin, TX: Southwest Educational Development Laboratory.

Hord, S. (1997b). Professional Learning Communities: What are they and why are they important? *Issues ... about Change,* 6(1), 1-8.

Hord, S. (2010). Professional Learning Communities: Communities of Continuous Inquiry and Improvement – Outcomes of Professional Learning Communities

for students and staffs. *Southwest Educational Development Laboratory*. Accessed at http://www.sedl.org/pubs/change34/5.html on 2010/03/21.

Hord, S. & Hirsh S. (2009). The principal's role in supporting learning communities. *Educational Leadership, 66*(5), 22-23.

Hord, S. & Sommers, W. (2008). *Leading professional learning communities: Voices from research and practice.* Thousand Oaks, CA: Corwin Press.

Howie, S., Venter, E., van Staden, S., Zimmerman, L., Long, C., Scherman, V. & Archer, E. (2007). *PIRLS Summary Report South African Children's Reading Achievement*. Funded by the Royal Netherlands Embassy and the National Research Foundation.

Huberman, M. (1995). Networks That Alter Teaching: Conceptualizations, Exchanges and Experiments. *Teachers and Teaching, 1*(2), 193-211.

Huffman, J. &. Hipp, K. (2010). Diagnostic and Planning Tools. In K. Hipp & J. Huffman (Eds.), *Demystifying professional learning communities: school leadership at its best*. (pp. 43-56). Plymouth, UK: Rowman and Littlefield Education.

Jackson, D. & Temperley, J. (2007). From professional learning community to networked learning community. In L. Stoll & K. Louis (Eds.), *Professional Learning Communities Divergence, Depth and Dilemmas.* (pp. 45-62). New York: Open University Press.

Janesick, V. (1994). The Dance of Qualitative Research Design: Metaphor, Methodolatry, and Meaning. In N. Denzin & Y. Lincoln (Eds.), *The Handbook of Qualitative Research*. Thousand Oaks, CA: Sage.

Janesick, V. (1998). *"Stretching" exercises for qualitative researchers*. London: Sage Publications Inc.

Janks, H., Dixon, K., Ferreira, A., Granville, S. & Newfield, D. (2014). *Doing critical literacy*. New York and London: Routledge.

Jansen, J. (2003a). Image-ining Teachers: Policy Images and Teacher Identity in South African Classrooms. In K. Lewin, M. Samuel & Y. Sayed (Eds.). Changing Patterns of Teacher Education in South Africa. Sandton: Heinemann.

Johnson, L. (n.d.). *Effective Facilitation*. College of Education, Criminal Justice and Human Services. Accessed at http://www.sst5.k12.oh.us/Effective_Facilitation.ppt on 2012/12/26.

Johnson, S., Hodges, M. & Monk, M. (2000). Teacher development and change in South Africa: a critique of the appropriateness of transfer of northern/western practice. *Compare: A Journal of Comparative Education, 30*(2) 179-192.

Joyce, B. & Calhoun, E. (1995). School renewal: An inquiry, not a formula. *Educational Leadership, 52*(7), 51-55.

Joyce, B., & Showers, B. (1995). *Student achievement through staff development: Fundamentals of school renewal* (2nd ed.). White Plains, NY: Longman.

Katz, S. & Earl, L. (2007). Creating new knowledge: evaluating networked learning communities. *Education Canada, 47*(1) 34-37.

Katz, S & Earl, L. (2010). Learning about networked learning communities. *School Effectiveness and School Improvement, 21*(1), 27-51.

Katz, S., Earl, M. & Jaafar, B. (2009). *Building and Connecting Learning Communities: The power of networks for school improvement*. Thousand Oaks, CA: Corwin.
Kelly, P. (2006). What is teacher learning? A socio-cultural perspective. *Oxford Review of Education, 32*(4), 505-519.
Kennedy, M. (1998). *Form and substance in in-service teacher education*. (Research Monograph No. 13). Arlington, VA: National Science Foundation.
Killion, J. & Todnem, G. (1991). A process of personal theory building. *Educational Leadership, 48*(6), 14-17.
Kilpatrick, S., Barrett, M. & Jones, T. (2003). Defining Learning Communities. Discussion Paper D1/2003. Centre for Research and Learning. Accessed at: http://www.crlra.utas.edu.au/files/discussion/2003/D1-2003.pdf.
King, B. & Newmann, F. (2000). Will Teacher Learning Advance School Goals? *Phi Delta Kappan, 81*(8), 576-580.
King, D. (2002). The Changing Shape of Leadership. *Educational Leadership, 59*(8), 61-63.
Knight, J. (2009). What Can We Do About Teacher Resistance? *Phi Delta Kappan, 90*(7), 508-513.
Knight, P. (2002). A systemic approach to professional development: learning as practice. *Teaching and Teacher Education*, 59(3), 229-241.
Kotter, J. (1996). *Leading Change*. Boston: Harvard University Press.
Kvale, S. (1996). *Interviews: An introduction to qualitative research interviewing*. Thousand Oaks, California: Sage.
Kvale, S. (2002). The social construction of validity. In N. Denzin & Y. Lincloln, (Eds.). *The Qualitative Inquiry Reader*. London: Sage.
Kydd, L., Anderson, L. & Newton, W. (Eds.). *Leading People and Teams in Education*. London: Sage.
Lambert, L., Walker, D., Zimmerman, D., Cooper, J., Lambert, M., Gardner, M. & Szabo, M. (1995). *The Constructivist Leader*. New York: Teachers' College Press.
Langer, G., Colton, A. & Goff, L. (2003). *Collaborative Analysis of Student Work*. Alexandria, VA: Association for Supervision and Curriculum Development.
Lassonde, C. & Israel, S. (Eds.). (2008). *Teachers taking action: A comprehensive guide to teacher research*. Newark, DE: International Reading Association.
Lassonde, C. & Israel, S. (2010). *Teacher Learning for Professional Learning: Facilitating study, research, and inquiry communities*. San Francisco, CA: Jossey-Bass.
Lave, J. & Wenger, E. (1991). *Situated Learning. Legitimate peripheral participation.* Cambridge: University of Cambridge Press.
Lee, D. & Lee, W. (2013). A Professional Learning Community for the New Teacher Professionalism: The case of a State-Led Initiative in Singapore Schools. *British Journal of Educational Studies, 61*(4), 435-451.
Lee, V., Smith, J. & Croninger, R. (1995). Another look at high school restructuring. *Issues in restructuring schools*. (9). Madison, WI: Centre on Organisation and Restructuring of Schools, School of Education, University of Wisconsin-Madison.
Lewis, C., & Hurd, J. (2011). *Lesson study step by step: How teacher learning communities improve instruction*. Portsmouth, NH: Heinemann

Lewis, C. & Tsuchida, I. (1998). A lesson is like a swiftly flowing river: How research lessons improve Japanese Education. *American Educator*, *22*(4), 12-17, 50-52.
Lieberman, A. (1992). School/University collaboration: A view from the inside. *Phi Delta Kappan*, *74*(2), 147-156.
Lieberman, A. (Ed.). (1995a). *The work of restructuring schools: Building from the ground up.* New York: Teachers College Press.
Lieberman, A. (1995b). Practices that support teacher development. *Phi Delta Kappan, 76*(8), 591-596.
Lieberman, A. & Grolnick M. (1996). Networks and reform in American education. *Teachers College Record*, *98*(1), 7-45.
Lieberman, A. & Grolnick, M. (1999). Networks and reform in American education. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice.* (pp. 292-312). San Francisco, CA: Jossey-Bass.
Lieberman, A. & McLaughlin, M. (1992). Networks for educational change: their power and their problems. *Education Digest*, *58*(4), 673-677.
Lieberman, A. & Pointer-Mace, D. (2010). Making practice public: Teacher learning in the 21st century. *Journal of Teacher Education*, (61), 77-88.
Lieberman, A. & Wood, D. (2002). From network learning to classroom teaching. In J. Sefton-Green, P. Thomson, K. Jones & L. Bresler (Eds.). (2011). *The Routledge International Handbook of Creative Learning* (pp. 383-392). London: Routledge.
Little, J. (1984). Seductive Images and Organisational Realities in Professional Development. *Teachers College Record*, *86*(1), 84-102.
Little, J. (1990). The persistence of privacy: autonomy and initiative in teachers' professional relations. *Teachers College Record*, *91*(4), 509-536.
Little, J. (1993). Teachers' professional development in a climate of educational reform. *Educational Evaluation and Policy Analysis*, *15*(2), 129-151.
Little, J. (1999). Organizing Schools for Teacher Learning. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: handbook of policy and practice*. (pp. 233-262). San Francisco, CA: Jossey-Bass.
Little, J. (2002). Locating learning in teachers' communities of practice: opening up problems of analysis in records of everyday work. *Teaching and Teacher Education*, (18), 917-946.
Little, J. (2005). *Nodes and Nets: Investigating resources for professional learning in schools and networks*. Unpublished paper for National College for School Leadership, Nottingham: UK.
Little, J, Gearhart, M, & Kafka, J. (2003). Looking at Student Work for Teacher Learning, Teacher Community, and School Reform. *Phi Delta Kappan*, 85(3), 184-192.
Lofland, J. (1971). *Analyzing Social Settings: A Guide to Qualitative Observation and Analysis.* Belmont, CA: Wadsworth.
Long, C. & Lampen, E. (2014). *Teacher agency and professional practice: Developing and nurturing creativity in Mathematics teacher education*. In M. Mabitso & A. Maclean (Eds.), *Proceedings of the 20th Annual National Congress of the Association for Mathematics of South Africa*. (pp. 275-283). Kimberley: AMESA.

Loucks-Horsley, S. (1995). Professional Development and the Learner Centered School. *Theory into Practice, 34*(4), 265-271.

Loucks-Horsley, S., Hewson, P., Love, N. & Stiles, K. (1998). *Designing Professional Development for Teachers of Science and Mathematics.* Thousand Oaks, CA: Corwin Press.

Louis, K. & Kruse, S. (1995). *Professionalism and Community: Perspectives on reforming urban schools*. Thousand Oaks, CA: Corwin Press.

Louis, K. & Marks, H. (1998). Does professional learning community affect the classroom teachers' work and student experience in restructured schools? *American Journal of Education*, 106(4), 532-575.

Lowery, N. (2002). Construction of teacher knowledge in context: Preparing elementary teachers to teach mathematics and science. *School Science and Mathematics*, 102(2), 68-83.

Martin, J. & Rose, D. (2003). *Working with discourse: meaning beyond the clause*. London: Continuum.

Marzano, R. (2007). *The Art and Science of Teaching: A comprehensive framework for effective instruction*. Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, R., Pickering, D. & Pollock, J. (2001). *Classroom Instruction that Works: Research-based strategies for increasing student achievement*. Alexandria, VA: Association for Supervision and Curriculum Development.

Marzano, R., Waters, T. & McNulty, B. (2005). *School Leadership that Works*. Alexandria, VA: Association for Supervision and Curriculum Development.

Massey, L. (2009). *The Principal as Professional Learning Community Leader*. Thousand Oaks, California: Corwin Press and Ontario Principals' Council.

Maton, K. (2008). Habitus. In M. Grenfell (Ed.), *Pierre Bourdieu: Key Concepts*. Durham: Acumen.

Mavhunga, E., & Rollnick, M. (2013). Improving PCK of chemical equilibrium in pre-service teachers. *African Journal of Research in Mathematics, Science and Technology Education*, 17(1-2) 113–125.

Mayeske, G. (1973). *A Study of the Attitude toward Life of our Nation's Students*. Washington: U.S. Print. Off.

McCotter, S. (2001). "The journey of a beginning researcher". *The Qualitative Report* [On-line serial], 6 (2). Available: http://www.nova.edu/sss/QR/QR6-2/mcotter.html.

McLaughlin, M. & Talbert, J. (1993). *Contexts that matter for teaching and learning*. Stanford: Centre for Research on the Context of Secondary School Teaching, Stanford University.

McLaughlin, T. (1999). Beyond the Reflective Teacher. *Educational Philosophy and Theory*, *31*(1), 9-25.

McLaughlin, M. & Talbert, J. (2007). Building professional learning communities in high schools. In L. Stoll & K. Louis (Eds.). *Professional Learning Communities Divergence, Depth and Dilemmas.* (pp. 151-165). New York: Open University Press.

McLaughlin, M. & Talbert, J. (2010). Professional Learning Communities: Building blocks for school culture and school learning. *VUE*, (27), 35-45.

Merriam, S. (1998). *Qualitative Research and Case Study Applications in Education*. San Francisco: Jossey-Bass.

Merriam, S. (2001). *Qualitative Research and Case Study Applications in Education*. San Francisco: Jossey-Bass.

Morrow, W. (2007). *Learning to teach in South Africa*. Cape Town: Human Sciences Research Council Press.

Morse, J. (1994). Designing funded qualitative research. In Denzin, N. & Lincoln, Y. (Eds). (1994). *The Handbook of Qualitative Research*. (pp. 220-235). Thousand Oaks, CA: Sage

Motshekga, A. (2010). Statement by the Minister of Education of Basic Education, Mrs Angie Motshekga, MP on the progress of the review of the National Curriculum Statement, Tuesday 06 July 2010". Accessed on 2010/07/06 at http://www.education.gov.za/dynamic/dynamic.aspx?pageid=310&id=10245

Mouton, J. (2001). *How to Succeed in Your Master's and Doctoral Studies, A South African Guide and Resource Book.* (3rd ed.). Pretoria: Van Schaik Publishers.

Muller, J. (2012). *The body of knowledge/le corps du savoir.* Paper presented at the Seventh International Basil Bernstein Symposium, Aix-en-Provence.

Muller, J. & Young, M. (2013). Discipline, skills and the university. Springer Science and Business Media Dordrecht. Published online: 13 July 2013. Retrieved from: https://www.deepdyve.com/lp/springer-journals/disciplines-skills-and-the-university-67a10cJFlF

Mundry, S. & Stiles, K. (2009). The promise of professional learning communities. In S. Mundry & K. Stiles (Eds.), *Professional Learning Communities for Science Teaching: lessons from research and practice*. Arlington, Virginia: NTSA Press.

Munn, P. & Drever, E. (1999). *Using Questionnaires in Small-Scale Research: A Teachers' Guide*. Scottish Council for Research in Education: Edinburgh.

National Middle School Association. (2003). *This We Believe: Successful Schools for Young Adolescents: A position paper*. Westerville, OH: Author.

National Middle School Association. (2006). *National Middle School Association's position statement on the professional preparation of middle level teachers*. Accessed at http://www.nmsa.org/AboutNMSA/PositionStatements/ProfessionalPreparation/tabid/287/default.aspx on March 17, 2008.

Ndlovu, M. (2011). University-school partnerships for social justice in mathematics and science education: the case of the SMILES project at IMSTUS. *South African Journal of Education, 31*(3). Retrieved on 6 October 2012 from http://www.scielo.org.za/scielo.php?pid

Newmann, F. & Wehlage, G. (1995). *Successful School Restructuring: A report to the public and educators by the Centre for Restructuring Schools.* Madison: University of Wisconsin Press.

Newmann, F.M. & Associates (1996). *Authentic Achievement: Restructuring Schools for Intellectual Quality*. San Francisco: Jossey-Bass.

Nichols, P., Meyers, J. & Burling, K. (2009). A Framework for Evaluating and Planning Assessments Intended to Improve Student Achievement. Educational Measurement Issues and Practices, (28)3, 14-23.

Niess, M. L. (2005). Preparing teachers to teach science and mathematics with technology: Developing a technology pedagogical content knowledge. *Teaching and Teacher Education*, 21(5), 509–523.

Noddings, N. (2005). Caring in education. *The Encyclopaedia of informal Education*. Available at www.infed.org/biblio/noddings_caring_in_education.htm.

Nonaka, I. & Takeuchi, H. (1995). *The knowledge-creating company*. Oxford, UK: Oxford University Press.

Oehrtman, M., Carlson, M. & Vasquez (2009). Attributes of content-focused professional learning communities that lead to meaningful reflection and collaboration among Math and Science teachers. In S. Mundry & K. Stiles (Eds.), *Professional Learning Communities for Science Teaching: Lessons from research and practice*. Arlington, Virginia: NTSA Press.

O'Neil, J. (1995). On Schools as Learning Organisations: A Conversation with Peter Senge. *Educational Leadership*, 52(7), 20-23.

Ono, Y. & Ferreira, J. (2010). A case study of continuing teacher professional development through lesson study in South Africa. *South African Journal of Education*, (30), 59-74.

Patton, M. (1985). *Qualitative Evaluation Methods*. (2nd ed.)Thousand Oaks, CA: Sage.

Perry, R. & Lewis, C. (2009). What is successful adaptation of lesson study in the US? *Journal of Educational Change*, (10), 365-391.

Phillips, J. (2003). Powerful learning: Creating learning communities in urban school reform. *Journal of Curriculum and Supervision*, *18*(3), 240-258.

Putnam, R. & Borko, H. (1997). Teacher learning: Implications of new views of cognition. In B. J. Biddle, T. L. Good, & I. F. Goodson (Eds.). *(*pp. 1223-1296). *The International Handbook of Teachers and Teaching.* Dordrecht, The Netherlands: Kluwer.Putnam, R., & Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning? *Educational Researcher*, 29(1), 4-15.

Reeves, D. (2010). *Transforming Professional Development into Students Results*. Alexandria, VA: Association for Supervision and Curriculum Development.

Republic of South Africa. (1998). *Educators Employment Act (Act 76 of 1998).*

Reynolds, M. (2009). *The effect of context on teachers' ability to innovate with information communication technologies in secondary schools*. Unpublished DPhil thesis, University of Pretoria.

Robertson, J. (2011). Partnership in leadership and learning. In J. Robertson & H. Timperley (Eds.), *Leadership and Learning*. (pp. 213-227). London: Sage.

Robertson, J. & Timperley, H. (Eds.). (2011). *Leadership and Learning*. London: Sage.

Rosenholtz, S. (1989). *Teachers' Workplace: The Social Organisation of Schools*. New York: Longman.

Rosenholtz, S., Bassler, O. & Hoover-Dempsey, K. (1986). Organizational conditions of teacher learning. *Teaching and Teacher Education, 2*(2), 91-104.

Rubin, H. & Rubin, I. (1995). *Qualitative interviewing: The art of hearing data.* Thousand Oaks, California: Sage.

Ryle, G. (1946). Knowing how and knowing that. *Proceedings of the Aristotelian Society*. (56), 212-225.

Ryle, G. (1979). *On Thinking*. London: Hutchinson.

Samuel, M. (2009). Beyond the Garden of Eden: deep teacher professional development. *South African Journal of Higher Education*, *23*(4), 739-761.
Schlechty, P. (2009). *Leading for Learning: How to Transform Schools into Learning Organisations*. San Francisco, CA: Jossey-Bass.
Schmoker, M. (1999). *Results. The key to continuous school improvement* (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.
Schön, D. (1983). *The Reflective Practitioner: How professionals think in action*. London: Temple Smith.
Schön, D. (1987). *Educating the Reflective Practitioner*. San Francisco: Jossey-Bass.
Seidman, I. (1991). *Interviewing as Qualitative Research*. New York: Teachers College Press.
Senge, P. (1990). *The fifth discipline: The art and practice of the learning organization*. New York: Currency Doubleday.
Sergiovanni, T. (1994b). Organisations or communities? Changing the metaphor changes the theory. *Educational Administration Quarterly*, *30*(2), 214-226.
Sergiovanni, T. (1996). *Leadership for the schoolhouse.* San Francisco: Jossey-Bass.
Shalem, Y. (2003). Do we have a theory of change? Calling change models to account. *Perspectives in Education*, *21*(1), 29-49.
Shalem, Y. (2010). How does the form of curriculum affect systematic learning? In Y. Shalem & S. Pendlebury (Eds.). *Retrieving teaching: Critical issues in curriculum, pedagogy and learning.* (pp. 87-100). Cape Town: Juta and Co.
Shalem, Y. (forthcoming). Professional judgement and criteria for professional knowledge in teaching. In M. Young & J. Muller (Eds.), *Knowledge & the Professions* (working title). London: Routledge/Taylor and Francis.
Shalem, Y. & Hoadley, U. (2007). "Political economy of teachers (low) morale". Paper presented at the Kenton Education Association Conference, Pumula Beach Hotel, 25-28 October.
Shalem, Y. & Rusznyak, L. (2013) 'Theory' for teacher practice: a typology of application tasks in teacher education. *South African Journal of Higher Education*, *27*(5), 1118-1134.
Shalem, Y. & Slonimsky, L. (2013). Practical knowledge of teaching practice – what counts? *Journal of Education*, (58), 67-86.
Shalem, Y., Sapire, I & Sorto, M. (2014). Teachers' explanations of learners' errors in standardised mathematics assessments. Pythagoras, 35(1), Art #254, 11 pages. http://dx.doi.org/10.4102/pythagoras. V35i1.254.
Sherer, M. (2009). All teachers can learn. *Educational Leadership*, *66*(5), 7.
Sherin, M. & Han, S. (2004). Teacher learning in the context of a video club. *Teaching and Teacher Education*. (20), 163-183.
Sherman, R. & Webb, R. (1988). Qualitative research in Education: A focus. In R. Sherman & R. Webb (Eds.), *Qualitative Research in Education: Focus and Methods*. (pp. 2-21). Bristol PA: Falmer Press.
Shulman, L. (1986). Those Who Understands Knowledge Growth in Teaching. *Educational Researcher*, *15*(2), 4-14.
Shulman, L. (1987). Knowledge and teaching: foundations of the new reform. *Harvard Educational Review*, *57*(1), 1-22.

Smith, A. & Wohlstetter, P. (2001). Reform through school networks: A new kind of authority and accountability. *Educational Policy, 15*(4), 499-519.
Smith, D., Wilson, B., & Corbett, D. (2009). Moving Beyond Talk. *Educational Leadership, 66*(5), 20-25.
Smith, M. K. (1996; 2001, 2007) 'Action research', the encyclopaedia of informal education. Accessed at: http://www.infed.org/research/b-actres.htm on 12 July 2010.
Snow-Renner, R., & Lauer, P. (2005). *Professional development analysis*. Denver, CO: Mid-Continent Research for Education and Learning.
Somers, J. & Plyley, S. (2009). Late-Start Mondays. In S. Mundry & K. Stiles (Eds.), *Professional Learning Communities for Science Teaching: lessons from research and practice*. Arlington, Virginia: NTSA Press.
South African Council for Educators. (2014). *CPTD Management System*. www.sace.org.za/CPTD/jit_default_7.about_CPTD.html.
Sparks, D. (2001). *Advocating for powerful forms of professional development*. National Staff Development Council. Retrieved, from http://nsdc.org/library/publications/results/res4-01spar.cfm.
Sparks-Langer, G., & Berstein Colton, A. (1991). Synthesis of research on teachers' reflective thinking. *Educational Leadership, 48*(6), 37-44.
Spaull, N. (2012). *Poverty and Privilege: Primary School Inequality in South Africa*. Working paper 12/13. University of Stellenbosch Bureau for Economic Research.
Spaull, N. (2013). *South Africa's Education Crisis: The quality of education in South Africa 1994-2011*. Johannesburg: Centre for Development and Enterprise.
Spillane, J. (2005). Standards Deviation: How Schools Misunderstand Policy. *CPRE Policy Brief No. RB-43*. Philadelphia, P.A.: University of Pennsylvania, Consortium for Policy Research in Education.
Spillane, J.P. (2006) *Distributed Leadership*. San Francisco: Jossey-Bass.
Stake, Robert. (1995). *The Art of case study Research*. Thousand Oaks, London, New Delhi: Sage. Stenhouse, L. (1975). *An introduction to curriculum research and development*. London: Heinemann.
Steyn, G. (2008). Continuing professional development for teachers in South Africa and social learning systems: conflicting conceptual frameworks of learning. *Koers, 73*(1), 15-31.
Stigler, J. & Hiebert, J. (2009) *The Teaching Gap: ideas from the world's teachers for improving education in classrooms.* New York: Free Press.
Stoll, L. (2009). Connecting learning communities: capacity building for systemic change. In A. Hargreaves, A. Lieberman, M. Fullan & D. Hopkins, D. (Eds.), *Second International Handbook of Educational Change.* (pp. 469-484). Dordrecht: Springer.
Stoll, L. (2011). Leading Professional Learning Communities. In J. Robertson & H. Timperley (Eds.), *Leadership and Learning*. (pp. 103-117). London: Sage.
Stoll, L. & Louis, K. (Eds.). (2007). *Professional Learning Communities Divergence, Depth and Dilemmas.* New York: Open University Press.
Stringer, E.T. (2007). *Action Research: A handbook for practitioners* (3rd ed.). Thousand Oaks, Ca.: Sage Publications.

Stycos, J. (1981). "A critique of focus group and survey research: The Machismo Case". *Studies in Family Planning*, 12 (12), pp. 450-456.

Sykes, G. (1996). Reform of and as professional development. *Phi Delta Kappan*, *77*(7), 465-476.

Sykes, G. (1999). Teacher and Student Learning: Strengthening Their Connection. In L. Darling-Hammond & G. Sykes G. (Eds.), *Teaching as the learning profession: handbook of policy and practice*. (pp. 151-179). San Francisco, CA: Jossey-Bass.

Taylor, N., Draper, K., Muller, J. & Sithole, S. (2012). *The National Education Evaluation and Development Unit National Report 2012*. Pretoria: NEEDU.

Taylor, N. & Taylor, S. (2013). Teacher knowledge and professional habitus. In N. Taylor, S. van der Berg & T. Mabogoane (Eds.), *What Makes Schools Effective?* (pp. 201-232). Cape Town: Pearson Education.

Taylor, N., van der Berg, S. & Mabogoane, T. (Eds.). (2013). *What Makes Schools Effective?* Cape Town: Pearson Education.

Taylor, S. & Bogdan, R. (1984). *Introduction to Qualitative Research Methods*. New York: Wiley.

The Presidency (2011). *National Planning Commission Diagnostic Report*: Pretoria.

The Teaching Commission. (2006). *Teaching at risk: Progress and potholes*. Washington, DC: Author.

Thompson, C. & Zeuli, J. (1999). The frame and tapestry: Standards-based reform and professional development. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 341-375), San Francisco, CA: Jossey-Bass.

Timperley, H. (2004). *Situating networked learning communities in international research coherence and networked learning communities: A distributed leadership perspective.* Paper commissioned by Aporia Consulting, Toronto, ON.

Timperley, H. (2011). Leading Teachers' Professional Learning. In Robertson, J. & Timperley, H. (Eds) (2011). *Leadership and Learning*. (pp. 118-130). London: Sage.

Timperley, H. & Robinson, V. (2003). Workload and the professional culture of teachers. In L. Kydd, L. Anderson & W. Newton (Eds.). *Leading People and Teams in Education*. London: Sage.

Timperley, H., Wilson, A., Barrar, H. & Fung, I. (2008). *Teacher professional learning and development: Best evidence synthesis iteration.* (BES). Wellington, New Zealand: Ministry of Education.

Troen, V. & Boles, K. (2010). Team Spirit. *Journal of Staff Development*, *31*(1), 59-62.

Tyack, D. & Cuban, L. (1995). *Tinkering Toward Utopia: A century of public school reform.* Cambridge, MA: Harvard University Press.

Umalusi. (2004). *Investigation into the Standard of the Senior Certificate Examination*. A report on research conducted by Umalisi. Pretoria: Umalusi.

University of the Witwatersrand School of Education. (2011). *Professional Learning Communities for Teacher Development: The Collaborative Enquiry Process in the Data-Informed Practice Improvement Project*. Johannesburg: Saide.

Van der Berg, S. & Louw, M. (2008). South African student performance in regional context. In G. Bloch, B. Fleisch, L. Chisholm & M. Mabizela (Eds.), *Investment Choices for South African Education.* Johannesburg: Wits University Press.

Verspoor, A.M. & Leno, J.L. (1986). *Improving Teaching: a key to successful educational change*. Education and Training Department Report No. EDT50. Washington, DC: The World Bank.
Verspoor, A. M. & Wu, K. B. (1990). *Textbooks and Educational Development*. Education and Employment Division, Population and Human Resources Department Paper No. PHREE/90/31. Washington DC: The World Bank).
Von Krogh, G., Ichijo, K. & Nonaka, I. (2000). *Enabling knowledge creation*. New York: Oxford University Press.
Wald, P. & Castleberry, M. (Eds.). (2000). *Educators as Learners: creating a professional learning community in your school.* Alexandria, VA: Association for Supervision and Curriculum Development.
Wang, J. (2002). Learning to teach with mentors in contrived contexts of curriculum and teaching organisation: Experiences of two Chinese novice teachers and their mentors. *Journal of In-service Education*, (28), pp. 339-374.
Wassermann, S. (2009). Growing Teachers Some Important Principles for Professional Development. *Phi Delta Kappan*, *90*(7), 485-489.
Watkins, C. (2005). *Classrooms as learning communities: What's in it for schools?* London: Routledge.
Wei, R, Andree, A. & Darling-Hammond, L. (2009). How Nations Invest in Teachers. *Educational Leadership*, *66*(5), 28-33.
Welch, T. (2012). *Teacher development: What makes it work and how can we learn from this and maximise the benefits?* Teachers' Upfront meeting, School of Education, University of the Witwatersrand.
Wenger, E. (1998). *Communities of Practice. Learning, meaning and identity*. Cambridge: Cambridge University Press.
Wenger, E. (2000). Communities of practice and social learning systems. *Organization*, *7*(2), 225-246.
Wenger, E., McDermott, R. & Snyder, W. (2002). *Cultivating communities of practice: a guide to managing knowledge*. Cambridge, Mass.: Harvard Business School Press.
Willingham, D. (2009). *Why don't students like school? A cognitive scientist answers questions about how the mind works and what it means for the classroom.* San Francisco: Jossey-Bass.
Wilson, E. & Demetriou, H. (2007). New teacher learning: substantive knowledge and contextual factors. *The Curriculum Journal, 18*(3), 213-229.
Wilson, S. & Berne, J. (1999). Teacher learning and the acquisition of professional knowledge: an examination of research on contemporary professional development. *Review of Research in Education*, (24), 173-209.
Winch, C. (2006). Rules, technique, and practical knowledge: a Wittgensteinian exploration of vocational learning. *Educational Theory*, *56*(4), 407-421.
Winch, C. (2010). *Dimensions of Expertise. A conceptual exploration of vocational knowledge*. London: Continuum.
Winch, C. (2012). Research in Vocational Education. *British Journal of Educational Studies* 60(1), pp. 53–63.
Winch, C. (2013a). Curriculum Design and Epistemic Ascent. *Journal of Philosophy of Education, 47*(1), 128-146.

Winch, C. (2013b). Three different conceptions of know-how and their relevance to professional and vocational education. *Journal of Philosophy of Education*, *47*(2), 281-298.

Wineburg, S. & Grossman, P. (1998). Creating a community of learners among high school teachers. *Phi Delta Kappan*, *79*(5), 350-353.

Wohlstetter, P. & Smith, A. (2000). A different approach to systemic reform: Network structures in Los Angeles. *Phi Delta Kappan*, *81*(7), 508-515.

Wong, J. (2010). Searching for good practice in teaching: a comparison of two subject-based professional learning communities in a secondary school in Shanghai. *Compare: A Journal of Comparative and International Education*, *40*(5), 623-639.

Wooten, D. & Reid II, A. (2000). "A conceptual overview of the self-presentational concerns and response tendencies of focus group participants". *Journal of Consumer Psychology*, 9 (3), pp. 141-153.

Wyatt-Smith, C., Bridges, S., Hedemann, M. & Neville, M. (2008). Designing professional learning for effecting change: Partnerships for local and system networks. *The Australian Educational Researcher*, *35*(3), 1-20.

Xu, Y. (2009). School-based teacher development through a school-university collaborative project: a case study of a recent initiative in China. *Journal of Curriculum Studies*, *41*(1), 49-66.

Yin, R. (1994). *Case study research: Design and methods*. Thousand Oaks, CA: Sage.

Yoon, K., Duncan, T., Lee, S., Scarloss, B. & Shapley, K. (2007). *Reviewing the evidence on how teacher professional development affects student achievement* (Issues & Answers Report, REL 2007 – No. 033). Washington, DC: US Department of Education, Institute of Education Sciences, National Centre for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest. Retrieved from http://ies.ed.gov/ncee/edlabs on 07/07/2010.

WHAT AND HOW DO TEACHERS LEARN IN PROFESSIONAL LEARNING COMMUNITIES?

A SOUTH AFRICAN CASE STUDY

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APPENDICES

CHAPTER 1

APPENDIX

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1.1 NETWORKED LEARNING COMMUNITIES

As this case study investigates three subject PLCs that are part of a larger NLC I explain briefly differences between a PLC and NLC and how, in the opinion of writers, participation in a NLC benefits teachers and schools.

A networked learning community (NLC) is similar to a PLC except that participants are from different schools who meet to enquire about issues of common interest. Factors that enable or constrain their effectiveness are similar to those affecting PLCs (Hadfield & Chapman, 2009, pp. 1-11).

Katz et al. (2009) refer to Surowiecki's (2004) book, *The Wisdom of Crowds*, to add strength to their argument that networks of teachers learning together will accomplish more for school improvement than traditional professional development. Surowiecki shows how the SARS virus was discovered by no single agency but a collaborative venture with no single party controlling the project. Participants benefit from diversity of opinion on which to draw when making decisions, independence, freedom to express their own and different views, and decentralisation which implies that the problems being discussed arise from their own needs and are not imposed from above, provided there is a means to bring all the diverse and independent opinion together, termed aggregation (Katz et al., 2009, p. 8).

The theory of action of how networked learning communities (NLCs) operate suggests that

> ... significant *changes in student learning* depend on major *changes in the practices and the structures of the school*, and these changes will emerge from the *professional knowledge creation and sharing* that occurs through interaction within and across schools in the networks. (Italics in the original) (Katz et al., 2009, p. 9)

The value of a networked learning community (NLC) lies in the opportunity for schools to contribute their strengths (knowledge and skills/professional expertise) to the network. These are then "downloaded" to the network for "uploading" by other sites which "upload" them (use them for their professional learning). In the ideal situation all

schools have something to contribute and something to learn. Members co-construct new knowledge by learning both *from* and *with* one another (Katz et al., 2009, p. 16). They investigate this knowledge and with expert explicit knowledge drawn from outside the network transform, enrich or create new knowledge and innovative solutions to genuine problems (Nonaka & Takeuchi, 1995; Von Krogh et al., 2000; Hakkarainen et al., 2004, in Katz et al., 2009).

NLCs are effective for enabling teachers' learning because they depend on these kinds of conversations extending to teachers in each of the schools creating debate, and challenging thinking. Teachers internalise the new knowledge which results in changes in their thinking and teaching practices. NLCs promote the development of professional learning communities (PLCs) in schools which are linked through the network to similar PLCs in other schools. These PLCs through their link into the NLC can further enrich the network with new knowledge. PLCs *upload* their ideas and practices into the network and school learning communities can *download* for use ideas and practices from the network (Katz et al., 2009, p. 11).

Participation in a NLC is likely to motivate teachers to challenge existing practices, renews their sense of purpose and efficacy and exposes them to extended classroom expertise and resources (Lieberman et al., 1992, pp. 673-674).

Although the PLCs that are the focus of this study are a segment of a NLC (that is teachers from a number of schools attend subject PLCs) this study does not focus on the NLC's operational issues but rather on the learning that takes place in the PLCs.

CHAPTER 4
APPENDICES

CHAPTER 4 APPENDICES

4.1 THE STRUCTURE OF THE NLC

The NLC (Big Project) comprises: a networked principals' PLC (NPPLC), networked subject-based PLCs (NSPLCs), and school-based subject PLCs (SSPLCs)[167].

At the beginning of 2011 there were six schools in the NLC which grew to eleven schools by 2012, involving approximately 60 regular participants. The network was made up of:

- One NPPLC comprising ten (one never attended) principals/deputies/or school PLC champion (a person in the school who has the responsibility for ensuring that PLC activity happens) (1 NPPLC = 10 participants);
- Between six and eight NSPLCs, one for each of the subjects identified by teachers in the network as being most in need of support, namely: English Home Language, English First Additional[168], Mathematics, Mathematical Literacy, Physical Science, Life Sciences, Geography and Accounting. Each NSPLC will comprise one lead teacher from each of the six schools (at least 6 NSPLCs x 5 participants in each = 30 participants). The learning of teachers through subject PLC learning activities in three of these NSPLCS is the focus of the PhD study.
- The project aimed to have one SSPLC in each school for each subject that was participating in the NLC, but this did not happen. Only one participant in the English HL PLC managed to set up a formal SSPLC.

The NLC is involved in collaborative teacher research which aligns with the goals of effective TPD. See the Table A4.1 below reproduced from Lassonde and Israel (2010, p. 7).

The PLCs operating in a collaborative manner, using an enquiry cycle such as Timperley et al.'s (2008) Professional Learning Inquiry Cycle (Katz et al., 2009, p. 71, Figure 6.2) established a focus for their learning and then engaged in learning activities centred on the identified focus. The work of each PLC was facilitated by a teacher from the co-ordinating school. The project was designed to run for three years (January 2011 - November 2013).

[167] Only English Home Language ran a formal SSPLC which was not studied as part of the PhD study.
[168] English FAL ran only for 2012. Accounting ran for 2011 and 2012.

Table A4.1 The Process of Teacher Research Closely Aligns with the Goals of Professional Development

Collaborative Teacher Research Involves:	Goals of professional development include:
• Ongoing conversations with colleagues	• Extensive participation with colleagues
• Developing purposes and potential research	• Exploring options and gaining new perspectives and idea questions for group study (or individual studies)
• Researching the topic for a theoretical framework	• Basing instruction on scientifically based research; adding to teacher knowledge
• Collecting, organising, and analysing data	• Learning how to interpret and use data and assessments to inform classroom practice
• Determining the results of the study and applying them to classroom instruction	• Having a lasting impact on instruction
• Evaluating the collaboration	• Evaluating the effectiveness of the endeavour

4.2 DATA COLLECTION TOOLS

4.2.1 Individual teachers' in-depth qualitative interview

QUESTIONS ABOUT LEARNING

1. Do you enjoy learning?
2. What motivates you to learn?
3. What sort of learner are you? What were you like as a learner at school?
4. How do you like to learn? What do you experience as helpful when you are learning?
    1. Do you enjoy learning more about teaching-related matters – subject content knowledge, how to teach your subject knowledge, learners' learning problems, child psychology and so on? Why?

QUESTIONS RELATED TO TEACHER PROFESSIONAL DEVELOPMENT (TPD) EXPERIENCES

5. What did you find most difficult in the early days of teaching? Describe some of your experiences as a new teacher.
    1. Do you think you need teacher professional development? If so, why and on what aspects of your work, specifically?
    2. Have you attended any TPD opportunities in the last year? If yes, please tell me about the experiences. Did you learn much?
    a. If you did learn,
        i. What did you learn?
        ii. What was the topic?
        iii. How did the learning take place?
        iv. How active were you in the learning process?
        v. Did the learning change your teaching practices? If yes, how did you change?
        vi. Have you noticed whether your new learning had any impact on how well your learners were learning?
        vii. Was there any follow-up after the TPD session/s?
    b. If you did not learn,
        i. What was the topic?
        ii. Why do you think you did not learn?
6. Describe what you think would be the ideal way of doing TPD.
7. In what areas of your practice, if any, would you like TPD?

QUESTIONS RELATED TO TPD TO HELP LEARNERS LEARN MORE EFFECTIVELY

8. What do you do when learners don't do well on an assessment task?
9. Do you use any particular methods to find out what learners are struggling with?
10. Do you feel you know how to help struggling learners and those who just don't seem to learn? Can you identify why they are struggling and what do you do?
11. Do you provide remedial opportunities (extra lessons) for struggling learners? What sort of things do you do with struggling learners in remedial lessons?
12. How successful in improving learners' marks are your remedial efforts?

QUESTIONS ABOUT BEING THE TEACHER RESPONSIBLE FOR THE SUBJECT AT YOUR SCHOOL

13. How do you understand your role?
14. Do you enjoy being a subject leader? What gives you pleasure and satisfaction?
15. What is the source of your biggest frustration in your role as subject leader?
16. Up till now from where have you received professional and subject support to help you do your job?
17. Who do you think should help you?
18. What do you need to know to do your job more effectively? In what areas do you feel you need teacher professional development?

QUESTIONS ABOUT PARTICIPATING IN THE NLC

19. What have you learnt in your subject PLC?
20. How did you learn?
21. Has what you have learnt changed the way you teach in the classroom?
22. Do you think your learners are learning more successfully because of what you have learned in the PLC?
23. What things have you changed that have helped – activities, processes, conditions?
24. What sort of things has not helped learning improve? Explain.
25. Have you shared any of this learning with teachers in your subject at your school? Elaborate.
26. Have you been able to teach teachers about collaborative analysis of learners' work? Explain.
27. Have you learned more about your role as a lead teacher through participation in the PLC? Explain.
28. If you have not been able to share your learning with subject colleagues in your school, what are the reasons for this? What would help you be able to do this?

4.2.2 Focus group interview with the facilitators

For discussion in the focus group interview:

1. The DBE Teacher Development Policy sees PLCs/COPs as one of its main pillars for teachers' on-going professional development. Schools will be expected to cluster geographically to do the type of work you have been doing in the NLC. Do you think it will work? Give reasons for your response.
2. Let's talk about the role of facilitator. Would you have done a much better job if you had been formally trained in facilitation skills? Did you use any of the protocols given to you at the beginning? What sort of things would you like to have learned about?
3. What have you learnt about yourself as person and leader of your subject from your experience as a facilitator?
4. Having been involved in the NLC for eighteen months, how would you rate your overall experience of being a facilitator? Is it something that has enriched you or has it all been a bad dream?
5. Would you be interested in facilitating a cluster COP or being part of a university project that is looking at this topic in more detail?

4.2.3 School background interview

SCHOOL NAME: _____ PSEUDONYM: _____

1	Location of the school?
2	How old is the school?
3	How many learners are currently enrolled? Last year? Next year? Is the enrolment stable, growing or decreasing on a year-on-year basis?
4	How many teachers on the staff? GDE? SGB?
5	How many support staff? GDE? SGB?
6	How would you describe the history of this school? Type of pupils, background achievement? What was the matric pass rate and entrance to bachelor degree study at university rate over the last three years? 2008 2009 2010
7	What is important in this school? What is valued? What is the school particularly proud of?
8	Are teachers faced with any particular contextual challenges?
9	How do teachers relate to one another? Are they friendly and supportive to all staff members? Are there cliques? Do teachers co-operate and share or do they prefer to work alone? How stable is the staff in terms of years of service at the school?

10	10.1 How well qualified are the teachers? 10.2 Are they comfortable with the NCS demands? In all subjects? 10.3 What sort of professional development activities have teachers at this school been engaged in? 10.4 What is their attitude to ongoing professional development? 10.5 Do subject heads understand their duties? Have they had any specific training for this?
11	How supportive are the parents?
12	Does the SGB play any role in academic and professional matters?
13	What are the annual school fees?
14	Do you have a school-devised programme for improving learner performance? Is it working? If yes, why? If no, why not?
15	In your opinion, what is hindering learners from improving their achievement levels?
16	What aspect of their work do teachers in your school complain about the most?
17	Please supply a summary of results for 2009 and 2010 in the subjects that you are participating in the Big Project. Use the table provided.

4.2.4 Participants' background questionnaire

(Teachers' version will have spaces in which the answers could be written)

REAL NAME: _____ PSEUDONYM: _____

PERSONAL INFORMATION

1. What subject/s and grades do you teach?
2. Describe the qualifications and experience you have in your teaching subject/s.
3. Have you done further studies after your initial training? If yes, please give some details. Please tell why you decided to do these studies.
4. How long have you been teaching?
5. What post level do you occupy?
6. Please complete the table below by ticking in the relevant block. How confident do you feel as a teacher about the following matters?

	Not confident/ knowledge-able	Sometimes confident/ knowledge-able	Usually confident/ knowledge-able	Very confident/ knowledge-able	Extremely confident/ knowledge-able – I can teach others
Subject content					
Subject teaching methods					
Formative assessment techniques					
Designing summative assessment tasks					
Constructing diagnostic assessments tasks					
Analysing learners' results and deciding on remedial / extension strategies					
Devising and delivering effective and creative lessons					
Helping struggling learners to overcome their learning difficulties					
Mentoring and coaching teachers in your subject					
Planning and monitoring the completion of the curriculum each year by teachers in your subject					

7. Describe the kinds of learners you teach.
8. Describe the learning environment in which you teach. Include comments about resources, facilities and attitudes.
9. How well are your learners doing in your subject? How successful do you feel?
10. What about your learners' work makes you happy as a teacher?
11. What about your learners' work makes you unhappy as a teacher?
12. How do you feel about participating in the networked learning community?

SPECIFIC QUESTIONS RELATED TO TEACHER PROFESSIONAL DEVELOPMENT

13. When you were a beginner teacher did a more experienced teacher help you develop as a teacher? Were your colleagues helpful to you? If so, in what ways?
14. What did you find most difficult in the early days of teaching? Describe some of your experiences as a new teacher.
15. Are you a better/more effective teacher these days? If yes, please explain why you think so.
16. Have you attended any teacher development opportunities in the last year? If yes, what was the topic? Do you think it helped you to teach more effectively?
17. What kind of teacher professional development would you like? Please complete the table below.

Topic: specify below	**Select a format:** a) once off workshop (2-4 hours); b) four to six sessions once a week (for approximately four to six weeks) c) longer sessions for a few days (6-8 hours for five days) d) once a week for 3-4 hours for an extended period (8-10 months) e) independent	**Who should run the programme and where?** a) individually in own time b) school-based c) school cluster-based d) district co-ordinated in centralised venue e) university-based f) other – please specify

18. In your opinion, who should provide and pay for teacher professional development? What types of TPD should they provide? Please complete the table below.

	Yes	No	If yes, what types of TPD?
School provide and pay			
Union provide and pay			
Union provide and member pay			
GDE/GDE district provide and pay			
University provide, GDE pay for individual teacher			
University provide, individual teacher pay			
NGO provide and pay			
Other – please specify			

SPECIFIC QUESTIONS ABOUT LEADING THE SUBJECT IN YOUR SCHOOL

19. How long have you been the Subject Head/Leader/HOD for your subject?
20. Did you receive any training when you took up this role? If yes, describe the type of training.
21. In a few sentences describe your understanding of the role of the subject leader.
22. What are the main difficulties in fulfilling your role that you experience at present?
23. Name three wishes for yourself and your subject department that would really help you do a better job?

4.2.5 Facilitators' brief reflection questionnaire 1

1. Please evaluate the success or otherwise of your NLC, giving reasons.
2. What was the average attendance at sessions over the last three sessions?
3. Do you have any subject heads or official HODs attending your NLC?
4. Please complete the table:

Subject	
Attendance	
What has the group provided? Quality of PLC work?	
Leadership potential in the group	
School PLC activity taking place	
Comment on follow-up activities	
Facilitator's feelings/attitude	
Knowledge of the group members	
Stage of development	

4.2.6 Facilitators' brief reflection questionnaire 2

Please complete the table and use a rating scale of 1 (poor) to 10 (excellent).

1	How many NLC sessions did you facilitate?	
2	Rate their overall value to the teachers who attended. Be guided by their reflection feedback and their conversation in the groups.	
3	Rate the value of their overall participation in the group activities. Did they participate in the learning process?	
4	Rate the value of the group's activities as a means for developing the participants' ability to lead their subject in their schools. Have they developed as lead teachers?	
5	Rate your effectiveness as a facilitator. Don't be too harsh on yourself.	

2. Please reflect a little on what you would do differently next year so that we can move closer to the goal of developing lead teachers so that they can provide subject leadership in their schools (in PLCs).

4.2.7 Facilitators' questionnaire (after 18 months)

Please answer the following questions:

For written answers:

Name: _____ Subject: _____

1. Teaching qualifications, incl. years of study of major subjects:
2. Experience: as a teacher _____ as an HOD/Subject Head _____ Total: _____
3. How much coaching and mentoring of teachers in your own school/s had you done prior to participating in the NLC as a facilitator? Briefly describe this experience and your feelings and attitudes towards it.
4. Have you had any training in mentoring, coaching or facilitation? If yes, please describe what you learnt and where.
5. Please reflect a little on your effectiveness as a facilitator in the NLC. How well did you do? Suggest reasons/explanations for your success or otherwise.
6. In your NLC group which of these roles most describes your type of participation?

   Teacher _____ Coach _____ Mentor _____ Facilitator _____ Friend _____
7. What was your best experience as a facilitator in the NLC project?
8. What was your worst/most difficult experience as a NLC facilitator?
9. Please complete the following table.

Please rate the extent to which you did the following things as the facilitator of your group using the scale: 1 - never; 2 - occasionally; 3 – fairly often; 4 – mostly; 5 – always

	Characteristic	**Rating**		**Characteristic**	**Rating**
1	Provided content expertise		11	Provided knowledge of curriculum	
2	Modelled good pedagogy		12	Provided general useful information for teachers	
3	Motivated the group		13	Established norms for the group and monitored adherence	
4	Used your influence to get things done, and succeeded		14	Used your power as the group leader to get things done, and succeeded	
5	Provided the organisational strategies – the action plan for the group		15	Provided the structure of each session - the agenda	
6	Provided scaffolding for the learning		16	Managed the talking turns/participation of members	
7	Ensured that teachers contributed		17	Helped teachers deepen their understanding of topics	
8	Helped teachers create new ideas/ways of doing things		18	Built relational trust	

	Characteristic	Rating		Characteristic	Rating
9	Moved teachers beyond where they were when they started (in terms of their teaching confidence/ knowledge)		19	Enabled learning to take place	
10	Promoted group accountability		20	Developed leadership in others	

10. If you had not been asked to participate or required to be a facilitator because of your role as HOD for the subject at the school, would you have volunteered for this type of work? Give some reasons for your answer. Speak your true feelings.

4.2.8 Head of Departments' questionnaire

NETWORKED LEARNING COMMUNITY (NLC) 2011

Dear Head of Department

The NLC subject groups have been running for one year. There have been thirteen networked sessions. The aim of the project was to help lead teachers (HODs and subject heads) to learn together how to lead their subject team better. The project has been funded by Absa Capital and they are willing to fund it again next year. We plan to run it at Ivy College. In order to gain maximum benefit from the project please would you fill in this short survey and return it to your Principal before ……. or fax it to ……..……

NAME: (Title)_____ (First name) _____ (Surname) _____

CONTACT CELL NO.: _____ SCHOOL: _____

For which subjects are you head of department?

_____

What subject/s do you teach and to which grades?

_____

How long have you been a head of department? _____

Have you had training to be an effective HOD? Please describe the training.

NLC QUESTIONS

1. Did you attend the subject NLC regularly?

   a) **If yes**, give one reason why you did so.
   b) **If no**, please give the reasons why you did not.
   c) Under what conditions would you attend the subject NLC meetings next year? What would you like to see happen in the groups?

2. Did a teacher from your department attend a subject group of NLC?

   a) **If yes**, did he or she tell you or any other teacher at your school anything about it or did you see any change in how this teacher did his/her work or the learners did their work? Please explain.
   b) **If no**, why did no one attend the subject group from your school? Please give the reasons as far as you know them.

3. In your school, what do you do to help your teachers in your department teach better?

4. In your school, what was done in 2011 to help learners perform better?

5. Are you aware of the South African Council for Educators' (SACE's) Continuing Professional Development Points (CPTD) System which will require all teachers to do 150 points of professional development over three years?

   YES or NO (circle one)

Participation in the NLC would count for points when the system comes into operation, possibly in 2012.

Thank you for answering these questions. Your participation in the NLC project is valued.

Anthea Cereseto
082 610 5756

4.2.9 Participants' progress questionnaire

Name: _____Pseudonym: _____ School:_____

Questions about your experience as a whole:

1. In general, how would you describe your experience of the NLC this year (circle one).
   A very positive
   B positive
   C not sure
   D negative
   E very negative

   Please supply reasons for your answer:

2. Is there anything that could have been done differently or better? (Please tick the statements that you believe to be true, and then use the space to specify and explain.)
   - □ We should have covered more content.
   - □ We should have covered more "how to teach" sections.
   - □ We should have worked more on how to set assessments.
   - □ We should have spent our time setting the assessments.
   - □ Other (please write down any/all other things that could have been done differently or better)

3. Why did you keep coming to the NLC?

4. Was there anything that made it difficult to come to NLC? Please write down any/all the challenges:

Questions about your experience in subject groups

5. Please circle what is most true for you for each statement:

   5.1 Being part of the NLC has improved my subject knowledge:
   Yes / No / Don't know

   5.2 Being part of NLC has made me a more empowered teacher:
   Yes / No / Don't know

   5.3 Being part of NLC has made me more aware of my learners' needs:
   Yes / No / Don't know

   5.4 Being part of NLC has helped me to develop materials that are appropriate for my learners:
   Yes / No / Don't know

5.5 Being part of NLC has made me a more reflective teacher (i.e. able to think about my teaching, identify challenges and develop ways to meet these challenges): Yes / No / Don't know

5.6 Please add anything that is not covered above.

6. Please write down any aspects of your subject group experience that has not been helpful or useful:

7. Were you able to take NLC work or ideas back to your school and share it with other teachers at your school? Yes / No

7.2 If yes, please describe what you did.

7.3 If no, please describe what made it impossible/difficult to do this.

8. Were the conduct and actions of your facilitator helpful for the learning processes for the subject PLCs? If yes, please say why.

If no, please explain what was not helpful.

9. Were you able to take NLC work or ideas back to your school and share it with the learners at your school? Yes / No

9.2 If yes, please describe what you did:

9.3 Did this have any visible changes/impact? Please describe:

9.4 If no, please describe what made it impossible/difficult to do this.

Questions concerning the workability of the Professional Learning Community model as national strategy

10. Do you think that this type of group (NLC/PLC) would work with the teachers in your subject group at your school? Why / Why not?

11. If a NLC group was set up for the schools in your area, what would it need to make it work?

12. Would there be any difficulties or challenges with this type of group? Please write down everything you can think of:

13. Would there be benefits of this type of group? Please write down everything you can think of.

14. If the NLC continues next year do you plan to attend? Yes / No / Don't know

4.2.10 Facilitators' progress questionnaire (after 24 months)

NLC facilitators' questionnaire

Pseudonym: _____ Subject: _____

Questions about your experience as a whole:

1. In general, how would you describe your experience of the NLC this year (circle one).
   A very positive
   B positive
   C not sure
   D negative
   E very negative

   Please supply reasons for your answer:

2. Is there anything that could have been done differently or better? (Please tick the statements that you believe to be true, and then use the space to specify and explain.)

3.
   □ We should have covered more content.

   □ We should have covered more "how to teach" sections.

   □ We should have worked more on how to set assessments.

   □ We should have spent our time setting the assessments.

   □ Other (please write down any/all other things that could have been done differently or better)

4. Why did you keep facilitating the NLC sessions?

5. What made facilitating the NLC sessions challenging?

Questions about your experience in subject groups

6. What have you learned (related to teaching/teachers/managing/instructional leadership) from your experience as a facilitator?

7. Were you able to take NLC work or ideas back to your PLC?
   Yes / No

   7.1 If yes, please describe what you did.

   7.2 If no, please describe what made it impossible/difficult to do this.

8. What were your strengths as a facilitator?

9. What were your weaknesses as a facilitator?

10. Has your experience as a facilitator equipped you better for conducting your school-based subject PLC?

Questions concerning the workability of the Professional Learning Community model as national strategy

11. If a NLC subject group was set up for the schools in your area, what would it need to make it work?

12. Would there be any difficulties or challenges with this type of group? Please write down everything you can think of:

13. Would there be benefits of this type of group? Please write down everything you can think of.

14. Evaluate the success of your NLC group. Consider the impact on teacher development and the likelihood of the performance of learners improving as a result of the teacher participation. Give some evidence for your response.

15. What would you do differently next year to make the work you do have more impact on improving learners' learning?

4.2.11 Principals' progress questionnaire

NLC principal's questionnaire

Name:_____ Pseudonym:_____ School:_____

Questions about your experience as a whole:

1. In general, how would you describe your experience of the Principals' NLC this year (circle one).
   A very positive
   B positive
   C not sure
   D negative
   E very negative

   1.2 Please supply reasons for your answer:

2. Is there anything that could have been done differently or better? (Please tick the statements that you believe to be true, and then use the space to specify and explain.)

   □ We should have covered more content
   _____

   □ We should have covered more "how to teach" sections
   _____

   □ We should have worked more on how to set assessments
   _____

   □ We should have spent our time setting the assessments
   _____

   □ Other (please write down any/all other things that could have been done differently or better)
   _____

3. Why did you keep coming to the Principals' NLC?

4. Was there anything that made it difficult to come to NLC? Please write down any/all the challenges:

Questions about your experience in the Principals' NLC

5. Please circle what is most true for you for each statement:

   5.1 Being part of the Principal's NLC has improved my

   a) _____

   b) _____

   c) _____

5.2 Being part of the Principals' NLC has made me a more empowered Principal: Yes / No / Don't know

5.3 Being part of the Principals' NLC has helped me to develop new strategies to manage learners and teachers. Yes / No / Don't know. Please give examples if possible.

a) _____

b) _____

c)_____

5.4 Being part of the Principals' NLC has made me a more reflective principal (i.e. able to think about my management and leadership, identify challenges and develop ways to meet these challenges): Yes / No / Don't know. Please give examples if possible.

a) _____

b) _____

c) _____

6. Please write down any aspects of your subject group experience that has not been helpful or useful:

7. Were you able to take Principals' NLC work or ideas back to your school and share it with other teachers at your school? Yes / No

7.1 If yes, please describe what you did.

7.2 If no, please describe what made it impossible/difficult to do this.

7.3 Did this have any visible impact? Please describe.

8. If you shared something with the staff or learners, please describe what you did.

If no, please explain what was not helpful.

9. If a Principals' NLC group was set up for the schools in your area, what would it need to make it work?

10. Would there be any difficulties or challenges with this type of group? Please write down everything you can think of:

11. If the NLC continues next year do you plan to attend? Yes/No/Don't know

4.2.12 Teachers' end of project questionnaire (Teachers' questionnaire 2)

NETWORKED LEARNING COMMUNITY

TEACHER'S QUESTIONNAIRE – OCTOBER 2013

SUBJECT _____ PSEUDONYM/NAME _____

1. Length of participation in the NLC (tick one)

a) More than 24 months ___
b) Between 12 and 24 months ___
c) Between 6 and 12 months ___
d) Less than 6 months ___

2. Please describe what you liked about the NLC sessions. Why did you attend them?

_____
_____
_____
_____

3. Please describe at least one example of "knowledge-for-teaching" that you learned in your NLC/PLC.

_____
_____
_____
_____

4. Was this knowledge mostly … (you may tick more than one)

a) Subject content knowledge (facts about your subject) ____
b) Practical knowledge (how to teach an aspect of your subject) ____
c) Knowledge that changed your personal beliefs about teaching or your subject ____

5. Please complete the following table. Rate each of the characteristics.

	Characteristic	Very good	Good	Accep-table	Not good	Problem-atic
1	Usefulness of the group's focus for expanding your knowledge-for-teaching					
2	The quality of facilitation/ leadership of your PLC group					
3	The amount of collaboration (working together on activities) that happened in the group					
4	The level of trust and respect for one another shown in the group					
5	The freedom to talk/to express your view					
6	The amount of learning that you experienced					
7	The amount of reflective dialogue (thinking about what you are doing or have done in your teaching or learners are doing or have done in their work and the reasons for all of this)					
8	The extent to which group members took collective responsibility for the activities in the PLC					

6. Choose one characteristic to which you gave a good or very good rating and explain why you gave it a high rating.

_____

_____

_____

7. Choose a characteristic to which you gave a low rating and explain why you gave it a low rating.

_____

_____

_____

8. Do you think participation in a NLC/PLC is a good way for learning "knowledge-for-teaching"?

Yes, because

_____

_____

_____

No, because

_____

_____

_____

9. The NLC/PLC would work better (be more effective/useful) if …

_____

_____

_____

10. Would you be able to start up a subject NLC/PLC in your school or with local schools?

Yes ___ No ___ Give a reason for this answer.

_____

_____

_____

11. Have you changed your way of teaching or what you teach because of your participation in the NLC/PLC?

Yes ___ No ___ Give a reason for this answer.

_____

_____

_____

12. What recommendation about PLCs would you make to the Education Department/District about setting up subject PLCs?

_____

_____

_____

_____

i. Facilitators' end of project questionnaire

NETWORKED LEARNING COMMUNITY

FACILITATOR'S QUESTIONNAIRE – OCTOBER 2013

SUBJECT _____

1) Please describe your general feelings about facilitating the NLC sessions over the last three years.

_____
_____
_____
_____

2) Please describe what you liked about the NLC sessions.

_____
_____
_____
_____

3) Please describe at least one example of "knowledge-for-teaching" that your NLC/PLC learned.

_____
_____
_____
_____

4) Was this knowledge mostly … (you may tick more than one)

   a) Subject content knowledge (facts about your subject) ____
   b) Practical knowledge (how to teach an aspect of your subject) ____
   c) Knowledge that changed your personal beliefs about teaching or your subject ____

5) Please complete the following table. Rate each of the characteristics.

	Characteristic	Very good	Good	Accep-table	Not good	Problem-atic
1	Usefulness of the group's focus for expanding teachers' knowledge-for-teaching					
2	The amount of collaboration (working together on activities) that happened in the group					
3	The level of trust and respect for one another shown in the group					
4	Participants' freedom to talk/to express their view					
5	The amount of learning that took place in the group					
6	The amount of reflective dialogue (thinking about what you are doing or have done in your teaching or learners are doing or have done in their work and the reasons for all of this)					
7	The extent to which group members took collective responsibility for the activities in the PLC					

6) Choose one characteristic to which you gave a good or very good rating and explain why you gave it a high rating.

_____

_____

_____

7) Choose a characteristic to which you gave a low rating and explain why you gave it a low rating.

_____

_____

_____

8) Do you think participation in a NLC/PLC is a good way for learning "knowledge-for-teaching"?

Yes, because

_____

_____

_____

No, because

_____

_____

_____

9) The NLC/PLC would work better (be more effective/useful) if …

_____

_____

_____

10) Would you facilitate a NLC again?

Yes ___ No ___ Give a reason for this answer.

_____

_____

_____

11) Have you changed your way of teaching or what you teach because of your participation in the NLC/PLC?

Yes ___ No ___ Give a reason for this answer.

_____

_____

_____

12) What recommendation about PLCs would you make to the Education Department/District about setting up subject PLCs?

_____

_____

_____

_____

ii. Principals' end of project questionnaire

NETWORKED LEARNING COMMUNITY

PRINCIPAL'S QUESTIONNAIRE – OCTOBER 2013

SUBJECT _____ PSEUDONYM/NAME _____

1. Length of participation in the NLC (tick one)
   a) More than 24 months ___
   b) Between 12 and 24 months ___
   c) Between 6 and 12 months ___
   d) Less than 6 months ___

2. Please describe what you liked about the NLC sessions. Why did you attend them?

_____
_____
_____
_____

3. Please describe at least one example of "knowledge-for-principals" that you learned in the NLC.

_____
_____
_____
_____

4. Was this knowledge mostly … (you may tick more than one)

   a) Factual knowledge (facts about leadership) ____
   b) Practical knowledge (how to lead) ____
   c) Knowledge that changed your personal beliefs about being a principal ____

5. Please complete the following table. Rate each of the characteristics.

	Characteristic	Very good	Good	Accep-table	Not good	Problem-atic
1	Usefulness of the group's focus for expanding your knowledge-for-principals					
2	The quality of facilitation/leadership of your PLC group					
3	The amount of collaboration (working together on activities) that happened in the group					
4	The level of trust and respect for one another shown in the group					
5	The freedom to talk/to express your view					
6	The amount of learning that you experienced					
7	The amount of reflective dialogue (thinking and talking about what you are doing or have done in your job as principal related to the topics in the sessions)					
8	The extent to which group members took collective responsibility for the activities in the NLC					

6. Choose one characteristic to which you gave a good or very good rating and explain why you gave it a high rating.

_____

_____

_____

7. Choose a characteristic to which you gave a low rating and explain why you gave it a low rating.

_____

_____

_____

8. Do you think participation in a NLC/PLC is a good way for learning "knowledge-for-principals"?

Yes, because

_____

_____

_____

No, because

_____

_____

_____

9. The NLC/PLC would work better (be more effective/useful) if …

_____

_____

_____

10. Would you be able to start subject PLCs in your school?

Yes ___ No ___ Give a reason for this answer.

_____

_____

11. Have you done things differently because of your participation in the NLC/PLC?

Yes ___ No ___ Give a reason for this answer.

_____

_____

_____

12. What recommendation about PLCs would you make to the Education Department/District about setting up subject PLCs in the District?

_____

_____

_____

_____

4.3 PERMISSION LETTERS AND INFORMATION SHEET

4.3.1 Letter of permission to conduct research from the GDE

UMnyango WezeMfundo
Department of Education

Lefapha la Thuto
Departement van Onderwys

Enquiries: Diane Buntting (011) 843 6503

Date:	21 October 2010
Name of Researcher:	CERESETO A.M.
Address of Researcher:	42 Kildare Avenue
	Parkview
	Johannesburg
	2193
Telephone Number:	011 646 6579 / 082 610 5756
Fax Number:	011 486 1828
Email address:	cereseto@parktowngirls.co.za
Research Topic:	Learning to lead: A case study of lead teachers in a networked learning community
Number and type of schools:	TWELVE SECONDARY SCHOOLS
District/s/HO	JOHANNESBURG NORTH

Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

Permission has been granted to proceed with the above study subject to the conditions listed below being met, and may be withdrawn should any of these conditions be flouted:

1. ***The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter that would indicate that the said researcher/s has/have been granted permission from the Gauteng Department of Education to conduct the research study.***
2. ***The District/Head Office Senior Manager/s must be approached separately, and in writing, for permission to involve District/Head Office Officials in the project.***
3. ***A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB) that would indicate that the researcher/s have been granted permission from the Gauteng Department of Education to conduct the research study.***

Office of the Chief Director: Information and Knowledge Management
Room 501, 111 Commissioner Street, Johannesburg, 2000 P.O.Box 7710, Johannesburg, 2000
Tel: (011) 355-0809 Fax: (011) 355-0734

4. *A letter / document that outlines the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned, respectively.*
5. *The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, and chairpersons of the SGBs, teachers and learners involved. Persons who offer their co-operation will not receive additional remuneration from the Department while those that opt not to participate will not be penalised in any way.*
6. *Research may only be conducted after school hours so that the normal school programme is not interrupted. The Principal (if at a school) and/or Director (if at a district/head office) must be consulted about an appropriate time when the researcher/s may carry out their research at the sites that they manage.*
7. *Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year.*
8. *Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.*
9. *It is the researcher's responsibility to obtain written parental consent of all learners that are expected to participate in the study.*
10. *The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.*
11. *The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of each of these individuals and/or organisations.*
12. *On completion of the study the researcher must supply the Director: Knowledge Management & Research with one Hard Cover bound and one Ring bound copy of the final, approved research report. The researcher would also provide the said manager with an electronic copy of the research abstract/summary and/or annotation.*
13. *The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned.*
14. *Should the researcher have been involved with research at a school and/or a district/head office level, the Director concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.*

The Gauteng Department of Education wishes you well in this important undertaking and looks forward to examining the findings of your research study.

Kind regards

21 October 2010

Shadrack Phele MIRMSA
[Member of the Institute of Risk Management South Africa]
CHIEF EDUCATION SPECIALIST: RESEARCH COORDINATION

The contents of this letter has been read and understood by the researcher.	
Signature of Researcher:	
Date:	

4.3.2 Letter to District Director/SGBs/Principals

42 Kildare Avenue
PARKVIEW
2193
11 January 2011

Dear SGB Chairperson/School Principal

INVITATION TO PARTICIPATE IN A RESEARCH STUDY

As you are aware your school and the teachers are currently participating in a networked learning community (NLC) aimed at improving the quality of teaching and learning in order to improve learner performance. I have chosen to research a segment of this NLC for the purposes of a PhD study supervised by the School of Education at the University of the Witwatersrand. The topic of the study is "Learning to lead: A case study of lead teachers in a networked learning community." The study seeks to explore the conditions and processes that enable *lead teachers* in a networked learning community (NLC) to develop their own capacity and that of the teachers they lead in subject-based PLCs (SSPLCs), to improve the quality of learners' learning and performance. It does this by focusing on the learning activities of the lead teachers in the networked subject PLCs (NSPLCs) and SSPLCs, specifically related to their learning how to do and facilitate collaborative analysis of learners' work. The study also aims to explore how lead teachers learn to understand better their role as leader of the subject in the school.

The study was motivated by a desire to find a way of improving the quality of learner achievement. Research pointed to the importance of improving what teachers do in the classroom, in particular the quality of classroom instruction. To improve this effective teacher development was needed. Collaborative teacher research that is subject- and context-based has been identified as more effective for changing teachers' instructional practice than the type of professional development teachers are usually involved in.

I am seeking your consent to allow teachers in two of the networked subject PLCs and their school-based subject PLCs to participate in this study for approximately the first nine months of the NLC's operation. The study will entail my interviewing six teachers in-depth twice, and about twelve others in two focus groups on two occasions. They will also need to complete two questionnaires, one at the beginning of the NLC operation and again after nine months. In addition, I would like to observe from time-to-time the NSPLC and SSPLC activities and

record, both audio and video, some of the meetings as well as study samples of teachers' and learners' work. I will also ask teachers to photograph from time-to-time their classroom and any items or places you feel relevant to their learning experiences. In the course of the NLC learning activities teachers will be required to examine samples of learners' work together. I therefore request your consent to allow samples of learners' work to be used.

Teachers and learners would not be burdened by extra work because of their participation and I will not be passing judgment on anyone or any school. I wish merely to gather information concerning teachers' learning experiences in the NLC.

The identity of participating schools and teachers will be kept confidential. Pseudonyms will be used. The interviews will be audio-taped and transcribed either by me or a person working under my supervision who will sign a confidentiality agreement.

I would greatly appreciate it if you would consent to your school's and teachers' participation in the study. Please could you complete the consent form attached and return it to me as soon as possible.

My contact details are as follows:

Work telephone number:	011 646 5423
Home telephone number:	011 646 6579
Mobile telephone number:	082 610 5756
Facsimile number:	011 486 1828

Please feel free to contact me about any questions that you might have concerning your school's participation in this study.

I look forward to a productive relationship with you and members of your school community in the interest of education in our country.

Yours sincerely

ANTHEA CERESETO (MRS)

CONSENT OF SCHOOL TO PARTICIPATE IN A RESEARCH STUDY

I, _____ of _____ school have been informed about the research study entitled "Learning to lead: A case study of lead teachers in a networked learning community" being conducted by Anthea Cereseto. I consent to the school's participation in the study, as explained in the Letter to the SGB/Principal and Participant Information Sheet, which will provide information that will be used for educational purposes. I specifically consent to this school's participation in the PLCs being audio- and video-recorded. I understand that the name of the school and its learners and teachers will be kept confidential unless consent, in writing, is given. I further understand that no harm will come to the school/learners/teachers and that I/we are free to withdraw from the study at any time. I am aware that I will not receive additional remuneration from the Gauteng Department for our participation in the study. I acknowledge that I have received a copy of this consent form for school records

Participant's signature _____ Date _____

Researcher's signature _____ Date _____

4.3.3 Participant information sheet (school, SGB, teachers and parents)

The research project in which you or your child has been asked to participate is entitled **"Learning to lead: A case study of lead teachers in a networked learning community".** It seeks to explore a model of professional development involving teachers in a professional learning community (PLC) in a networked learning community (NLC) collaborating to learn to teach better with a view to improving the achievement of learners.

Despite considerable investment in teacher professional development (TPD) to improve the quality of education in South Africa only approximately a third of a cohort of learners entering the system obtains a senior certificate pass after twelve years and in international benchmarking tests South African learners perform very badly. Research suggests that the type of professional development that South African teachers have been exposed to has had little or no impact on teachers' instructional practice or learners' performance because it has mostly been generic and insufficiently related to the context in which the teachers work (Crouch & Patel, 2008, in Bloch et al., 2008).

A model of TPD that is subject- and context-focused that has emerged internationally is collaborative learning in professional learning communities (PLCs) and networked learning communities (NLCs). Researchers argue that for professional development to change what happens in the classroom it needs to involve teachers in collaboration and teacher research (Lassonde & Israel, 2010, pp. 6, 7). In this model teachers operate in a NLC/PLC that focuses on teacher development in the areas of learners' learning needs, that is, on what the teachers need to do better in order to enable learners to learn better.

This study aims to investigate the conditions and processes that enable *lead teachers* in a NLC to develop their own capacity and that of the teachers they lead in subject-based PLCs (SSPLCs), to improve the quality of learners' learning and performance. It does this by focusing on the learning activities of the lead teachers in the networked subject PLCs (NSPLCs) and SSPLCs, specifically related to their learning how to do and facilitate collaborative analysis of learners' work. The study also aims to explore how lead teachers learn to understand better their role as leader of the subject in the school. This study focuses on lead teachers because the quality of facilitation/leadership is central to the effectiveness of the model of TPD in a NLC/PLC referred to above.

This study is conducted by means of a case study of four lead teachers in two networked subject-based PLCs that are part of a NLC comprising six schools in Johannesburg North District, Gauteng. The study will explore the learning experiences of these teachers by means of questionnaires, in-depth semi-structured interviews, focus group interviews, observation of NSPLC and SSPLC activities, examination of samples of teachers' and learners' work, and analysis of documents such as records of PLC meetings. Some of the NSPLC and SSPLC sessions will be audio- or video-recorded with the consent of participants. The researcher will report on the data collected and the findings in a thesis for a Doctor of Philosophy Degree (University of the Witwatersrand). It is hoped the findings will also be shared with the broader education community.

Teachers' participation will enable data to be collected which when analysed will benefit teachers directly and indirectly. The researcher believes the data collected will contribute to an understanding of the conditions and processes that enable effective TPD. In particular, the data will explain how lead teachers learn to do and facilitate collaborative analysis of learners' work and learn to understand their roles and responsibilities as subject leaders in their schools.

The learners who allow their work to be used as samples to be studied would also be making a significant contribution. They and learners in other schools could benefit in the long run from improvements in the quality and type of assistance they would receive from their teachers which would help them learn more effectively.

The researcher does not envisage any risk to any participant. The identity of the schools, the teacher participants, and the learners' whose work samples are studied and that are used in the research report and any other dissemination of the research findings will be protected through the use of pseudonyms or kept anonymous to observe confidentiality and to be sensitive to all parties involved. A copy of the final report will, if requested, be made available to the participants and the participating schools.

Anthea Cereseto

Researcher
11 January 2011

4.3.4 Letter to participants (teachers and facilitators)

42 Kildare Avenue
PARKVIEW
2193
11 January 2011

Dear Teacher

INVITATION TO PARTICIPATE IN A RESEARCH STUDY

Your school and you are currently participating in a networked learning community (NLC) aimed at improving the quality of teaching and learning in order to improve learner performance. I have chosen to research a segment of this NLC, of which you are part, for the purposes of a PhD study supervised by the School of Education at the University of the Witwatersrand. The topic of the study is "Learning to lead: A case study of lead teachers in a networked learning community". The study seeks to explore the conditions and processes that enable teachers in a networked learning community (NLC) to develop their own capacity and that of the teachers they lead in subject-based PLCs (SSPLCs), to improve the quality of learners' learning and performance. It does this by focusing on the learning activities of the lead teachers in the networked subject PLCs (NSPLCs) and SSPLCs, specifically related to their learning how to do and facilitate collaborative analysis of learners' work. The study also aims to explore how lead teachers learn to understand better their role as leader of the subject in the school.

The study was motivated by a desire to find a way of improving the quality of learner achievement. Research pointed to the importance of improving what teachers do in the classroom, in particular the quality of classroom instruction. To improve this effective teacher development was needed. Collaborative teacher research that is subject- and context-based has been identified as more effective for changing teachers' instructional practice than the type of professional development teachers are usually involved in.

I am seeking your participation because you and your school are currently participating in a NLC and I request your consent for me to study your learning experiences and activities as a teacher in your school-based subject PLC (SSPLC) over the next nine months of your participation in the NLC.

The study will entail your participation in a focus group on two occasions: the first at the beginning of the project and the second after eight months and completing two questionnaires, one at the beginning of the NLC operation and again after nine months. In addition, I would like to observe your learning activities in the NSPLC and your SSPLC and record, both audio and video, some of the meetings as well as study samples of your work and learners' work. I will also ask you to photograph from time-to-time your classroom and any items or places you feel relevant to your learning experiences. I will not be passing judgment on you; I wish merely to gather information concerning your experiences of learning to do and facilitate collaborative analysis of learners' work in your NSPLC and SSPLC as well as how you understand your role as a subject leader in your school.

The identity of participants will be kept confidential. Participating schools and teachers will use pseudonyms. The interviews will be audio-taped and transcribed either by me or a person working under my supervision who will sign a confidentiality agreement.

I would greatly appreciate it if you would consent to participate in the study. Please could you complete the consent form attached and hand it to me at the end of today's meeting.

My contact details are as follows:

Work telephone number:	011 646 5423
Home telephone number:	011 646 6579
Mobile telephone number:	082 610 5756
Facsimile number:	011 486 1828

Please feel free to contact me about any questions that you might have concerning your participation in this study.

I eagerly anticipate your participation and look forward to a productive relationship with you and members of your school community in the interest of education in our country.

Yours sincerely

ANTHEA CERESETO (MRS)

CONSENT OF TEACHER TO PARTICIPATE IN A RESEARCH STUDY

I, _____, have been informed about the research study entitled "Learning to lead: A case study of lead teachers in a networked learning community" being conducted by Anthea Cereseto. I consent to participate in the study, as explained in the Letter to Teachers and Participant Information Sheet, which will provide information that will be used for educational purposes. I specifically consent to my participation in the PLCs being audio- and video-recorded. I understand that my name (and that of my school and the other participants) will be kept confidential unless I consent, in writing, to my name being used. I further understand that no harm will come to me and that I am free to withdraw from the study at any time. I am aware that I will not receive additional remuneration from the Gauteng Department for my participation in the study. I acknowledge that I have received a copy of this consent form for my personal records.

Participant's signature _____ Date _____

Researcher's signature _____ Date _____

4.4 SCHOOL BACKGROUND INFORMATION

1. Field Secondary School[169]

Field, a co-educational, no-fee school, was established in 2006 in a new housing estate with mainly RDP housing. It serves a wider area including learners from informal settlements. The school has to deal with many social problems: HIV/Aids, child-headed households, orphans, poor and hungry learners. They do have a sponsored feeding scheme. The teachers complain that learners entering the school in grade 10 have been poorly prepared for the FET phase. The school has 902 learners in grades 10-12, 31 GDE paid teachers and 7 GDE paid support staff.

The school values "ubuntu". They teach about respect, privacy, respecting school and learners' property and they encourage learners to believe that life can be different.

In 2011 the school was troubled by tensions between the principal and some teachers and the SGB chairperson and some teachers. This was partially resolved by the end of 2011 but the teachers who stirred the trouble remained. The majority of teachers, especially new teachers to the profession, work hard and are willing to learn. The teachers are mostly well-qualified and feel competent to deliver the curriculum. They have a positive attitude to professional development. The HODs have not had specific training for their jobs but have been assisted by the principal and deputies. Teachers complain about lack of learner commitment and parental involvement. Learners do not do homework. Often this is because they do not have a place at home to do it and there is no community library.

The school has little support from parents. The principal thinks this may be because of parents' illiteracy. Many children do not have parents and the grandmothers do not attend meetings. The SGB has no involvement in academic work and, in general, it has a negative impact. Good parents who were willing to stand were intimidated or became discouraged.

[169] The information in these school profiles is as given when the questionnaire was administered. In most cases the data is for 2011.

The school has many support programmes for learners: morning and afternoon extra classes, NGOs and FNB offer Mathematics and Science classes, retired teachers assist with English and Afrikaans once a week.

2. Siza Secondary School

Siza, a co-educational, no-fee school, was established in 1981 in an old section of Soweto. Of the 800 learners attending this school many live with grandmothers or in child-headed households, many live in informal settlements, and many have moved there from the Eastern Cape. In all cases, whether they are local or not, learners are ill-prepared, presenting with literacy and numeracy issues. They deal with poverty and hunger issues. Food is delivered to those in need. There are 1400 learners, 44 GDE and 1 SGB paid teachers and 10 GDE paid support staff.

The school wants to be proud of its results. Learners, however, choose subjects for which they have no basic knowledge, for example Mathematics. There are structures in place such as HODs assisting teachers, availability of teaching resources to supplement teachers' knowledge, and good textbook management. The Principal notes that the attitude of the HODs makes teachers feel threatened and uncomfortable. However, union problems are identified as a stumbling block. Member teachers will not work after 15:00 or permit class visits. After a challenge from the unions because they felt that the NLC project would not help because the learners from Siza were so different from those at the co-ordinating school, Siza eventually agreed by saying "Let's learn what they do". Now teachers of subjects that are not provided for in the NLC are asking why they cannot join.

The staff is stable and most have degrees. In general they are reasonably comfortable with the curriculum except for Mathematics and Physical Science teachers who are struggling. Teachers have been used to working alone but more recently have begun to prepare together and they do the same classwork and tests. They have attended professional development opportunities but were not satisfied with the district clusters because they needed something more. HODs have not been trained for their role and the Principal believes they need intensive training. They do not operate with subject heads.

Teachers' main complaint is paperwork which takes time away from teaching and they do not like being taken out of class by officials when they are teaching.

The parents come to meetings at the beginning of the year but later in the year they do not attend meetings. The SGB is considered helpful.

Bad discipline, lack of commitment from the learners and their families, the need to be spoon fed and not go home and read things for themselves, and failure to ask for help or attend extra lessons are seen as hindrances to learner progress. Teachers do help by giving morning and afternoon classes and the Grade 12s do attend these.

3. Galaxy High School

Galaxy is a fee-paying, co-educational, ex-Model C suburban school established fifty years ago with an enrolment of 860 grade 8-12 learners. The school has 58 teachers, thirty paid for by the SGB. There are 20 support staff members, with 13 paid for by the SGB.

The learner population has changed radically over the last twenty years. In the 1980s it included a large number of the Jewish learners from privileged, high-achieving families and most learners lived in the immediate neighbourhood. Now the learner population is very diverse and from many different areas. The learners from the neighbourhood are mostly the children of domestic workers. Some high flyers still attend the school but many are academically and financially disadvantaged. The school usually achieves a 100% pass rate. The university entrance rate has declined from 83% in 2008 to 70% in 2010.

The school has adjusted its focus from helping the academically bright to do exceptionally well to getting the weak learners up to standard. The school values the individual and nurtures individual traits. The school has embraced its diversity and this is reflected in the staff as well as the learners. The staff is happy and functions collegially.

The teachers recognise that they are privileged to have the resources they need and that the teaching and learning environment is not as difficult as in other schools. They do,

however, find the political context challenging, including changes in the curriculum, interference in how they do their work, and some administrative work and meetings that are considered a waste of time. At present many travel from quite far to teach at a good school but with the traffic congestion and the prospect of toll fees, they are now thinking of looking for a post closer to home.

Generally the teachers work collaboratively. There is a small group which is perceived as subversive and does not appear to have the school's interest at heart. It is, however, more of a personality issue rather than union affiliation. Teachers are well-qualified with a minimum of a degree and higher diploma. Quite a number have honours degrees. They are able to cope with the demands of the NCS. Teachers generally do not resist staff development because most recognise the need to develop further. They wish they had more time for it. There are a few with a "know it all" attitude. There is a slot every Friday afternoon after school where small issues are dealt with. Two big sessions are held each year, usually focusing on discipline. Teachers choose to attend courses that they are interested in and these are recorded in IQMS documentation. Early in the year there is a refresher course for subject heads so that their role is well understood. The GDE has asked teachers from the school to provide development for other teachers in specialist areas such as: Technology, Electrical Technology, and Engineering Graphics and Design. Teachers' main complaints centre on work overload and unequal work distribution and performance. Learner apathy is also a problem for teachers.

The parents are supportive in matters concerning academic performance. They attend information meetings and will come to the school if called to do so. It is a struggle to involve parents in other voluntary work such as fundraising. The SGB is supportive and demands thorough and transparent reporting.

There are programmes to assist underperforming learners. These include extra lessons for Mathematics and English every afternoon and holiday classes in April and July for Grade 12s in Mathematics and Science. Some learners are underachieving through lack of application and personal responsibility despite the school's efforts. Teachers find that language deficiencies hinder performance in the content subjects. Many learners have a very poor foundation in Mathematics. They also do not have good reading skills and

habits. Teachers feel ill-equipped to do remedial teaching as no one is specially qualified for this.

4. Lots High School

Lots was established in 1980 in an old part of Soweto for girls in grades 8-12. Previously it was in another location and then it was co-educational. It used to draw learners from the neighbourhood but now they come from other areas. It has recently become a no-fee school. Enrolment is 988 and there are 33 GDE paid teachers and 8 GDE paid support staff.

The school prides itself on its history of being a good school where academics and discipline are valued. The school is faced with the challenge of large classes and learners from Lesotho and Transkei who stay with siblings rather than parents.

There is a strong management team but teachers are not very willing to share. The principal noted that the teachers who did share were Zimbabweans. About half the teachers have degrees and the others secondary teachers' diplomas. Some are studying further. Teachers are not very supportive of professional development programmes, especially the management staff, although a few younger teachers are eager. The reason given most often is that there is already too much GDE work. The HODs understand their duties although they were not trained for them. They do not carry them out as effectively as before because of teacher union (SADTU) resistance to the controls. Teachers, many of whom have been at the school for more than 15 years, complain about too much marking, GDE interference and excessive expectations. Teachers believe the level of learners is going down every year.

The parents of the grade 8s and 9s are more supportive than parents of senior learners. The principal feels that the parents are struggling with bringing up the "new youth" who give in to peer pressure, want "smart" things, and do not understand that they have to work hard for things you want. There are limited academic support programmes for learners. They have DVDs for Physical Science and Geography. They involve learners in speech competitions and this has improved their confidence.

5. Rock High School

Rock, established in 1939, is a no-fee school situated in an old part of Soweto. It has an enrolment of 865 grades 10-12 learners. There are 29 GDE paid teachers and 7 GDE and 1 SGB paid support staff. The school is proud of its rich history, especially in relation to academic and sporting excellence. The school is a heritage site which people visit to honour the June 16 Soweto student uprising. The current learners are mostly poor; many learners head their households; crime and drugs are a problem; the school has to feed learners, and sometimes teachers even foster the learners.

Most teachers are qualified, some with degrees. The teachers of Physical Science and Accounting are not comfortable with the demands of the NCS curriculum. Teachers are not committed to professional development. They attend when they are instructed to do so. There is conflict amongst the teachers along ethnic divisions. Many teachers have been at the school for over thirty years. At the beginning of the second year of the project a new principal was appointed who appears to have managed these tensions. Teachers complain about the poor academic background of the grade 10s and that many of them are failures from other schools. They struggle with the diversity in their classrooms with respect to age, ability, co-operation, and work ethic.

Most learners come from outside the area and so the parents are not involved in the community. The SGB is not helpful as they attend meetings but do not follow up on promised actions.

To assist learners there are morning and afternoon extra classes and Saturday classes for grades 10 and 11. Teachers from another school teach Physical Science and Accounting extra classes but the Rock teachers find this insulting.

The principal believes teachers are more concerned about their rights than their responsibilities to the learners and that learners are hindered by their and the teachers' late-coming and lack of commitment.

6. Lake High School

Lake is a fee-paying, single-sex, ex-Model C suburban school established in 1923 with an enrolment of 1100 grade 8-12 learners. The school has 70 teachers, 29 paid for by the SGB. There are 22 support staff members, with 13 paid for by the SGB.

The learner population has changed radically over the last twenty years. It is now very diverse and learners come from many different areas. The school usually achieves a 100% pass rate with a university entrance rate ranging between 97% and 99%.

The school values its emphasis on holistic development and is proud that although it cannot turn any learners away it manages to get them all through grade 12 with good results.

Teachers find managing the diversity a challenge. Learners are not as well-prepared for high school as in the past so the teachers have to work harder to maintain high academic achievement levels.

The teachers are well-qualified and able to handle curriculum demands. There is a TPD programme for the year but teachers are sometimes resentful about having to participate but afterwards they appreciate what they learned. Teachers are supportive of one another and are learning to collaborate more. They are willing to share resources. The teachers recognise that they are privileged to have the resources they need and that the teaching and learning environment is not as difficult as in other schools. Teachers complain about administration work and red tape. Learner apathy is also a problem for teachers.

The parents are generally supportive in matters concerning academic performance but are not so supportive of extra-mural and fund-raising activities. The SGB is concerned with governance and provides other assistance when asked to do so.

There are numerous programmes to assist underperforming learners. These include study skills programmes provided by an educational psychologist, extra lessons in Mathematics and English and holiday classes in April and July for grade 12 Science. Some learners are underachieving through lack of application and personal responsibility despite the school's efforts. Teachers find that language deficiencies

hinder performance in the content subjects and many learners have a very poor foundation in Mathematics. Teachers feel ill-equipped to do remedial teaching as no one is specially qualified for this.

7. Purpose Combined School

Purpose, established in 1981, is a no-fee school situated in Soweto. It has an enrolment of 1500 grades BB-12 learners; it grows annually by about 100. Learners come from outside the area such as Vereeniging and Westonaria.

The school prides itself on the fact that is has a higher enrolment than other schools in the area which is interpreted as a vote of confidence in the school by the community and further afield. It regards itself as culturally diverse and caring of individuals. The school offers a number of home languages while most schools offer only two. The community is engaged in the school through the use of the facilities after hours, for a church, ANC meetings, computer classes in the Gauteng-on-line laboratory and as an ABET centre.

Contextual challenges faced by the teachers include: poverty, with most parents being unemployed and living in informal settlements; many families are affected by HIV; and escalating pregnancy rate, even amongst girls in grades 7 and 8. A feeding scheme is run by an NGO and social workers addresses the problems of HIV, pregnancy, alcohol abuse. Teachers bring food from home to help learners. Many learners have to look after younger siblings. Parents are not educated so cannot help with the homework and some just do not care and do not monitor their children's work.

Teachers are learning to work as a team but there are cliques. They do help each other when someone is away. There is one SGB teacher and all staff contribute towards this from their own pockets. The majority of teachers have degrees but some with REQV13 studying for an ACE to upgrade. The ACEs are usually not in line with the subject the teacher is currently teaching. The Accounting teachers are studying business management at the University of Johannesburg. A few have honours degrees and two are studying towards masters degrees. Some teachers are negative towards professional development because they want to escape from teaching. They feel there are too many demands on their time. They are required to attend Saturday workshops run by the

district. They complain asking, "When can we rest?" The school does not use subject heads because the HODs should do that work which is mostly seen as a paperwork exercise. In general, the main complaint of all teachers is the paperwork overload. They do not have problems with the NCS content. Many are specialists and they can deliver.

While many parents are not involved there are some that spend the day at school helping with discipline, preparing and serving of meals and the tidying up afterwards, cleaning the toilets and the yard, helping in the library, and fundraising. The SGB is very involved. The chairperson comes to school to check. The SGB issues text books and other stock, monitors the changing of periods, and approximately twice a week checks that the teachers are actually there.

The school offers extra lessons before and after school as well as on Saturday, especially for Mathematics, Mathematical Literacy and Physical Sciences. The learners do attend the classes. A register is taken and the Principal follows up. If they do not attend the Principal calls in the parents. All the Grade 12 learners attend Saturday classes with another local high school (SSIP run classes). One teacher, the HOD and the Principal also attend every Saturday.

8. Stadium Secondary School (SSS)

Stadium, a co-educational, grades 10-12, no-fee school, established in the 1930s originally as a mission school and then taken over by the education department, is situated in an old part of Soweto. It has an enrolment of 908 learners, 31 GDE paid teachers and 6 GDE paid support staff. The learners comprise those from the area as well as those from other provinces who are staying with relatives. They travel long distances to get to the school because they like the reputation of the school.

The school values good discipline and good academic results. They strive to produce learners who are internationally competitive.

The school is faced with familiar social problems of poverty, child-headed households, and learners who live far away and have unreliable transport causing them to be absent.

The school has limited resources and no playing fields. They have to play their sport at outside venues.

On the whole the staff works well together, are supportive of one another and share work, except for a clique of five who are negative. Teachers are qualified, mostly with secondary teachers' diplomas. They are comfortable with the demands of the NCS. A few teachers are doing ACE programmes. Most teachers look forward to professional development opportunities. The HODs know their duties but the subject heads do not. They do what the HOD tells them to do. The GDE has provided limited training. Teachers complain about the grade 10s being academically unprepared when they enter the school, that their English language usage is poor and that learners who live far from the school often miss first period. The language teachers complain about too much marking.

The parents of the school are supportive and make a positive contribution. The principal set this as goal when she took over. It has become an expectation that parents must be involved. The SGB parents are active and assist with things such as late-coming, discipline, and the GDE feeding scheme.

To support learners, classes run from 07:00 - 16:00, the school is open at night for study purposes and there are holiday programmes.

9. Ivy College

Ivy, a co-educational school for grades 8-12, was established as a private school with boarding facilities in 1963 in a poor western suburb of Johannesburg. In 2002 it was taken over by the GDE when the school was in financial difficulties. It charges fees for day school and boarding. It has an enrolment of 405, 17 GDE and 6 SGB paid teachers, and 15 GDE and 10 SGB paid support staff (mostly for the boarding school). It serves underprivileged learners with Mathematics and/or Science potential as well as those from the area who have potential. As a special focus school it is still permitted to administer entrance tests.

The school prides itself on its rich cultural programme in which learners have been very successful. It also values its links with the community and the high level of learner involvement in these activities.

The GDE does not regard the school as underperforming so it receives little support. The funding from the GDE is insufficient to maintain and equip the school as well as pay off the debts the school had incurred in the past. Classrooms are small and teachers have to share rooms.

The staff work together willingly but they did experience turnover when the school changed to the GDE. Teachers are well-qualified, most with bachelor degrees. They are comfortable with the NCS curriculum demands. Recent professional development has focused on rebuilding the staff team after the period of instability. Teachers are interested in professional development but do not participate extensively because they do not have time. The HODs, appointed on the basis of experience, understand their duties although they have not been trained in their jobs. Teachers believe the learners are not working hard enough to maximise their potential. Their challenge is to achieve more rating 7s.[170] They complain about meetings on Fridays and the GDE's last minute changes to instructions and plans.

The parents are involved. Some are even too eager and do not understand their role. The SGB is not particularly helpful although the chairperson can be phoned for help and guidance.

Saturday classes, extra lessons and a Mathematics tutor once a week are provided to support learners.

10. Wood College

Wood is an independent co-educational school for grades 1-12, established under new church ownership in 2005 in the CBD of Randburg. A new principal took over in 2011. Wood charges fees of R7 200,00 for grades 1-3 and R8 400,00 for grades 4-12. It had an enrolment of 128 in 2012 and 180 in 2013. The principal (1) and all teachers (14)

[170] Marks in the range 80-100%

and support staff (3) are all paid for by the school. It serves mostly underprivileged learners and foreigners. Many of the senior learners are "drop-outs" from public schools and are overage.

The school faces many challenges. The grade 12 pass rate has ranged from 0% in 2008 to 76,5% in 2011 and down to 44.4% in 2012. Punctuality and discipline were a problem but the principal has talked to parents and learners individually to motivate them to change. There has been an improvement. The school does not have the equipment for teaching the sciences. The principal was encouraged to send his staff to the NLC by the District IDSO in 2011. Three attended but left the school after one year. The principal struggles to find qualified teachers as the pay is less than in the public system resulting in high turnover. He employs foreigners but they need support with interpreting the South African curriculum. Other teachers need to learn their subject content.

The principal has tried to change the staff culture to be less individualistic and to encourage them to work as a team. They have not had much TPD and have a negative attitude to the GDE training. Most are qualified with bachelor degrees. There are no HODs or subject heads. Teachers are overworked because of the number of classes they have to teach: three grades across two different subjects making six sets of preparation per day.

The parents are involved with a 60% attendance at the most recent meeting. Some are even too eager and do not understand their role. There is no SGB (as in public schools) but the principal intends to set up a parents' committee.

To improve performance the principal asks for improvement reports from teachers.

11. Valley Secondary School

Valley Secondary School, a co-educational, no-fee school, was established in 1974 in Soweto. Of the 750 plus learners attending this school some come from Limpopo and are left with families who do not supervise them and who have no authority over them. The school struggles with learners who are progressed because of their age and the

failure rate in Grade 10 is very high. The school has difficulty accessing remedial help for those learners who need it. The school is under-resourced: classes are large and there is insufficient furniture and no funds available.

The school has a vision of academic excellence and some past students have qualified in prestigious careers. Morning and afternoon classes are arranged to supplement teachers to improve results. Outside teachers offer classes. Many learners are unmotivated and have a poor work ethic. They need to be told to study and they tend to leave things until the last minute. Learners do not take school-based assessment tasks seriously. Discipline is poor because teachers have not taken control and because there are many over-age learners in the school. The new principal has instituted some changes and is helping teachers with disciplinary skills.

The staff is stable with most having been at the school for more than twenty years. Most do not have university qualifications. Some are reluctant to teach the subjects in which they are qualified. A few younger teachers are prepared to attend professional development opportunities but as a school the teachers boycotted the NLC. HODs understand their duties.

The principal and teachers feel that parents and the community do not support the school. They are not prepared to fundraise or even attend meetings. The SGB is not functional.

4.5 OVERVIEW OF PLC DISCUSSION

4.5.1 Geography PLC discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
Session 1 09/02/2011	1. Identified a learning question for teachers: "How can we best get through to our learners when teaching topics that they have no experience/ understanding of?" (G1M-09/02/2011)	Bring newspaper articles related to curriculum, e.g. tropical cyclone, to share resources (+)	4	Identification of teachers' learning focus		n/a	n/a	n/a
	2. Discussed, for example, how to make marine geomorphology relevant and interesting to learners who have never seen the sea and without resources such as videos and projectors? Proposed using current newspaper articles that deal with geographical matters. (G1M-09/02/2011)		11	Curriculum content topics	1	Teachers' learning needs	KHi KCT	Collaborative discussion
	3. Discussed the problem of teaching geomorphology and climatology at the same time; discussed the order of teaching topics in the curriculum in grades 11 and 12; examined the work schedule provided by the GDE. The facilitator offered to bring an alternative schedule to the next meeting. (G1M-09/02/2011)		10	Curriculum sequencing	2	Teachers' learning needs	KHii KCC	Collaborative discussion
	4. Examined examples of the Global Warming Project (a prescribed task for grade 12) which had not been done very well and discussed the basic criteria for the project. (G1M-09/02/2011)	Bring samples of Global Warming projects (+)	10	Assessment demand	3	Facilitator's choice	KHii KCT	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	5. Identified where the learners had failed to demonstrate the required learning in the project. (G1M-09/02/2011)	Bring a rubric for marking a global warming poster (+)	8	Identification of learners' learning needs	4	Learners' learning needs	KHii KCS	Collaborative enquiry process
	6. Teachers discussed ways of helping learners to understand what they were supposed to show in the project and the facilitator gave examples of creative ways of presenting the information. (G1M-09/02/2011)		7	Assessment demand	5	Learners' learning needs	IK KHi KHii KCT	Collaborative discussion
	7. Facilitator showed how to teach the development of the 'mid-latitude cyclone' (depressions) using cut-out shapes. Teachers practised using these. (G1M-09/02/2011)		20	Curriculum content topics	6	Facilitator's choice	KHi KCT	Other - Concrete apparatus/ representation
	8. Discussed what teachers wanted to learn more about to help teach the next sections of the curriculum. (G1M-09/02/2011)		10	Identification of teachers' learning focus		n/a	n/a	n/a
Session 2 23/02/2011	9. Looked at the wording of the News Research project (set by GDE for grade 12s) and identified areas of difficulty in the wording, e.g., "government policy", "public policy". Proposed that alternative wording be written by the PLC; proposed providing an information resource package for learners but would be extra work for teachers and would limit learners' choices. Discussed ways of handling other requirements of the project and what teachers can start doing to help learners find a topic. Identified areas of difficulty when the learners did their research project last year. (G2R-23/02/2011- 10:18)		18	Assessment demand	7	Teachers' learning needs	IK KHii KCT	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	10. Teachers brought sample articles. Discussed what can be done with newspaper articles to promote learner engagement and show curriculum relevance, for example: an article on the tropical cyclone (Yassi) off the east coast of SA and they questioned the naming of cyclones. The facilitator pointed out geographic issues covered in a number of articles: development in Africa, earthquake in New Zealand, acid mine drainage, global warming, and water supply in SA. (G2R-23/02/2011-28:18)		8	Learning resources	8	Teachers' learning needs	IK KHii KCT	Collaborative enquiry process
	11. Teachers given the Social Sciences and Geography CAPS documents and alerted to the fact that they will have to teach the "new curriculum" in grade 10 in 2012. Facilitator highlights some aspects of concern, for example, the length of the curriculum to be covered in grade 11. (G2R-23/02/2011-36:00)	Examine the CAPS, especially the grade 10 curriculum (+)	4	Curriculum policy/ structure/ content	9	Facilitator's choice	KT HCK, IK KHii KCC	Other - Learning resources
	12. Teacher brought a suggested rubric for the Global Warming Poster. PLC discussed the criteria to see whether they gave sufficient guidance to the learners so that the learning that was required to be demonstrated was indicated in the rubric. (G2R-23/02/2011-40)		3	Assessment development	10	Learners' learning needs	IK KHi KHii KCT	Collaborative discussion
	13. Facilitator suggested alternative creative ways of teaching concepts, e.g., teaching 'orographic and convection rain' through dance and 'mid-latitude and tropical cyclones' using folded shapes. A teacher who had tried this out during the week reported on her success. Teachers practised using the paper shapes. (G2R-23/02/2011-42:53)		6	Curriculum content topics	11	Facilitator's choice	IK KHi KCT	Other - Concrete apparatus/ representation
	14. Discussed the problem of the Grade 12 data handling assignment (set by the GDE) and solution being available on the internet because it threatens the validity of learners' results. Teachers were going to use the same one and just take it back after it was written. The facilitator provided an alternative from some years back as a proposed solution. (G2R-23/02/2011-50)		6	Assessment validity and reliability	12	Teachers' learning needs	KHii KCT	Collaborative discussion
Session 3 16/03/2011	15. Continued the discussion from previous session on how to approach topics in the grade 12 News Research Project and what to advise learners. (G3M-16/03/2011)	Bring drafts of News Research projects (+)	25	Assessment demand	13	Teachers' learning needs	KHii KCT	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	16. The facilitator gave out sample tests for grades 10, 11 and 12. Teachers looked at: the way they were constructed, the use of source materials, and levels of questioning. Teachers to take tests home and look at them for discussion next session. (G3M-16/03/2011)	Study and comment on test papers (-)	15	Assessment development	14	Facilitator's choice	KHii KCT	Collaborative discussion
	17. Examined the grade 12 curriculum content knowledge required in order to determine teachers' learning needs which could be the focus of future PLC sessions. (G3M-16/03/2011)		15	Identification of teachers' learning focus		n/a	n/a	n/a
Session 4 13/04/2011	18. Examined drafts of the grade 12 News Research Project and identified where learners had difficulty interpreting the requirements of the project. Discussed the problem of the timing of the project because the topic chosen by the learner required knowledge that had not yet been taught. Teachers discussed problems they have with their learners choosing a topic because they cannot read an article and find the topic within it that is relevant to Geography. Decided that it was necessary to extend the time allowed for the project. Discussed suggestions for doing it next year and for preparing grade 10s and 11s through their projects. (G4R-13/04/2011-1:00-4:20, unrecorded time, and continuation 00:09:00)	Bring examples of own test papers for sharing (+)	38	Assessment demand	15	Learners' learning needs	KHii KCT	Collaborative enquiry process
	19. Facilitator explained a method to help learners develop a glossary (extended with drawings/diagrams) of terms for themselves even though the text book does provide one before each section (called a sexy word list in junior grades). This is kept from grade 8 to grade 12. Discussed why this works especially helping them understand that they build knowledge over time thus showing them that previous grade's work is important. (G4R-13/04/2011- 09:00)		6	Learning resources	16	Facilitator's choice	KHi KCT	Other - Learning resources
	20. Discussed the problem of lack of resources, including text books, and surmised reasons. (G4R-13/04/2011-17:00)		7	Contextual matters		n/a	n/a	n/a

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	21. Discussed that common exams were set from a particular preferred text book that most of the schools do not have. Learners cannot recognise the diagrams because those in their books/notes look different. (G4R-13/04/2011- 47:00)		1	Contextual matters		n/a	n/a	n/a
	22. Teachers discussed using a single prescribed text book as the solution. As an alternative the facilitator offered to provide a variety of depictions of a concept so that learners could be exposed to different representations. (G4R-13/04/2011- 48:00)		1	Learning resources	17	Teachers' learning needs	KHi KCT	Collaborative discussion
	23. Discussed the content of the GDE common papers which underperforming schools are compelled to write. Discussed the problem of not setting the paper based on what all teachers agreed to include, i.e. the test should be based on what they had covered. It was difficult to prepare learners because teachers did not know what would be covered in the test and the extent of the learning required. (G4R-13/04/2011- 49:00)		7	Assessment validity and reliability	18	Teachers' learning needs	KHii KCT	Collaborative discussion
	24. Teachers discussed the fact that their schools were identified as under-performing and they had identified some of their problems but they did not get the necessary support to remedy the problems. PLC facilitator asked what the PLC could do to help. Teachers proposed that the subject facilitator be asked to let the PLC set the tests and to look at the GDE work schedule that is not working. (G4R-13/04/2011- 56:00)		2	Contextual matters		n/a	n/a	n/a
	25. Teachers discussed their learning needs. They identified 'GIS', 'cross-sections', 'true bearing', and 'declination'. The facilitator had some GIS materials but was waiting for permission to use them in the PLC. The facilitator questioned whether they still needed to teach cross-sections because it had not been asked in recent question papers. (G4R-13/04/2011- 63:00)		7	Identification of teachers' learning focus		n/a	n/a	n/a
Session 5 04/05/201	26. Facilitator gave teachers a summary of the grade 12 curriculum to help learners know what they needed to study. (G5R-04/05/2011-0:30)		1	Learning resources	19	Facilitator's choice	KHi KCT	Other - Learning resources

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	27. The facilitator gave out the map work skills and interpretation notes then discussed: When in grade 10 do you introduce map work? To what level do you teach it? When and how do you teach new concepts and revise them? (throughout the year – GDE work schedule or in one go so that bits are not left out) (G5R-04/05/2011- 1:30-9:30)	Study the map work notes to ask questions (+)	2	Curriculum sequencing	20	Facilitator's choice	KHi KHii KCC	Other - Learning resources
	28. Teachers identified their problem areas when teaching map work? They identified 'calculations of gradient', 'bearing', 'scale', learners did not do any map work in grade 8 or 9; direction; 'cross-sections'; 'photographs.' (G5R-04/05/2011-17:30)		10	Identification of teachers' learning focus		n/a	n/a	n/a
	29. Teachers identified problems experienced by learners when learning map work for the first time. They identified that learners have not handled maps before; they need to practise to get it right; they don't know the formulae they need to apply. Discussed these problems. (G5R-04/05/2011-25:30)		18	Identifying learners' learning need	21	Learners' learning needs	KHii KCS	Collaborative discussion
	30. Facilitator gave out a map work resource note. It is structured to give the calculation methods to be learned by rote. (G5R-04/05/2011-45:00)		1	Learning resources	22	Learners' learning needs	KT CCK SCK	Collaborative enquiry process
	31. Teachers practised some of the concepts that they found difficult: looked at 'aerial photographs', including 'orthophotos', and teachers' difficulties using them – 'high, low and oblique angle'; the facilitator advised teachers to tell learners to use reading time in the exam in grade 12 to study the map for details. (G5R-04/05/2011-46:00)		5	Curriculum content topics	23	Teachers' learning needs	KHi KCT	Collaborative enquiry process
	32. Teachers discussed reading a map to calculate distance to another nearby town, not marked on the map. Discussed teachers' difficulty with helping learners to understand the difference between rural and urban; discussed climate and ecology questions related to the map; discussed how to revise map work in grade 11 and 12 when to complete particular sections. (G5R-04/05/2011-51:00)		6	Curriculum content topics	24	Teachers' learning needs	IK KHi KHii KCT	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	33. Discussed the effect of contextual difficulties on teachers' teaching, such as, large classes, learners' language problems, lack of teaching resources, and learners' inability to understand English. (G5R-04/05/2011-57:00)		5	Contextual matters		n/a	n/a	n/a
Session 6 18/05/2011	No meeting.							
Session 7 01/06/2011	34. The facilitator showed some examples of physical models made by learners to demonstrate geomorphology and climatology concepts: 'cross-sections', 'volcanoes', 'mid latitude cyclones', 'tropical cyclones'. (G7R-01/06/2011-1:03)		3	Learning resources	25	Facilitator's choice	KHi KCT	Collaborative enquiry process
	35. Teachers discussed the issue of teaching GIS theoretically because most schools do not have computers. The facilitator gave examples of how GIS can be used in real life when, for example, a person wants to open a hairdressing shop. GIS could supply much of the background information that the business owner would need when deciding where to locate the business. 36. Concept exploration - the facilitator gave participants a booklet and then went through some of the concepts. Teachers discussed how to make definitions meaningful. Participants offered suggestions. They discussed the 'definition of GIS', 'spatial and attribute data', 'vector and raster data'. Discussed the stages at which to introduce the concepts. Discussed the concept of 'buffering' with examples. (G7R-01/06/2011- 3:56)		23	Curriculum content topics	26	Teachers' learning needs	KT CCK SCK IK KHi KHii KCT	Collaborative discussion
	37. Teachers discussed setting tests, including ones where learners had to do 'cross-sections' to see whether they got them right and what they will focus on in the next session: setting tests and how to teach 'cross-sections' so they can understand numbers on contour lines. (G7R-01/06/2011-26:19)	Bring questions, articles and diagrams for setting end of year exams (+)	25	Assessment development	27	Teachers' learning needs	KHii KCT	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
Session 8 27/07/2011	38. Teachers looked at various physical models of land formations made from glass plates, OHP transparencies and cardboard that can assist with teaching contours and cross-sections. (G8R-27/07/2011-00:56)		12	Curriculum content topics	28	Teachers' learning needs	KHi KCT	Collaborative enquiry process
	39. Teachers used materials provided by the facilitator to do cross-sections using handouts. Teachers committed to do cross-sections with their learners using these notes for the next session. (G8R-27/07/2011-12:18-24:15)	Get learners to do cross-sections using the instruction note and bring them to the next session (+)	12	Curriculum content topics	29	Teachers' learning needs	KHi KCT	Collaborative enquiry process
	40. Teachers discussed setting the grade 10 and 11 end-of-year exams as a group. They agreed on the sections and then volunteered to set questions on particular topics. (G8R-27/07/2011-24:15)	Bring questions, articles and diagrams for end of year exams (+)	6	Assessment development	31	Teachers' learning needs	KHii KCT	Collaborative discussion
Session 9 24/08/2011	41. Teachers examined samples of cross-sections done by learners to see what mistakes they were making. As they did this they together made changes to the cross-section instruction note so that learners would not make the type of mistakes that they had. (G9R-24/08/2011-00:00)		46	Curriculum content topics	31	Learners' learning needs	KHii KCS	Collaborative enquiry process
	42. Discussed the matter of not doubling marks in the common paper but this is done in the final one. Discussed the problem of confusing learners and making the paper too long for the good learners. Discussed the fact that the diagrams were not clear. (G9R-24/08/2011-45:41)	Bring questions, articles and diagrams for end of year exams	2	Assessment development	32	Teachers' learning needs	KHii KCT	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
Session 10 07/09/2011	43. Teachers discussed the problem of learners not knowing what and how to study.		3	Contextual matters		n/a	n/a	n/a
	44. Facilitator showed the teachers the "Geogopaedia" for grade 10 which is a list of words that grade 10s need to know. Learners create their own "Geogopaedia" by looking up all the words and writing the definitions with diagrams and drawings. This is a part of a solution to the problem of learners not knowing what and how to study as well as the learners' language difficulties. (G10M-07/09/2011)		9	Learning resources	33	Learners' learning needs	KHi KCT	Other - Learning resources
	45. Teachers were asked to bring questions for the grade 10 and 11 exams. They discussed the questions that the facilitator brought to the session. Discussed different way of testing global warming. (G10M-07/09/2011)	Bring questions, articles and diagrams for end of year exams (+)	16	Assessment development	34	Teachers' learning needs	KHii KCT	Collaborative discussion
	46. The facilitator showed a resource for teaching land and sea breezes and explained how to use it. (G10M-07/09/2011)		15	Curriculum content topics	35	Facilitator's choice	KHi KCT	Other - Learning resources
Session 11 21/09/2011	47. The facilitator gave teachers an example of a creative way to teach settlement - the Wakkerstroom role play and debate task. She explained the concepts and skills that could be taught using it. (G11R-21/09/2011-00:00)		10	Curriculum content topics	36	Facilitator's choice	IK KHi KCT	Collaborative discussion
	48. Teachers continued working through questions that they brought for the grade 10 and 11 papers. The facilitator gave feedback on some of the questions and offered to put together a complete paper for everyone to look at. She would use the questions they had discussed. (G11R-21/09/2011-09:25)		20	Assessment development	37	Teachers' learning needs	KHii KCT	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	49. Teachers discussed their frustrations concerning implementing CAPS for grade 10 in 2012, in particular which textbooks they would use and whether the GDE would supply them, and to a lesser extent, the re-arranged content. No solutions were found. They would wait for CAPS training in the September holidays. (G11R-21/09/2011-30:00)	Bring CAPS for a discussion about planning for grade 10 in 2012 (+)	5	Contextual matters		n/a	n/a	n/a
Session 12 19/10/2011	50. The facilitator gave the teachers the exam papers that they had worked on previously plus additional resources for questions and examples of questions. (G12R-19/10/2011-00:00)		7	Learning resources	38	Teachers' learning needs	KHi KCT	Other - Learning resources
	51. They discussed the problem of the common exam they would have to write in grade 11. (G12R-19/10/2011-07:00)		3	Contextual matters		n/a	n/a	n/a
	52. Discussed the changes in the grade 10 curriculum structure/content because of the introduction of CAPS in 2012. (G12R-19/10/2011-10:00)		8	Curriculum policy/ structure/ content	39	Facilitator's choice	KT HCK	Collaborative discussion
	53. Discussed the changes needed to implement CAPS in grade 10 and what these would mean for teachers. (G12R-19/10/2011-18:00)		7	Identification of teachers' learning focus		n/a	n/a	n/a
	54. Discussed how to use current news topics in teaching to make Geography concepts relevant in daily lives of learners, for example, the census, to reinforce teaching on population; xenophobia in Alexandra to discuss settlement and development; cultural myths about tornadoes (snake) to discuss applicable climatology. (G12R-19/10/2011-25:00)		30	Curriculum content topics	40	Teachers' learning needs	IK KHi KCT	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
Session 13 09/11/2011	55. Teachers discussed how to ensure climatology could be covered properly because it was not in the grade 11 curriculum but would be when CAPS was introduced in grade 11 in 2013. (G13R-19/10/2011-00:00)		16	Curriculum policy/ structure/ content	41	Teachers' learning needs	KHii KCC	Collaborative discussion
	56. Teachers identified areas which learners generally found difficult. (G13R-19/10/2011-16:00)		8	Identification of learners' learning needs	42	Learners' learning needs	KHii KCS	Collaborative discussion
	57. Teachers discussed the value of the NLC and the questions for the reflection journals as well as the preferred site for holding the sessions. (G13R-19/10/2011-23:43)		7	NLC issues		n/a	n/a	n/a
	58. Teachers returned to the discussion of using current topics in teaching. They discussed population/settlement/development problems and government policies relating to grants, learner pregnancy, service delivery – hospitals, water. (G13R-19/10/2011-31:43)		14	Curriculum content topics	43	Teachers' learning needs	IK KHii KCT	Collaborative discussion
Session 14 25/01/2012	59. The facilitator asked the teachers to write down what their personal learning needs are regarding subject content knowledge or general teaching knowledge so that the learning focus for the PLC could be established. (G14M-25/01/2012)		10	Identification of teachers' learning focus		n/a	n/a	n/a
	60. Teachers continued discussing the use of current topics in teaching. The facilitator handed out the media release from the South African Weather Service on the recent intense tropical cyclone Funso. They discussed how to incorporate such current events into teaching. (G14M-25/01/2012)		15	Curriculum content topics	44	Teachers' learning needs	IK KHi KCT	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	61. Teachers again raised the problem of common tests being set using a particular text book as the source of information. (G14M-25/01/2012)		10	Contextual matters		n/a	n/a	n/a
Session 15 01/02/2012	62. The facilitator dealt with PLC administration matters. (G15R-01/02/2012 – 00:00)		2	NLC issues		n/a	n/a	n/a
	63. The facilitator gave the group an example of work schedules that taught the curriculum in a slightly different order from the common work schedule. They discussed the reasons for the facilitator's choices. (G15R-01/02/2012 – 01:45)		4	Curriculum sequencing	45	Facilitator's choice	KHii KCC	Collaborative discussion
	64. The PLC collaboratively designed a lesson to teach 'tri-cellular circulation'. The facilitator will teach this lesson to her learners (which will be video-recorded for discussion in the next PLC session) and learners at a Soweto school. (G15R-01/02/2012 – 06:00)	Teach this lesson to own learners and do a reflection on it (-)	46	Curriculum content topics	46	Teachers' learning needs	IK KHii KCT	Collaborative enquiry process
Session 16 29/02/2012	65. Discussed the CAPS document and how teachers of grade 10s were managing. (G16R-29/02/2012 – 00:00)		2	Curriculum policy/ structure/ content	47	Teachers' learning needs	KHii KCC	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	66. The facilitator raised issues that were discussed at the Grade 12 Matric Road Show. Teachers discussed the topics that the markers found that learners struggled with and how to implement the suggestions made by the presenter (an examiner): 'making GIS real by working with maps', 'noting map projection details provided on the map', 'understanding views of diagrams', 'map work calculations (distance, declination, gradient ,co-ordinates)' and 'importance of being able to apply this knowledge not just do the calculations (G16R-29/02/2012 – 02:00)		37	Identification of learners' learning needs	48	Learners' learning needs	KHii KCS	Collaborative discussion
Session 17 14/03/2012	67. The facilitator supplied all PLC teachers with the SBA documents for grades 10-12. (G17R-14/03/2012-00:00)		1	Learning resources	49	Facilitator's choice	KT SCK	Other - Learning resources
	68. The facilitator supplied all PLC teachers with work schedules for grades 10-12. (G17R-14/03/2012-01:00)		1	Curriculum policy/ structure/ content	50	Facilitator's choice	KHii KCC	Other - Learning resources
	69. The facilitator showed the PLC some articles she was using with her grade 12 class that relate to 'city climates', including one about growing vegetables in roof gardens for use and sale which could link with teaching 'development'. The articles could also be used when teaching 'global warming' to grade 8s and 9s. (G17R-14/03/2012-02:00)		2	Learning resources	51	Facilitator's choice	IK KHi KCT	Other - Learning resources
	70. The facilitator repeated the remarks made at the Road Show about learners failing because they could not do map work. She gave out a number of documents: a step-by-step document for map work calculations; an information sheet showing pictures of land features, contour representations of them and cross-sections through them; a conventional signs list; map work notes from the Thutong portal, a table for learners to fill in symbols; a set of map work questions.. (G17R-14/03/2012-04:00)		6	Learning resources	52	Learners' learning needs	KHi KCT	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	71. The teachers discussed the sequencing of the teaching of map work concepts in the CAPS. They discussed the benefits of gradual introduction of the concepts and calculations for them versus doing them all in grade 10 and then having time over the next years to practise using them. (G17R-14/03/2012-10:00)		2	Curriculum sequencing	53	Teachers' learning needs	KHii KCT	Collaborative enquiry process
	72. Teachers went item by item through the step-by-step calculations hand-out to simplify the instructions and make all concepts, calculations and steps as clear as they could be. They dealt with 'area', 'scale', 'map distance', 'true bearing', 'magnetic declination', 'co-ordinates', 'direction', 'gradient', 'inter-visibility' and 'vertical exaggeration'. They discussed some Maths concepts (is multiply 0,5 the same as divide by 2) and use of precise terminology (difference, sum, dividend, product). (G17R-14/03/2012-12:00)		44	Curriculum content topics	54	Teachers' learning needs	KT CCK SCK IK KHii KCT	Collaborative enquiry process
	73. Discussed the fact that some of the PLC teachers were going to attend the CAPS training in the forthcoming holidays. They were going but did not know what was to be covered. (G17R-14/03/2012-57:00)		2	Contextual matters		n/a	n/a	

4.5.2 English PLC discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
Session 1 09/02/2011	1. The facilitator outlined the purpose of the PLC and dealt with administrative issues. (E1M-09/02/2011)		15	NLC issues		n/a	n/a	n/a
	2. The facilitator discussed the type of work they could do in the PLC related to looking at learners' work and identifying their learning needs. As a proposed starting point Fred brought First Additional Language and Home Language final grade 12 exam papers to the meeting. Teachers discussed at length the problems of language teaching at HL and FAL levels. Fred suggested that they could work on teaching writing and compared the writing tasks. It was generally agreed that the tasks were very similar and so the question was posed: "What skills would the learner need to be able to complete the required tasks in the final writing exam?" Two questions were isolated as examples: one in response to an instruction and one in response to a picture. Teachers then discussed the skills needed and compiled a list. (E1M-09/02/2011)	Examine the two questions and then discuss what skills the learners need to answer the question. Discuss this with the teachers at their schools. (+)	50	Identification of learners' learning needs	1	Facilitator's choice	IK KHii KCS	Collaborative enquiry process
Session 2 23/02/2011	3. Fred stressed that the PLC was meant to be a collaboration and nobody was supposed to be the leader. No one was the expert. He was facilitating because it was at his school. If it were at someone else's school that person would facilitate. Everyone was going to share. They dealt with the paperwork regarding consent form, transport claim, the reflection journal and the introductory questionnaire. He handed out a proposed agenda highlighting the goals of the project. (E2R-23/02/2011-00:00)		11	NLC issues		n/a	n/a	n/a
	4. Recapped the previous session's activities: identified two topics from the writing papers. Two teachers brought examples of essays and two brought a list of skills needed by the learners. These were photocopied for the participants. Teachers began discussing the list and then stopped at 'planning' in order to gather evidence more systematically for the skills list from the sample essays (E2R-23/02/2011-11:00)		10	Identification of learners' learning needs	2	Learners' needs	KHii KCS	Collaborative enquiry process
	5. Teachers worked individually looking for the strong points in the best of		17	Identification	3	Learners'	IK	Collaborative

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	the sample essays. Identified strengths (content interesting, ideas do flow) and errors (inconsistent voice, incorrect tenses, concord, planning insufficient, no focus, long sentences) that teachers need to address. (E2R-23/02/2011-21:00)			of learners' learning needs		needs	KHii KCS	enquiry process
	6. Discussed how teachers marked the essays: teachers mark the first submission and send it back for correction in the areas identified giving learners many opportunities to write and get feedback. Teachers complained that there was not enough time for this as it took a lot of time because of the large classes. Fred suggested using peer editing to help with this. (E2R-23/02/2011-38:00)		5	Assessment feedback	4	Teachers' needs	KHi KHii KCT	Collaborative enquiry process
	7. Discussed how to teach learners how to plan. Discussed 'mind-mapping' and 'brainstorming' and the problems with what learners did with these. Planning needed to include the ordering of ideas such as what idea would be used for the 'introduction'. Discussed the selection of ideas from the map or brainstorm. Fred encouraged all teachers to suggest ideas. Mary said she was just listening to learn from more experienced teachers. She did, however, add ideas. (E2R-23/02/2011-43:00)		4	Curriculum content topics	5	Teachers' needs	KHi KHii KCT	Collaborative enquiry process
	8. Fred posed the idea that was given to him some years ago that to teach writing teachers should write themselves so they can understand the process from personal experience. (ER-23/02/2011-47:00)		2	Curriculum content topics	6	Facilitator's choice	KHi KCT	Collaborative enquiry process
	9. Discussed problems of their learners not reading and not watching television other than 'soapies' on television. They were not able to write from imagination and they did not have much general knowledge. They stressed that they do not read enough. They also copy from the internet. Suggested ways to overcome these difficulties. (E2R-23/02/2011-49:00)		3	Contextual matters		n/a	n/a	n/a
	10. Identified the skills that learners needed, for example: 'structure', 'difference between written and spoken English', 'register', 'grammatical sentence', 'paragraphing', 'use of imagery', 'spelling', varied vocabulary', 'use of direct and indirect speech', 'basic punctuation', 'use of apostrophe', 'content selection and coherence', 'purpose of writing', 'audience', 'detail', 'planning', 'tense', 'write from experience', 'use of strong verbs'. Teachers then decided which ones the PLC would focus on: 'sentence structure' and 'tense'. Fred explained that the PLC would devise a lesson together and then teachers would teach it at their own schools. After that they would bring back samples of the work produced	Discuss with other teachers at own school how to teach 'sentence structure' and 'tense'. Bring ideas	10	Curriculum content topics	7	Learners' needs	IK KHii KCT	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	after the lesson. (E2R-23/02/2011-52:00)	to next session. (+)						
	11. Mary introduced the problem of learners not being able to distinguish between a statement and a question. Participants described how they handled that problem. (E2R-23/02/2011-62:00)		4	Curriculum content topics	8	Learners' needs	IK KHi KCT	Collaborative discussion
Session 3 16/03/2011	12. Teachers discussed a chapter from a book on teaching learners how to write sentences. (E3M-16/03/2011)		15	Curriculum content topics	9	Facilitator's choice	KT SCK IK KHi KHii KCT	Collaborative enquiry process
	13. Teachers discussed how to teach sentences. They came up with ideas. (E3M-16/03/2011)		25	Curriculum content topics	10	Teachers' needs	KHii KCT	Collaborative enquiry process
	14. Teachers produced a note on teaching sentences from the discussion. (E3M-16/03/2011)		20	Learning resources	11	Teachers' needs	KHi KCT	Collaborative enquiry process
Session 4 13/04/2011	15. Fred recapped the process followed to date for a newcomer.		10	NLC issues		n/a	n/a	n/a
	16. Teachers identified the errors they found when they focussed on learners' sentence structure. (E4R-23/02/2011-10:00)		2	Identification of learners' learning needs	12	Learners' needs	KHii KCS	Collaborative enquiry process
	17. Discussed when it was best to teach 'finite verbs', 'phrases' and 'clauses' in Home Language. One teacher proposed teaching 'finite verbs' in grade 8, 'phrases' in grade 9 and 'clauses' only late in grade 10. Discussed why it was necessary to teach these concepts. They concluded it helped because learners were provided with a meta language to discuss their work. (E4R-23/02/2011-12:00)		6	Curriculum sequencing	13	Teachers' needs	IK KHii KCC	Collaborative enquiry process
	18. Fred provided an exercise that would help learners write properly constructed sentences. Teachers discussed how to integrate teaching sentence structure with writing a complete essay. Teachers discussed how up till now they had not concentrated on sentence writing. They believed the primary school should focus on getting sentences right, then paragraphs and only when these had been mastered should they write essays. (E4R-23/02/2011-18:00)		7	Curriculum content topics	14	Teachers' needs	IK KHii KCT	Collaborative enquiry process
	19. Discussed word order and the effect of changing the order, including		2	Curriculum	15	Teachers'	IK KHi	Collaborative

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	'transitive' and 'intransitive verbs', 'active and passive voice'. (E4R-23/02/2011-25:00)			content topics		needs	KCT	enquiry process
	20. Designed two lessons on teaching sentence structure. Recapped ideas that could be included in the lesson which would be aimed at grade 11. They would not refer to meta language. Sam volunteered to type up the lesson plans. The teachers would administer these lessons to their classes. (E4R-13/04/2011-27:00)	Teachers will teach the lessons and bring their findings from the lessons taught to the SSPLCs for a discussion. All these findings to be brought to the next PLC. (+)	48	Curriculum content topics	16	Teachers' needs	KHii KCT	Collaborative enquiry process
Session 5 04/05/2011	21. Discussed the effectiveness of their teaching of the two lessons designed in the last session. They concluded that the process was helpful and that learners did write sentences once the instructions were made clear. Teachers realised the importance of being precise in the instructions and that providing examples of correct sentences would help. Identified some of the difficulties that learners have. (E5R-23/02/2011-00:00)		17	Curriculum content topics	17	Teachers' needs	KHii KCT	Collaborative enquiry process
	22. Discussed Sal's recommendations for follow up activities to deal with the identified problems. Referred to the book chapter on writing sentences discussed previously then designed the next lesson which would involve the correction of errors in the sentences written. Identified which errors, in particular, would be focused on. (E5R-23/02/2011-17:00)	Teach this lesson to own class and bring findings to next session (+)	21	Curriculum content topics	18	Teachers' needs	IK KHi KHii KCT	Collaborative enquiry process
Session 6 18/05/2011	No meeting this week.							
Session 7	23. Reviewed the process the PLC had followed so far. Discussed the fact		28	Curriculum	19	Teachers'	IK KHii	Collaborative

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
01/06/2011	that teachers don't usually teach sentence writing. Usually teachers emphasise the grammar. Sam explained her experiences teaching the lessons, focussing on the third lesson and the answers the learners gave when they examined the selected sentences. The third lesson required the learners to start using grammar terms. She explained her follow-up lesson which was a final check of their progress on sentence writing and the results of this lesson. The group discussed the value of the sentence teaching process and what they learnt about learners' needs. They realised that learners were becoming conscious of their own work and able to evaluate it. (E7R-01/06/2011-00:00)			content topics		needs	KCT	enquiry process
	24. Teachers discussed that the next step would be to identify the individual learners who needed more teaching and more practice writing sentences and those who had mastered it could move onto paragraphs. It would also be possible to get the competent writers to write expanded sentences of different types. (E7R-01/06/2011-28:00)		5	Curriculum content topics	20	Teachers' needs	KHii KCT	Collaborative enquiry process
	25. Discussed when in the curriculum sentence writing should be taught. Participants believed that it ought to be done in grade 8 because if it is done later bad practices had become entrenched. (E7R-01/06/2011-33:00)		4	Curriculum sequencing	21	Teachers' needs	IK KHii KCC	Collaborative enquiry process
	26. Discussed having school-based subject PLCs and when to hold them. They believed it helped if TPD time was officially scheduled. (E7R-01/06/2011-38:00)		6	Contextual matters		n/a	n/a	n/a
	27. Sam spoke about the need for meaningful formative feedback. Praise alone was not meaningful but feedback should explain what the learner can do to improve next time. Even a learner who got 85% needed to know how to get to 100%. Teachers needed to be aware of whether they were justified in holding back marks or were they capping the learners unfairly? (E7R-01/06/2011-44:00)		6	Assessment feedback	22	Teachers' needs	IK KHii KCT	Collaborative discussion
Session 8 27/07/2011	28. Discussed ideas that the school-based subject PLCs had suggested for teaching 'tense': a card game where they had time cards and verb cards, responses to pictures in a particular tense, asking and responding to questions in the appropriate tense, passages from texts (used as examples), excerpts from learners' writing that contain tense errors. Discussed what could be learnt from the card game and how the other ideas could be used. Discussed how many tenses they would work on.		18	Curriculum content topics	23	Teachers' needs	IK KHi KHii KCT	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	Discussed whether tense errors were because of laziness. Discussed the fact that most written texts are in the past tense. (E8R-27/07/2011-00:00)							
	29. Sam presented a note/exercise that she used when teaching a grade 11 lesson on 'tenses'. (E8R-27/07/2011-18:00)		5	Learning resources	24	Teachers' needs	KHi KCT	Collaborative enquiry process
	30. Teachers examined learners' responses to the exercise and identified problems that the learners experienced but that their final efforts indicated that learners had made progress.		4	Identification of learners' learning needs	25	Learners' needs	KHii KCS	Collaborative enquiry process
	31. Teachers discussed the learners' errors, surmising reasons for them and what they could do to correct them.		4	Curriculum content topics	26	Learners' needs	IK KHi KHii KCT	Collaborative enquiry process
	32. Examined a sample response to the exercise of a weak learner. She had got it all correct. Fred questioned whether the exercise was not a false exercise because learners had not constructed the passage themselves. (E8R-27/07/2011-31:00)		4	Assessment validity and reliability	27	Teachers' needs	IK KHii KCT	Collaborative enquiry process
	33. Teachers discussed how learners could demonstrate their use of tenses in a more authentic manner. They suggested giving a list of words, excluding verbs, that they would have to include in a written passage to create atmosphere. They should include some dialogue. The teachers would not mention that the purpose of the exercise was to see whether they could use tense consistently. They agreed that they would each write the instruction for an exercise where learners would construct a very short story that created atmosphere using words from a list of clue words. They would e-mail their instructions to one another. Discussed in which grades the various ideas for teaching 'tense' could be used. (E8R-27/07/2011-35:00)	Write the instructions and list of clue words for the short story writing exercise and email to fellow participants. (+)	7	Curriculum content topics	28	Teachers' needs	IK KHii KCT	Collaborative enquiry process
Session 9 24/08/2011	34. Teachers discussed what they had done with the ideas from the last PLC. Fred had written up the instructions and presented the task to his school-based PLC which discussed whether it would work for teaching 'tense' and concluded it would but that the learners should be told that they were being assessed on the use of tense. Sam had used these same instructions except that she had altered the clue words to eliminate any form of the verb as she had not want to confuse them by giving a particular tense or form of the verb. She had marked their responses and found that even		15	Curriculum content topics	29	Facilitator's choice	IK KHi KHii KCT	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	weak learners were almost perfectly correct. She had ticked every use of the verb to show learners how the action is carried by verbs. At the same time she had checked for correctness of sentences. She identified only a few (6 of 26) who were still not able to write them correctly. She has written a letter to them and their parents to ask them to come for extra tuition to attend to this. Sal had emailed colleagues her list of single words but without instructions. (E9R-24/08/2011-00:00)							
	35. They discussed the fact that the attitude of some of the teachers at their schools revealed their negative feelings about teacher professional development activities. Discussed possible reasons for this. (E9R-24/08/2011-15:00)		1	Contextual matters		n/a	n/a	n/a
	36. Fred felt uncomfortable in his school-based PLC because he felt there was a vibe that indicated to him that they disapproved of the task because the list of words was rather clichéd. The others said that she felt it was clichéd but that was not a problem it could be used to advantage. Because the ideas were familiar, the learners could focus on the tenses. However, another member of that PLC had said that the task could also be used to practise writing different writing genres. (E9R-24/08/2011-16:00)		6	Assessment validity and reliability	30	Facilitator's choice	KHii KCT	Collaborative enquiry process
	37. Discussed other follow-up sentence writing activities: write paragraphs from a list of words in one specific tense from time to time; add planning to the focus and check that the planning includes looking at tense. (E9R-24/08/2011-22:00)		3	Curriculum content topics	31	Teachers' needs	KHi KHii KCT	Collaborative enquiry process
	38. Discussed planning. Sam described a process of teaching autobiographical writing to grade 10s that culminated in the learners' writing their own autobiography. The process made learners concentrate on what tense they were going to use. Planning was very deliberate. She emphasised that you could teach planning. Fred suggested that they mark the plans. Discussed errors of planning, reasons for them and how to remediate this. (E9R-24/08/2011-25:00)		16	Curriculum content topics	32	Teachers' needs	IK KHi KHii KCT	Collaborative enquiry process
	39. Fred reviewed the work they had done in the PLC. Discussed whether the two skills they had worked on were linked and whether they had contributed towards improvement in the learners' work. (E9R-24/08/2011-41:00)		3	NLC issues		n/a	n/a	n/a
	40. Fred asked whether they could add things to the exercise, for example, when looking at the verbs could teachers add another skill such as		1	Curriculum content topics	33	Teachers' needs	KHii KCT	Collaborative enquiry

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	suggesting that they could use strong verbs to add to the impact of their writing. (E9R-24/08/2011-44:00)							process
	41. Discussed that they had chosen for their exercise on 'tense' lists of words that required writing that was "in the moment", emotional and tense because many of the 'tense' errors occurred when they were writing emotional passages. (E9R-24/08/2011-45:00)		1	Assessment validity and reliability	34	Teachers' needs	KHii KCT	Collaborative enquiry process
	42. Discussed follow-up exercises. Teachers realised that they needed to do short exercises frequently to practise these skills. Designed the next exercise together: write a short paragraph in a particular tense. (E9R-24/08/2011-46:00)		3	Assessment development	35	Teachers' needs	KHii KCT	Collaborative enquiry process
	43. Sam read excerpts from a learners' writing and then explained how she had worked through the tense errors with that learner. Discussed how teacher would give feedback. (E9R-24/08/2011-49:00)		2	Curriculum content topics	36	Learners' needs	KHi KCT	Collaborative enquiry process
	44. Discussed learners' obsession with marks and why they always ask "Is it for marks?" and how that indicated their attitude to learning. (E9R-24/08/2011-51:00)		2	Contextual matters		n/a	n/a	n/a
	45. Sal works with individual teachers because it was difficult to have a school-based PLC. Again discussed that not all schools in the NLC have scheduled PLC time. Discussed ways to motivate schools to have PLCs, such as, writing up the exercises they have done and presenting it to the schools to show the kind of work the PLC does. Sal suggested that schools should schedule PLC time. (E9R-24/08/2011-56:00)	Teachers will ask other teachers in the school to do the 'tense' exercise with grade 8s and then give feedback. (+)	3	Contextual matters		n/a	n/a	n/a
	46. Discussed that many teachers were reluctant to participate in TPD because it was so difficult to see one's development as one never arrives. They were also reluctant to add extra exercises to the official summative SBA tasks. They did not see the value of the type of formative assessment exercises they were doing in the PLCs. Discussed the value of formative assessment. (E9R-24/08/2011-59:00)		2	Contextual matters		n/a	n/a	n/a

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	47. Returned to discussion of teaching 'tense' and other ways of showing learners how tense is used in literary and popular writing. Discussed how to handle the argument that writers do change tenses in a passage. Concluded that learners may change tense for good reason and how to demonstrate what good reason is. Fred volunteered to look for a good passage where tense did change and to create an exercise using it. (E9R-24/08/2011-61:00)		6	Curriculum content topics	37	Teachers' needs	IK KHii KCT	Collaborative enquiry process
	48. Discussed two schools of teaching writing: one that promoted writing spontaneously and another which promoted teaching 'form'. Discussed whether a learner's reading voraciously could improve his writing. They concluded that it depended on what was being read and the extent the learner engaged with the written text. (E9R-24/08/2011-67:00)		2	Curriculum content topics	38	Teachers' needs	KT SCK IK KHii KCT	Collaborative enquiry process
Session 10 07/09/2011	49. Discussed how to teach "tense". Fred and Sam brought examples of exercises that could be used. Teachers wrote up instructions using a thriller/mystery scenario. Sal said she would adapt the instructions to create a different scenario for her learners based on a school activity. (E10M-07/09/2011)	Teachers to use the "tense" exercise and analyse their learners' results. (+)	60	Curriculum content topics	39	Teachers' needs	KHi KHii KCT	Collaborative enquiry process
Session 11 21/09/2011	No formal meeting as there were only two participants. They had an informal discussion which was not minuted or recorded.							
Session 12 19/10/2011	50. Sam described how she had adapted the model discussed at the previous session. She had constructed a pre-lesson to test learners' use of tenses. She presented the results of the learners and described how she thought the pre-lesson had prepared learners for the lesson on writing a tense paragraph/essay. Teachers discussed this information. (E12M - 19/10/2011)		15	Curriculum content topics	40	Learners' needs	KHii KCT	Collaborative enquiry process
	51. Sam brought examples of learners' paragraphs/essays and discussed her analysis of them. She had found that the learners had focused on tense and had been generally successful in showing their understanding of tense. Fred and Sal had done the exercise with their learners but had not analysed the results. Their superficial reflections indicated that the learners had demonstrated a good understanding of the rules of tense use. Teachers examined samples of learners work and discussed what they		25	Identification of learners' learning needs	41	Learners' needs	KHii KCS	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	noticed. They discussed whether the task had been successful as a teaching exercise. They agreed that it had been very successful for almost all learners. (E12M -19/10/2011)							
	52. Sam showed examples of the follow-through exercises and produced a series of extension lessons on tense writing derived from her findings in the original task. Teachers discussed these and other remediation strategies that they would use if learners still could not demonstrate proficiency after these exercises. (E12M -19/10/2011)		20	Curriculum content topics	42	Learners' needs	KHi KHii KCT	Collaborative enquiry process
Session 13 09/11/2011	53. Fred dealt with NLC issues: finalising of samples of work, transport claims, registers, other remuneration, change of venues, increasing participation, whether it should continue next year. This was discussed. (E13R-09/11/2011-00:00)		11	NLC issues		n/a	n/a	n/a
	54. Talked about what would be the learning focus of the following year. Sal was about to teach grade 12 for the first time, after a considerable break from them, in 2012 and thought she might want to collaborate on something relevant to grade 12. It would depend on whether there were any new teachers and what grades they taught. Recapped the process they had used to identify their learning focus for the year. Discussed the need for collaboration which was what they valued. (E13R-13/04/2011-11:00)		6	Identification of teachers' learning focus		n/a	n/a	n/a
	55. Discussed the essay (creative or literary) planning booklet which Sam had produced to teach essay planning, using 'mind-maps' and different kinds of 'thinking maps'. She also described how her learners had responded to these ideas. She emphasised 'thinking'. (E13R-13/04/2011-17:00)		19	Curriculum content topics	43	Facilitator's choice	KT CCK SCK IK KHi KHii KCT	Collaborative enquiry process
	56. Discussed the problem of the 10 minutes reading time given in the grade 12 exam and how it could be better used. Learners did not know what to do with it. They want to get on with rushing into answering. (E4R-13/04/2011-36:00)		3	Contextual matters		n/a	n/a	n/a
	57. Returned to the discussion on planning and thinking and using the 'thinking maps' for studying as well as writing. Different kinds of maps could be used for different purposes. Discussed examples of how they could be used. (E4R-13/04/2011-39:00)		4	Curriculum content topics	44	Teachers' needs	KHi KCT	Collaborative enquiry process
	58. Discussed what they would put in their workbook to show what they had	Each person	15	NLC issues		n/a	n/a	n/a

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	covered in the PLC in 2011. They had covered three basic skills required for writing 'sentence writing', 'tense' and 'planning'. They would include a motivation for the choice of these skills and include the exercise in each section. Each person would be responsible for one section. (E4R-13/04/2011-43:00)	to collate one section of the PLCs workbook for 2011 by a date to be agreed. (+)						
	59. Completed reflection journals which included reflections on the whole year's participation in the NLC, including reflecting on the question of whether participants had learned to lead in the NLC. (E4R-13/04/2011-58:00)		15	NLC issues		n/a	n/a	n/a
Session 14 25/01/2012	60. Fred recapped the work that was done by the PLC the previous year. He read the list of skills that the teachers had identified as necessary skills for writing and which ones they had dealt with in 2011. (E14R-25/01/2012-00:00)		8	Identification of teachers' learning focus		n/a	n/a	n/a
	61. Discussed how the PLC works as a collaboration. No one is the leader. Teachers share ideas. Teachers discussed the process they had followed and how they had experienced the previous year's learning and how it had changed their approach. The group would divide into Home Language and First Additional Language. (E14R-25/01/2012-08:00)		3	NLC issues		n/a	n/a	n/a
	62. Discussed what should be the learning focus of the group. Judy, a new participant discussed the need to come up with new assessment tasks. She would like to collaborate on that. Suggested setting a test, someone answering it and another person marking it. Then they would analyse the responses and see if the problem was with the question or whether the learner was not yet able to demonstrate the knowledge, skills and what the reasons might be for it. Generated a list of what they could explore. The new people were very keen on setting assessment tasks and sharing tasks that had been said. (E14R-25/01/2012-11:00)		11	Identification of teachers' learning focus		n/a	n/a	n/a
	63. Discussed teaching a poem by introducing it via an unseen poetry test and then afterwards go over it as the way of teaching it. (E14R-25/01/2012-22:00)		4	Curriculum content topics	45	Teachers' needs	KHi KCT	Other - Conceptual steps
	64. Returned to the discussion of what should be the focus of the next PLC. Discussed the possibility of focusing on something related to writing. (E14R-25/01/2012-26:00)		4	Identification of teachers' learning focus		n/a	n/a	n/a

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	65. Discussed the problems teachers encounter when setting tests and how setting it collaboratively could help. (E14R-25/01/2012-28:00)		2	Assessment development	46	Teachers' needs	KHii KCT	Collaborative discussion
	66. Discussed the grade 8 writing programme of one school and identified the common problems experienced. (E14R-25/01/2012-32:00)		5	Learning resources	47	Teachers' needs	IK KHii KCS	Collaborative discussion
	67. Discussed whether learners had to write two different genres of essays for their grade 12 writing portfolio. (E14R-25/01/2012-37:00)		5	Assessment demands	48	Teachers' needs	KT SCK HCK	Collaborative discussion
	68. Finally identified the focus for the next session: Design a lesson on how to teach learners to write a response to a picture topic. (E14R-25/01/2012-42:00)	Teachers to bring a picture and quotation to next session (+)	5	Identification of teachers' learning focus		n/a	n/a	n/a
Session 15 01/02/2012	69. Discussed what teachers wanted to get from the session. Concluded that they wanted to create a lesson that would enable learners to respond effectively to a picture stimulus. (E15R-01/02/2012-00:00)		2	Identification of teachers' learning focus		n/a	n/a	n/a
	70. Teachers discuss various things they have learned from past experiences where learners have responded poorly to pictures. They referred to a picture of a bus and a picture of a ladder then discussed what might be valid interpretations. They then argued whether that would be a way to do it with the learners in groups. They offered various other steps to start teaching how to interpret pictures. Began to come up with steps and rules, such as, dealing with it literally or figuratively, avoiding interpretation of a discreet aspect, deal with the picture as a whole. Summed up what would go into the lesson and the timing of each section of the lesson. (E15R-01/02/2012-02:00)		28	Curriculum content topics	49	Teachers' needs	IK KHii KCT	Collaborative enquiry process
	71. Discussed some of the pictures that teachers brought and the grounds for selection, for example, they must provide opportunity to write different genres of essays, should not be too obvious, scope for making the writing memorable. (E15R-01/02/2012-30:00)		6	Assessment development	50	Teachers' needs	IK KHii KCT	Collaborative enquiry process
	72. Discussed whether the same approach would be used for essays where there is a quotation as the stimulus. Emphasised that they needed to deal with the core meaning of the quotation rather than a single word or phrase. Teachers discussed their own difficulties with interpreting	Teach the lesson to a class and get them to	10	Curriculum content topics	51	Teachers' needs	IK KHii KCT	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	quotations as a stimulus and the problems they have encountered in learners' responses. Agreed to teach one of these lessons to their learners at their own schools and then bring learners' planning/mind maps for the topic to see whether they had learned anything. Agreed that the lesson was generic and applicable from grade 8 to grade 10. Discussed when they could manage to teach the lesson. Each person would write up their own plans based on the lessons discussed. (E15R-01/02/2012-36:00)	plan an essay. Bring the plans to the next session. (+)						
	73. Continued discussing pictures; tried to understand their essential meaning. (E15R-01/02/2012-46:00)		13	Assessment development	52	Teachers' needs	KHii KCT	Collaborative enquiry process
	74. Discussed whether to move on to a new focus for the next lesson. Agreed they should and discussed possible topics. Discussed writing minutes and the need for learners to listen to a meeting and take minutes. Was it worth the time it would take? Turned down the idea of doing this. Teachers agreed to bring suggested topics to the next session of the PLC. (E15R-01/02/2012-60:00)		6	Identification of teachers' learning focus		n/a	n/a	n/a
Session 16 29/02/2012	75. Discussed how teachers experienced their teaching of the essay lesson on responding to visual prompts and examined the work that learners did. Discussed that the majority had chosen topic (b) which appeared to be the easiest. (E16R-29/02/2012-00:00)		7	Identification of learners' learning needs	53	Learners' needs	KHii KCS	Collaborative enquiry process
	76. Fred took the lesson and developed it more formally using input from another professional development session. He reported on what he had found and some interesting questions that had arisen in his lesson. Looked at some of the planning and discussed whether learners' interpretations were appropriate. Discussed the importance of ensuring a link to the picture. Discussed how he had taken learners through a process of looking at a literal interpretation and then going into a figurative interpretation. (E16R-29/02/2012-07:00)		11	Curriculum content topics	54	Facilitator's choice	KHii KCT	Collaborative enquiry process
	77. Continued examining learners' planning and the types of errors and difficulties that were seen. Discussed how to help students. (E16R-29/02/2012-18:00)		11	Identification of learners' learning needs	55	Learners' needs	KHii KCS	Collaborative enquiry process
	78. Discussed a lesson plan which he had designed which required identifying the learning target, teaching the work by modelling and doing it aloud. (E16R-29/02/2012-29:00)		3	Learning resources	56	Teachers' needs	KHi KCT	Collaborative enquiry process
	79. Returned to the discussion of essay planning. (E16R-29/02/2012-32:00)		2	Curriculum	57	Teachers'	KHi	Collaborative

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
				content topics		needs	KCT	discussion
	80. Discussed what would be the next PLC focus. Decided on focusing on other visual material, such as, cartoon interpretation. Discussed whether they should focus on the assessment of this or should they plan a lesson to teach interpretation of cartoons? They would make that decision next time. (E16R-29/02/2012-34:00)	Teachers to bring Barrett's taxonomy and a range of visual texts: cartoons and advertise-ments. (+)	3	Identification of teachers' learning focus		n/a	n/a	n/a
	81. Fred told the group about what he and a colleague were doing in a remedial English class using visual material. (E16R-29/02/2012-37:00)		4	Curriculum content topics	58	Facilitator's choice	KHi KCT	Collaborative enquiry process
Session 17 14/03/2012	82. Looked at the visual texts that the teachers had brought: political cartoons, ordinary cartoons, comprehension based on a graphic novel, advertisements. Teachers discussed what scope for questions these texts offered. (E17R-14/03/2012-00:00)		8	Curriculum content topics	59	Teachers' needs	KHii KCT	Collaborative enquiry process
	83. Spent some time trying to identify what they wanted to focus on. Decided to plan a series of lessons involving visual texts, including some assessment in each and then move to a bigger summative assessment task. Decided to focus the lessons on grade 12. Discussed the order in which they should tackle the different types of texts where the common thread would be reading and understanding a picture no matter where it is found. (E17R-14/03/2012-08:00)		12	Identification of teachers' learning focus		n/a	n/a	n/a
	84. Began the process of designing the lessons. Teachers identified what had to be covered in these lessons. Identified the copyright issues involved and how to ensure good quality reproduction of texts. Discussed scaffolding in the questions. Looked at the visual texts and identified the type of questions that could be asked on them. Thought about the type of problems learners would have answering the questions. (E17R-14/03/2012-20:00)	Teachers to find suitable visual texts on which to base questions they had thought of and bring	40	Curriculum content topics	60	Teachers' needs	IK KHii KCT	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
		them to the next session. (+)						

4.5.3 Mathematics PLC discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
Session 1 09/02/2011	1. The facilitator explained the purpose of the Big Project and PLC and dealt with administrative matters such as: information letters about the research study, consent to participation in the study forms, personal questionnaires and the reflective journals. She answered participants' questions. (M1M-09/02/2011)		30	NLC issues		n/a	n/a	n/a
	2. The facilitator gave teachers the article "Exploring Mathematics through the analysis of errors" by Raffaella Borassi. Teachers were asked to read the article for the next session and to reflect on some questions provided by the facilitator. (M1M-09/02/2011)	Read article and questions and be prepared to discuss answers to the questions at next session (+)	2	Identification of teachers' learning focus	1	Facilitator's choice	KT SCK	Collaborative enquiry process
	3. The facilitator gave teachers a copy of ICAS Mathematics paper for 2009 and asked them to give it to their learners as a test. The test answers would then be analysed and errors identified. (M1M-09/02/2011)	Administer and mark test and bring to next session (+)	2	Identification of learners' learning needs	2	Facilitator's choice	n/a	Not counted
	4. Facilitator introduced the concept of analysing student errors to understand learners' learning needs and teachers' learning focus. She asked participants some introductory questions for reflection: What do errors in the learning and teaching of mathematics tell us? Discuss in relation to the following: Are errors an indication that something is horribly wrong? Elaborate in relation to teaching and in relation to learning. Are errors an indication that something is going right? Elaborate in relation to teaching and in relation to learning. Can errors be used to grow understandings of mathematics and the discipline itself? In what ways? Give examples if possible. (M1M-09/02/2011)		25	Identification of learners' learning needs	3	Facilitator's choice	IK KHii KCT	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
Session 2 23/02/2011	5. Teachers made general remarks on the article they had been given to read. They discussed that it was theoretical and intellectually challenging but they got the point that errors made by learners were not necessarily bad because they indicated that learners were not always completely wrong and that teachers could use the mistakes to help learners restructure their knowledge so they could get it right. One teacher said that her problem was that she did not know how to get the learners to restructure their knowledge. (M2R-23/02/2011-00:00)	Administer and mark test and bring to next session (+)	6	Identification of learners' learning needs	4	Learners' learning needs	IK KHii KCS	Collaborative enquiry process
	6. Teachers began to discuss the questions that had been asked about the article. One teacher discussed 4a (Can $\frac{3}{4}+\frac{6}{7}=\frac{9}{11}$ be correct in any context? Why?) and said that a person who had only 'village mathematics' would make that mistake because he only knew numbers and nothing about operations and fractions. (M2R-23/02/2011-06:00)		2	Identification of learners' learning needs	5	Learners' learning needs	IK KHii KCS	Collaborative enquiry process
	7. Teachers argued about the difference between a 'misconception' and an 'error'. They discussed whether it was failure to follow instructions, inability to understand abstract concepts, or laziness. (M2R-23/02/2011-08:00)		11	Curriculum content topics	6	Learners' learning needs	IK KHii KCS	Collaborative enquiry process
	8. Teachers discussed the question: "Are errors an indication that something is horribly wrong?" They gave examples of errors they had recently dealt with and how they handled them. Facilitator emphasised that if the teacher knew why the learner was making the error the teacher could change his teaching to prevent the error in the first place. (M2R-23/02/2011-19:00)		4	Identification of learners' learning needs	7	Learners' learning needs	IK KHii KCS	Collaborative enquiry process
	9. Discussed a concrete way of teaching the concept of 'y²'. Teachers debated the effectiveness of this. One teacher said learners must learn the rule and another said they need to understand why they are doing certain things. (M2R-23/02/2011-23:00)		6	Curriculum content topics	8	Learners' learning needs	KHi KCT	Collaborative discussion
	10. Teachers attributed their learners' problems to past teaching they had had and their negative home circumstances. (M2R-23/02/2011-29:00)		2	Contextual matters		n/a	n/a	n/a
	11. A teacher asked whether there was the concept of 'BOMDAS' as well as 'BODMAS'. Group discussed this and one teacher showed how they are the same. They worked on a few examples together. (M2R-23/02/2011-31:00)		7	Curriculum content topics	9	Teachers' learning needs	IK KHi KCT	Collaborative discussion
	12. Teachers' discussed the realisation that if there were errors something was not going right and that the teachers would have to fix the problem. They discussed the possibility that Maths was not understood because learners		7	Curriculum content topics	10	Teachers' learning needs	IK KHi KHii KCT	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	were not shown how the concepts were applied in real life. One teacher referred to teaching ratio through adjusting recipe quantities. Another teacher argued that there came a time in Maths when it was actually abstract. It was agreed that they should try to make it more concrete in the earlier stages so they could understand the abstract later on. (M2R-23/02/2011-38:00)							
	13. Discussed whether teachers who taught at FET level also taught grade 8s. One teacher expressed the belief that senior teachers should teach younger grades. Another reported the experience of interviewing a headmaster of a poor school that is very successful at Maths and how he insisted that his best teachers teach in grades 8 and 9. The group discussed these ideas and agreed that misconceptions were formed in earlier grades and if senior, knowledgeable Maths teachers taught in these grades it could reduce the problems seen later. (M2R-23/02/2011-45:00)		5	Identification of teachers' learning focus		n/a	n/a	n/a
	14. Discussed q. 2: "Do Mathematicians make errors?" they then referred to the article which they had not really understood except the example given that through an error a new kind of geometry was discovered. Teachers agreed that the types of errors they encountered were unlikely to be this type. A teacher gave an example of using incorrect Maths in her early days of teaching 'logs'. (M2R-23/02/2011-50:00)		5	Identification of teachers' learning focus	11	Learners' learning needs	IK KHii KCT	Collaborative enquiry process
	15. Teachers discussed learners' errors they had encountered recently. In response to one of the concepts found to cause problems for learners, one teacher explained how she taught 'minus numbers' and the 'number line' through physical movement. She also referred to the Hip Hop Geometry game she used to teach types of angles. (M2R-23/02/2011-55:00)		3	Curriculum content topics	12	Learners' learning needs	IK KHi KCT	Collaborative discussion
	16. Teachers discussed an idea raised in the article that errors can be used as "springboards for exploration in Maths". They said that it depended on the motivation of the learner and the teacher. One teacher gave a method she uses for using errors to re-teach concepts and get rid of the false thinking. Using errors productively would take time and careful thought. (M2R-23/02/2011-58:00)		5	Curriculum content topics	13	Teachers' learning needs	KHi KCT	Collaborative enquiry process
Session 3 16/03/2011	17. The facilitator introduced the idea of curriculum mapping and how useful having a curriculum map of the curriculum from Grade R-9 has been to her. She explained that it would help FET teachers to know where the learners have come from. She explained how the document worked and that they would work with that alongside the SAG document. One of the	Administer and mark test and bring to next session (+)	7	Curriculum structure/ content/policy	14	Facilitator's choice	KT HCK	Collaborative discussion

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	teachers, Clara, facilitated the discussion on this topic. (M3R-16/03/2011-00:00)							
	18. Clara pointed out that in grade R leaners began to formulate the idea of a 'function'. Teachers discussed analogies to describe a 'function' and where and when they could be used. (M3R-16/03/2011-07:00)		8	Curriculum sequencing	15	Facilitator's choice	KHii KCT KCC	Collaborative discussion
	19. Clara then pointed out why they do 'factorisation' and why they 'simplify'. It was to simplify the expression which would lead to answers, a tool to solve equations. (M3R-16/03/2011-15:00)		4	Curriculum content topics	16	Learners' learning needs	KT SCK IK KHii KCT	Collaborative discussion
	20. Teachers discussed how and when they introduced 'inequality' and helped learners understand where plus and minus were on graphs. Clara explained that she taught inequality first in grade 11 but did it thoroughly so that much of the understanding had been achieved when they did graphs in grade 12. She explained the importance of showing links, for example showing that a 'simultaneous equation' is the intersection between two graphs. (M3R-16/03/2011-19:00)		11	Curriculum content topics	17	Learners' learning needs	IK KHi KHii KCT	Collaborative discussion
	21. Discussed 'patterns': 'linear', 'exponential' and 'quadratic' and the link with 'functions'. (M3R-16/03/2011-30:00)		4	Curriculum content topics	18	Learners' learning needs	IK KHi KCT	Collaborative discussion
	22. Clara proposed to the teachers that they should teach analytical geometry after functions because they could use that knowledge. She showed the important links and that was why the curriculum map was useful. (M3R-16/03/2011-34:00)		6	Curriculum sequencing	19	Facilitator's choice	IK KHii KCC	Collaborative discussion
	23. Clara emphasised to teachers the need for them to teach for "why?" If teachers understood what they were doing and why they were doing it and then how the topics were inter-linked teaching would be so much better. Teachers discussed the importance of mathematical reasoning. (M3R-16/03/2011-40:00)		3	Curriculum content topics	20	Teachers' learning needs	IK KHii KCT	Collaborative discussion
	24. Discussed the degree to which learners need to show their reasoning steps. They agreed they must show the working out because they have to reach the answer in the correct mathematical manner. Clara highlighted the 'equal sign' often being used indiscriminately in the learners' calculations. She recommended they should get nought if they do such non-mathematical things. Another teacher asked whether they could get marks for 'factorisation by inspection'. Clara said they could if it were for		7	Curriculum content topics	21	Learners' learning needs	IK KHii KCT	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	a trinomial. (M3R-16/03/2011-43:00)							
	25. The facilitator demonstrated a way of teaching the factorisation of trinomials which weak learners found helpful. (M3R-16/03/2011-50:00)		11	Curriculum content topics	22	Teachers' learning needs	KHi KCT	Other - Conceptual steps
	26. The facilitator handed out sample portfolio tasks, including examples of alternative assessments a) a finance investigation, which turned out to be a very revealing exercise because it required working with formulae, plotting points, working out the functions, and b) a translation for grade 12s which required them to explain what and how, c) journal entry and d) Silly Sue (a sheet where all the answers are always wrong and demonstrate the common errors which learners must then correct after identifying and explaining the errors). Teachers then asked for the memos as well. Clara explained what was required of learners in the translation task. Clara also gave out a worksheet on functions to give learners extra practice because she felt there were not enough in the text book. (M3R-16/03/2011-61:00)		7	Learning resources	23	Teachers' learning needs	KHi KCT	Other - Learning resources
	27. Teachers responded to questions in their diary, including identifying what they wanted to do in the PLC to improve their teaching to make the results of the school better. (M3R-16/03/2011-68:00).		3	NLC issues		n/a	n/a	n/a
Session 4 13/04/2011	28. Teachers worked with the answers to the tests they had administered to their learners. Teachers spent the whole session tallying responses to multiple choice questions to find out the percentage of learners that gave each letter as a response for each question. They would work with their finding in the next session. (M4R-16/03/2011-00:00).		65	Identification of learners' learning needs		Not counted	n/a	Not counted
Session 5 04/05/2011	No meeting							
Session 6 11/05/2011	29. The facilitator explained the NLC project and where, in particular, the Maths group was going with it. They had given their leaners a test and analysed the results but had not looked at the reasons behind learners' choice of answers. They were then going to do the test themselves and use their processes to understand why the learners had selected particular responses. After that they would identify the most common errors and design lessons together to teach the concepts, making sure they avoided the errors. They would film these lessons and discuss how their lesson plan had worked out. The group responded positively to the process outlined. (M6R-11/05/2011-00:00)		5	NLC issues		n/a	n/a	n/a

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	30. Teachers answered the first five questions of the test that learners wrote. Facilitator reminded teachers that they were not being judged and that, if they got the wrong answer it might be more helpful because that might help understand where and why the learners went wrong. One teacher said he hoped they would understand that if he got it wrong it was because he was tired. (M6R-11/05/2011-05:00)		9	Identification of teachers' learning focus		n/a	n/a	n/a
	31. Teachers discussed the reasons for the wrong answers to q. 1. Learners did not understand kilograms and grams and how to do conversions. Only 39% of the learners had got it correct. (M6R-11/05/2011-14:00)		2	Identification of learners' learning needs	24	Learners' learning needs	IK KHii KCS	Collaborative discussion
	Moved on to q. 2, began discussion. (M6R-11/05/2011-16:00)		1	n/a		n/a	n/a	n/a
	32. M2 asked if they could go back to q. 1 to find out how other teachers taught the learners the concept of conversions (metres to kilometres, etc). Viv offered her way of teaching it. Teachers discussed this and made other suggestions. Teachers discussed their own difficulties with understanding the concept. (M6R-11/05/2011-17:00)		7	Curriculum content topics	25	Teachers' learning needs	KHi KCT	Collaborative discussion
	33. Returned to q. 2 which dealt with concepts used in statistics which teachers felt they handled reasonably well when they came from primary school. Discussed the related concepts (mode, median, mean) to understand why learners could have got the answer wrong. Discussed the various problems they encountered. . (M6R-11/05/2011-24:00)		3	Identification of learners' learning needs	26	Learners' learning needs	IK KHii KCS	Collaborative discussion
	34. Discussed how to teach the concept of 'mode'. (M6R-11/05/2011-27:00)		2	Curriculum content topics	27	Teachers' learning needs	KHi KCT	Collaborative discussion
	Decided not to bother with q. 3 because it was a perception question and not really Maths. (M6R-11/05/2011-28:32)		0	n/a		n/a	n/a	n/a
	35. Discussed q. 4. "What is the difference between 12 and -5? Half the teachers gave the wrong answer. Discussed this question at length. Decided that it could have been a language problem in the question. Came up with a saying: "Don't ask a question in English language and expect the answer in Maths language." Discussed using the number line to teach this. Discussed whether temperature was a vector. Agreed it was because it had direction. Discussed whether learners had seen thermometers and would understand how it worked. Also used the example of a lift going from basement floors to above ground floors to teach the concept. 33% of learners had got it correct. (M6R-11/05/2011-29:00).		20	Curriculum content topics	28	Learners' learning needs	IK KHii KCT	Collaborative discussion
	36. Discussed q. 5 which dealt with conversions from one currency to		6	Identification	29	Learners'	KHii KCS	Collaborative

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	another. Discovered that the error was mostly a BODMAS problem. (M6R-11/05/2011-49:00)			of learners' learning needs		learning needs		discussion
	37. Discussed q. 5 further and concluded they did not like to rearrange the equation. Discussed the percentages for various responses: 26% got it right. 8% chose the response "I don't know". Teachers tried to understand what that response meant. They questioned whether that meant "I don't understand the question" or "I don't understand the Maths". Discussed other reasons for the difficulty: the language of the question, the fact that they don't know about foreign exchange, or not understanding how to substitute in a formula. (M6R-11/05/2011-55:00)		6	Identification of learners' learning needs	30	Learners' learning needs	IK KHii KCS	Collaborative discussion
	38. Teachers discussed the problem learners have with using formulae. They discussed that they do not understand what the formulae actually meant. (M6R-11/05/2011-61:00)		2	Identification of learners' learning needs	31	Learners' learning needs	KHii KCS	Collaborative discussion
	39. Teachers discussed the problem of questions that have too many words because they struggle with reading. Q. 5 was problematic because it had many words and included symbols (for the currencies) which were not familiar to them. (M6R-11/05/2011-63:00)		1	Assessment development	32	Learners' learning needs	IK KHii KCT	Collaborative discussion
	40. M4 told the story of helping a Grade 8 learner with understanding the formula for perimeter. She had not understood the concept of perimeter. (M6R-11/05/2011-64:00)		3	Curriculum content topics	33	Learners' learning needs	KHi KCT	Collaborative discussion
	41. Returned to the problem of converting the currencies in q. 5. Discussed different ways of approaching substitution in formulae so that the learners could understand. (M6R-11/05/2011-67:00)		5	Curriculum content topics	34	Learners' learning needs	KHi KCT	Collaborative discussion
	42. Facilitator asked whether the teachers had found the work they had done that session interesting. Discussed why it was worthwhile. Teachers were asked to respond in their journals about how their learning in the session had made them think about setting questions for their learners and learners in general. (M6R-11/05/2011-72:00)	Teachers were asked to finish answering the questions and bring their responses to the next session. (+)	4	NLC issues		n/a	n/a	n/a
	43. M2 wanted to return to q. 3 which they had left out because it dealt with 3-dimensional diagrams. (M6R-11/05/2011-76:00)		2	Identification of teachers' learning focus		n/a	n/a	n/a

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
Session 7 01/06/2011	44. Facilitator gave out the summary of the analysis of learners' responses to the test. She asked whether anyone had thought further about any of the issues from the last session. (M7R-01/06/2011-00:00)		2	Identification of learners' learning needs	35	Learners' learning needs	KHii KCS	Collaborative discussion
	45. Viv wanted to return to q. 4 and they concluded that the language was the problem. Discussed learners' difficulties with word problems. (M7R-01/06/2011-02:00)		3	Identification of learners' learning needs	36	Learners' learning needs	KHii KCS	Collaborative discussion
	46. M2 asked to return to q. 3. Teachers spent time trying to understand the various perspectives and whether it mattered if the distance the object was viewed from was very far or quite near. They considered changing the wording of the problem but decided it was not necessary. Many of the teachers struggled with this concept. Not really resolved even after the discussion. (M7R-01/06/2011-05:00)		9	Curriculum content topics	37	Teachers' learning needs	KHii KCT	Collaborative discussion
	47. M3 returned to the reason given the previous session for not spending time on q 3 because it was not Maths. Teachers then discussed what Maths was. Concluded it was Maths when the skills involved manipulation. (M7R-01/06/2011-14:00)		7	Curriculum structure/ content/policy	38	Teachers' learning needs	IK KHii KCC	Collaborative discussion
	48. Returned to q. 3. Clara explained that she had a new idea for understanding 3 which involved measuring. Group became stuck so facilitator asked them to move on. They could go and ask the learners how they had approached the question to understand their reasoning. (M7R-01/06/2011-21:00)		6	Curriculum content topics	39	Learners' learning needs	KHi KHii KCT	Collaborative discussion
	49. Discussed the reasoning for the responses to q. 6 which required working with fractions. M2 suggested dealing with this type of problem in a concrete form so the learners can see it. Clara asked teachers to consider how to teach children that to understand the concept they needed to get the common denominator to understand the number of parts (boxes, strips) they had to work with. Discussed whether it was easier to teach learners using a concrete or abstract method. (M7R-01/06/2011-27:00)		12	Curriculum content topics	40	Learners' learning needs	IK KHi KCT	Collaborative discussion
	50. Viv moved on to discussing this topic using algebraic expressions and factorisation. A strip would be x and a square would be x^2. Clara provided a template for teaching this concept. (M7R-01/06/2011-14:00) (M7R-01/06/2011-39:00)		5	Curriculum content topics	41	Teachers' learning needs	KHi KCT	Collaborative discussion
	51. Discussed factorisation using the "diamond" method. (M7R-01/06/2011-44:00)		4	Curriculum content topics	42	Teachers' learning needs	KHi KCT	Other - Conceptual steps
	52. Discussed the learners' choice of responses and the reasons for the errors.		2	Identification	43	Learners'	KHii KCS	Collaborative

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	They identified that a problem could have been the learners' poor reading of the question. Some learners just did not read the whole question and others misread. (M7R-01/06/2011-48:00)			of learners' learning needs		learning needs		enquiry process
	53. Discussed the language of teaching and whether teachers explained to learners in their home language, or whether learners explained to each other in their own language. Some teachers did because that did help some learners. Teachers debated whether the matric exam should be in the learners' home language, because, for example, the word "coincided" was used in a matric exam and learners could not answer the question because they did not know the meaning of that word. M2 argued that they should do it in English because that was the language they would have to use outside their home environment and that 'mathematical register' did not exist in most African languages. They concluded that language was an issue but that learners were not very good in their home language because they did not read or develop it. (M7R-01/06/2011-50:00)		16	Identification of learners' learning needs	44	Learners' learning needs	KHii KCS	Collaborative enquiry process
Session 8 27/07/2011	54. Teachers congratulated Will on achieving his Masters in Maths from Wits with distinction. In his research he had looked at number patterns as a way of introducing algebra. He found that it was necessary to connect numbers with objects. Learners needed to work with the concrete before the abstract. He also focused on how they communicate their understanding or reasoning. Teachers expanded on these ideas and discussed how they were doing this in their classes. (M8R-27/07/2011-00:00)		10	Identification of learners' learning needs	45	Learners' learning needs	KHii KCS	Collaborative enquiry process
	55. Discussed what to focus their learning on in the next five sessions of the year. Option 1 - continue analysing errors; Option 2 - design a lesson on one of the topics, film someone delivering the lesson, and then discuss it as a group; Option 3 - design an assessment paying attention to cognitive levels, language and so on, give it to a class, analyse the results, discuss the errors and feedback; Option 4 – work on leadership skills needed by Maths HODs. They decided to continue analysing the results of the texts and working out why learners make errors. (M8R-27/07/2011-10:00)		7	Identification of teachers' learning focus		n/a	n/a	n/a
	56. Q. 7 only 22% got it right. Reasons for errors were arithmetic carelessness and not understanding the words: 'being in proportion'. Discussed learners' difficulty handling 'ratio' and understanding of 'similarity'. In the question the shape is preserved but the size is not. It was not a question about 'transformations'. (M8R-27/07/2011-17:00)		27	Curriculum content topics	46	Learners' learning needs	IK KHii KCS KCT	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	57. Prompted by q. 7 teachers discussed how to word an answer dealing with reduction or enlargement. Clara introduced the term 'dilation' to cover both 'enlargement' and 'reduction'. They decide this is a "dodgy concept". (M8R-27/07/2011-44:00)		4	Curriculum content topics	47	Teachers' learning needs	KHi KCT	Collaborative discussion
	58. Q. 8 only 23% got it right. The reason for the errors could have been lack of knowledge about types of angles or because of the note on the test that said "not to scale" which could have confused them. Discussed whether the fact that the test was "not for marks" affected the effort they spent trying to get the right answer. (M8R-27/07/2011-48:00)		8	Identification of learners' learning needs	48	Learners' learning needs	KHii KCS	Collaborative enquiry process
	59. Will asked who had set the test and what the geometry curriculum in that country was. It was an Australian team but many countries did the test. (M8R-27/07/2011-56:00)		2	Learning resources	49	Teachers' learning needs	n/a	Collaborative enquiry process
Session 9 24/08/2011	60. Discussed q. 9. Some teachers made a mistake by not reading the whole question. Learners made the same error (36% of them). Only 25% got it right. Then tried to work out why the other options were chosen. One reason for the error could be that they do not understand the word "fewer" or they used +5, instead of -5. (M9R-24/08/2011-00:00)		8	Identification of learners' learning needs	50	Learners' learning needs	KHii KCS	Collaborative enquiry process
	61. Discussed q. 10 about volume. Teachers got different answers. 29% of learners got it right. Discussed reasons for errors and what concept might be lacking. Most learners saw the problem in concrete form and did not use Maths. These ones got it right. Teachers and learners who used the Maths (volume calculations) would have got it wrong because the shapes would not fit wholly in the box. One teacher commented that teachers teach in the abstract removed from the reality and that is what caused the problem. Identified that learners use formulae without understanding them. Facilitator will try it with a class to see whether they can answer better if they handle it by looking rather than calculating using a Maths formula. Discussed why one teacher could not get it right until after the discussion. His problem was that he had not understood the words of the question, for example, "wholly". Learners could be hindered by the language problem. Another problem was that the question gave more information than needed. The trick was to select the correct information to solve the problem. (M9R-24/08/2011-08:00)		20	Identification of learners' learning needs	51	Learners' learning needs	IK KHii KCS KCT	Collaborative enquiry process
	62. Discussed how they taught the concept of volume and whether they focused on space. Discussed the difference between volume that is rigid and volume that is liquid or gas. (M9R-24/08/2011-20:00)		8	Curriculum content topics	52	Teachers' learning needs	KHii KCT	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	63. Discussed q. 11 the area of a circular pond. Teachers discussed what sort of errors learners made when they got the wrong answer. (M9R-24/08/2011-36:00)	Teachers to work out answers to the next few questions (+)	5	Identification of learners' learning needs	53	Learners' learning needs	KHii KCS	Collaborative enquiry process
	64. A teacher shared a rhyme for teaching the difference between circumference and area. (M9R-24/08/2011-41:00)		2	Curriculum content topics	54	Teachers' learning needs	KHi KCT	Other - Conceptual steps
	65. Discussed the reflection journal question: "How do you think your knowledge of the curriculum and your learners has influenced your choice of strategies when teaching?" (M9R-24/08/2011-43:00)		8	Identification of teachers' learning focus		n/a	n/a	n/a
Session 10 07/09/2011	66. Q. 12 51% got the wrong answer A. They only square but didn't double. This indicates they don't read the whole question. (M10R-07/09/2011-00:00)		4	Identification of learners' learning needs	55	Learners' learning needs	KHii KCS	Collaborative enquiry process
	67. Q. 13 Most learners got this right (Ω_8-Ω_2). Teachers tried to understand reasons for the wrong answers. The problem arose when they did not use brackets: 8+7+6+5+4+3+2+1) – (2+1) (M10R-07/09/2011-04:00)		10	Identification of learners' learning needs	56	Learners' learning needs	IK KHii KCS	Collaborative enquiry process
	68. Q. 14 23% answered correctly – probability question ; (M10R-07/09/2011-14:00)		8	Identification of learners' learning needs	57	Learners' learning needs	IK KHii KCS	Collaborative enquiry process
	69. Q. 15 – area problem. Discussed problem of spatial awareness. (M10R-07/09/2011-22:00)		28	Identification of learners' learning needs	58	Learners' learning needs	IK KHii KCS	Collaborative enquiry process
	70. Q 16 – ratio problem; discussed learners' difficulties with this ratio. (M10R-07/09/2011-50:00)		7	Identification of learners' learning needs	59	Learners' learning needs	IK KHii KCS	Collaborative enquiry process
	71. Facilitator explained that their next step would be to design an assessment using what they had discovered from analysing the assessment they had been busy with for the last weeks. They would get a class to do it then analyse the responses, including interviewing learners to understand how they were thinking. (M10R-07/09/2011-57:00)		4	Identification of teachers' learning focus		n/a	n/a	n/a
Session 11 21/09/2011	72. Decided to stop at q. 19. They would go back over identified questions. They began with q 17 (Which line represents 2y+x-6). The answer was B but 29% chose A meaning they did not notice the 2 in front of the y. they just looked at the -6 indicating they know that the constant represents the y axis. Those that chose C did divide by 2 but they changed the signs. D		4	Identification of learners' learning needs	60	Learners' learning needs	KHii KCS	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	shows that they changed the sign of y. (M10R-07/09/2011-50:00)							
	73. Discussed q.18 which required conversion from miles to kilometres. Teachers decided it was A but were not entirely sure if they were correct. They tried to work it out using ratio. After 6 minutes they asked Alph what he thought. He said the answer was D. He understood how they were reasoning but it was wrong. The answer had to be bigger in kms than in miles. 21% got it right. From the teachers' error in thinking they understood why the learners chose the wrong answer A. They discussed the reasons for the other wrong answers. Teachers discussed that learners began to learn how to do conversions from grade 4. They concluded it could be a language problem because people say "Oh, it's miles away". They discussed which countries used the metric system and which had the imperial system. (M11R-21/09/2011-15:00)		15	Curriculum content topics	61	Learners' learning needs	KT CCK IK KHii KCT	Collaborative discussion
	74. Discussed q. 19 (conversion question). Teachers got answer B which was correct. 13% of learners got it right. Teachers felt better after having lost confidence because of their error in q. 18. They discussed the reason for the wrong answer A which was as a result of merely dividing the 165 by 60. They took notice of the conversion from km to m or from hour to seconds. They tried to work out the reasoning for C and eventually worked out that they had taken the 165 km and multiplied by 3600 then divided by 1000. They noted that 14% left the question out but only 6% left out q. 20. (M11R-21/09/2011-19:00)		10	Learners' learning needs	62	Learners' learning needs	IK KHii KCS	Collaborative enquiry process
	75. Clara asked to discuss q. 20 (question dealing with sharing of strawberries among friends). She said she did not work it out with an equation. The answer was D which 21% got right. One error was made because learners did not answer the question that was asked. They needed to focus on what they have to find out – the x. Viv said in her step plan when she taught word sums that her last step was always "Answer the question". She told them to go back and read the question. It was a question that trapped the teachers. The question asked for number of friends and they had answered for the number of strawberries which is not what was asked in the question. (M11R-21/09/2011-29:00)		8	Curriculum content topics	63	Teachers' learning needs	KHi KCT	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	76. Teachers discussed giving this question to other grades and without answer options. They discussed the difficulty learners have with word problems. They tried to understand the reasons. It was suggested that it could be a language problem, they found the parts of the problem confusing and others struggled because it was abstract. Viv said you could teach steps but that did not work for all problems. The facilitator suggested drawing. They concluded that learners in all grades struggled with these and that the best would be to give them lots of practice. (M11R-21/09/2011-37:00)		9	Concept/skills mediation	64	Learners' learning needs	KHi KCT	Collaborative discussion
	77. Will introduced a problem he had dealt with in class recently concerning surface area. He asked the teachers what the difference was between total surface "area" and "surface area". They discussed what actually was the "surface area". Did they include the bottom if it was house, or if it was a closed cylinder did they include both and whether it included the inside of the object? They concluded that the context was important so teachers have to be very precise. Teachers must be careful not to be ambiguous when they set tests. Will asked what word he must use when he wanted them to calculate. Viv gave an example of calculating the metal for the tin of baked beans. She repeated that the wording must specify what was to be specified. Teachers discussed problems learners experience when they do area problems. Alph said he thought the question should ask for "total surface area". Viv still believed "total" was not necessary because it was implied in the meaning of "surface area". (M11R-21/09/2011-46:00)		19	Curriculum content topics	65	Teachers' learning needs	IK KHi KHii KCT	Collaborative discussion
Session 12 19/10/2011	78. Facilitator re-capped on previous session. They had got to no. 20. Although there were 40 questions she asked if they wanted to discuss any of those not worked out together. They did not want to discuss any more of them. Facilitator asked teachers to identify an error that they could work on and design a lesson that teaches a concept in a way that ensures that learners will not make the error. Teachers discussed errors that they had come across while going over the results of the test questions. The facilitator rejected working on the error identified in answers to q 10 because it was a language error rather than a Maths one. Teachers proposed integers, fractions, or word problems as on the ICAS paper. They rejected these ideas. (M12R-19/10/2011-00:00)		9	NLC issues		n/a	n/a	n/a
	79. Clara proposed that they work on setting an assessment task that asks the question in a way that the learner demonstrates the learning that the		2	Assessment development	66	Teachers' learning	KHii KCT	Other - Assessment

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	teacher intended to have them demonstrate. Clara motivated this by saying that all teachers must learn how to set questions and not rely on questions from past papers. She believed it would contribute more to their professional development. Most of the teachers rely on questions set by the district or found in text books. Teachers expressed their own difficulties experienced when setting assessment tasks. (M12R-19/10/2011-09:00)					needs		design
	80. Alph found problems in the tests set by the district facilitator. The teachers at the underperforming schools complained that their learners were being disadvantaged by the common tests that were set on work that their learners had not yet covered. Teachers believe it would be best for teachers to be able to set their own tests. Alph referred to a newspaper article in the Star which said that the department did not trust the school's SBA. He interpreted this as lack of trust and Nomsa said they were making teachers lazy. Alph got into trouble for setting his own questions and he found that problematic. (M12R-19/10/2011-11:00)		7	Contextual matters		n/a	n/a	n/a
	81. Continued the discussion on the value of learning to set good assessment tasks. They could work on any grade. They needed to select a topic. Teachers proposed topics: functions, word problems that contained some of the other problems, such as substitution, integers. Clara said that functions could be integrated in other topics. To set a complex question it was necessary to integrate. Setting simple, lower order problems was easy but higher order ones needed topics to be integrated. She said it would be helpful have a bank of tests on which to draw. (M12R-19/10/2011-18:00)		8	Identification of teachers' learning focus		n/a	n/a	n/a
	82. Will said they should be designing questions that break the stereotypes because most teachers are just teaching for the exams. Teachers must teach beyond knowledge and teach for application. Learners need to be challenged otherwise they would not be prepared for tertiary study even if they got an A. He believed the district SBA tasks were not valid assessments because they merely used previous tasks for which the answers were available. A learner could pass the test and still not know anything. Clara emphasised the importance of teaching for "why?". Learners were too concerned with the marks and not understanding. It would be better to spend a long time on an important section in order to achieve understanding. Teachers agreed and said they were learning the "why?" themselves. Teachers agreed they would work on setting		7	Assessment development	67	Teachers' learning needs	KHii KCT	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	questions for grade 10 on "functions". The facilitator and Clara would work on getting some literature and other material to prepare for the sessions on this topic. (M12R-19/10/2011-26:00)							
	83. Facilitator said that they would go over the CAPS document in the next session. All Maths teachers from the schools were invited to attend because Clara would show the links with other grades. It would be the NLCs mini CAPS training in order to help teachers with their 2012 planning. Session ended early and they completed their journal entry. (M12R-19/10/2011-33:00)		5	NLC issues		n/a	n/a	n/a
Session 13 09/11/2011	84. The facilitator welcomed everyone, a bigger group, because all Maths teachers were invited to hear a presentation on the CAPS document. Clara explained the process of drawing up the CAPS document. She recommended that all Maths teachers read the whole document, all the way from grade 1. She said the word "topics" was used. Linear programming and transformations were out and all of Paper 3 was in. Only 8 days of teaching were taken out but three to four weeks of teaching were in. She drew attention to a table which indicated what was examinable in which paper. She gave some advice on handling probability across grades 10-12. Geometry is of paper 2. Clara made comments on the work schedule which is a guideline and which she would not be using because she believed it would not work. Discussed the fact that only linear graphs were set for grade 10 but should do geometric as well and do the patterns as usual. Discussed terminology "linear", "arithmetic", "geometric", "exponential". Pointed out "nature of roots" as a topic which is 6 weeks of work. She believed someone is imposing his/her own agenda. She proposed it should be handled as an intuitive thing and links it to the graph. She continued going through the document making suggestions about re-ordering some of the topics and beginning some of the topics in grade 9 in a simple form that could be built on in the subsequent years. She highlighted topics that could be dealt with in more detail than the curriculum writers intended. She said that accounting principles were very easy to teach once the teacher understood it. She was willing to help teachers with this topic. She gave an example of teaching an aspect. She believed all teachers and learners could be successful at this. Geometry was all back in. She emphasised certain theorems and suggested when certain proofs could be taught. Analytical geometry and		31	Curriculum structure/ content/policy	68	Teachers' learning needs	KT HCK IK KHii KHiii KCC	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	statistics remained mainly the same. (M13R-09/11/2011-00:00)							
	85. Discussed the work schedule and assessment schedule but teachers felt they were not realistic. Clara suggested that teachers needed to use their professional judgment. (M13R-09/11/2011-31:00)		2	Curriculum policy/ structure/ content	69	Facilitator's choice	KHii KCC	Collaborative discussion
	86. Teachers identified that a problem could arise if the common tests and exams followed these schedules. (M13R-09/11/2011-33:00)		2	Contextual matters		n/a	n/a	n/a
	87. Looked at some of the examples provided as guidance for teaching the topics. (M13R-09/11/2011-35:00)		5	Learning resources	70	Teachers' learning needs	KHi KCT	Collaborative discussion
	88. Looked at the assessment requirements. Clara pointed out the change in % of each level of questioning. She pointed out that teachers found it difficult to reach agreement on what the levels of question were. Clara pointed out the SBA requirements. She emphasised that teachers needed to be flexible (M13R-09/11/2011-40:00)		3	Assessment policy	71	Teachers' learning needs	IK KHii KCT	Collaborative discussion
	89. Clara challenged an instruction on pp. 54 and 55 that said formula sheets should not be used in grade 10 and 11 tests and final exams. She explained how she used formula sheets with her learners. (M13R-09/11/2011-43:00)		2	Teachers' frustration		n/a	n/a	n/a
	90. Clara referred to an early draft of the CAPS which had some very good examples of 'problem solving" but there were no answers. She would provide the examples and proposed that the teachers in the PLC work out the answers together. (M13R-09/11/2011-45:00)		4	Learning resources	72	Facilitator's choice	KHi KCT	Collaborative discussion
	91. Teachers asked about the text books. She said only four titles were approved. Clara said she was waiting for a year before buying books. She was going to manage with the current book and supplementing with her own notes and exercises. She referred to the Mark Shuttleworth Foundation book which could be downloaded off the Siyavula website. Clara said it had good examples in it. She downloaded it on the computer to show participants. She also said teachers could subscribe to a website called Full Marks. She suggested these books could be used as a resource and it was free of copyright, (M13R-09/11/2011-49:00)		4	Learning resources	73	Teachers' learning needs	KHii KCT	Collaborative discussion
	92. Discussed work schedules further. Clara offered to forward her work schedules for all grades to the participants. She explained how many lessons and the length of the lessons. (M13R-09/11/2011-53:00)		2	Curriculum structure/ content/policy	74	Teachers' learning needs	IK KHii KHiii KCC	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s Knowledge domain/s	Ways of working with knowledge
	93. Viv asked whether teachers should change anything in their grade 8 or 9 curriculum to prepare for the introduction of their new curriculum in 2013. Clara suggested teaching the Cartesian plane in a very practical way in grade 8. (M13R-09/11/2011-55:00)		5	Curriculum structure/ content/policy	75	Teachers' learning needs	IK KHi KHii KCT KCC	Collaborative discussion
	94. Clara concluded by saying that she felt it was a wonderful curriculum that was easily comparable with the best in the world. She encouraged teachers to embrace it. The curriculum was challenging and interesting. (M13R-09/11/2011-60:00)		2	Curriculum structure/ content/policy	76	Facilitator's choice	KHii KCC	Collaborative discussion
	95. A teacher was asked if there were any changes in the AP curriculum. She replied that it was only in the assessment. She suggested that they should balance their tests, setting different topics in the same test. (M13R-09/11/2011-62:00)		2	Assessment policy	77	Teachers' learning needs	KHi KCT	Collaborative discussion
	96. Returned to a discussion of the Shuttleworth book and pointed out what was useful in it. She emphasised that the book specifically said teachers were free to make copies at no charge. (M13R-09/11/2011-64:00)		2	Learning resources	78	Teachers' learning needs	KHii KCT	Collaborative discussion
	97. The PLC participants remained to do their journals. (M13R-09/11/2011-66:00)		5	NLC issues		n/a	n/a	n/a
Session 14 25/01/2012	98. Teachers introduced themselves. Facilitator welcomed new members and re-capped what was done in 2011 and outlined what the PLC would do in the next sessions. Teachers would design a series of lessons on a topic where the learners have demonstrated that they commonly have misconceptions or make errors. They would then teach the lesson, one person would be videoed then as a group they would watch the video and discuss what they observed. After that they would design a summative assessment on the topic. The group decided that the topic would be 'exponents' because teachers deal with this topic at various stages. (M14R-25/01/2012-00:00)		16	NLC issues		n/a	n/a	n/a
	99. Teachers began to discuss what problems they encountered when teaching exponents. They identified: understanding the difference between multiplying, adding and subtracting powers; adding only like terms but can multiply them; memorising of rules without understanding; (M14R-25/01/2012-16:00)		4	Curriculum content topics	79	Learners' learning needs	IK KHii KCT	Collaborative discussion
	100. Debated whether learners have to understand the "why" of multiplying unlike terms and how they would explain it to the learners. Discussed whether it was enough for the learners to be able to just 'recognise'		5	Curriculum content topics	80	Learners' learning needs	IK KHii KCT	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	without understanding. Some learners want to understand the "why", others do not. (M14R-25/01/2012-20:00)							
	101. Discussed whether "streaming" of Maths classes was a good thing to enable better teaching. (M14R-25/01/2012-25:00)		2	Contextual matters		n/a	n/a	n/a
	102. Began designing a series of lesson plans on exponents for grade 10s. Discussed how to break it up. Identified what must be taught: Definitions, Laws 1 - 4, simplification, addition and subtraction, factorising, exponential equations, graphs and logs, roots, rational exponents. Discussed the order in which they should introduce these aspects. They looked at the CAPS document to check whether they had identified all the aspects required for grade 10. (M14R-25/01/2012-27:00)		10	Curriculum content topics	81	Teachers' learning needs	IK KHii KCT	Collaborative enquiry process
	103. Studied the CAPS document comparing what was required in grade 10 and 11 concerning exponents. Discussed which aspects they would focus on in grade 10, specifically the depth to which they would teach it, and which they would leave for grade 11. (M14R-25/01/2012-37:00)		3	Curriculum sequencing	82	Teachers' learning needs	IK KHii KCC	Collaborative enquiry process
	104. Continued discussing the order in which they would present the aspects of exponents and the reasons for the choices. (M14R-25/01/2012-40:00)	Teachers to bring resources to be used in the next session to help with the lesson planning (+)	11	Curriculum content topics	83	Learners' learning needs	IK KHii KCT	Collaborative enquiry process
Session 15 01/02/2012	105. Facilitator dealt with NLC issues, including consent to being recorded and videoed, travel claims, starting and finishing time to avoid interruptions after the start, speaking one at a time. (M15R-01/02/2012-00:00)		5	NLC issues		n/a	n/a	n/a
	106. Recapped decisions of previous session. Teachers brought resources and examples of work related to the topic of 'exponents'. Watched a PowerPoint brought by G. Teachers responded to the question: "So what do you think?" Viv said she learnt something. It helped to connect Maths to the real world. Clara said that it helped learners conceptualise how big 10 to the power of 20 is compared to 10 to the power of something else. Al thought it would send them to sleep. Teachers suggested other resources and offered to bring further examples next week. Viv described the magnitude of 10 to the power of 100 being more than all the grains of		20	Curriculum content topics	84	Learners' learning needs	IK KHi KHii KCT	Collaborative enquiry process

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	sand on all shores and C discussed the magnitude of infinity. Teachers decided the PowerPoint was a good way to introduce exponents in a different way. It would give them a good understanding but teachers would still have to explain the Maths. (M15R-01/02/2012-04:42)							
	107. Discussed suggestions for the next stage of the lesson. Clara explained in detail using prior knowledge of patterns. Teachers agreed that was a good idea. Alph linked this with rational numbers and pointed out the symmetrical pattern. The other teachers had not seen it like that. Viv suggested a discovery worksheet which would show the pattern. (M15R-01/02/2012-25:15)		10	Curriculum content topics	85	Teachers' learning needs	IK KHi KHii KCT	Collaborative enquiry process
	108. Teachers discussed how many lessons they would need to cover the aspects. They complained about having to rush through the curriculum and not having time to do the necessary exploration (which was also fun). Clara said they could cover a number of the aspects in one 20 minute investigation. (M15R-01/02/2012-35:00)		2	Curriculum content topics	86	Teachers' learning needs	KHi KCT	Collaborative enquiry process
	109. They began designing the discovery worksheet. They decided on how many questions they needed for the pattern to emerge. They decided not to use 2 to the power of 2 because that is confusing. They chose base 3. It was important for learning to work out the answer but the purpose of the exercise had nothing to do with the answer, Teachers wanted the learners to use the pattern to work out the exponent, not the answer. The purpose was use the pattern to work out the exponent. Discussed how they would set out the questions on the page. It was important to see it on one page. Then they discussed whether it should be bigger going up the page and smaller going down, like the y axis rather than smaller on the left and bigger on the right like the number line. They chose the former. They decided that learners needed a clue where to start the exercise. Discussed the instructions for the exercise which would refer to following the pattern of the answers and the exponential form. Decided they needed to do the exercise with more than one base. (M15R-01/02/2012-37:00)		18	Curriculum content topics	87	Learners' learning needs	IK KHii KCT	Collaborative enquiry process
	110. Teachers identified errors that learners were likely to make. The main error was multiplying the base by the power. Discussed ways of teaching to avoid this error. (M15R-01/02/2012-54:55)		10	Curriculum content topics	88	Learners' learning needs	KHii KCT	Collaborative enquiry process
	111. Teachers answered a question in their reflection journals. "How has today's session helped to inform your teaching and make you become conscious of your teaching?" (M15R-01/02/2012-65:00)		2	Identification of teachers' learning focus		n/a	n/a	n/a

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Session 16 29/02/2012	112. Facilitator welcomed new participants. She handed out copies of the worksheet that had been designed last session. She asked for two volunteers to be filmed teaching the exponents lesson using the worksheet. The facilitator explained the filming process. She invited participants to the Naptosa Secondary School subject conference on the coming Saturday. Clara gave an outline of the programme: grade 10 geometry and probability. (M16R-29/02/2012-00:00)		6	NLC issues		n/a	n/a	n/a
	113. The facilitator asked the participants to look at the worksheet and see whether it captured everything they had discussed. Viv recapped for the new members. Teachers discussed some modifications to the questions and the instructions. They decided that they needed 3 or 4 worksheets using different base numbers. (M16R-29/02/2012-06:00)		31	Learning resources	89	Teachers' learning needs	KHii KCT	Collaborative enquiry process
	114. Teachers discussed what would follow the worksheets. They discussed questions they would ask that would consolidate their understanding of exponents. (M16R-29/02/2012-37:00)		10	Curriculum content topics	90	Learners' learning needs	KHii KCT	Collaborative enquiry process
	115. Teachers agreed that the next stage would be practice examples. They suggested some examples and what each of these would be reinforcing. (M16R-29/02/2012-47:00)		1	Curriculum content topics	91	Learners' learning needs	KHii KCT	Collaborative enquiry process
	116. Discussed the fact that they had not taught the laws. The assumption had been made that they had been done in previous years. Some teachers always revise the laws assuming that they have not done anything to do with exponents before. (M16R-29/02/2012-48:00)		1	Curriculum structure/ content/policy	92	Learners' learning needs	KHii KCC	Collaborative enquiry process
	117. Viv reported that the grade 8s at her school loved the PowerPoint introductory presentation but that she had changed the accompanying music to something more dramatic that would not send the learners to sleep. They were fascinated. (M16R-29/02/2012-49:00)		1	Learning resources	93	Learners' learning needs	KHi KCT	Collaborative enquiry process
	118. Teachers discussed how long they thought the stages prepared so far would take. The worksheet should take 15 minutes which they would do in pairs. Then they would discuss the questions in groups before interacting with the teacher. This would be followed by the practice questions. (M16R-29/02/2012-50:00)		3	Curriculum content topics	94	Teachers' learning needs	KHi KCT	Collaborative enquiry process
	119. The facilitator tried to persuade two teachers to be filmed. Aya and Angie agreed. The facilitator would provide the worksheet and questions before participants left. (M16R-29/02/2012-53:00)	Teachers teach this lesson using the materials designed in	2	NLC issues		n/a	n/a	n/a

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
		the sessions. (+)						
	120. Teachers reflected on the following question in their journals: "How has this latest session helped you think about how you design worksheets regarding instructions, layout, and purpose of the worksheet?" (M16R-29/02/2012-55:00)		2	Identification of teachers' learning focus		n/a	n/a	n/a
	121. Teachers discussed when the PowerPoint could be shown to the learners because it was not factored into the lesson time. Aya did not have facilities for that. Angie would show it before she taught the lesson that was being filmed. They decided it would be interesting to compare classes that had seen it and those that had not. (M16R-29/02/2012-57:00)		3	Learning resources	95	Teachers' learning needs	KHi KCT	Collaborative enquiry process
Session 17 14/03/2012	122. Facilitator asked Angie to reflect on how the lesson that the PLC had designed went with the grade 9 class that was filmed. She identified that the learners gave their answers using decimal places rather than fractions which was needed to see the pattern. The group recognised that the instructions needed to be changed and an example could be given. Discussed whether this should be done before Aya taught the lesson. Angie explained how she marked the first page and the learners did see the pattern. (M17R-14/03/2012-00:00)		8	Curriculum content topics	96	Learners' learning needs	IK KHii KCT	Collaborative enquiry process
	123. Angie said they did not have time to answer all the questions in the lesson and she did not think they really understood. Teachers consider asking the questions after the first page but make them easier. Angie described the type of errors learners made when answering the questions. Discussed the fact that the lesson designed was an introductory one and should not be too difficult. Clara suggested that the wording of the questions could be the problem and that is what the teachers needed to learn. Discussed scaffolding the questions to lead to the answers. (M17R-14/03/2012-08:00)		6	Assessment development	97	Learners' learning needs	IK KHii KCT	Collaborative enquiry process
	124. Aya said that his learners would struggle with the questions because they do not make connections between what they learn. Clara emphasised that it was the teachers' job to facilitate integrating the different topics so that the learners made the connections. Clara questioned whether teachers integrated topics in assessments to force them to make the links. (M17R-14/03/2012-14:00)		4	Curriculum content topics	98	Learners' learning needs	IK KHii KCT	Collaborative enquiry process
	125. Teachers worked on rewording the questions. Aya would use the re-worded questions when he teaches the lesson. Teachers considered what		5	Assessment development	99	Learners' learning	KHii KCT	Collaborative enquiry

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	learning the learners must demonstrate. (M17R-14/03/2012-18:00)					needs		process
	126. Facilitator asked Angie to reflect on other aspects of the lesson: "How did she feel about the lesson?" She was not nervous but was worried that her learners would struggle. After they had been told to answer in fractions they worked quickly through the pages. After they had done the three pages they discussed the answers briefly. This took 42 minutes so there was not much time to answer the questions. Teachers discussed further modifications. Discussed that calculators should not be used for the extrapolating questions. Discussed putting a question at the bottom of each page to force the learners to make links. Discussed the questions in more detail. (M17R-14/03/2012-23:00)		10	Curriculum content topics	100	Teachers' learning needs	IK KHi KHii KCT	Collaborative enquiry process
	127. Facilitator asked Aya how he felt about being filmed. He replied he was "cool". They discussed possible dates and times. Aya would teach the lesson to grade 10s. (M17R-14/03/2012-33:00)		1	NLC issues		n/a	n/a	n/a
	128. Angie discussed the preparation she did before the lesson. She did not have to do much except decide what would be done individually, in pairs, whole class report back. Angie described how she facilitated the lesson and reflected on how it worked. (M17R-14/03/2012-34:00).		2	Curriculum content topics	101	Teachers' learning needs	KHii KCT	Collaborative enquiry process
	129. The facilitator asked how Angie felt about not being able to finish the whole lesson. She said it meant that they could not consolidate the learning on the day when they were engaged with the topic. It was difficult to come back to complete it the next day when they were not in the same frame of mind. She was not able to do it the way she wanted to. She needed 10 more minutes. Teachers asked her questions. (M17R-14/03/2012-36:00)		3	Curriculum content topics	102	Teachers' learning needs	KHii KCT	Collaborative enquiry process
	130. The facilitator asked Angie whether the learners learned what the lesson was planned to achieve. Angie recommended using the PowerPoint which she had not had time to do before the filmed lesson. She showed it to them after the lesson and followed up with some consolidation in two further lessons. Alph identified the problem with pacing according to the prescribed work schedule. Nomsa asked what the teacher should do if the lesson does not achieve the objectives. Teachers will be asked to teach the lesson and complete a questionnaire. Alph asked teachers how the lesson could be introduced. Teachers said teachers could try different things and then tell the group how it worked. (M17R-14/03/2012-38:40)		4	Curriculum content topics	103	Learners' learning needs	IK KHi KHii KCT	Collaborative enquiry process
Session 18	131. Teachers watched a video of one of the participants (Angie) teaching the		74	Curriculum	104	Learners'	IK	Collaborative

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
16/04/2012	lesson on exponents designed by the group. Teachers used a guide sheet for observations. They paused the video frequently and discussed their observations and tried to understand why learners were doing what they were doing and what the teachers could do about it. This led to identification of learners' learning needs and teachers' learning needs. (M18R-16/04/2012-00:00)			content topics		learning needs	KHii KCT	enquiry process
Session 19 02/05/2012	132. Teachers continued their discussion of the observations of Angie's videoed lesson. They identified errors and other problematic practices, such as the excessive use of calculators and failure to read instructions properly. They identified a teaching practice for discussion – questioning. They noticed that Angie asked yes/no questions rather than open-ended ones. (M19R-02/05/2012-00:00)		4	Curriculum content topics	105	Learners' learning needs	IK KHii KCT	Collaborative enquiry process
	133. Teachers discussed the merits of open-ended questions but were reluctant to do this in big classes because it was time-consuming. They discussed the need to probe when learners give their answers. This was identified as a topic for teacher learning. (M19R-02/05/2012-04:00)		6	Curriculum content topics	106	Learners' learning needs	KHii KCT	Collaborative enquiry process
	134. Teachers continued identifying learners' difficulties and trying to understand the reasons for them. (M19R-02/05/2012-10:00)		5	Identification of learners' learning needs	107	Learners' learning needs	KHii KCS	Collaborative enquiry process
	135. Teachers discussed observations related to the problems with the actual lesson design and the teacher's mediation of it. They discussed how to avoid the teaching mistakes. (M19R-02/05/2012-15:00)		7	Curriculum content topics	108	Teachers' learning needs	KHii KCT	Collaborative enquiry process
	136. Teachers continued identifying learners' difficulties and understanding the reasons for it. (M19R-02/05/2012-22:00)		2	Identification of learners' learning needs	109	Learners' learning needs	KHii KCS	Collaborative enquiry process
	137. Teachers identified a problem when teachers identify errors and warn learners not to do them. They discussed research which indicates that learners are more likely to make the mistake because it has been emphasised. (M19R-02/05/2012-24:00)		3	Identification of teachers' learning focus		n/a	n/a	n/a
	138. Teachers continued discussing their observations of the lesson presentation. (M19R-02/05/2012-27:00)		4	Curriculum content topics	110	Teachers' learning needs	KHii KCT	Collaborative enquiry process
	139. Discussed the length of the curriculum and how to find time for those who take much longer to grasp the concepts. Discussed teaching an adjusted curriculum called "Maths Light" where the focus was on the simpler		21	Curriculum structure/ content/policy	111	Teachers' learning needs	KHii KCC	Collaborative discussion

Dates	Segments	PLC's homework	Time in minutes	Dominant code	Learning unit number	Influence	Knowledge type/s / Knowledge domain/s	Ways of working with knowledge
	concepts. Identified what they could leave out and proposed more topics. They discussed the idea that in grade 9 they begin some of the grade 10 topics. (M19R-02/05/2012-31:00)							
	140. Teachers continued watching the video discussing their observations of the lesson presentation. (M19R-02/05/2012-52:00)		16	Curriculum content topics	112	Teachers' learning needs	KHii KCT	Collaborative enquiry process
Session 20 16/05/2012	141. Teachers watched a video of another teacher (Aya) teaching the same lesson designed by the group. Teachers used a guide sheet for observations. They did not pause the video this time. At the end of the lesson the teachers began to discuss what they saw. They identified a problem with one of their questions because learners gave answers which the teachers had not intended. (M20R-16/05/2012-00:00)		75	Curriculum content topics	113	Learners' learning needs	IK KHii KCT	Collaborative enquiry process
Session 21 30/05/2012	142. Watched Aya's teaching video in the background while discussing the similarities between the two teachers' videoed classes. Teachers noticed that if both classes made the same mistakes when following the instructions then the problem could be the worksheet. Viv changed the worksheet when she used it for her class. Discussed the reasons for making the change. Discussed not using the introductory video because of fear of having not enough time but finding that the saving of time was probably more time-consuming in the end. (M21R-30/05/2012-00:00)		60	Curriculum content topics	114	Learners' learning needs	IK KHi KHii KCT	Collaborative enquiry process

CHAPTER 5

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5.1 COMPOSITION OF THE PLCS

When referring to participants I count only those who attended more than 50% of the sessions or those who joined in the second year of the project but had 100% attendance.

Table A5.1 Geography PLC participant details

	Participant pseudonym	Gender / race[171]	School pseu-donym	Type of school - current performance rate	Participant's age / years of experience	Participant's qualifications	Post level
1	JC	Male, black	Field	Poor, poorly resourced, new township, priority	47, 25 years	BA Ed, studying for Hons	PL2
2	Jim	Male, black	Wood	Poor, urban, struggling to achieve	38, 16 years	BCom, Dip. Ed	PL2
3	Gay (facilitator)	Female, white	Lake	Well-resourced, suburban, achieving	42, 20 years	BSc, Higher Dip. Ed	PL2
4	Bal	Male, black	Field	Poor, poorly resourced, new township, priority	45, 23 years	Sec. teachers' Dip.	PL1
5	Oupa	Male, black	Rock	Poor, poorly resourced, township, priority	55, 33 years	JSTC, NPDE	PL1
6	Mab	Male, black	Ivy	Poor students, generally well-resourced, suburban, struggling to maintain past achievement level	37, 15 years	BA Hons, PGCE, BEd Hons, studying for masters	PL1
7	Selby	Male, black	Rock	Poor, poorly resourced, township, priority	40, 15 years	Sec. teachers' Dip.	PL1
8	Basi	Female, black	Rock	Poor, poorly resourced, township, priority	42, 4 years	Sec. teachers' Dip.	PL2

[171] In this study I refer to the social construct of "race" as historical practices in South Africa privileged the "white race" over other "races" resulting in most "black" people receiving a vastly inferior and underfunded education to that of "whites". "Coloured" and "Indian" education was marginally better. These discriminatory practices extended to colleges and universities for "races" other than "whites" resulting in a cohort of teachers with inadequate preparation for teaching a modern curriculum. The practices persisted officially until 1994 (actually later because the new curriculum and restructuring of education departments happened after 1996) but their impact continues to this day. In the TPD environment "race" is sometimes used as a proxy for teacher knowledge/preparedness for teaching. Funders of education research and improvement initiatives are more inclined to support programmes aimed at assisting "black" people or schools with "black" learners. In South Africa "race" is still used as a classifier ostensibly in order to gauge the level of redress.

Table A5.2 English PLC participant details

	Participant pseudonym	Gender / race	School pseu-donym	Type of school - current performance rate	Participant's age / years of experience	Participant's qualifi-cations	Post level
1	Fred (facilitator)	Male, white	Lake	Well-resourced, suburban, achieving	53, 26 years	BA Hons, HED	PL2
2	Sam	Female, white	Lake	Well-resourced, suburban, achieving	50, 24 years	BA, HED	PL3
3	Mol	Female, black	Wood	Poor, urban, struggling to achieve	27, 15 years	Diploma	PL1
4	Sal	Female, coloured	Ivy	Poor students, generally well-resourced suburban, struggling to maintain past achievement level	50, 25 years	HED and incomplete BA	PL1
5	Ali	Female, white	Galaxy	Well-resourced, suburban, achieving	55, 30 years	BA Hons, HED	PL2
6	Judy	Female	Galaxy	Well-resourced, suburban, achieving	26, 3 years	BA, PGCE	PL1

Table A5.3 Mathematics PLC participant details

	Partici-pant pseu-donym	Gender / race	School pseudo-nym	Type of school - current performance rate	Participant's age / years of experience	Participant's qualifi-cations	Post level
1	Aya	Male, black	Purpose	Poor, poorly resourced, township, priority	32, 10 years	STD, ACE (FET Maths ed.)	PL1
2	Russ	Male, black	Rock	Poor, poorly resourced, township, priority	42, 20 years (4 in SA)	BSc Hons (Maths)	PL1
3	Alph	Male, black	Stadium	Poor, poorly resourced, township, priority	40, 17 years	Diploma in Ed. BEd (Hons)	PL1
4	Di	Female, black	Field	Poor, poorly resourced, new township, priority	44, 21 years	STD, ACE, BA incomplete	PL2 (act-ing)
5	Angie	Female, white	Lake	Well-resourced, suburban, achieving	27, 4 years	BEd	PL1
6	Taz	Female, white	Lake	Well-resourced, suburban, achieving	25, 2 years	BEd Hons (Adult and Higher Ed)	PL1
7	Alex (facili-tator)	Female, white	Lake	Well-resourced, suburban, achieving	26, 4 years	BSc, PGCE	PL1
8	Clara	Female, white	Lake	Well-resourced, suburban, achieving	36, 15 years	BSc, HDE	PL2
9	Viv	Female, white	Galaxy	Well-resourced, suburban, achieving	50, 27 years	BA, HDE, Hons (but not in Maths)	PL2
10	Nomsa	Female, black		Poor, poorly resourced, township, priority	32, 8 years	STD	PL1
11	Fab	Male, coloured	Ivy	Poor students, generally well-resourced, suburban, struggling to maintain past achievement level	45, 20 years	BA, HDip	PL2
12	Will	Male, black	Galaxy	Well-resourced, suburban, achieving	45, 20 years	MEd (Maths Ed)	PL1

5.2 PLC CONFIDENCE/KNOWLEDGE QUESTIONNAIRE

Table A5.4 Geography confidence/knowledge questionnaire

Teaching competence	Not confident/ know-ledgeable	Sometimes confident/ know-ledgeable	Usually confident/ know-ledgeable	Very confident/ know-ledgeable	Extremely confident/ know-ledgeable – I can teach others
Subject content			2	1	3
Subject teaching methods			3	3	
Formative assessment techniques			2	4	
Designing summative assessment tasks			3	3	
Constructing diagnostic assessments tasks			4	2	
Analysing learners' results and deciding on remedial / extension strategies		3	1	1	1
Devising and delivering effective and creative lessons			3	2	1
Helping struggling learners to overcome their learning difficulties		2	3	1	
Mentoring and coaching teachers in your subject			2	3	1
Planning and monitoring the completion of the curriculum each year by teachers in your subject			2	3	1

Table A5.5 English PLC confidence/knowledge questionnaire

Teaching competence	Not confident/ know-ledgeable	Sometimes confident/ know-ledgeable	Usually confident/ know-ledgeable	Very confident/ know-ledgeable	Extremely confident/ know-ledgeable – I can teach others
Subject content				1	5
Subject teaching methods				3	3
Formative assessment techniques				4	2
Designing summative assessment tasks				4	2
Constructing diagnostic assessments tasks			2	3	1
Analysing learners' results and deciding on remedial / extension strategies			1	2	3
Devising and delivering effective and creative lessons				4	2
Helping struggling learners to overcome their learning difficulties			1	3	2
Mentoring and coaching teachers in your subject			1	3	2
Planning and monitoring the completion of the curriculum each year by teachers in your subject			2	2	2

Table A5.6 Mathematics PLC confidence/knowledge questionnaire

Teaching competence	Not confident/ know-ledgeable	Sometimes confident/ know-ledgeable	Usually confident/ know-ledgeable	Very confident/ know-ledgeable	Extremely confident/ know-ledgeable – I can teach others
Subject content			2	6	4
Subject teaching methods			2	7	3
Formative assessment techniques			4	5	3
Designing summative assessment tasks		2	2	4	4
Constructing diagnostic assessments tasks		2	5	4	1
Analysing learners' results and deciding on remedial / extension strategies			4	6	2
Devising and delivering effective and creative lessons			2	10	
Helping struggling learners to overcome their learning difficulties			5	5	2
Mentoring and coaching teachers in your subject			4	6	2
Planning and monitoring the completion of the curriculum each year by teachers in your subject		2	5	3	2

5.3 INDIVIDUAL INTERVIEW TEACHER PARTICIPANTS

Table A5.7 Individual Interview Teacher participants

	Teacher's name[172], school and date of interview	Gender / race	Age (approx.)	Teaching subjects, qualifications and experience	General additional information.
1	Mongi, Rock[173], 19/01/2012	Female/ back	42	Geography lead teacher, Social Sciences HOD, Sec Teachers' Dip., 16 years	Regular participant; teaches extra classes before and after school and on Saturdays.
2	Bal, Field, 03/02/2012	Male/ black	47	Geography PL 1 teacher, Sec. Teachers' Dip., 15 years	Shares PLC information with colleagues; learners use his office where he keeps a range of old and new textbooks as a resource centre.
3	Fred, Lake, 28/09/2011	Male/ white	53	English HOD, BA Hons (English), HED, 26 years	Fred co-facilitated the English PLC; used ideas from the PLC for his school-based PLC which fed back into the network PLC.
4	Sal, Ivy, 28/10/2011	Female/ coloured	50	English PL 1 teacher, HED and incomplete BA, 25 years	Shared ideas with colleagues informally and fed back into the network PLC; HOD was not supportive.
5	Viv, Galaxy, 12/10/2011	Female/ white	50	Mathematics HOD, BA Hons (not in Maths) HDE, 27 years	Believed that those in her school who were interested in PLC activities should attend rather than her taking ideas back to the school; a number of part-time teachers were not interested.
6	Will, Galaxy, 28/09/2011	Male/ black (foreign)	40	Mathematics, PL 1 teacher, Med, 15 years	Very interested in understanding learners' learning processes; participated knowledgeably in 2011; appointed to a university from 2012.
7	Alph, Stadium, 27/09/2011	Male/ black (foreign)	40	Mathematics lead teacher, Diploma in Ed., BEd Hons, 17 years	Shared with other Maths teachers and HOD.

[172] All participants' names used are pseudonyms.
[173] All schools' names used are pseudonyms.

5.4 SUMMARY OF PRINCIPAL PARTICIPANTS IN THE NLC

Table A5.8 Summary of Principal participants in the NLC

	School	Name of principal	Gender/race/age	Qualifications	Experience as a principal	Length of service at present school
1	Field	Matsie	Female/black/	BEd, ACE	5	5
2	Siza	Thuli	Female/black/	BEd Hons	4	4
3	Galaxy	Natalie	Female/white/	BA, HDE (pg)	6	6
4	Lots	Grace	Female/black/	BA, STD	15	15
5	Rock	(2011) Maurice	Male/black/	BA, STD	5	8 months
		(2011-2013) Patrick	Male/black/	BA, ACE	1	1
6	Lake	Joanne	Female/white/	BA, BEd (Hons) STD (pg), MEd	21	17
7	Purpose	Boris (2012)	Male/black/	STD, BEd Hons	3	3
8	Stadium	Fay	Female/black/	STD, BA, BEd	5	5
9	Ivy	Helen	Female/coloured/	HDE, BEd	4	4
10	Wood	Did not attend the principals' PLC until late in 2013				
11	Valley	Winston (2011-2013)	Male/black			

5.5 ATTENDANCE RATE OF PRINCIPALS (%) AND TEACHER PARTICIPATION (NUMBER)

Table A5.9 Attendance rate of Principals and teacher participation

	School pseudo-nym	Princi-pals Year 1 %	Number of teachers Year 1	Number of subjects Year 1	Princi-pals Year 2 %	Number of teachers Year 2	Number of subjects Year 2	Princi-pals 2 year average	Number of teachers 2 year average	Number of subjects 2 year average
1	Field	100	3	3	100	15	7	100	9	5
2	Siza	75	4	4	0	0	0	38	2	2
3	Galaxy	88	2	1	63	6	3	76	4	2
4	Lots	88	1	1	88	0	0	88	.5	.5
5	Rock	100	5	4	100	6	6	100	5.5	5
6	Lake	100	10	7	100	14	8	100	12	7.5
7	Purpose	38	4	4	100	2	2	69	3	3
8	Stadium	88	3	2	88	2	2	88	2.5	2
9	Ivy	50	3	3	88	5	4	69	4	3.5
10	Wood	0	0	0	0	2	2	0	1	1
11	Valley	75	0		100	0	0	88	0	0

CHAPTER 6
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6.1 TABLES

Table A6.1 Summary of information about PLC facilitators

	Name of facilitator[174]/ gender/race/age	Subject	Qualifications, post level, experience	Additional information
1[175]	Gay/female/white/40	Geography	BSc, HDE, HOD, 20 years	Facilitated in a directive style; played the role of the subject expert.
2	Fred/male/white/53	English	BA Hons (English), HOD, 26 years	Facilitated in a non-assertive manner, participated as an equal with other teachers, shared facilitation.
3	Sam/female/white/50 (co-facilitator)	English	BA, HED, deputy principal, 24 years	Shared facilitation with Fred, more directive than Fred; participated with other teachers.
4	Amy/female/white/26	Mathematics	BSc, PGCE, PL 1, 4 years	Had participated in DIPIP so understood how facilitators operated and brought ideas to the PLC; business-like facilitation style, participated with the others teachers, shared facilitation especially when subject expertise was needed.
5	Clara/female/white/36 (co-facilitator)	Mathematics	BSc, HDE, HOD, 15 years	Facilitated when subject expertise was needed, quite directive in style, participated with other teachers and expressed her learning needs openly.

[174] All facilitators' names used are pseudonyms.
[175] The first five rows are shaded to indicate the facilitators of the PLCs in the study.

Table A6.2 % of facilitators' speaking turns focused on facilitation functions

Session	Organisational functions %	Motivational functions %	Professional functions %
Geography			
2 – 23/02/2011	21	9	71
7 – 01/06/2011	26	15	58
9 – 24/08/2011	5	1	94
13 – 09/11/2011	21	35	44
17 – 14/03/2012	5	2	93
Average for five sessions	16	12	72
English			
2 – 23/02/2011	24	5	72
7 – 01/06/2011	19	20	60
9 – 24/08/2011	13	7	80
13 – 09/11/2011	49	15	36
17 – 14/03/2012	10	2	88
Average for five sessions	23	10	67
Mathematics			
2 – 23/02/2011	8	1	91
7 – 01/06/2011	8	4	88
9 – 24/08/2011	8	1	91
13 – 09/11/2011	4	0	96
17 – 14/03/2012	10	2	88
Average for five sessions	8	2	90
Overall average for three PLCs	16	8	76

Table A6.3 Approach of the Geography facilitator - % of speaking turns

Approach / Session/date	Discussion leader %	Fellow learner %	Teacher %
2 - 23/02/2011	49	19	32
7 – 01/06/2011	43	0	57
9 – 24/08/2011	39	42	19
13 – 09/11/2011	26	22	52
17 – 14/03/2012	42	32	26
Average for five sessions	40	23	37
How the facilitator described herself overall			√

Table A6.4 Approach of the English facilitator - % of speaking turns

Approach / Session/date	Discussion leader %	Fellow learner %	Teacher %
2 - 23/02/2011	58	37	5
7 – 01/06/2011	29	71	0
9 – 24/08/2011	53	47	0
13 – 09/11/2011	74	26	0
17 – 14/03/2012	35	58	8
Average for five sessions	50	48	2
How the facilitator described himself overall	√		

Table A6.5 Approach of the Mathematics facilitator - % of speaking turns

Approach / Session/date	Discussion leader %	Fellow learner %	Teacher %
2 - 23/02/2011	66	30	4
7 – 01/06/2011	56	44	
9 – 24/08/2011	68	32	
12 – 19/10/2011	80	20	
17 – 14/03/2012	79	21	
Average for five sessions	70	29	1
How the facilitator described herself Overall	√		

Table A6.6 % facilitator/teacher speaking turns/time in the Geography sessions

Session/date (no. of participants in the session)	**Facilitator speaking turns %**	**Teachers' speaking turns %**		**Facilitator speaking time %**	**Teachers' speaking time**
2 - 23/02/2011 (5)	51	49		83	17
7 – 01/06/2011 (6)	51	49		85	15
9 – 24/08/2011 (6)	46	54		64	36
13 – 09/11/2011 (5)	45	55		68	32
17 – 14/03/2012 (6)	47	53		35	65
Average for five sessions (5.6)	48	52		67	33

Table A6.7 % facilitator/teacher speaking turns/time in the English sessions

Session/date (no. of participants in the session)	Facilitator speaking turns %	Teachers' speaking turns %		Facilitator speaking time %	Teachers' speaking time
Fred				**Fred**	
2 - 23/02/2011 (4)	48	52		65	35
7 – 01/06/2011 (4)	33	67		32	68
9 – 24/08/2011 (3)	40	60		40	60
13 – 09/11/2011 (3)	32	68		34	66
17 – 14/03/2012 (3)	41	59		46	54
Average for five sessions (3.4)	39	61		43	57

Table A6.8 % facilitator/teacher speaking turns/time in the Mathematics sessions

Session/date (no. of participants in the session)	Facilitator speaking turns %	Teachers' speaking turns %		Facilitator speaking time %	Teachers' speaking time
	Amy			Amy	
2 - 23/02/2011 (9)	35	65		36	64
7 – 01/06/2011 (7)	20	80		14	86
9 – 24/08/2011 (7)	45	55		49	51
12 – 19/10/2011 (6)	24	76		23	77
17 – 14/03/2012 (10)	33	67		29	71
Average for five sessions (7.8)	31	69		30	70

Table A6.9 PLC participants' and facilitators' evaluation of PLC facilitation/leadership effectiveness

	Characteristic	Geog. participants	Geog. facilitator	Eng. participants	Eng. facilitator	Maths participants	Maths facilitator	Participants' average	Facilitators' average
Organisational									
1	The quality of facilitation/leadership of your PLC group	4.9	n/a	5	n/a	4.5	n/a	4.8	n/a
Motivational/Relational									
2	The amount of collaboration (working together on activities) that happened in the group	4.3	3	4.3	4	4	3	4.2	3.3
3	The level of trust and respect for one another shown in the group	4.4	3.5	4.7	4	5	5	4.7	4.2
4	The extent to which group members took collective responsibility for the activities in the PLC	4.3	2.5	4.7	3	4.7	3	4.6	2.8
Professional									
5	Usefulness of the group's focus for expanding your knowledge-for-teaching	4.4	4	4.3	5	4.5	4	4.4	4.3
6	The freedom to talk/to express your view	4.9	4	4.3	4	5	5	4.7	4.3
7	The amount of learning that you experienced	4.7	3.5	4	4	4.3	4	4.3	3.8
8	The amount of reflective dialogue (thinking about what you are doing or have done in your teaching or learners are doing or have done in their work and the reasons for all of this)	4.4	3.5	4.3	4	4.5	5	4.4	4.2
	Overall evaluation average	4.5	3.4	4.5	4	4.6	4.1	4.5	3.8

6.2 FACILITATORS' PERSONAL QUALITIES

	Personal qualities	Gay - Geography	Fred – English	Sam - English	Amy - Maths	Clara - Maths
Organisational attributes						
1	"Management intelligence" (Chapman et al., 2008) – Organisational and administration skills	Gay managed the PLC smoothly, performing all the NLC administrative functions efficiently. She planned and prepared but the agenda was not always clear. There seemed to be a lot of *ad hoc* activities. For the first year there was no indication that the group was following a predetermined course of enquiry.	Fred managed the PLC smoothly performing all the NLC administrative functions efficiently. The agenda for each PLC was clear and agreed upon by the PLC. The group pursued a definite focus in a systematic manner but the organisation of the materials was not always well-co-ordinated.	Sam assisted/supported Fred particularly with organisational functions. Sam organised materials for the group and did the necessary planning and preparation for focused learning to take place.	Amy's administration and organisational skills were excellent. All the administrative and organisational functions were carried out in a way that the work of the PLC could flow without unnecessary interruptions. The agenda was clear and agreed upon by the PLC. Amy planned and did the preparation thoroughly to enable the session to run smoothly.	Clara was called in twice to present topics which required subject knowledge expertise and leadership. She was well-prepared and followed a pre-determined agenda.
2	"Leadership intelligence" (Chapman et al., 2008) – Leadership skills (ability to lead and share leadership) Leadership experience	Gay understood what needed to be done in her group although participants did not contribute as the model of TPD intended. She did not share leadership because there were no interested and able takers. 8 years as Head of Department.	Fred understood the model of TPD well and used his leadership skills and others' to accomplish the goals. 2 years as Head of Department.	Sam understood the model of TPD well and used her leadership skills, in support of Fred, to accomplish the goals. 2 years as Deputy Principal, 5 years as Head of Department responsible for academic matters.	Amy understood the model of TPD well and used her leadership skills and others' to accomplish the goals. Facilitating the Maths PLC was her first leadership role.	Clara understood the model of TPD well and used her leadership skills, in support of Amy, to accomplish the goals. 8 years as Head of Department.

	Personal qualities	Gay - Geography	Fred – English	Sam - English	Amy - Maths	Clara - Maths
3	Facilitation skills	Nil other than coaching and mentoring teachers in her subject department.	As a lecturer at an education college he has experienced leading adult learners' learning.	Nil other than coaching and mentoring teachers in her subject department.	Participation in the DIPIP project which exposed her to the TPD model of the NLC and the facilitation demands.	Nil other than coaching and mentoring teachers in her subject department.
Motivational attributes						
1	"Social intelligence" (Chapman et al., 2008) – social skills Understanding of group dynamics and a team player	Gay had good social skills and her sensitivity to participants' needs was possibly a reason for the group's erratic progress as she responded in an *ad hoc* manner to the needs of the teachers on the day instead of following an agreed programme. She paid a lot of attention to understanding their needs, values and motivations. Very skilled; quickly understood the dynamics of the group and how things changed as new participants joined.	Fred's non-confrontational and quiet manner enabled him to relate easily to everyone. He displayed sensitivity to the needs of group members and was always anxious about meeting them through the work they were doing. Sufficiently skilled but overwhelmed by a forceful participant but soon worked out how to handle the dynamics.	Sam was strong in this domain. She used her skills to good effect when confronted with two teachers whose needs and style of operating in the PLC differed greatly from other participants' needs. Very skilled, could help Fred with the forceful person.	Amy's skills in this area were sufficient for the group's effective functioning; she did not prioritise using them. She was motivated to get on with implementing the agenda and did not dwell on people's non-Mathematics related needs. From time to time in the sessions she asked questions which indicated her awareness of the need to understand the people in the group. Skilled but there were no issues to test this.	Clara also did not prioritise the social aspect of the group's functioning. For her getting on with learning about Maths teaching was more important. This lack of focus on social skills did not seem to hinder the group's learning. Sufficiently skilled; met the needs of the PLC.

	Personal qualities	Gay - Geography	Fred – English	Sam - English	Amy - Maths	Clara - Maths
2	Relationship building skills	Gay did not spend much time deliberately doing this as she was focused on the learning activities. It took a while for trust to develop mostly because of teachers' feelings of inadequacy, Gay helped them when they asked for additional things.	Very good, easily built trust and an environment for risk-taking.	Very good, easily built trust and an environment for risk-taking.	Good; Amy's business-like, confident approach made teachers who were insecure in their knowledge a little wary of her at first.	Good; Clara's fast thinking pace and quick intelligence may have intimidated insecure teachers at first but when she expressed her own teaching difficulties trust developed and participants were more ready to risk.
3	Motivational skills and enthusiasm	Gay did not do much of this explicitly but her belief in the ability to get learners to understand difficult topics motivated teachers to try. She presented ideas with enthusiasm and passion for the subject. The participants' regular and continued attendance indicated that motivation was sustained.	Fred was not strong in this area. His quiet, under-stated personality did not lend itself to explicitly motivating people in an obvious manner; his enthusiasm for learning and the discoveries they made in their PLC probably did have motivational impact.	Sam supported Fred in this area with her natural enthusiasm for the work and excitement when the group discovered new things about learners and learning.	Amy's natural enthusiasm and passion for the NLC project did motivate participants. Their regular and continued participation may be attributed to this (amongst other factors).	Clara, while not so expressive, also showed enthusiasm for the PLC learning activities. Her honesty in expressing her own difficulties in teaching, despite her excellent demonstrated knowledge, motivated others to participate in the learning processes.
4	Communication skills, including active listening	Good; Gay was sometimes too eager to get on with the work that she did not allow participants to finish their sentences.	Very good; Fred listened, probed, and challenged.	Very good; Sam was an empathetic listener but believed she talked more than she should have.	Very good and business-like; Amy believed she talked too much.	Good; Clara found silences very difficult to handle and so was inclined to want to fill in the space.

	Personal qualities	Gay - Geography	Fred – English	Sam - English	Amy - Maths	Clara - Maths
5	Commitment to the PLC	Gay found it difficult to fit in the preparation time needed for facilitating the PLC and this affected her commitment. She believed in the model and that she should be involved. She continued facilitating because her participants always gave her positive feedback about the value it had for them.	Fred was very committed to the NLC project and the TPD model. He was enthusiastic about what he learned in the PLC.	Sam was very committed to the NLC project and the TPD model. She was enthusiastic about what she learned in the PLC and found it professionally stimulating.	Amy and Clara were very committed to the NLC project and the TPD model. They were enthusiastic about what they learned in the PLC and considered it the best form of professional development.	
6	Trustworthiness	Gay's trustworthiness lay in her consistently keeping promises to the group; her subject and general facilitation competence; and her openness. She made herself vulnerable by being filmed teaching and by telling participants about her teaching difficulties, mistakes and lack of knowledge.	Fred and Sam's trustworthiness stemmed from: their subject and general facilitation competence; willingness to expose their own lack of knowledge and desire to learn; personal honesty; openness about their teaching difficulties; willingness to expose their learners' work to the group's scrutiny; commitment to leading the group; and keeping promises.		Amy was trusted because she was open and honest about her lack of knowledge while at the same time she consistently and efficiently facilitated the sessions and asked other more knowledgeable teachers to provide expertise.	Clara was trusted firstly because of her subject competence and then because she was open and honest when she did not know something. She kept her promises to access information for the group.
7	Caring, empathetic, and supportive disposition	Displayed these qualities, perhaps too strongly.		Appropriate for the work of the PLC.		
8	Democratic disposition	All the facilitators were democratically inclined. They were not tied to autocratic ways of relating or hierarchical operations. The facilitators regarded themselves as equals amongst the participants in their PLC although they were the *de facto* leaders to start with.				

	Personal qualities	Gay - Geography	Fred – English	Sam - English	Amy - Maths	Clara - Maths
9	Ability to handle conflict, willing-ness and ability to challenge others	Not put to the test.		No real conflict; able to challenge colleague's ideas; this developed over time.		
10	Ability to hold others accountable, establish collective responsibility	Gay tried to do this but was not able to do this effectively.	Reasonably accomplished in a small group.	Reasonably accomplished in a small group.	This was a challenge and frustration for Amy; some members did accept responsibility, others did not.	Clara was not required to do this.
11	Sense of humour	All facilitators displayed a sense of humour, sometimes at their own expense. Laughter was common in all PLCs.				
	Professional					
1	"Pragmatic intelligence" (Chapman et al., 2008)	Gay realised what could realistically be achieved in her PLC and responded accordingly.	These facilitators understood what could be realistically achieve and pursued their goals slowly and systematically.		Amy was ambitious for the group at first but then adjusted her expectations and pursued the PLC goals in a structured manner.	Clara was not responsible for this aspect but she supported Amy.
2	"Contextual intelligence" (Chapman et al., 2008) knowledge of South African schools and teachers	Limited knowledge to start; learned fast during the project's operation and responded in terms of her new understanding.	A reasonable understanding from his experience lecturing and his exposure generally through his community involvement.	Limited as Sam's experience before joining Lake School was in the privileged independent school sector; she has taken steps to increase her knowledge in the last two years.	Limited but the participation in the DIPIP did expose her to some aspects which were useful for her understanding of the working context of participants in the Maths PLC.	Limited but her experience as a national Maths Examiner has exposed her to difficulties of teachers, especially regarding their subject content knowledge.

	Personal qualities	Gay - Geography	Fred – English	Sam - English	Amy - Maths	Clara - Maths
3	Subject knowledge/ experience	20 years, BSc and HED (pg) majoring in Geography.	26 year, BA, HED (pg), Hons, specialising in English.	24 years, BA, HED (pg), majoring in English.	4 years, BSc, PGCE, with a sub-major in Maths.	15 years. BSc, HED (pg), majoring in Maths.
4	Willingness to seek/use outside expertise	Willing; Gay used suggestions and resources from other teachers, education department resources, expert practitioners, text books. She acknowledged the source each time when she presented it to the group.	Willing; Fred used a chapter in a book as a resource to begin the process; thereafter the group appeared to have no need.	Willing; Sam accessed mind-mapping and thinking skill resources from the internet.	Willing; Amy began the process with an article that advocated the usefulness of analysis of learners' errors. Participants brought external resources, e.g. a PowerPoint.	Willing; Clara referred the PLC to resources available free on the internet which could help teachers.
5	Knowledge and understanding of collaborative enquiry processes	Nil	Fred read Langer et al.'s (2003) book: *Collaborative Analysis of Student Work* in preparation for facilitating the PLC.	Nil	Participation for two years in the DIPIP (Phase 1) project provided her with a model.	Nil
6	Insightfulness	Not really demanded in her PLC as they did not do much interpretation or analysis.	Strong; Fred asked insightful questions and probed responses and comments in a way that demanded insight.	Sam approached all the activities in a manner that showed insight.	This was not very evident in Amy's contributions but other members of this PLC showed insight which helped the group's learning.	This was Clara's strength. She insightfully probed participants' comments and responses in order to develop teachers' understanding of Maths concepts.
7	Productive work ethic	Gay has an exceptional work ethic which resulted in her taking on all the follow-up work from the PLC activities.	Good; Fred met the needs of the PLC.	Excellent; Sam was able to make additional contributions to the PLC because of the work she did between PLC sessions. This feedback helped the group's learning.	Very good; Amy met the needs of the PLC and did additional things to promote the group's learning such as setting reflection questions after each session.	Very good; Clara prepared presentations of a technical nature and presented them clearly and meaningfully.

6.3 EXAMPLES OF APPROACHES TO FACILITATION

Discussion leader (leading and organising the PLC work by, for example, making suggestions for the focus of discussion, inviting participants' contributions, developing the ideas, ensuring the focus is sustained, concluding and summing up at the appropriate point), e.g.:

> F: Ok. And did you say to them they must… Um, did you say they must do it in one sentence, one full sentence or just…
> S: I did. I said, 'a sentence'
> F: A sentence
> S: But many of them didn't, they used more than one sentence
> F: OK (E5T/04/05/2011);
>
> A: Ok, so the first question I'm going to ask you is how did things turn out? How did you feel that they went? (M17T/14/03/2012:8-9)

Fellow learner (participating in the discussion as an equal, contributing ideas of his/her own, forgetting the responsibilities of the facilitation role, sometimes causing the PLC to digress), e.g.:

> Ay: Connecting's the problem.
> A: Ja, no we have the same problem.
> C: So how then, maybe the question is, how do we force children to make those connections? Because that's our job.
> T1: Mmm
> C: That's my job as a teacher, standing in front…
> Ay: Yes
> C: … to facilitate those connections, surely?
> A: We've got the same problem. Our kids compartmentalise. They just put things in boxes. Right, we've done exponents, now we've finished.
> T1: Mmm, mmm, and they can't link. (M17T/14/03/2012:252-262)

Teacher – telling and demonstrating (directly teaching members of the PLC subject matter knowledge and practical knowledge through explanations and/or demonstrations with visual aids), e.g. of telling:

> Ok, I think then what might help in this booklet is some of the diagrams, but also to put it into their real life. What I often say when I start with the learners is I say to them now (obviously I teach girls, so the example you might have to change) but I say to them, 'You want to open a hair dressing salon, you want to have your own salon, so what are you going to do? How are you going to open it?' So you can put it to anything they'll understand. You know, say to the boys, 'You want to open a music shop or a car shop. What do you want to know?' You'll say, 'Where in this area do you want to open it?' So slowly you'll get out of them, and especially for the grade 12s it links to the projects that they're doing where they've got to go and research data. (G7T/01/06/2011:96-102)

e.g. of demonstrating:

> We were talking about map work and teaching it and it's difficult, especially the cross-sections and that, to get them to understand. And I thought maybe this is something which, it will cost a bit, but it's not as difficult to get hold of. What we sometimes do (and I will… I said I will print out for you, so we'll do it in our next session, I'll show you) is to give them a simple contour pattern. So it would look (let me use this) we would give them something like this on a map – just 3 circles or 4 circles and it would have heights on it, so 80, 140. And then what we do is we give them 4 pieces of glass. On the first piece of glass they put down and they trace the first contour, second piece, third piece, fourth piece. And then when they put them together they start getting an idea, especially when it's like that, of the 3-D, what they're looking at, how each contour line makes up a pattern. So I thought I would show you that.
>
> The other thing that we do sometimes – we haven't got them to do it for a year or two – are these models. Again we would give them that on a piece of paper, they bring in, it's just cardboard boxes that they find – these ones coloured them in. Draw the first one, cut it out; draw the second one, and they just add it together like that. So again it's easy enough for them. When they look at that they just see a flat piece of paper. When they look at it like that they start getting an idea of what it looks like. So then when we ask them to do a cross-section through it, it's sometimes a bit easier and they understand. So there's various ones there that we got them to do. This one I find helps nicely, because you know that whole thing… And it's common they ask them to identify the spur and the valley. So when they see it… She said it would be better if she teaches, if she helps us with the GIS, the use of computer - like this it makes it a bit easier. And the nice thing is, as we said, it's just out of cardboard boxes that the girls bring in. So that was there that I thought I would just show you. (G7T/01/06/2011:14-34)

6.4 EXAMPLES OF STYLE OF FACILITATION

Directive – the facilitator makes the decisions for the PLC (the facilitator was the dominant party in the discussions) e.g.:

> Ok, because what I want to do today if you don't mind, (G4T/13/04/2011:117)

Although the facilitator added the tag "if you don't mind" she is still making the decision for the PLC: "I want to do".

Directive – *the facilitator makes suggestions to the PLC* about what the PLC should or could do, e.g.:

> F: So I nabbed a few of them and brought them along so we could possibly do something with that, I'm not sure. Um, so I don't know if you want a copy, maybe, there's a copy.
> Sam: Thank you
> F: And ja, the article is on the back. I also brought a copy of Barrett's taxonomy which we might find useful along the way if we're gonna be working with a text which we could also have a look at. Then, uh, I was thinking what cartoon shall I bring and I thought well hopefully you'll bring some… (E17T/14/03/2012:48-53)

Non-directive – the facilitator asks the PLC regarding decisions and what the PLC would like to do.

> We can do that. That's fine. We can scaffold a little bit more. What do you guys think? (M17T/14/03/2012:238)
>
> But that was just something that we were thinking of maybe exploring. I don't know as a suggestion but I don't know, um, we could take something off this list if we wanted or we could generate some other list to do with something else or... You know that's up to, up to whoever, you know. Uh, what do you think? (E14T/25/01/2012:167-170)

Non-directive – the facilitator participates in PLC discussions as a teacher, an equal member of the PLC (the participants as a group were more dominant).

> F: Or it's hot at that point, ok. So the diagrams are important - to put the diagram on the board.
> T6: Exactly, ja, very important.
> F: And talk them through it.
> T6: If you don't draw on the board they will not seem to understand how it is circulating. Even though it is something that is difficult to explain to them, you see. So with the diagram I think it will ease their understanding.
> F: Do you think if they came in and you do the diagram with them first, just the line, the diagram with the lines of latitude?
> T6: No, don't do that. Draw bit by bit, don't… you draw all that, they don't know where to start. If I draw the circle
> F: Ja
> T6: Then from there, ok, you draw the equator to see those…
> F: Get the lines…
> T6: Ja, um, Ca, Ca…
> T9: Tropic of Capricorn
> T6: The tropic of Cancer and so on and so on.
> F: Ja
> T6: And if there's an atlas(?) they can see also, ok? Then from there you start proceeding(?) and you get various winds for circulation – easterlies and westerlies – and what is happening to them. You take, for example you take the northern hemisphere first.
> F: Mmm (G15T/01/02/2012:188-209)

6.5 EXAMPLES OF MOOD, POLARITY AND MODALITY

The *Mood* element refers to the Subject and Finite element (tense or modality) of a sentence (Halliday, 1985, p. 72).

Example: The cat (subject) has (finite) eaten the mouse.

There are three moods but the rudimentary discourse analysis used in this study only refers to Indicative (for statements and questions) and Imperative (for commands and offers). (Halliday, 1985, pp. 74, 85).

Examples: Declarative/statement - The cat has eaten the mouse. (Subject then finite)
Interrogative/question – Has the cat eaten the mouse? (Finite then subject)

Command – Eat the mouse. Eat.
Command with Mood tag - Eat the mouse, won't you.
Offer – The cat is keen to eat the mouse.

Imperative clauses may have a Mood element that consists of Finite plus Subject, or Finite only, or Subject only or even no Mood element. There may also be a Mood tag (Halliday, 1985, p. 85).

Polarity expresses the choice between positive/yes and negative/no in the Finite element: is/isn't; do/don't (Halliday, 1985, pp. 85, 86).

Modality expresses the degree between positive and negative poles. "Modalisation" is the term used to express degrees of probability in statements and questions, e.g. certainly/ probably/possibly and degrees of usuality: always/usually/sometimes. Modulation is used to express obligation in commands, e.g. required/supposed/allowed and or inclination/readiness in offers, e.g. determined/keen/willing (Halliday, 1985, p. 335).

Modality is expressed through Modal Finites, Mood Adjuncts and interpersonal metaphor (not used in this study). Modality expressed in a Modal Finite can be of low (can, could, might), median (will, would, should, is to, was to) or high value (must, ought to, need, has to, had to) (Droga & Humphrey, 2002, p. 73). Examples of Mood Adjuncts are: perhaps, maybe, just, mainly, of course, only, totally.

The style of facilitators was directive when they spoke with certainty and used high value modality: e.g.:

> So then we say, 'Right, take (command) one government person and that government person now must (high modal value) have a number 1, a number 2, a number 3, a number 4, a number 5. And they…And they sit together. And now they must have a debate. So what we say is it's the government who's got to (high modal value) make their mind up.
> (G2T/21/09/2011:39-43)

The style was non-directive when they, expressed uncertainty and used low value modality, e.g.:

> So I just (low intensity Mood Adjunct) thought that might (low modal value) be something nice to give some people an idea of something extra. (G11T/ 21/09/2011:108-181)

6.6 EVALUATION OF PLC FACILITATION

In a questionnaire completed at the end of the NLC project, participants were asked to evaluate the quality of facilitation/leadership of their PLCs on a scale of 1 (problematic) to 5 (very good) for each function. The average rating given by all participants was 4.8 which reflected a very high level of satisfaction with the way their PLCs were led and the learning activities facilitated. Facilitators were also asked the same questions (excluding question 1) and I compared the facilitators' ratings with the participants' ratings (see Table 6.2).

In general all the participants' ratings were high with participants scoring their PLC "Very good" or "Good" for all characteristics. A high average rating (4.7) was given for "The level of trust and respect shown in the group" and "The freedom to talk/to express your view". This seems to indicate that teachers were able to participate freely because they had developed strong relational trust in their PLCs. The lowest rating was for "The amount of collaboration that happened in the group" (4.2). This may point to a feeling the participants had that they had not contributed as much to the group as they could have. What is more significant is that this rating reflects the opinion of facilitators on this point. They rated this characteristic at 3.3. These ratings reflect the fact that not all participants did the follow-up activities after sessions that the facilitator expected. The difference between the participants' rating and the facilitator's is the least in the English PLC because these participants did bring feedback to the group.

Overall the facilitators' ratings for all characteristics were lower than the participants'. They gave the lowest average rating of 2.8 for "The extent to which group members took collective responsibility for the activities in the PLC". It appears that all the facilitators found this the most challenging aspect of their work. This difficulty was expressed in the earlier self-evaluation (see Table 6.1) when they scored themselves an average 3.0 for "Established norms for the group and monitored adherence" and "Promoted group accountability". The greatest difference in perceptions between participants and the facilitator occurred in the Geography PLC. The possible causes of these differences and the implications are discussed in Chapter 8.

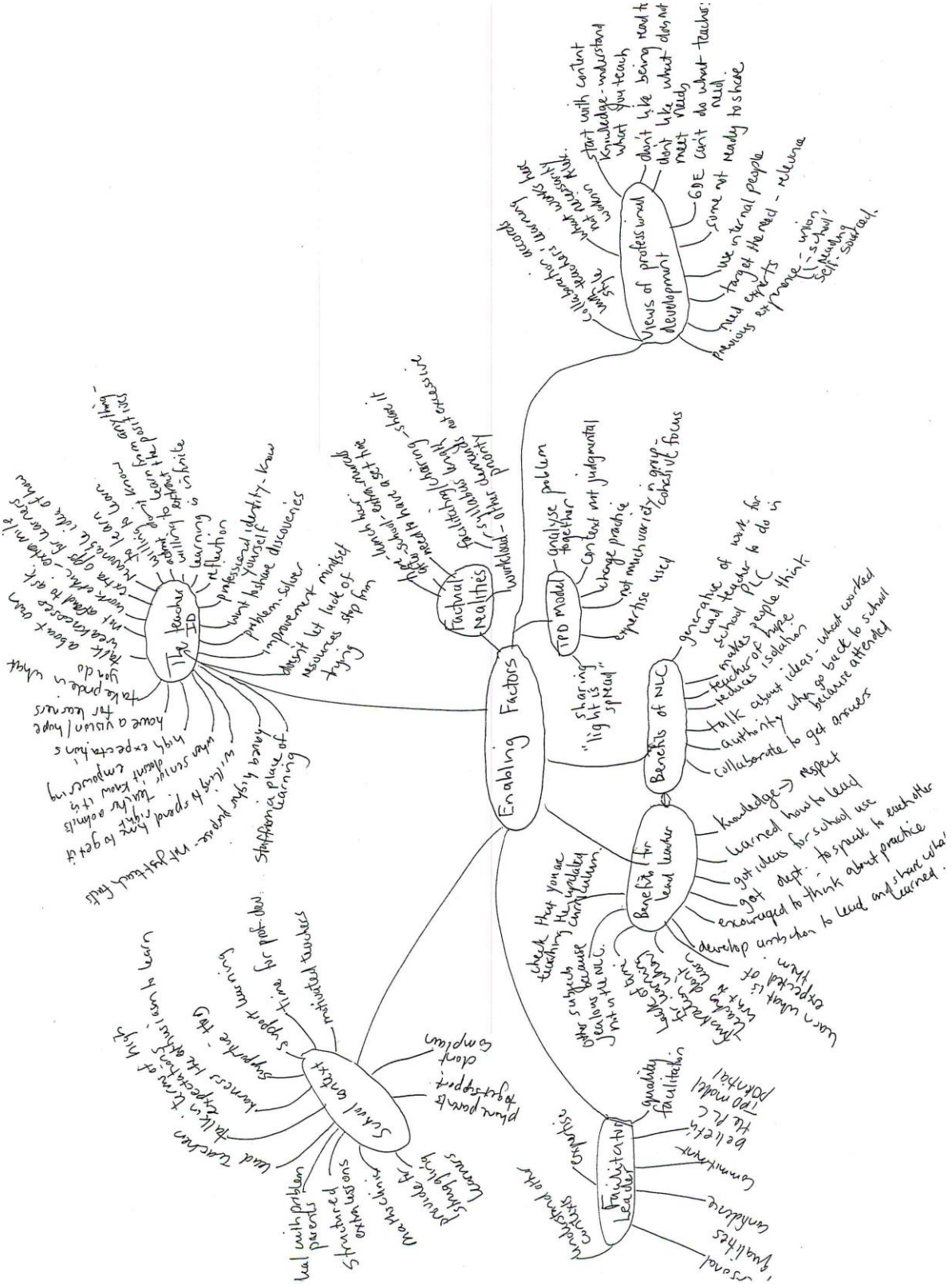
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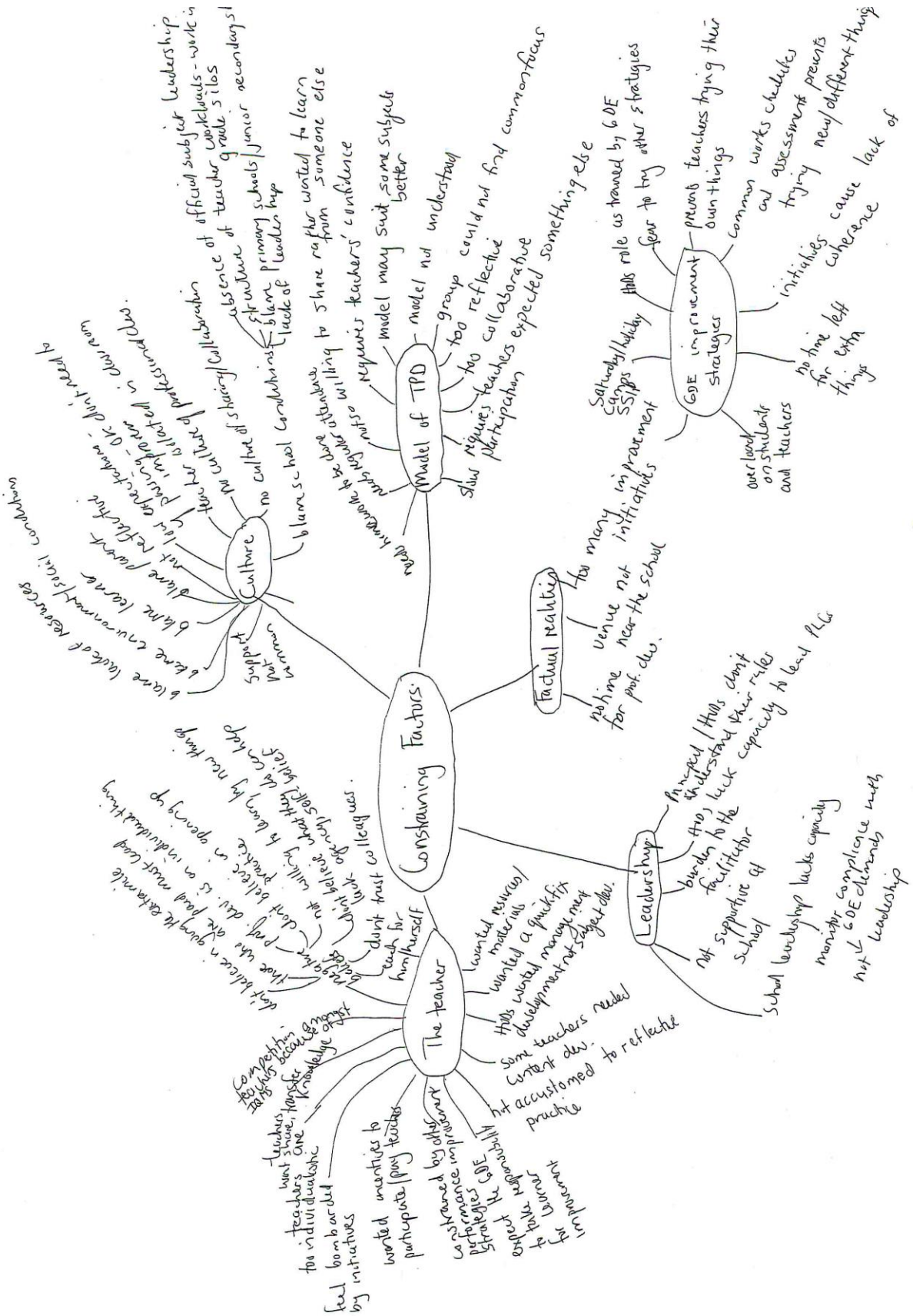
CHAPTER 7 APPENDICES

7.1 PLC MIND MAPS

7.1.1 PLC enabling factor



7.1.2 PLC inhibiting factors


Constraining Factors
The teacher
Leadership
Factual matter
Culture
Model of TPD
GDE improvement strategies
Principal / Hods don't understand their roles
Hod lack capacity to lead PLCs
burden to the facilitator
not supportive of school
School leadership lacks capacity
monitor compliance with GDE demands not leadership
Hods role is watered by GDE
fear to try other strategies
Saturday/holiday camps SSIPs
Common works schedules and assessment prevents trying new/different things
initiatives cause lack of coherence
no time left for both things
overload on students and teachers
How many initiatives
venue not near the school
no time for prof. dev.
Lacks knowledge
Competition
Teachers become egocentric
Don't believe in value of PLC
Don't believe in quality work
Have low expectations
Don't believe in learners
Don't believe learners can learn
Don't believe learners can do more than they do
Don't believe learners can do more than they do
Don't believe learners can do more than they do
Don't trust colleagues
Don't trust colleagues
Don't trust colleagues

7.2 DEFINITIONS OF PLC ENABLING AND INHIBITING THEMES

School context: the characteristics of the teachers, learners, parents and the community in which the school is situated; the physical and material and other resources available to the school; the location of the school;

Practical realities: facts about the school context that enable and constrain improvement efforts, for example: department improvement programmes operating at the school; rate of learner pregnancy and absenteeism; presence of gangs; levels of crime, alcohol and substance abuse; current learner performance; condition of the school building and whether the school has facilities such as a library, science centre and recreational facilities;

Teacher professional identity, qualities and attitudes: what teachers believe about themselves as teachers and their ability to make a difference in learners' lives (their personal and professional agency); their beliefs about their knowledge-for-teaching and their willingness/desire to learn more; their commitment to their work as a teacher and their willingness to work with other teachers; their involvement in their union;

Teachers' views of professional development: teachers' views of TPD based on previous experiences and their attitude towards attending further TPD;

Teachers' understanding and ability to work with the TPD model/difficulties with the model: teachers' view of the PLC model of TPD requires participation, reflection, an enquiry mind-set, collaboration, honesty and a willingness to trust colleagues and be trustworthy; an understanding that the PLC model will require teachers to be active learners and creators of materials and that they cannot expect hand-outs prepared by other people;

Role of the leader in the PLC: The leader is important but there is an expectation that leadership would be shared; the leader has functions to perform to ensure the functioning of the PLC, for example, obtaining agreement on the PLC agenda/goals, making practical organisational arrangements, sourcing necessary resources;

*School culture***:** The way people in the school conduct themselves, their beliefs, values and attitudes enacted;

Improvement strategies/initiatives operating in the school: whether or not there are other improvement initiatives requiring teachers' involvement, such as the strategies for the

"priority schools", for example a common work schedule and common tests and examinations; and

The quality of facilitation: A PLC session requires someone to facilitate it; the facilitator may be a participant in the group, a fellow teacher, or an external person who facilitates or leads the group; the quality of the facilitation impacts on the usefulness of the session and the learning; quality facilitation could take a number of different forms but the main aim is to ensure that professional learning takes place in a community of people who trust one another enough to openly enquire about learning content and practices and collaborate to gain deeper knowledge-for-teaching.

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8.1 KNOWLEDGE CLASSIFICATION INSTRUMENT

KT Propositional/ theoretical knowledge	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/used	Quotation
Common content knowledge (CCK) Mathematical knowledge and skill used generally and not specifically in a teaching context	Without IK The PLC does not discuss how to relate this formal knowledge in a procedural or practical way to make it understandable to learners.	Example 1 The Mathematics teachers discuss the solution to the following ratio problem. "Jake read that most people walk about 118000 miles in their lifetime. One kilometre is approximately equal to 62% of a mile. About how many kilometres will most people walk in their lifetime? (A) 73000, (B) 118000, (C) 120000, (D) 190000. Clara uses mathematical knowledge that: "It should be more kilometres than miles" because as Amy said earlier "a kilometre is less distance than a mile". She argues: "So if you've got 1 000 miles you should have 1 600 kilometres" and then Amy understands and completes the formula correctly: "So it's 1.62 times 118000".	Learning resource: MA3[176] – ICAS test 2009	The group struggles at first with a false understanding of whether the answer should be more or less than 118000. Viv reiterates the ratio given in the question but Amy does not apply the information correctly. A: Because it should be less than 118 000 because a kilometre is less distance than a mile. V: 1 kilometre is 62% of a mile… A: So it's 62% of 118 000… C: So I've got 1 kilometre as equal to 0,62 miles After further discussion Clara says: C: It should be more kilometres than miles. V: Ja Al: It should be more because… C: So if you've got 1 000 miles you should have 1 600 kilometres V: Yes Al: That's what it means, yes. A: Ok, I take it all back. *[laughs]* Al: Because if you are teaching proportion and ratio that should actually lead to an answer that is more, yes. … A: So it's 1.62 times 118000 … C: So the answer's actually D Al: Ja. (M11T/21/09/2011:86-257)
	With IK The PLC discusses the	Example 2 In the Mathematics PLC Clara and Amy make an inference about	Learning resource: MA3 – ICAS test 2009	A: Can I also just say another point about BODMAS is that if you've got these 2 and these 2 it doesn't mean because the D comes first that division must be done first. These two are done whichever comes first.

[176] See Appendix 8.2 for the main artefacts created/used in the PLCs. Not every item created/used in the PLCs has been included.

KT Propositional/ theoretical knowledge	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/used	Quotation
	factual understanding of BODMAS (KT) and also its implications for teaching it to learners.	the commutative nature of multiplication and division and addition and subtraction when discussing the application of BODMAS.	Learning resource: MA4A – ICAS test – summary of learners' responses	And the same with this – it's whichever comes first. So if you've got 3 – 2 + 1 it doesn't mean that addition must be done (although in this case it doesn't matter) but you can do subtraction and then addition. It doesn't mean because A comes first that you have to do the addition, it's whatever comes first, just work along the line. So the same with 3 divided by 3 times by 3. You can do the division first and then do the multiplication and if it's the other way round you can do the multiplication first and then because it's whatever comes first for division or multiplication, addition and subtraction. C: But it's because multiplication and division and addition and subtraction are commutative. A: The same operation, ja. They're actually the same operation. (M2T/23/02/2011:807-818)
Specialised content knowledge (SCK) Knowledge of the subject that is unique to teaching it, that makes it explicit to learners	Without IK The teachers merely identify the features of writing that need to be considered when teaching learners how to write an essay. At this stage they do not discuss how they will teach these features.	Example 3 The English teachers identify features of writing (for example, register, sentence construction) that they need to make explicit to their learners in order for them to write better. The teachers work with writing procedures such as constructing a correct sentence.	Learning resource: Teachers came to the PLC with their own lists of features that learners have difficulty with when writing an essay.	So maybe, you know, some appreciation that when you're writing you're doing something different from when [you're speaking] …Register, yes, ja. Register, colloquial, formal, whatever. Ja, that there are different formats and so on, ja. Then the second thing we looked at was, you know, most of the learners struggle to just write a decent sentence in various forms. They either write one continuous sentence from the beginning of the essay to the end of the essays with lots of ands and commas and no full stops, or they just grammatically can't write a sentence, you know. So there are all sorts of problems there. Then learners would need to paragraph. So they need to know something about paragraphing. Then we thought spelling proficiency, vocabulary, appreciation for words, the difference between a phrase and a clause, maybe something along that line. Then learners would need to demonstrate the ability to discriminate between direct and indirect speech – the whole punctuation of direct speech and dialogue is always a problem. And then just basic other punctuation. We thought at least they should know what a full stop is and use it! (E4T/13/04/2011:35-51)
	With IK In this example the teacher shows that she	Example 4 The Mathematics teacher explains how she will teach integers using the number line and link this to	Concrete representation: The teacher uses the actual physical	You see there, well I've just started integers with my grade 8s and I'm actually going to make them create a number line. I'm going to put them into groups of 5 or 4 and they're physically going to create a number line – it will probably be as long as the classroom - where I'm going to make

KT Propositional/ theoretical knowledge	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/used	Quotation
	understands the KT (how numbers operate) sufficiently well to be able to make inferences that help her teach the concept using a concrete representation.	the concept of negative number as a direction. In order to accomplish this she will "make them physically move it, move themselves".	movement of learners' bodies up and down the number line to show the concept of numbers having negative and positive direction.	them jump the stages and change direction so that… I don't know how else to do it because they need to see that negative number as a direction. They need to see it as a direction. So I don't quite know how else to do it other than to make them physically move it, move themselves. (M2T/23/02/2011:1366-1371)
Horizon content knowledge [177](HCK) Knowledge of how subject topics are related across the curriculum;	Without IK In this example the facilitator merely points out to the teachers that a particular article would be suitable because it deals with a topic that the learners will study later in the	Example 5 The Geography facilitator provides an example of a suitable article for the News Research Project that deals with the topic of water which she points out will be studied later in the grade 12 curriculum.	Learning resource: An example of a suitable news article learners could use for their News Research Project.	And then just, if you wanted to show the learners ideas for their article for the grade 12s there was this one … 'It's dry but you can drink it.' … But this one is, you know when we had all the rains and that they talked about – where was it – Beaufort West being so dry. And this is the dam in Beaufort West. But you know in grade 12 towards the end of the year we have to talk about water in South Africa and this talked about how we're going to have a problem, but it also talked about a new thing they were bringing in there which was converting sewage straight into basically to go into the taps. So they were about to open a plant there. (G2T/23/02/2011:327-343

[177] Curriculum knowledge is difficult to classify. Shulman's (1987) description of curriculum knowledge involved both KT and KH aspects. Ball (2008) identified two domains which she called Horizon content knowledge (HCK) (classified as KT) and Knowledge of content and curriculum (KCC) (classified as KH) (see Figure 2.6). Ball's description of HCK is quite brief so I include in this domain all factual matters related to the curriculum which include the curriculum document which specifies what is to be taught in various grades and factual knowledge concerning the available materials for teaching the curriculum. This includes having knowledge of, for example, at what grade level in the curriculum a certain topic is introduced and when it is expanded on. It includes knowledge of what foundational concepts have been dealt with before a related concept is introduced as well as knowing what this new concept will link with in the grades that follow. KCC, on the other hand, includes knowledge of how to choose (having good reasons for their choice) appropriate curriculum materials for teaching the curriculum content at the various grade levels. It also includes planning the curriculum delivery in such a way that learners make links with prior learning in the subject as well as learning in other subjects.

KT Propositional/ theoretical knowledge	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/used	Quotation
	curriculum.			
	With IK In this example inferential understanding of the Cartesian plane is shown as the facilitator links it with teaching equations.	Example 6 The Mathematics facilitator explains how she teaches patterns in a way that makes functions understandable. She links knowledge of the Cartesian plane with knowledge for solving a quadratic equation: "Well you understand the Cartesian plane, so this is what we're actually doing".	Prior mathematical knowledge link with new abstract formal knowledge: The facilitator linked learners' knowledge of the Cartesian plane with the new abstract concept of quadratic equations.	They don't make the link. And I think we as teachers are definitely at fault. And I know this year I tried a different tack and last year I tried a different tack as well. Actually, when we were doing algebra in grade 11, I started a different idea of well what is an equation? Why would I need to solve a quadratic equation? And we hadn't done the parabola yet at all, but I said to them, I said, 'Well you understand the Cartesian plane, so this is what we're actually doing. The equals zero is actually a y value. This is where it is in the Cartesian plane (because they'd done straight lines in grade 9 and grade 10, so I was able to actually put that all together for them). (M3T16/03/2011:104-109)

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
Knowledge of content and students (KCS) Knowledge about the way learners think and understand the subject, including anticipating what the	KHi The teacher proposes a simple **technique** (stop marking the work) to prevent learners from writing inappropriate essay content or using inappropriate register in	With IK The teacher shows she understands writing is more than correct grammatical expression: a writer writes for an identified audience and that the	Example 7 The teachers anticipate the type of inappropriate content (pornography, bigoted and sexist views, blasphemy) learners might write in school and external examinations and the errors in choice of register (colloquialisms and slang, including swearing). One participant, Ali, suggests that the way to stop these errors is to stop marking the work at the point of the use of the	Conceptual steps: Teachers' discussion concerned one of the steps in teaching learners how to write essays. No artefacts were created/used. Teachers relied on their	J: So are you saying that I would get inappropriate essays for this curtain one? A: I actually have no idea. I think we've hammered pornography out of ours on the whole. J: Ja, we don't read it. … F: Well some of the girls here they endlessly are writing about rape and sometimes in all sorts of graphic detail. I don't know if you've ever come across anything that… … A: On the whole the rape essays are more contained. I mean the boys tend to write – not at our school may I point out – because I think they know they'd get short shrift and I'd send a photocopy to their father – but in the matric exam they write some of the most

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
learners will find difficult or easy and knowing what the common misconcep-tions are;[178]	school essays.	content of the writing should not alienate the reader if the writer wants to find approval, in this case, a good mark from the teacher.	incorrect register or inappropriate content: "I just stop at the swear word". Throughout the discussion as teachers identify the examples of inappropriacy, Ali emphasises that she and her team of teachers do not mark unacceptable content: "I won't accept it anyway"; "Slap them into place".	knowledge and experience of marking learners' essays.	unbelievably graphic stuff. … A: Because you see they could do any… I mean seriously, they could take this and write something pornographic if that's the way they went. I have no idea how having sex and somebody's looking in through the window – I mean truly they will find a way if that's what they want. J: Ja Sam: Ja, absolutely F: But I've said, I in fact said it to the grade 10s the other day, as far as I know the two things that are – what's the word? – um A: Taboo? F: Yes, from the roadshows and stuff, that children are not allowed to write about is kind of explicit sexual stuff and bigotry. Those are the two. A: You've got to be really careful, ja. Bigotry's against the Constitution … A: But you cannot attack another group on any grounds. And the boys have got to be careful about anti-feminine stuff. You know you've got to bear in mind that a lot of them …the bulk of your markers are women and they will write denigrating things about women. Stop and think. If that's what you think, this is not the time to express it. Just grow up. … You've got strict religious people who find it deeply offensive and have tried very hard to be objective. And then you've got me.

[178] There are no examples where teachers only discuss learners' thinking/errors/misconceptions. The teachers' learning predominantly comes from their taking these difficulties and working out how to teach to prevent them in the future. Therefore when classifying for KCS I include examples where the PLC discussion centres on learners' thinking/errors/misconceptions and the teachers propose methods for handling these learner difficulties that teachers are aware of. For KHi I include examples where a teacher proposes a relatively simple technique for handling the difficulty and for KHii I include examples where having identified the learners' likely difficulties the PLC evaluates possible reasons for the learners' misunderstanding and suggests possible ways of teaching to circumvent error/misinterpretation which may take the form of techniques or longer processes.

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
					Anything pornographic, I mark it right down and hope that nobody above me finds it because I will not give it credit. I will not. It's inappropriate in a public national exam. A: Ja. Again, swearing I think they should be very careful of swearing and blasphemy. Sam: It's offensive. J: Because I know we tell our kids that if you swear then we'll stop marking. A: I just stop at the swear word. … F: … But what I do say, and I always just say it for fun and for a joke, I always say, you know, 'If you're writing about a sailor and he sees a storm approaching in his ship he's not going to say, "Oh dear". A + Sam: Yes F: "Oh crumbs, there's a storm coming." He's going to use more coarse language and that would be fine because it's in character or something.' J: Ja A: You see, I say 'No' J: I don't even want to open the door… … Sam: But your candidates when they do swear is it in direct speech? A: No, sometimes like education is the key to education, they'll say something like, 'This is crap.' Sam: Oh really? A: You know what I mean? They'll actually write it. J: No, they don't… A: You say, 'That's a swear word.' 'Is it? F: Yes Sam: Oh my goodness really? A: Yes Sam: So their register is really inappropriate for… A: Inappropriate

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
					Sam: … for the task. … A: And I mean they calls boys a bitch. I say, 'I won't accept that on a number of grounds. First of all for me it's got to be female. I'm sorry I cannot cope with this…' Sam: Yes, absolutely, we've got a gender problem. A: Yes, I've got a gender problem *[laughter]* A: And then I won't accept it anyway. Sam: Ja A: But they say, 'But Ma'am it's really casual, it's like, you know, it's like really easy.' 'No.' Sam: No *[laughs]* A: You know, I am this age and I won't have it. F: Ja A: Ja. So, but I really think we don't get a lot of it anymore because we stand together. There are 13 of us in the department Sam: Mmm A: We stand shoulder to shoulder and just say, 'That's it.' And then they get it moderated and they say, 'Oh, I don't even have to read it, the word's been ringed, have it back.' ... A: And then if there's a problem with a parent, photocopy it and say, 'Here. Would you read this. What do you think?' F: But I do… I do emphasise that like colloquial language A: Yes F: And slang and all those things just for the sake of it are out, you know. A: Exactly … A: Slap them into place. (E15T/01/02/2012:1231-1384)
	KHii A teacher	With IK Teachers	Example 8 In this excerpt teachers	Conceptual steps:	V: But I see what you're saying, they never see the negative exponent.

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
	suggests her **technique** for getting learners to memorise answers to a set of examples in order to get them to understand the effect of working with positive and negative exponents. Another teacher has a **technique** for helping learners to understand that the "original", for example 2^{-1} is 1; another technique, offered by Amy and supported by Ayanda, is to write the base number very large in size and the exponent	understand how exponents work and use their inferential understanding to work out the effect of negative exponents and how to teach it	discuss learners' errors/misconceptions/con-fusions when working with exponents as they plan a worksheet to teach the concept. Amy suggests they list all the difficulties they must be aware of. The first difficulty is not understanding that there are positive and negative exponents and what operation they must use when working with these exponents. Viv offers a technique involving memorising a set of answers so that they get a sense of the pattern of increasing (multiplying) numbers when the exponent is positive and decreasing (dividing) when the exponent is negative. She gives her reason for using memorisation. Clara points out that the learners do not comprehend what they read in Mathematics: "So it's also about getting the kids to read	Teachers are discussing the conceptual steps to be considered as they design a learning resource: MA7A.	C: That's why… ja A: Actually… actually that reflection[179] works really well because if they get 2^1 and 2^{-1}, we can show them that 2^1 is this way around and 2^{-1} is that way around. … V: I also think after this, what I do all the time is give them… um powers that they actually have to learn off by heart. T: Mmm V: And they've got to then rattle them off to me and they go 2^2 is 4, 2^3 is 8, 2^4 is 16, 2^5 is 32, 2 to the… 6 is 64 so we go up to that and then we're done. 2^{-1} is ½, 2^{-2} is ¼ and they actually learn it off by heart. They've got to say it to me without looking. And we go 3 up to 4, so we go 2 up to 6 and -1 ? up to 4 and then 5 up to 3. So at least those ones, they know off by heart and it makes a huge difference when they're learning that 2^{-2} is ¼, it cuts out often on the… 2^{-2} is -4 mistake. … T: Ja. When they learn it off by heart, sometimes it sticks in a lot… not everyone. Al: Now if I may ask you, are the tenets … regarding the positive exponents and the negative exponents the same? A: Are the what? Al: The… the… the premises behind using the positive exponents and the negative exponents the same? Like you have 2^2 and 2^{-2}… T: Mmm Al: Because you know, I have that difficult time explaining 2^3 when you have learners always coming back to give me the answer of 6. V: Ja, that's why I'm making them learn it off by heart. A: Actually I was going to say maybe we should just write down the problems that we encounter and see how we're going to attack

[179] The worksheet was designed to show the pattern of increasing numbers with positive exponents and the decreasing numbers with negative exponents reflected around the central point of 2^0 (which is 1).

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
	number very small and then to emphasise that the operation is done to the big number however many times the small number indicates. The teachers use **transversal abilities** as they evaluate some of the errors (not understanding the effect of a negative exponent, not being able to comprehend the words in a Maths question; not knowing what must be multiplied or divided by what; the concept of base and exponent). The teachers		that 2^3 and 2×3 are two different instructions". Aya promotes the technique of writing the base number very large and the exponent small and then emphasising that the base is multiplied by itself the number of times that the exponent indicates: "They always need to know as to the exponent is telling how many times is the base supposed to be multiplied by itself. … We don't multiply by our exponent, but we repeat the base, we multiply the base by itself…"		them? Al: You know… you know… A: Because… because that's one, that's a big one. 2^3 is 6. V: And 3^2? A + V: 3^2 is 6. A: But also… V: 5^2 is 10. A: 2^{-3} is… V: -6. ... A: Ok, right? If I've got 2^{-3} but minus is the opposite operation of the plus there. C: Mmm A: Opposite operation, then I was multiplying, so here I have to divide it by 2 three times. So you can actually use that definition, you just have to start from a position of 1. Al: Ok A: And that's the most difficult part for the kids to understand Al: Mmm A: Because they don't believe… Ci: Mmm A: … why it fits into this at all. But yes you can get away with that if we get them to understand 1 is my starting point, then you… then you're explanation holds with the division. C: The problem with that that I found as well is that kids cannot read maths, they don't understand what they're reading. G: Yes Ci: Mmm C: 'Cause maths is essentially a language, and if you don't understand… Like if you read in French… if you read a French sentence and you don't know what's going on, I mean how can you answer the question? If you read a mathematical sentence and you don't understand what's going on, how can you answer the question?

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
	make and plan ways to teach so that the learners do not make those errors.				So it's also about getting the kids to read that 2^3 and 2×3 are two different instructions. Some teachers: Mmm C: And although they both mean multiplication, they mean multiplication in different ways. Al: Ja, I think the best thing is to avoid using the example 2^2 because it confuses them, because if you say 2^2 they think you get 4, then you say 2×2 you get 4. … Ay: I also think if, if our kids can also know as to what, what Mr M has just said that the meaning of the word exponent, it does not mean that we multiply our base by the exponent but it tells us as to how many times is the base supposed to be multiplied by itself. Ci: Yes T: Mmm Ay: That is… I always… What I always do when I deal with the exponents, I do it the way Amy has done it. I always write the big base when I'm writing. If it's 2^2, I write the big 2 on the chalk board and the small 2 T: Mmm Ay: And next to that, I show that the bigger 2 multiplied by the smaller 2 is not the one which is correct. Ci: Mmm Ay: They must always know that. So that your… in a, in a situation whereby now there is a problem of 2^2, they will always have a problem if we avoid that one. They always need to know as to the exponent is telling how many times is the base supposed to be multiplied by itself. Ci: By itself. Ay: We don't multiply by our exponent, but we repeat the base, we multiply the base by itself… (M15T/01.02/2012:900-1045)
	KHiii		No example in the data		
Knowledge of	KHi	With IK	Example 9	Concrete	F: Something I found which works quite nicely and it might not

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
content and teaching (KCT) Knowledge about the subject and about teaching, including the best ways (representa-tions, procedures, need for clarification) to teach it considering the teacher's knowledge of issues that affect a learner's learning	The teachers use a **technique** to represent the concept they are teaching in a concrete manner. They have selected it with care to enable their learners to comprehend the concept.	The teachers derive their concrete representation from an inferential understanding of the concepts of the earth's revolution around the sun and rotation on its own axis.	The Geography facilitator and the teachers discuss two techniques for showing learners, in a practical /concrete way, how the earth revolves around the sun. The techniques are: using a light bulb to represent the sun and showing the effect of it on objects moving around it or using a person to represent the sun and another to represent the earth which rotates on its own axis (the person spins) at the same time as he/she revolves (moves) around the person representing the sun. The discussion shows that skill is more than performing a technique. The teachers have a clear purpose to present abstract knowledge in concrete form. They want, for example, the learners to see that the earth is lit up for half the time and in shadow for half the time (day and night) as it rotates. They understand what they want to demonstrate using the technique and have chosen the particular technique to	representation: the light bulb and objects and two people moving in a particular manner	be too difficult to get for the seasons is to get a light bulb … on a stand … Because to tell them the earth's moving around the sun, they need to see it shining. (G15T/01/02/2012:311-315) T2: I remember some time ago when I was teaching them the sun setting, sun rising and the movement of the earth - both the rotation and revolution - and then I wanted to show them that between the sun and the earth it is only the earth that is moving, not the sun. So I put one man. I said to him, "You are the sun and you are always shining and me I'm the earth, I'm revolving around you and while I'm revolving around you I'm also rotating on my own axis, and while I'm rotating on my own axis if I'm this way then the sun is shining but then while rotating on my own axis and revolving around you in the same time. If it's not shining, if you are not this side, you are this side of me, then it mean this is the night and this is the day this other side." But I find them… I found them to be understanding in that, in that case. (G15T/01/02/2012:349-357)

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
			accomplish this skilfully.		
	KHi The facilitator refers to a **technique** for teaching about rainfall types (learners' dance movements) and another **technique** for teaching about mid-latitude cyclones (manipulating cut-out paper shapes);	With IK In order to devise a dance movement or design paper shapes to represent concepts the teachers use their inferential understand-ing of the respective concepts.	Example 10 The Geography facilitator refers to a technique for teaching a type of rainfall (using specific dance movement of learners' bodies). She then demonstrates a different technique using cut-out shapes. The facilitator says that by seeing the concept, mid-latitude cyclone, in visual form and manipulating learners (at least some) understand what it is and how it is formed. It is more than the performance of a technique, however. The quotation illustrates that what the facilitator does in the group involves character (her commitment to making a concept understandable) and ability to use the techniques proficiently (so that learners can learn from it).	Concrete representation: Reference to learners' dancing/ moving their bodies in the way rain would fall; demonstration and use of cut-out paper shapes to represent a mid-latitude cyclone and how it moves (GA1)	F: I don't know if you've picked up sometimes that learners, you do something different and there's those few learners who suddenly click onto it better than they have about anything else? … Some teachers: Mmm F: I don't know if I mentioned last week, we had a teacher here she was a dance teacher so she loved anything to do with movement. And I walked into her class the one day and I think it's in grade 10 – you know when you taught them the types of rainfall? So you talk about orographic and convection rain. And she had them dancing. She had them standing up (now I can't do it because I don't dance) but she had, she had something like frontal being different and… Now for some of them they just laughed, but for some of them they suddenly figured out, 'I understand now' because they moved. Some learners learn much better if they move and some of them learn much better if they get something with their hands. So I'll show you now how on these pieces of paper… I haven't actually used the tropical cyclone one yet, but I've used the mid-latitude cyclone one. If you want to do it with just one of your copies you fold it down the dash line – so the line in the middle. If you fold it down – I don't know if any of you have seen this one before – and then again here, the line with the temperatures on, you fold that upwards. *[teachers fold the paper]* I'll show you sort of what we're wanting to land up with. What you want is something that's going to look like that. So you've got to fold both other edges up along the solid lines. So wherever there's a long straight line you fold it. F: Now I did this with my grade 11s the other day. And I could see some of them did it and it did mean nothing, it didn't make an impact for anybody else. But for some of them, if you look at it from above, if you look at it straight down you can see the synoptic view of the mid-latitude cyclone. And then if you look at it from the side you can see the relation between the cross-section and the

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
					synoptic view. Now just be careful, there's all these funny symbols on here and my learners got all worried, 'Do we have to know those?' They are the… I think they are the proper symbols that the meteorologists use, so we don't worry about that. But I just found there were some learners who just suddenly went, 'Oh, ok.' So it won't necessarily benefit all of them. If you want to you can then also there's a graph there and you can draw for them the fact that in the pressure… you know, in the cold sector the pressure's high, it decreases in the warm sector and increases again. So it's there if you want. I thought you might like to have that one. … But if you have a look and you cut it out and it's quite a nice way to show the mid-latitude cyclones and how they form. When everybody was here last time I'd actually done it on blue paper and pink paper, but I mean when I did it with the learners they just coloured in. Ja, they coloured in with whatever they had. … Oh, there you are, just to show you. Thank you. So you just get to see it like this and then it turns and you can see exactly, the whole thing until you get to an occluded stage. E: But it's better if they colour it with red and blue. ... Ja, for the cold fronts. (M2T/23/02/2011:454-641)
	KHii The teachers make use of a **technique** (a rubric to help learners know what should be in the project and that helps teachers assess the poster). This involves teachers using	With IK In order to select news articles that would be relevant for a poster project on global warming the facilitator needs to have a thorough knowledge of	Example 11 The Geography teachers have to manage the task of getting all their learners to complete a global warming poster. This involves the teachers in managing the completion of the assessment task using skills/techniques (drawing up a rubric for the poster that makes the assessment criteria evident to learners –	Conceptual steps: The teachers employ a process to identify what they want the learners to demonstrate in their poster and then they evaluate what would be	Learners have generally done this project badly because they do not understand the requirements of the task: F: …Esther, if I can ask you, how did that… Did you manage to work out a global warming rubric? What did you eventually do with them for the poster? What did you ask them to do? … E: For the poster we said they must do a poster that warns people about global warming. … Just to warn. Because I mean in a poster you can't have a lot of things. So just to warn people about the dangers of global warming. So the topic itself has to be capturing. It doesn't have to say 'Global Warming'. They must… You know like some of the learners have used things like The End… 'The world is coming to an end and we are burning to death' and so on.

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
	transversal abilities such as planning, evaluating, advising, and communicating.	the concept and then make inferences to link this knowledge to examples of articles.	"What did you ask them to do?"). They also use abilities such as planning the steps of teaching the learners how to approach the task (evaluating what should be in the rubric; advising learners of the pitfalls they could encounter - "…they can't concentrate on all of them … I like the idea of getting them to concentrate on one" and making an appropriate selection - not polar bears because that issue is removed from the learners' context[180]; and communicating important aspects – "Explain the difference between an article and a picture with a caption"). The facilitator promotes using something familiar to learners in order to connect their knowledge by acquaintance with the formal knowledge the project aims to teach – "makes it so more, so real".	suitable examples of news articles to use; in this case the teachers rehearse the steps they will use when they teach their learners.	So such, such headings. F: A nice slogan. E: Ja. And then they look for pictures. And unfortunately I didn't say they must concentrate on the polar regions like it is stated in the [task] … So they, it's just to warn the public about global warming. So I allowed them to mention the causes of global warming but they must concentrate on one. Each girl must choose any one to concentrate on, because they can't concentrate on all of them. And mind you it's just a poster. So it cannot be a very big poster. The size of the poster is half of that. … That's what they are doing. F: I like the idea of getting them to concentrate on one. Could they choose which one they wanted to do? Because then at least you get different… E: And they must also… If they choose one, they must also give solutions to that very one. F: Oh, that's quite a nice idea. That might help. … I think to tell learners to say what's happening in the polar regions is silly because they don't live in the polar regions and they don't actually care about the polar regions – unless you show them a polar bear with a little cub. FT1: Oh, and they all have the same picture that they saw from one other article of a polar bear that is swimming. F: Oh, that was recent because I said… I remember seeing it because I said … '.' Because I said to them - I think there was that picture, it was about a week or two ago - and there's a lovely picture of a polar bear with a caption of 'The polar bears will die out because there won't be enough ice' or something, so they probably, you know… But I think for me if ever we talk about the global warming or environment it's got to be what's happening in their area. What do they notice around them? What have they

[180] The facilitator is expressing a view that the learners should focus on issues of immediate relevance to the learners and from their own context and knowledge.

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
					picked up is different that makes it so more, so real? (G2T/23/02/2011:476-538)
	Khii The teachers use **transversal abilities** to design a process for teaching learners how to write essays in response to visual prompts. This involves a number of steps. They evaluate the difficulties they have observed in learners' work and they try to understand these. They evaluate solutions (potential steps which could guide learners), including a **technique** such as getting learners to look at the prompt and asking them	With IK To teach learners how to interpret a visual prompt essay topic the teachers need knowledge of all aspects of writing essays as well as inferential understanding of what would constitute legitimate content in an essay based on a picture. This ability would depend on a vast range of knowledge including what examiners find acceptable.	Example 12 The English teachers use their knowledge of learners' approach to writing essays (mainly their errors in interpreting visual prompts, for example, not having a clearly visible link between the essay, content and the picture, choosing to write on something very obscure, choosing a minor detail of the picture to focus on) to identify difficulties they have. Teachers discuss a process for interpreting pictures in order to identify relevant topics from a visual prompt. The discussion moves from how to use visual prompts to guide 'interpretation' to planning a lesson. The teacher guides the group on what she requests from her learners when they look at a visual prompt (for example using the techniques of writing up a literal description of the picture). They use transversal abilities such as	Conceptual steps: In this example teachers identify steps in the process of teaching learners how to interpret visual texts. They used EA16 and created EA15.	F: Well what I've done in the past, and I don't know if it has been that effective… For me one of the things that I would like to try and sort out in a learner's mind, as much as my own, is the kind of gap between any kind of response and identifying the picture as a stimulus, you know, because we might as well not give them a picture if they can write on anything. And often people can interpret a picture so loosely that it could almost be anything. And so somehow for me I like to try and get them to identify what they think the theme or the emphasis of the picture is which is not always easy to do and it's always a bit of a grey area for me. … Sam: … I think then the lesson idea that we're doing here would actually be very worthwhile because if we could actually give them some sort of training in this …where we would say, 'Right. Now today we are going to look at pictures and we're going to discuss what kind of things that you might be tempted to answer, or how you would be tempted to answer. And let's look at the type of essays that you could, you could answer and let's see whether you would be right or wrong. So let's discuss various interpretations.' … J: I'll tell you what I wrote down for what I think I would try and do…. So what is actually happening in this photograph? So they need to write down for me what is literally happening. Ok, what is literally happening? There are three men washing windows on …They're hanging, suspended, and inside the restaurant there are people having lunch, drinking wine. So that's where… So they must look at that, ok Sam: Yes J: Why would this be happening? Well it's a… So my first question is: What is literally happening? Then: Why would this be happening? And then what I would like them to do is: Is there a

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
	to interpret it literally and then figuratively. They plan the steps of the lesson and determine how they will evaluate/ monitor its success (the lesson plan they do for homework).		planning (teachers develop a plan as they identify the steps they would suggest their learners use when using the visual prompt and conclude with the homework task and what they aim to achieve from it – "see if they're still within what you call reasonable boundaries), evaluating (the learner's idea "mustn't be so individual" – the idea is weighed for a link with the visual prompt).		figurative meaning behind this? Now obviously they can't go, you know, there has to be some connection with… … J: So they need to use all the elements of the photo. So they can't just talk about a child… A: But what I liked about you is you said is there a figurative meaning or symbolism? Sam: Yes A: If we tie that to what Fred said then I think we're giving them better direction. Sam: And I would like to ask would we then, actually would that be one of our important pieces of advice to them? Look for something figurative or symbolic before you just go off. A: It doesn't have to be. Because if they wrote about a child (he looked as if he were a bit raggedy, you know, from a poor background) Sam: Mmm A: And they just did something around that, that was also fine. Sam: That would be fine as well. A: So when you said, 'What is actually happening?' was it? Oh: What is actually happening in the photo and why is it happening? If they wrote a little narrative [or] descriptive [essay] on that – absolutely fine. Sam: That would be acceptable. J: Well that was my final point. I said: Which of these can I write the most - ok, not necessarily but… because… A: The most effectively on? J: Yes. So which is am I going to be able to write most honestly on, the most unique approach and then, you know, if it's figurative then they must write, or symbolic. … Sam: It mustn't be so individual to you …

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
					J: So must we… How do we tell them that that you mustn't look at the tiny, look for the tiny details? Sam: Yes, absolutely. As you said there, there isn't… I can't remember the word you used but you said for example somebody who was, who was, what they were having for lunch or whatever. It's just one… There must be some sort of unity. They must look at the picture as a whole. They must look at it as a unit. … A: Ok, so we've got, we've got… I think that's that's better… What we've got first of all is your lesson and then to follow it with here are potential topics, say these topics are acceptable and these ones aren't. And you have to distinguish between them. I think we need to find… F: I think you've got a sort of lesson plan there. … Sam: But then what do you envisage as homework? A: Well I thought perhaps we could give them something either as homework or in the next lesson. Then you say, 'Here is a picture… Sam: Go and interpret A: 'I want you to mind-map this picture. Don't write the draft… Sam: Yes, absolutely A: … because we actually need to look at what you're planning to write. And sift again.' … A: And you're just trying to see if they're still within what you call reasonable boundaries, ja. … A: But I think that seriously would give you a lesson as an intro and then you'd start your whole process again. (E15T/01/02/2012:11-656)
	KHiii		No example in the data		
Knowledge of	KHi	With IK	Example 13	Concrete	V: I just wanted to ask. You mentioned what changes you would

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
content and curriculum (KCC) Knowledge of the curriculum of the subject and materials available to teach it and knowing which ones are the best to choose in the circumstances	The teachers learn a **technique** to teach the Cartesian plane to learners earlier in the curriculum than before (representing the Cartesian plane as a grid on the ground and learners position themselves on the grid according to the co-ordinates they are given)	Clara uses inferential thinking when she suggests a concrete way of teaching the Cartesian plane at an earlier grade because of changes in the curriculum. She understands the concept well enough to be able to simplify to make it accessible to younger learners using a concrete representa-tion.	The Mathematics teachers discuss changes that need to be made in the order in which they teach concepts because of the introduction of CAPS. The facilitator identified the need to teach the Cartesian plane earlier (in Grade 8) and because the learners are younger doing it in a concrete/practical way helps. They discuss a **technique** for introducing the concept of the Cartesian plane - a grid drawn on the ground – "…we need to make a bigger grid, and we made co-ordinates and all that sort of stuff and we took them outside… And we gave each kid a co-ordinate, and we put the grid down … And then they realised they were all standing on the actual grid".	representation: The learners place themselves on a grid drawn on the ground representing the Cartesian plane according to the co-ordinates they are given.	do in grade 9. Is there anything in grade 8 that you would do? C: I'd bring the Cartesian plane in. … We wanted to bring the Cartesian plane in this year and do it very practically. Very practically. In fact Amy got all excited and made us a grid, but it's only a 3 by 3 grid, we need to make a bigger grid, and we made co-ordinates and all that sort of stuff and we took them outside. Here's the grid. And we gave each kid a co-ordinate, and we put the grid down. And to get the kids to understand, so we said to them, 'Ok, anyone who's got x = 1/y(?).' And we explained to them. We wrote along here x = 1/y(?). So if it's x = 1/y(?)… And they all stood up and they could see it was a vertical line. And anyone who has got y = 0. And then they realised they were all standing on the actual grid. So a very silly exercise but very practical in getting through to the kids. (M13/09/11/2011:620-636)
	KHii The PLC discusses when to teach phrases, clauses and finite verbs. This entails the use of	With IK When discussing teaching phases and clauses the teachers use inferential	Example 14 The English teachers discuss when in the curriculum they teach the concept of the finite verb and its relevance to phrases, clauses and sentences. They engage in evaluating and planning	Conceptual steps: In response to one teacher's question the PLC discusses the sequence in the	Sam: … So do you teach phrases and clauses anywhere in your, in your curriculum? … Do you know where? S: I think probably they're doing it with 11 Sam: 11 S: and 12, ja. I don't know if it's a bit late. Sam: No, I don't think it's a bit late. S: Not?

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
	transversal abilities as they evaluate and plan when to teach the concepts. Sam explains her planning and in her explanation includes reference to a **technique** for remembering three non-finite verb types.	reasoning based on their knowledge of finite verbs.	(transversal abilities) when they do this. For example, Sam explains the order (her planning), in which she teaches the finite verb phrase and clause and Sal evaluates this plan and says: "Ah that makes sense". Sam also briefly refers to a technique (the Three Little Pigs) that she sometimes used to remind the learners about the difference between finite and non-finite verbs.	curriculum for teaching phrases and clauses, including the finite verb. Sam outlines a sequence she used, explaining her reasons for the particular timing (the conceptual steps).	Sam: I think… I used to teach it always at the end of… When I taught grade 10, 11 and 12 I used to teach it at the end of grade 10 because I found only then could their brains actually assimilate that sort of thing. So what my schedule looked like was in grade 8 that teacher would teach them the finite verb towards the end of the year, and try and get the finite verb into their heads, and find different methods and ways of – effective ways of teaching it. Then in grade 9 we'd embroider on that and teach the phrase. And teach them that a phrase can actually be taken out of a sentence and very often that sentence still makes sense. S: Yes Sam: Like 'I walked to the park'. If you take 'to the park' out there, 'I walked' is still a sentence. It's not a very elaborate one but it's still a sentence. It has a subject and a verb. So discussing that sort of thing. And then in grade 10 we would add on. At the end of grade 10 we would do clauses. So they had this finite verb, the phrase, now we're putting in the clause. S: Ah, that makes sense. Yes. Sam: And then review that in grade 11 because a lot of them don't get it at the end of grade 10. S: Right. Sam: And then if you have time in grade 12 (which is not often the case) but at least in grade 12 then you're saying, 'Remember in grade 10 when we did phrases and clauses…' Or, 'Remember last year when we reviewed phrases and clauses…' then some of them, you know, the rusty wheels start to turn… And of course some of them do remember it. A lot of them do. And also depending on how you teach it and if you keep those kids from grade 8 to grade 12. F: Ja Sam: I know for example when I taught the finite verb I used an old Mac Rat idea. … they set up a wad of worksheets on teaching phrases and clauses. And she called them the Three Little Pigs

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
					when she taught non-finite verbs. So if you hooked… If you gave them that hook in grade 8 then you could say, 'Remember the three little pigs? Remember the finite verb?' So then, you know, then they're, 'Oh yes, of course we remember the three little pigs' – the participles, the infinitive and the gerund – those are not finite verbs. Now remember everything else, all other verbs usually are because they've got the subject etc. So there are ways of teaching them, you know. S: Yes Sam: That's what my curriculum used to look like. (E4T13/04/2011:158-207)
	KHiii Teaching a Mathematics curriculum requires **project management abilities** such as seeing the whole picture and then breaking it up into smaller manageable units without losing sight of the bigger picture. To do this requires **transversal abilities** such as planning (the	With IK The facilitator and teachers rely on their knowledge of mathematical concepts to make inferences about when concepts are actually introduced in simple form in the curriculum in lower grades and to point out the continuum between concepts such as patterns and functions.	Example 15 The Mathematics facilitator presented a map of the Grade R-12 curriculum on large sheets of paper (the project plan). The teachers discussed how the teaching of the Mathematics curriculum across the grades was planned and managed. They focused on the Grade 8-12 part of it but saw how concepts like "patterns", "fractions", "BODMAS" were brought in at earlier grades but formalised in Grade 9 and 10. "Trigonometry", and "analytical geometry", for example, are not separate entities but build on "algebra" and "number patterns". They evaluated how the concepts	Learning resource: The teachers work with a curriculum map (MA2) which provides essential knowledge about how the curriculum is organized across the grades. This provides the big picture for Maths teachers.	It's also for me interesting because with my son being in grade 4 now I'm seeing the beginnings of the development of where they're going to go with the Cartesian plane. So in grade 4, if you look in your document, they actually start with input output diagrams. So he came home the other day and he said, 'Oh Mom, I've got to do a spider diagram.' And I said to him, 'What are you doing with the spider diagram?' And he said, 'Well the body of the spider tells me to add 3 and the left leg I have to choose a number and the right leg I have to tell them what the answer is.' And he had to do a whole lot of these (obviously with different instructions in the body). And actually that's beginning of functions. That's the beginning of the idea of an input which we choose the independent variable, having an expression that tells you what to do and the output. And it was very interesting for me to chat to him to say, 'But why can't you choose the other way? Why can't I choose the right arm first?' And for him he doesn't understand that if it says plus 2 in the body, to choose the right arm means he's got to subtract 2. He obviously hasn't got to that stage yet. But very soon I think they're going to get there. And I think that it's important for us to realize that actually they've been doing this for a long time. So by the time they get to grade 10 they should be pretty proficient in functions or the idea of the function. But unfortunately that isn't the case.

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
	order of concepts to be taught), communicating (making the plan/curriculum document known to the implementers and monitoring (checking to see whether the plan has been carried out and the correct pace has been maintained) and evaluating its success. Along the way **techniques** may also be used to accomplish aspects of the project (for example using colour to highlight key parts of an expression).		were introduced: (The facilitator asked her young son: "What are you doing with the spider diagram?" And he said, "Well the body of the spider tells me to add 3 and the left leg I have to choose a number and the right leg I have to tell them what the answer is." And he had to do a whole lot of these (obviously with different instructions in the body. And actually that's the beginning of functions). The facilitator emphasised the extent to which the concepts were linked with one another ("I think that it's important for us to realise that actually they've been doing this for a long time. So by the time they get to grade 10 they should be pretty proficient in functions or the idea of the function. But unfortunately that isn't the case."). The process of teaching the curriculum, bearing in mind the links that the curriculum map makes clear, entails use of transversal abilities such as planning ("Did you say you		And if you have a look at the learning outcome 2 of the [Grade] R - 9 curriculum you can actually see that in grade R they are actually starting to formulate the idea of a function. But they formulate it through a pattern. Because there they are extending simple patterns. … And what I think is very sad in the FET phase is that we teach it in sections. 'Let's teach patterns now.' We teach patterns. Ok, we're done with patterns. 'Let's teach functions now.' And we don't see the continuum between the two. (M3T16/03/2011:35-93) The facilitator goes on to say: Ok, so if we have a look at a function we need to understand that first of all a function is a picture, ok. So a function's just a picture. But what is it a picture of? So I will always tell the learners it's a picture. But now they need to understand what of, ok. So we start and say 'Ok, well it's an ex… picture of an expression.' So we say to them, 'You know those things that you had to factorise all the time – the cubes, the squares, the common factors – all of those things? We are now taking that expression, we are giving it a y value, right, so we're giving it another side. (M3T/16/03/2011:123-129) Teachers argue about that notion of functions being a "picture" but eventually reach understanding and the facilitator continues: Um, all right. So where do we kind of start? Where does it all start? And what we need to realize is that when you are doing algebra… So the algebra that we do, just the simple factorization, why do we factorise? Why do we simplify? Why do we do all of these things? And if a child knows why I think it's much easier for them to actually grasp it. Why? And it's to simplify. It's to simplify the expression, ok. It's to simplify the expression because ultimately what happens here is that we actually take this, we equate it to a number – generally 0 – and we're able to find answers

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
			teach the inequality after?...), evaluating and monitoring progress as well as the application of techniques (showing that patterns and functions are linked, or the use of colour to understand the concept they are working with).		from it. So the simplification of the expression leads to answers. And the answers it generally leads to are x intercepts. Or x values of the x intercepts… During the discussion the facilitator explains a simple technique she uses: C: So I said, 'Ok find it on the graph for me.' So all right, we'll highlight it. Because, I don't know, kids seem to see better in colour. … So here what I did, because I said to them, 'Ok, we'll go and colour our line. Ok? And now for bigger than it's got to be which side?' And we decide on a side. And they all get that this is the plus and this is the minus side. Ok. And then we'll colour (because they tend to like doing that). So we colour - for argument's sake for a plus and then they do the other for the minus. I say why, what are you doing? All right. Now in an inequality they factorise to get those values, right, they factorise to get those values. And they factorise it when y is zero. We need to explain to them that on the function picture it's identical. It's identical. Those x values are the x values of the x intercepts. So we need to say to them, when I give them a function question and say, 'For which values of x is f of x bigger than 0' they need to link that to the knowledge that they've got there. Why teach it twice? Why teach it twice? If we do it properly once because I can say, 'Hold on I know I've done this. I know I've done this with you. Let's take it back to what we did here.' And then I always say to them, 'Ok, so these are the x values of the x intercepts' because 90%... V: Sorry, can I just say… C: Ja V: What did you just say there? Did you say you teach the inequality after? C: I teach the inequality in grade 11. V: Before. Ok. Ok.

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
					C: Grade 11, first term V: Ja, ok C: Second week, or whatever it is V: Then when you come to graphs you relate it back to what you've done? C: Yes. But when I'm teaching inequality in grade 11, second week I say to them, 'We are going to come to the parabola' V: Ok C: 'And I'm going to ask you where's the parabola above the y axis.' And we make a huge note then and there. And I'll say, 'You'll not understand it now or whatever, just write it down – humour me.' (M3T16/03/2011:377-448) The discussion continues as the facilitator gives further examples of how concepts are linked and the need to teach in such a way that the learners see these links.. <u>We can then take the pattern section and work it out for them. Patterns – it's very simple. We've got a linear, an exponential and a quadratic. And what they need to see is the picture that corresponds to it because the questions are becoming more and more intertwined these days.</u> A patterns question about I think it was 2 years ago asked them to prove that a, the um, I think the pattern mix sort of -2, 2, -2, -6 and it went on like that. And they had to prove that it would never give more than 2 or something. It was one of those. And it was a quadratic pattern. And the answers to that were shocking. The answers to that were shocking. What they didn't understand was that quadratic patterns had a picture. So it needed to actually be left with a turning point. So the minimum and the maximum value they have from there. And that comes from the equation that they get. … <u>And the exams are becoming such that we actually need to interlink all of these</u>. A patterns question will be asked in functions and a functions question will be

KH Procedural/ practical knowledge	KH Practical/social knowledge:	IK With or without inferential knowledge	Example	Pedagogical device/ artefact created/ used	Quotation
					asked in patterns. (M3T16/03/2011:514-525)

8.2 ADDITIONAL EXAMPLES OF COLLABORATIVE ENQUIRY PROCESSES

8.2.1 Geography PLC Professional learning enquiry cycle for teaching map work cross sections and calculations

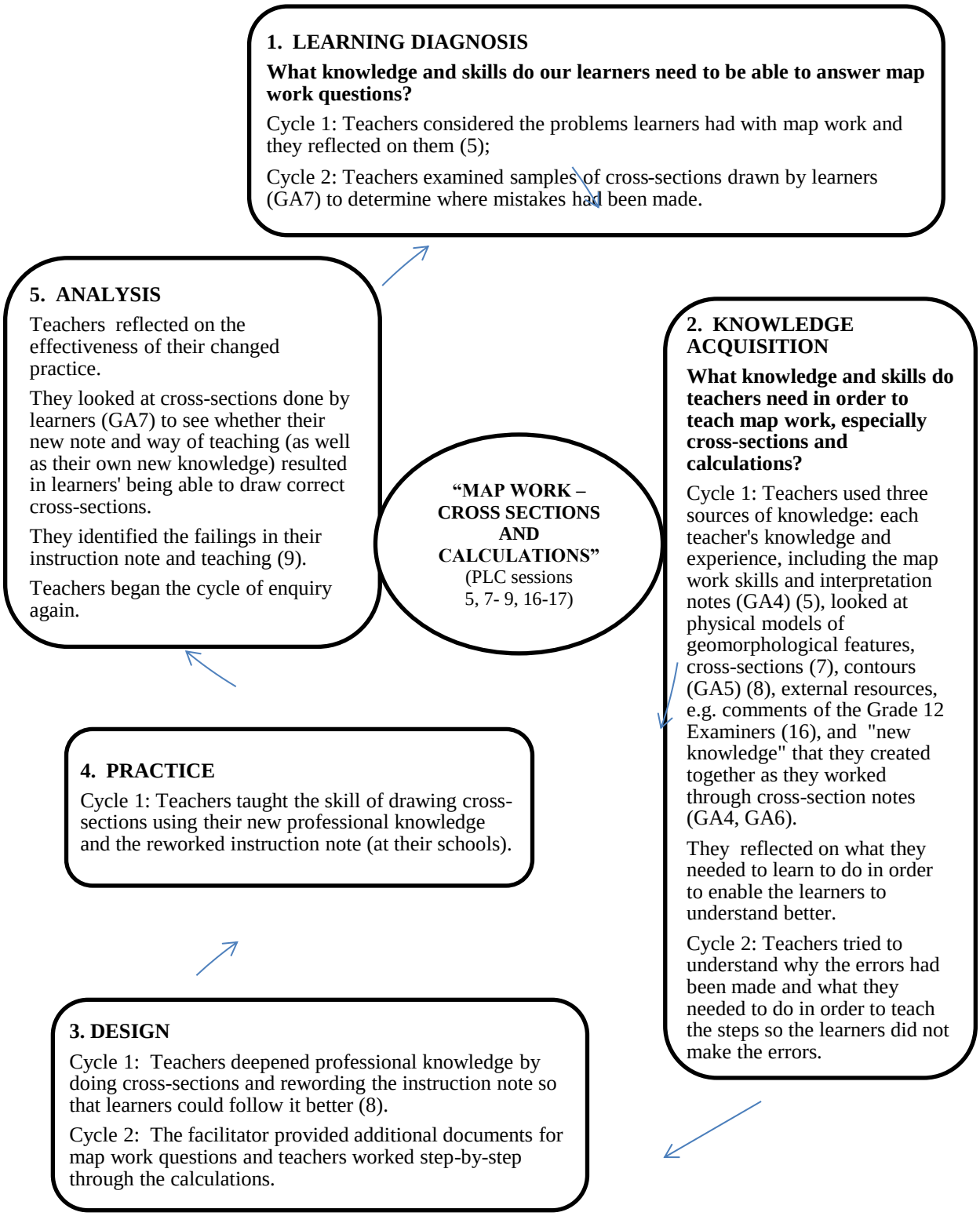
The Geography PLC followed the PLIC process and completed one full cycle comprising 5 stages (cycle1) and the first three stages of a second cycle (cycle 2) as it pursued its learning about map work cross-sections and calculations (see Figure A8.1). This PLC did not follow the stages in the enquiry cycle in successive learning units. Aspects of map work were the focus of the teachers' learning over fifteen months, in sessions 5, 7-9, and 16-17. The learning need was primarily teacher identified although the NSC Grade 12 Geography examiners had reported back on learners' poor learning performance in relation to these topics (Stage 1). Although teachers could have engaged with KCS in response to this information from the examiners in order to understand better why their learners made the errors, they did not do so.

In response to these identified learning needs of the teachers, the facilitator gave the teachers map work skills and interpretation notes (GA4)[181]. They looked at resources of models of geomorphological features, cross-sections, contours (GA5) and cross-section notes (GA6) before investigating in greater depth what the teachers struggled with and also where these teachers believed the learners had problems. The teachers reflected on what they needed to learn in order to teach better (Stage 2). The next two stages involved the teachers in designing a teaching note and then trying it out. In Stage 5 they examined the impact of their use of new knowledge (the new lesson notes they had created collaboratively). This involved after the event reflection-on-action using KCT and KCS – KHii.

Having completed the 5-stage PLIC cycle the PLC began a second cycle on the *same subject of discussion* in sessions 9, 16 and 17. They completed three stages of the second cycle but did not put the new knowledge into practice or evaluate its impact.

[181] See Appendix 8.2.1 for the artefacts used in the Geography PLC.

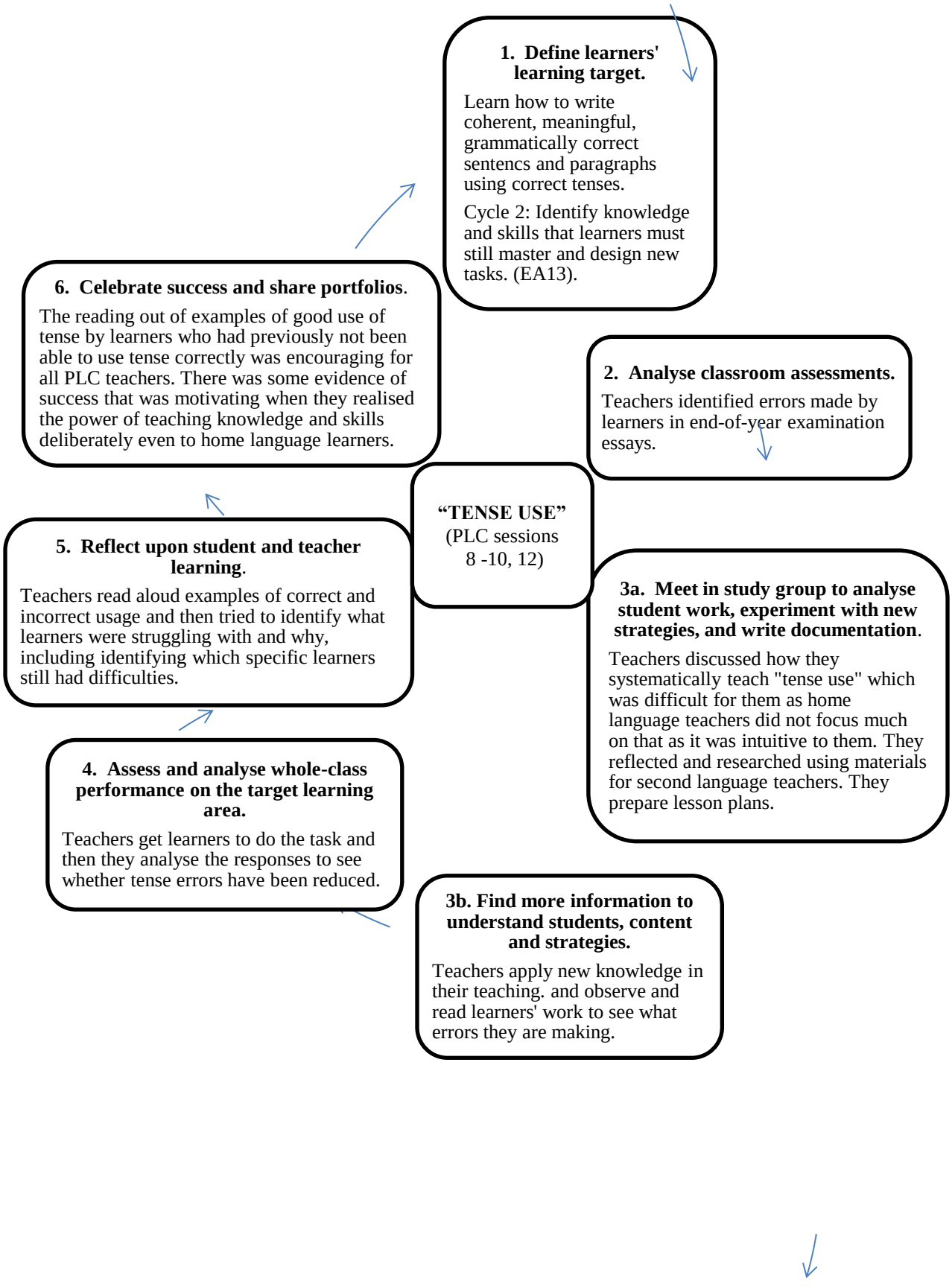
Figure A8.1 Professional Learning Inquiry Cycle for teaching "map work"



8.2.2 English PLC CALW cycle for teaching "tense use"

The English PLC defined the learning target which arose from curriculum and assessment requirements (Stage 1). They studied samples of learners' work to see the types of errors the learners were making and identified tense error as a problem area (Stage 2). Teachers then discussed how they taught tense and discovered that they struggled with this as home language speakers did not think about it in a systematic manner. They consulted teaching materials for teaching second language speakers to help them design lesson plans (SCK – KT and KCT – KHii), taught their planned lesson and then evaluated the work learners produced in response to see whether errors of tense were fewer (Stages 3a, 3b and 4). The next stage involved trying to understand what aspects of tense the learners struggled with and which particular learners had difficulties (KCS and KCT – KHii) (Stage 5). Teachers shared their successes by reading out examples of good use of tense that made them believe that the deliberate and systematic teaching of tense can improve the home language learners' writing (Stage 6). As not all learners were using tense correctly the PLC began a second cycle of PLIC by identifying knowledge and skills that learners still had to master. See Figure A8.2 for a representation of the process.

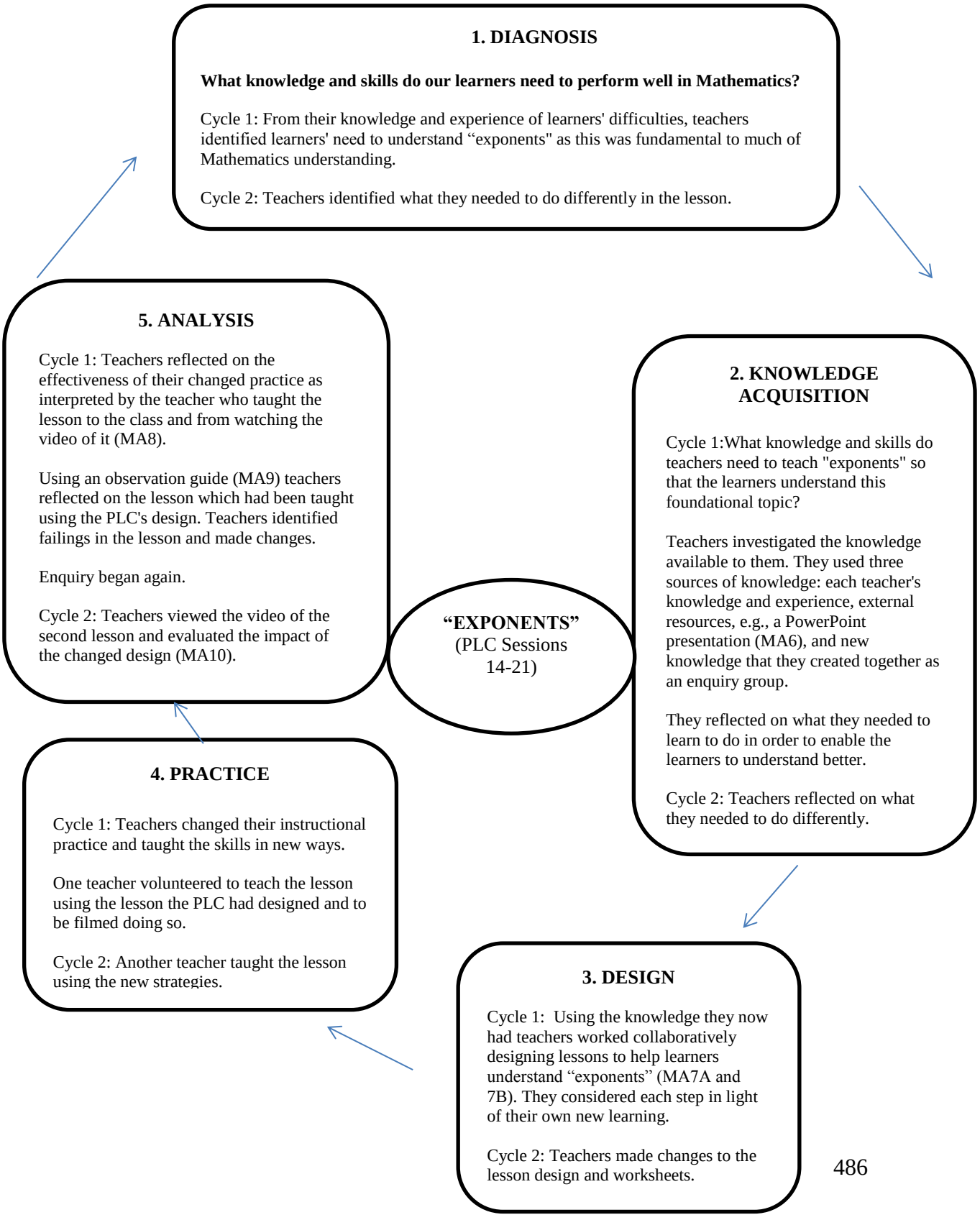
Figure A8.2 CALW cycle for teaching "tense use" (after Langer et al., 2003, p. 13)



8.2.3 Mathematics Professional learning enquiry cycle for teaching "exponents"

In Figure A8.3 I depict the JLS process described in 8.3.2.3 in the form of two full cycles of the PLIC process on "exponents".

Figure A8.3



8.3 ARTEFACTS CREATED/USED IN PLCS

8.3.1 Artefacts created/used in the Geography PLC

GA1 Mid-latitude depression cut-out shapes
GA2A + 2B Tropical cyclone shapes for folding
GA3 GIS booklet
GA4 Map work notes (specifically pages dealing with contours and cross-sections)
GA5 Overhead contours transparency for cutting out
GA6 Cross-section instruction note
GA7 Sample of a learners' cross-section
GA8 Teaching aid for land and sea breezes
GA9 Wakkerstroom role play instructions
GA10 Map work calculations handout
GA11 Topographical features: photographs, contours, cross-sections
GA12 Map work notes produced by the Department of Basic Education (DBE)

8.3.2 Artefacts created/used in the English PLC

EA1 Chapter 5 "Writing begins with a sentence" from Farrell, J. (1996). *The Creative Teacher of Language*
EA2 Teaching sentences - Lesson 1
EA3 Teaching sentences - Lesson 2
EA4 Teaching sentences – Lesson 3
EA5 Sentence exercise
EA6A Reflection on sentence work lesson 1
EA6B Examples of sentences written by learners
EA7 Reflection on sentence work lesson 2
EA8 Sample of weak learner's work
EA9 Teaching tense - exercise
EA10 Samples of learners' work – correct use of tenses
EA11 Writing activity instructions
EA12 Samples of two learners' work
EA13 Extension exercise – correct use of tenses
EA14 Essay planning templates
EA15 Note on teaching how to write an essay in response to a picture prompt
EA16 Picture prompt essay topics (one example)
EA17 Introductory discussion on teaching interpretation of visual texts
EA18 Examples of visual texts for interpretation (one example)
EA19 Barrett's Taxonomy

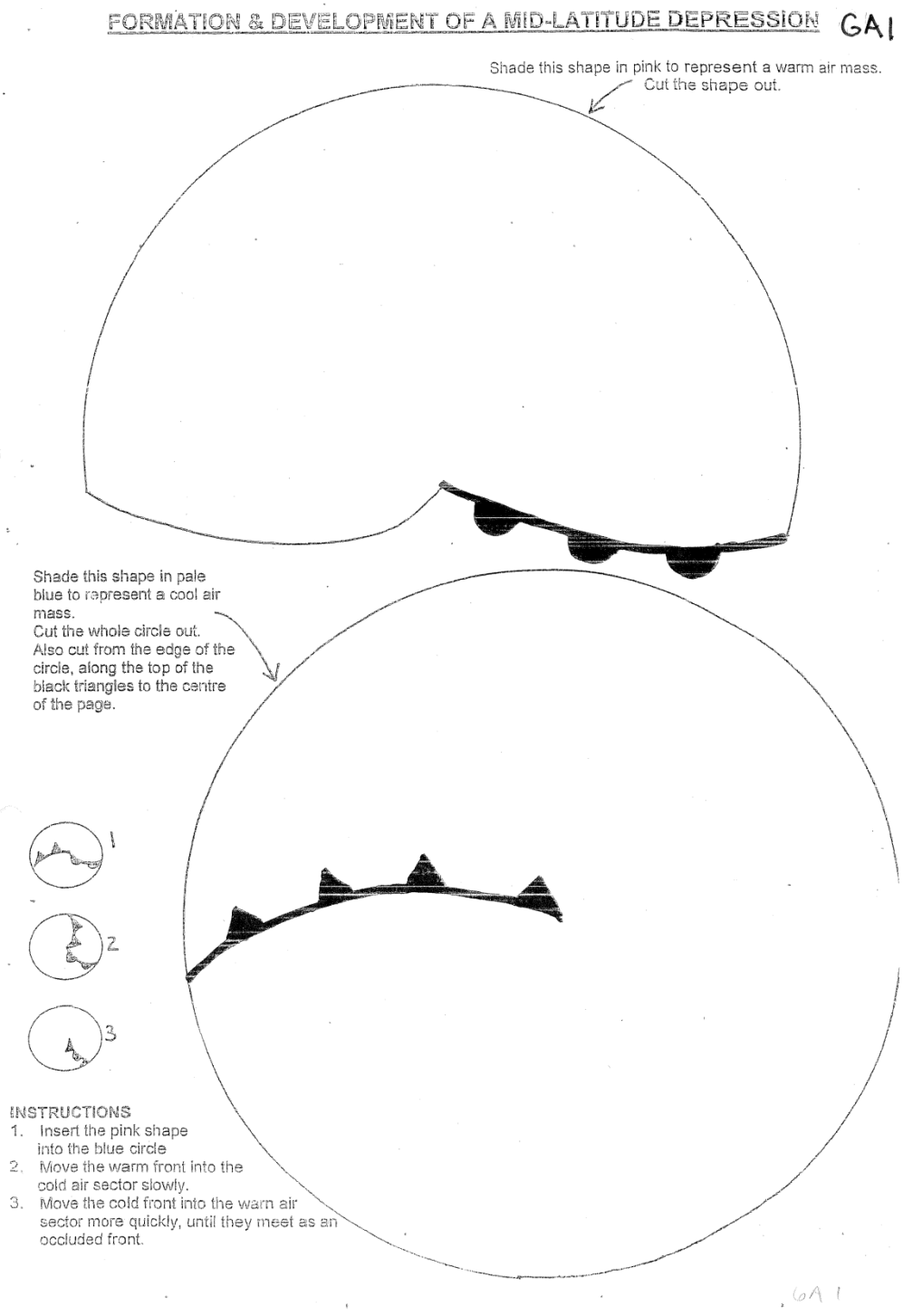
8.3.3 Artefacts created/used in the Mathematics PLC

MA1A Article: "Exploring Mathematics through the Analysis of Errors" by Raffaella Borassi (1987)
MA1B Reflection questions on journal article and PLC journal reflection question
MA2 Curriculum map
MA3 ICAS test 2009
MA4A ICAS test – summary of learners' responses
MA4B ICAS test – sample one learner's responses
MA5 CAPS document for Mathematics
MA6 PowerPoint for "exponents"
MA7A "Exponents" investigation worksheet 1
MA7B "Exponents" investigation worksheet 2
MA8 Video of Ang teaching the "exponents" lesson

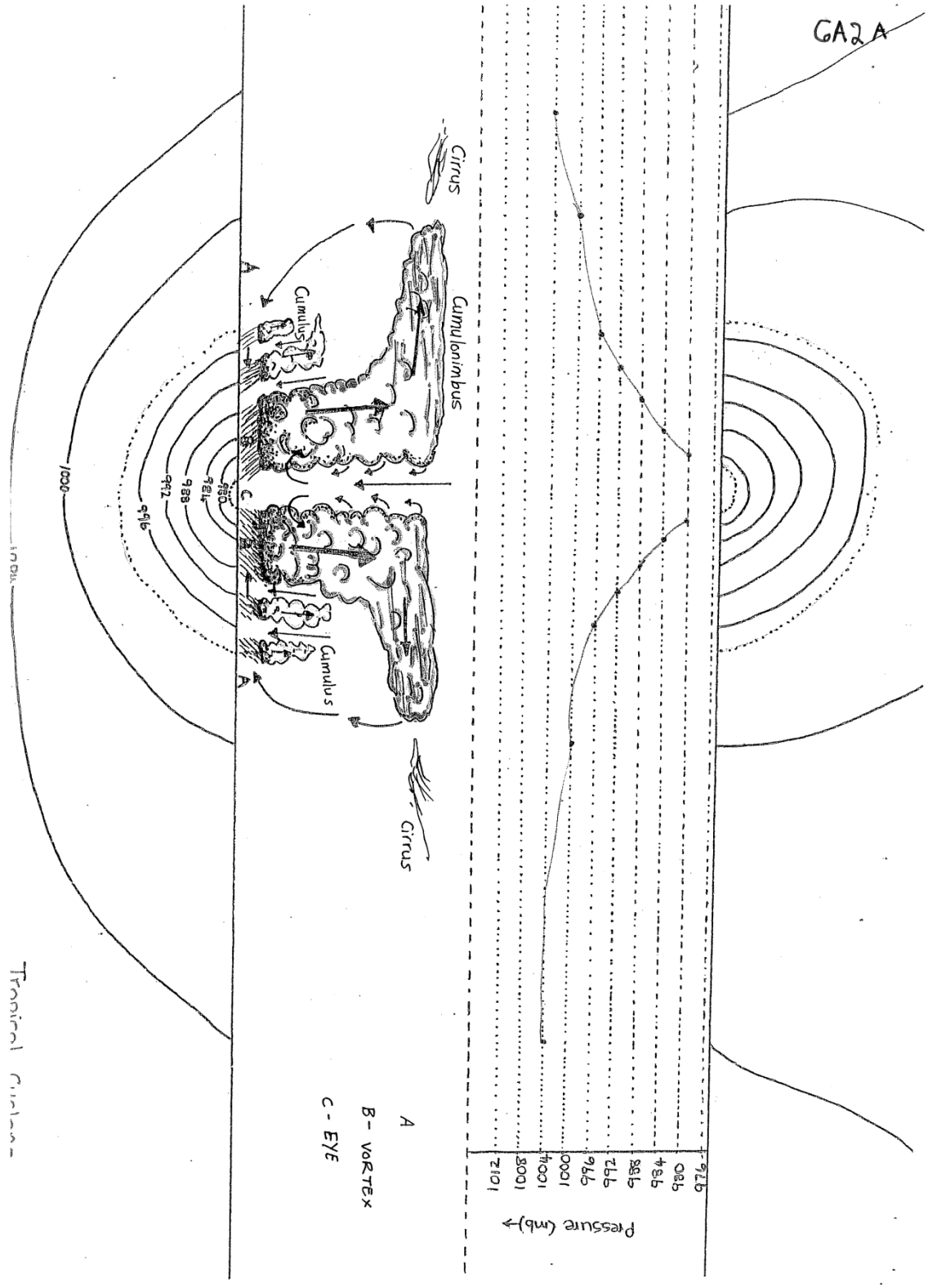
MA9 Lesson observation guide sheet
MA10 Video of Ang teaching the “exponents” lesson

8.3.1 Sample Geography artefacts

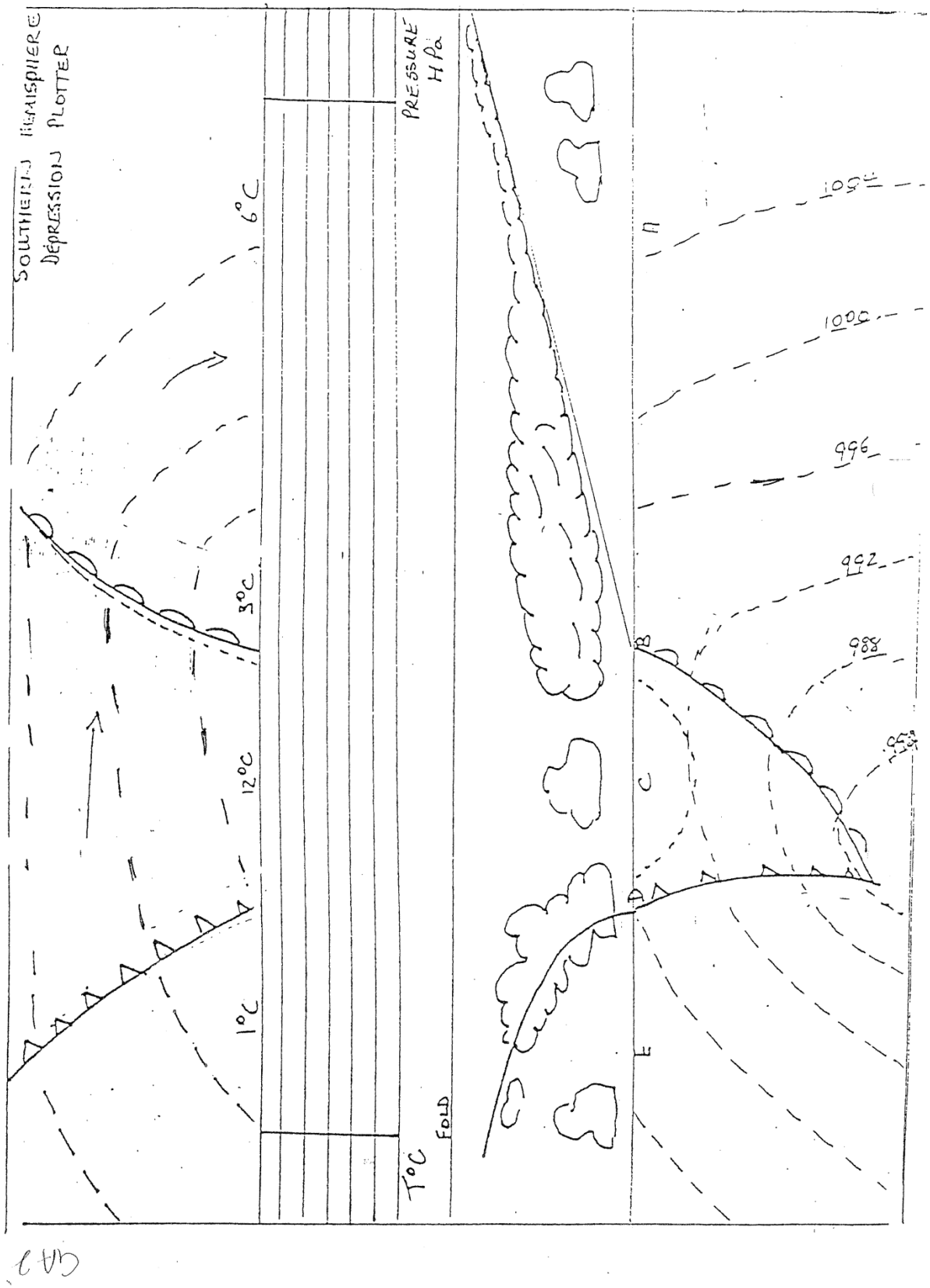
GA1 Mid-latitude depression cut-out shape



GA2A and 2B Tropical cyclone shapes for folding



GA 2B


SOUTHERN HEMISPHERE
DEPRESSION PLOTTER
6°C
8°C
12°C
10°C
7°C
FOLD
PRESSURE
HPa
1004
1000
996
992
988
984
A
B
C
D
E

GA 2B

GA3 GIS booklet – sample first page only

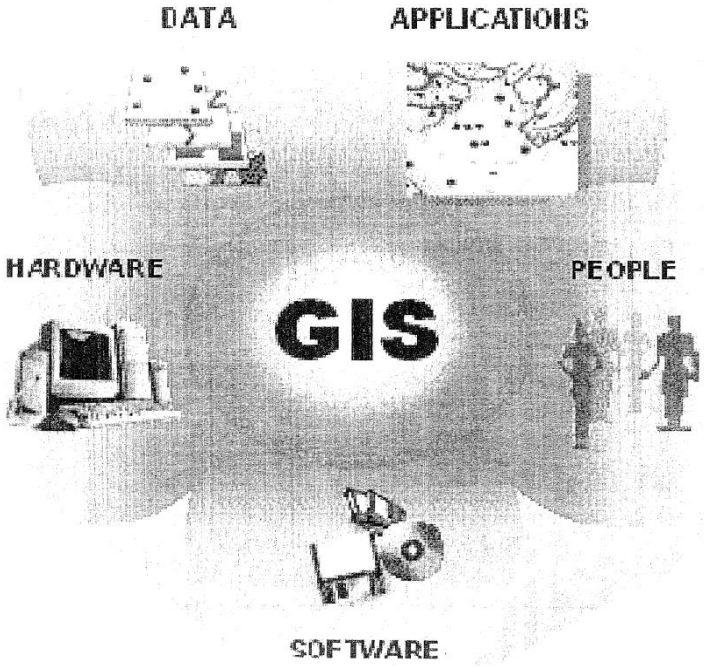
GA3

GIS

* GEOGRAPHIC INFORMATION SYSTEM
  * Geographic – place on Earth, Georeferenced – Spatial
  * Information – data (facts) put together to make sense
  * System – interrelated information
* GIS is an organised collection of computer hardware, software, geographic data and personnel designed to capture, store, update, manipulate, analyse and display geographically referenced data.

THE COMPONENTS OF GIS

* Hardware or Equipment
* PCs, printers, plotters, scanners, GPS devices, digitising tables
* Software or Computer programmes
* IDRISI, ArdGIS, IMPA, Google Earth, PlanetGIS, QGIS, Geomatica, etc



GA 3

1

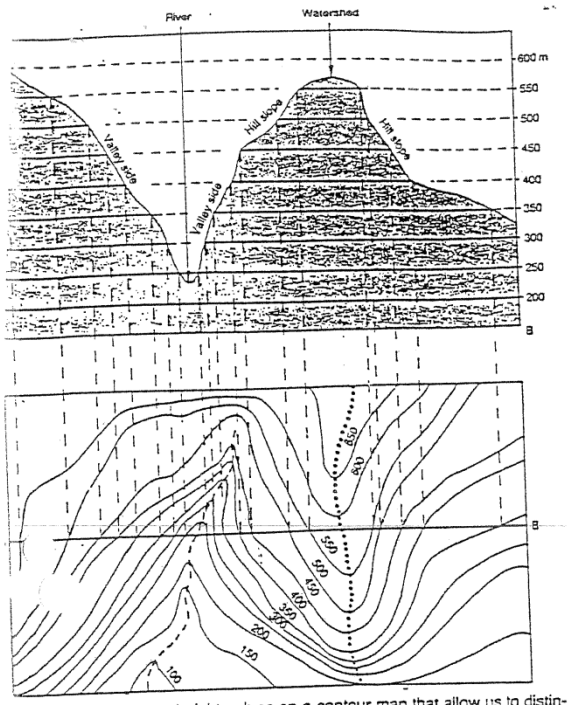


Figure 7.19 It is the height values on a contour map that allow us to distinguish between a river valley and a mountain spur.

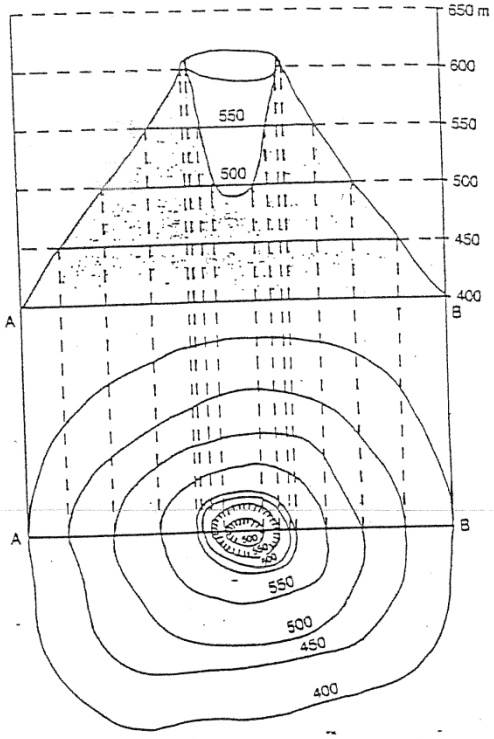


Figure 7.22 Contour representation of a volcano.

GA4

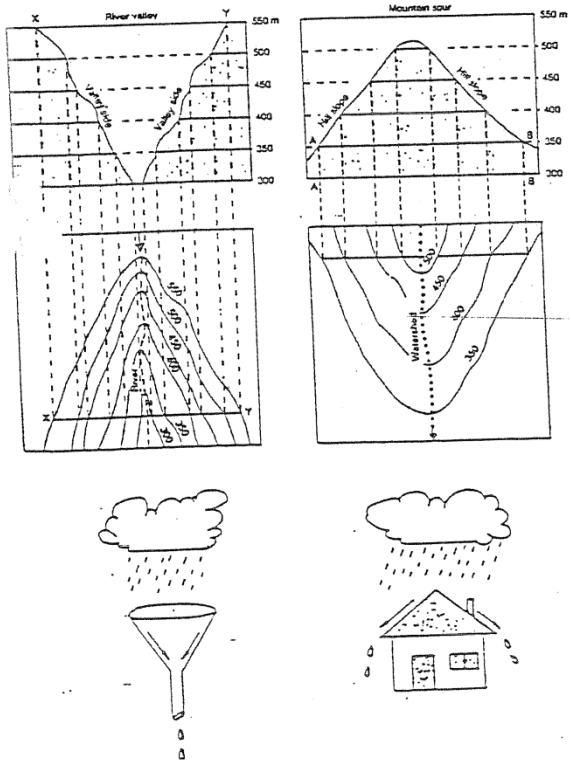


Figure 7.20

Figure 7.21

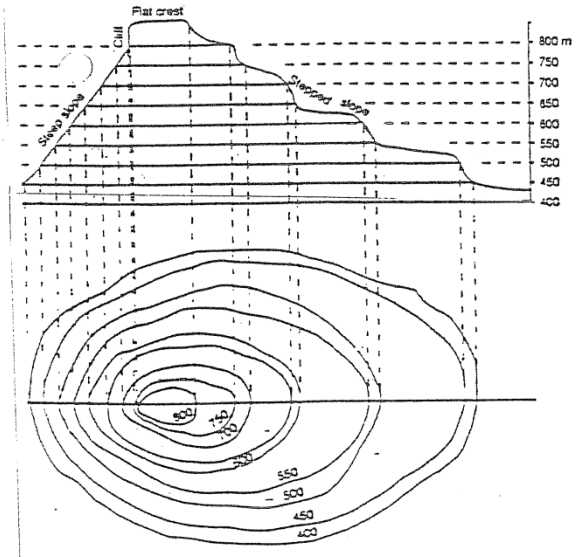
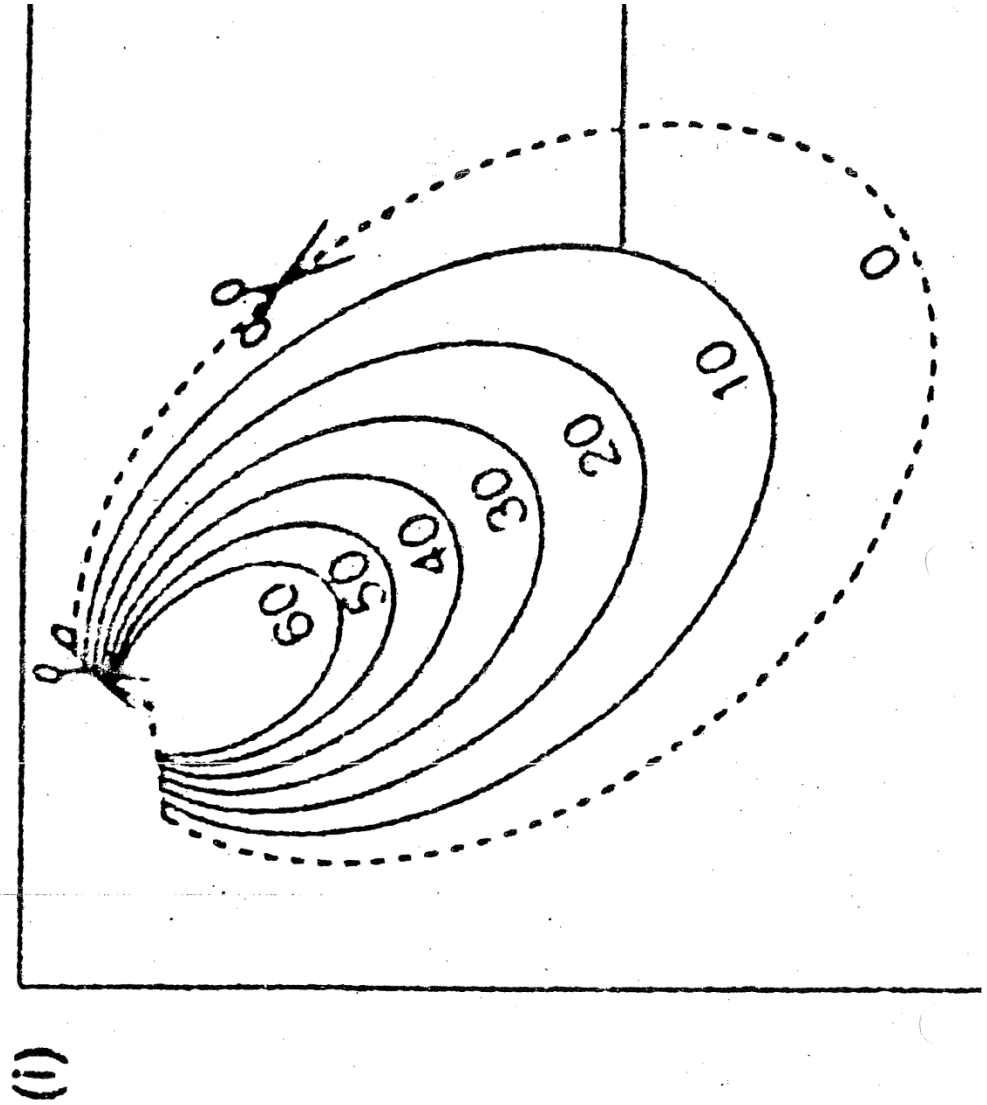


Figure 7.17

GA5 Overhead contours transparency for cutting up

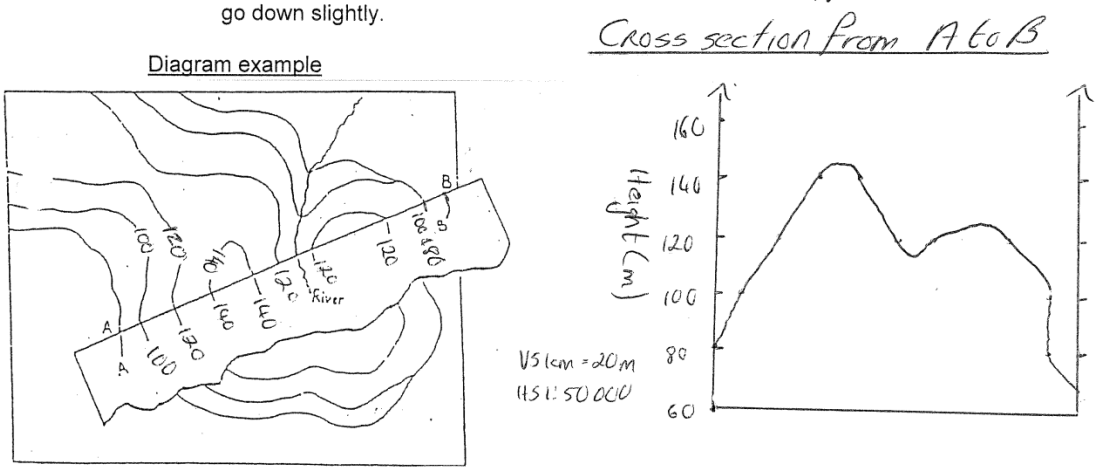


CROSS SECTIONS

Method

1. Join the two points with a straight line in pencil on the map.
2. Lay a strip of paper along this line and mark off where the contours cross the strip of paper.
3. On your strip of paper write down the heights of each contour line next to the mark.
4. Use spot heights, Trig beacons and the contour interval to determine the height of contours which are not labelled.
5. You now need to draw the axes on which you will draw the cross section. Ensure you have enough space for the horizontal and vertical axes.
6. Place your strip of paper on the lined paper and mark on the two points between which the cross section is drawn. (this shows the length of the horizontal axis
7. On the vertical axis, using the given scale, mark off the heights of the vertical intervals do this on both sides of the horizontal scale. (Note this vertical scale may change, and this will also affect your vertical exaggeration calculations.)
8. The lowest height on the vertical scale must be one contour interval below the lowest height on your strip of paper. The highest height on your vertical scale must be one contour interval above the highest height on your strip of paper. Remember the contour interval on a topographic map is 20m.
9. Transfer these markings onto your set of axes. Make sure your first mark is in line with the vertical axis line.
10. Move the strip of paper to each vertical interval and, in pencil, mark off the height or vertical interval for each marking on your strip of paper. Use dots not crosses.
11. Join the dots in pencil, free hand (no rulers). If two marking of the same height are next to each other and they are at the top of a hill your line must go up slightly between the two, if it is at the bottom of the hill, your line must go down slightly.

Diagram example

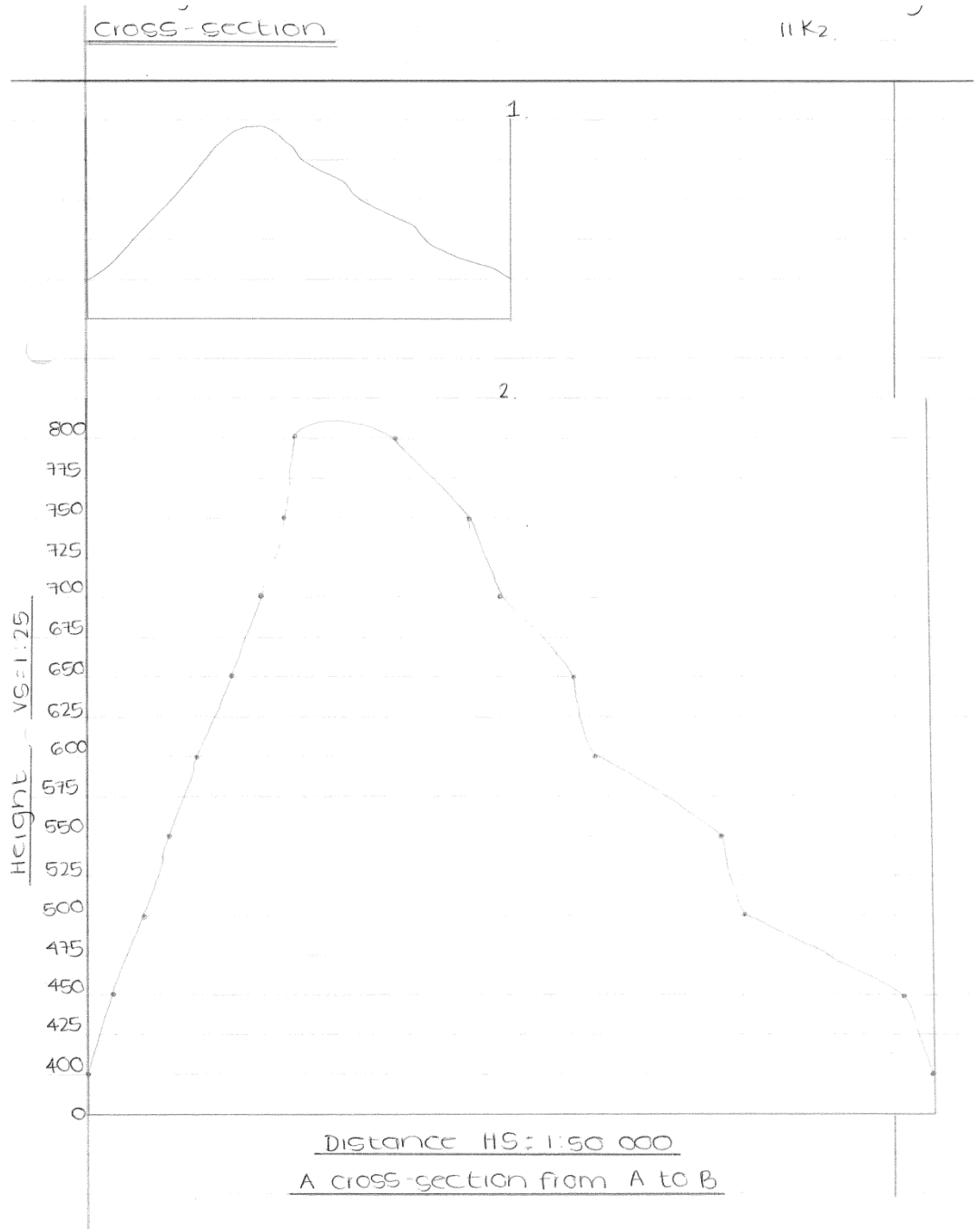


Your cross section must have the following.

1) A heading – cross section from A to B
2) The two scales must be written next to your cross section; vertical and horizontal scales – VS 1cm = 40m HS 1: 50 000
3) Vertical axis must be labelled; Height (m)
4) Fill in any rivers or main roads or power lines etc. asked for in the question, label these first on your strip of paper.

27

GA7 Sample of a learner's cross-section

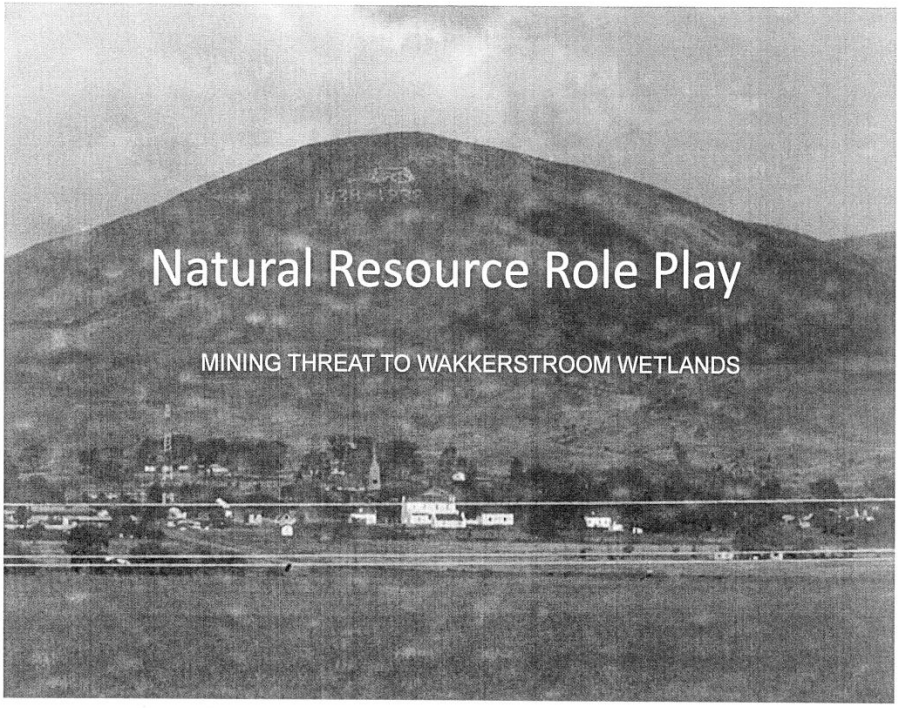


GA9 Wakkerstroom role play instructions (sample pages)

WAKKERSTROOM ROLE PLAY AND DEBATE GA9

Instructions:

- Introduce the class to Wakkerstroom use the pictures, explain this town actually exists.
- Give everyone in the class a number from 1 – 6.
- Then let all ones get into a group and all twos into a group etc., if these groups are big make smaller groups.
- Then tell the ones they are farmers, the twos they are the Mine Company, the threes and fours they are townspeople 1 and 2, the fives they are environmentalists and the sixes they are the government.
- Explain they will have a debate as to whether to allow the mining to go ahead or not, they have to think and argue as the people they represent, in the end the government will decide the outcome.
- First they meet in groups of the same people e.g. all the mine company people.
- Give each group their information page; they must now formulate their arguments for "why mining must go ahead". The government group must think about what information they will want and what kinds of questions they need to ask.
- Each person in the group must make notes as they will split up and have to present their own argument.
- Then make groups of 6 people, one from each "group" represented.
- Explain for the discussion to happen properly each person will get given 2 minutes to present their argument. If another group member objects to something said they must make a note of it and there will be time for debate after everyone has put forward their argument.
- The 5 stakeholder must address all comments to the government, who facilitates the debate, as it is the government person in each group who will eventually make the decision.
- Once the debate is over give the "government" a few minutes to make a decision, and let each one report back to the class as to what their decision is and why.
- To conclude tell them that the actual decision was not let mining go ahead.



Wakkerstoom Role Play

Farmers:

About you: Your family used to farm sheep and cattle on the farms purchased by Delta Mining

Your Position: YOU ARE FOR IT

You believe that:

- Your decision to sell the land was a good one as you are concerned for the welfare of your family (farm attacks and land redistribution)
- You got a better price selling to a mine than you would have selling to another farmer
- The environmentalists are probably making a mountain out of a molehill- they are all "bunny huggers" and prone to exaggerate to avoid any progress. If they had their way there would be no electricity.

The Mine Company

About you: You are an engineer working for the mine Delta Mining Corporation, a London Owned Mining Company

Your position: YOU ARE FOR IT

You believe that:

- 77% of our country's primary energy needs are provided by coal. This is unlikely to change significantly in the next decade, due to the relative lack of suitable alternatives to coal as an energy source.
- Burning coal is the most cost-effective and energy efficient way of generating electricity.
- Coal-fired power stations are reliable. South Africa's infrastructure to generate electricity from coal is well established.
- It will result in job creation and upliftment of both the local and national economy.

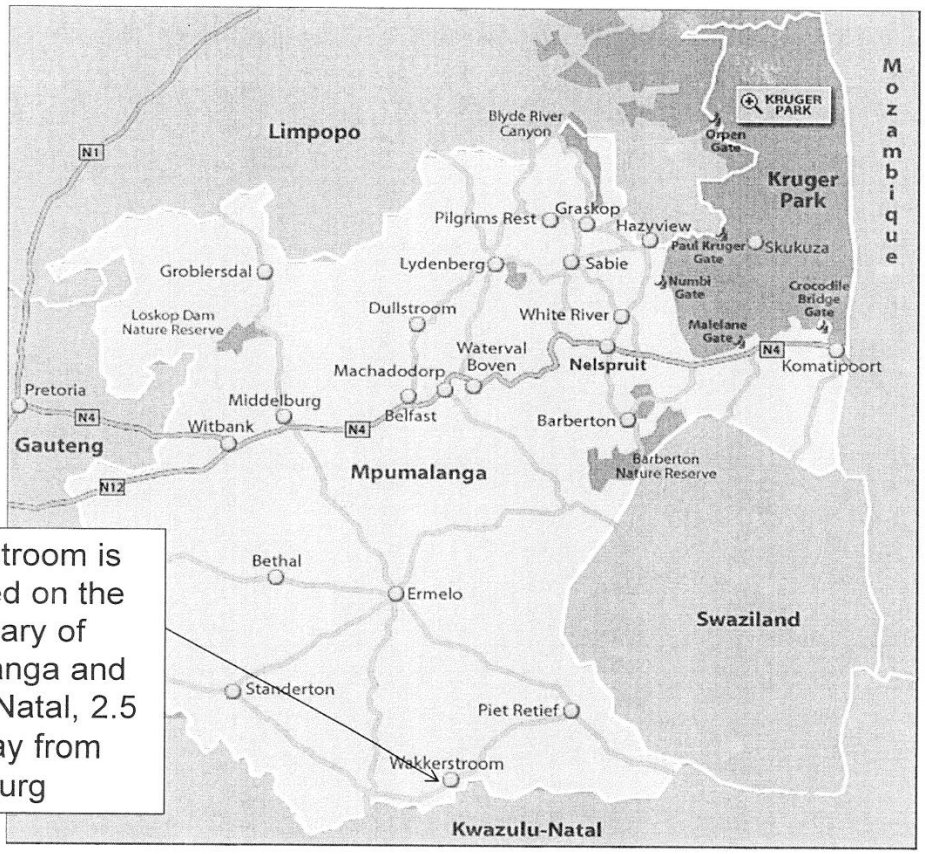
Townsperson 1:

About you: You own a bed and breakfast and restaurant in the village.

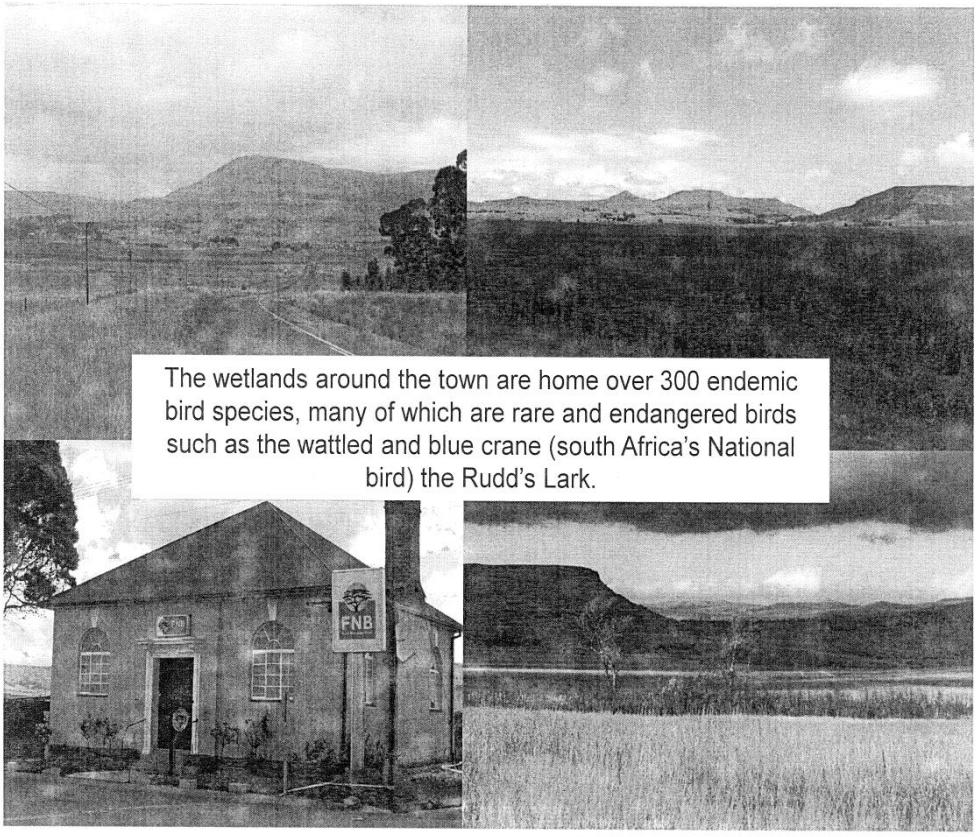
Your position: YOU ARE FOR IT

You believe that

- the building of the mine will bring prosperity to the town as mine employees will need to purchase houses, food, etc
- you believe that even if the local community are not employed at the mine itself, the increased spending in town will create jobs in other sectors
- You believe that progress is necessary and Wakkerstroom needs to get with the times.



Wakkerstroom is positioned on the boundary of Mpumalanga and Kwazulu-Natal, 2.5 hrs away from Joburg



The wetlands around the town are home over 300 endemic bird species, many of which are rare and endangered birds such as the wattled and blue crane (south Africa's National bird) the Rudd's Lark.

GA10 Map work calculations hand out (first 2 pages)

MAP WORK SKILLS AND INETRPRETATION

GA 10

AREA

This is the measurement of surface space

Formula: **AREA = LENGTH X BREADTH**

The answer must be in km^2 or m^2
Use the following method:

- Measure the length and breadth of the area in cm
- Convert these map distances to kilometres (x 0,5 if on a topographic map or x by 0,1 if on an orthophoto)
- If the answer must be in meters squared time length and breadth by 1000.
- Multiply the length (in km or m) by the breadth (in km or m)
- This gives you the answer in km^2 or m^2.

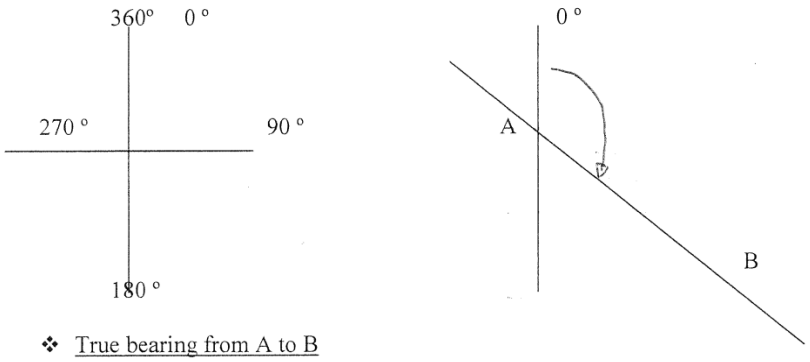
Example

- Length = 4cm
- Breadth = 2cm
- Length = 4 x 0,5= 2 km
- Breadth = 2 x 0,5= 1 km
- Length x Breadth= 2 km x 1 km = 2 km^2

True Bearing

True bearing is the angle measured clockwise from true north.

A protractor is used to measure the angle.
The protractor must always be positioned with the flat side vertical.



❖ True bearing from A to B

- draw a vertical line through the point you are measuring FROM i.e. A
- draw a straight line joining A and B
- place the nought of your protractor at the top of the vertical line
- then moving in a clockwise direction from 0 along the markings on the protractor, read off where the line joining A & B touches the protractor
- in this case the reading must be more than 90 ° but less that 180 °
  = 129°

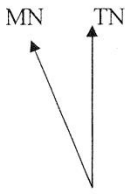
To determine the direction of one place to or from another it is useful to determine the true bearing first.

1

GA 4

What is the true bearing of the following directions of the compass:

a) North 0° b) North north east 22,5°
c) North east 45° d) East north east 67,5°
e) East 90° f) South 180°
g) West 270° h) North north west 337,5°

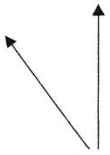


Magnetic Declination

The angle between True North and Magnetic North.

Because of the electric currents active in the core of the earth the needle of a magnetic compass will not necessarily always point to True North; Instead the compass will always seek magnetic North. Now we know that there are 2 North poles: true North Pole and magnetic North pole. It is also important to be aware that magnetic North is constantly moving. We must always take this into account when we do calculations and adjust our answer accordingly.

Mean Magnetic Declination 20° 48' West of True North (1981.01) Mean annual change 2' eastwards (1975 – 1980)



Method:

a) find out the magnetic declination and annual change.
(If the MD is 23°,3 W times whatever is behind the "," by 6 to convert it to 23° 18'W)
b) Work out the difference in years between the present year and year in which MD was measured (**always use the year by itself)**
c) Multiply the year difference by annual change
d) If the annual change is East subtract if the annual change is West add your answer to the MD. (See illustration at the bottom of this page.)

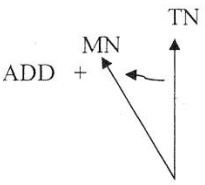
Example:

MD = 20° 48' W of TN
AC = 2 ' E
1999 – 1981 = 17 years
17 x 2' E = 34' E

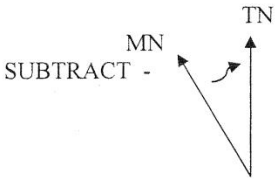
MD = 20° 48' W – 34' E = 20° 14' W →

Illustration

1. Moving West



2. Moving East



GA11 Topographical features worksheets (first page sample)

5 The symbols used in Topographical Maps of Sri Lanka

By now you may have studied maps that are compiled on various themes under the subject of Geography.

Take an atlas. You will notice that all countries in the world are mapped on different themes. Observe these maps carefully. Every feature found on the surface of the Earth is represented by the use of colours and symbols in these maps.

Activity

Name five themes which are shown on maps of Sri Lanka.

You have identified the basic characteristics of maps such as scale, direction and key in Grade Seven.

- A map depicts features which are seen on land.
- All maps are drawn to a scale in order to show the exact area.
- Various colours, letters and symbols are used to show different features of maps. The key helps to identify the features. With this you will be able to read the map.

Now let us understand topographical maps.

Features that exit on land

Natural features

Features due to human activities.

Maps drawn to a scale using colours, letters and symbols to depict natural features and features due to human activities are called topographical maps.

For free distribution

GA12 Map work notes produced by the Department of Basic Education (DBE) (first two pages sample)

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GA 12

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GEOGRAPHY

MAPWORK

NOTES

GRADES 10-12

Section 1
Mathematical Mapwork

Click Here & Upgrade
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- ACCURACY IS OF THE UTMOST IMPORTANCE !!!
- In order to write the mapwork examination you need the following equipment
  - Protractor
  - Pen
  - Pencil
  - 30 cm ruler
  - Chain or string
  - Calculator

1. *Conventional Signs*

This is a standard sign used on a map to indicate a particular feature. These must be learnt as they form the LANGUAGE of mapwork. See attached list

A conventional sign is a standard sign used on a map to indicate a particular feature. The conventional sign may be a letter of the alphabet or it may be a symbol. Many symbols look like the features that they depict. If you know your signs you will be able to interpret every map.

Learn the colours, they give the clues

8.3.2 Sample English artefacts

EA2 – EA4 Teaching sentences – Lessons 1-3

23rd February 2011

Lesson One:

1. Start with precise definitions (p. 63)

STATE: "x is an animal with two eyes."

ASK: "What is x?"

Etc. as page 63

2. Exercise 1:

Give 16 words

Instruction: Write full sentences defining the word precisely.

- place in a class and define it accurately
- try to be creative and original

3. Choose eight best – rewrite + hand in (name on back)

Lesson Two:

Correct errors in groups

Lesson Three:

Learners write further three sentences.

(To see if anything has been learned)

EA5 Sentence exercise

EA5

SENTENCE WORK

The following groups of words are a mixture of "good" and "bad". This means that some of them are sentences and some are not; some are clear in their definition and some are unclear or confusing; some are well constructed and some are poorly constructed; some are creative and interesting and some are ordinary and uninteresting. In your group, read and examine each sentence carefully and decide the following (make notes on each in the order given):

1. Is it, grammatically speaking, a sentence? (In doing this, you will need to decide what a "sentence" is.)
2. Is it clear as a definition or is it confusing or unclear?
3. Is it well or poorly constructed?
4. Is it creative and interesting or not?

If the sentence needs grammatical correction, write it correctly.

Your group will be given two sentences at the end of the examination process about which you will feed back to the class.

a) A psychiatrist is a profession in which people help others with their personal issues by listening, offering advice or prescribing medication.

b) A book is a story on paper with a cover and a heading, it tells us a story through written words about many different subjects, some are real but some are fictional too.

c) An adjective is a part of speech used to add flavour to a noun.

d) Love is that very moment when your heart stops beating as one, but joins another in one single heart beat.

e) A job that requires you to educate.

f) A television set creates a utopia, where nearly everyone is perfect.

g) Jealousy is an emotion that doesn't allow people to be happy about other people's triumphs and is often associated with the colour green.

h) Democracy is a political policy that gives every man equal say.

i) Love and jealousy are emotions that everyone has whether you an optimistic person or not, you could be jealous of your friend's success or love your family or partner so dearly.

j) A television being a box that projects, images, action, colour and sound as a form of story-telling.

k) An Isosceles triangle is a shape often used to confuse children in Maths tests.

l) Jealousy is an emotion one experiences when someone has something they desire.

EA5

EA6A Reflection on sentence work lesson 1

FINDINGS OF SCRIPT ANALYSIS: CREATING PRECISE SENTENCES

GRADE 11

EXERCISE 1

Compose full sentences precisely defining given terms; be as creative and original as possible.

FINDINGS

1. Some of the sentences were grammatically correct and well constructed.
2. The comma splice was FRIGHTENINGLY common.
3. Many sentences were not only grammatically incorrect, but also illogically expressed eg. *poetry is a piece of literature …* or *a psychiatrist is a profession …*
4. Learners often use "whereby" erroneously.
5. Prepositions are misused and abused!
6. Sometimes the sentence construction fault is the lack of a subject and a verb, which means that some learners still do not know what a sentence actually is.
7. Some learners' attempts were seasoned with wisdom. This is lovely because they were creative and precise in this.
8. Some learners wrote two or three sentences instead of just one (which is indicative of some interesting problem, but I don't know what it is!).

RECOMMENDATIONS (aka what I would like to do next!)

I think the next action would be to type out a number, say 10, of the good sentences and 10 of the "poor" sentences and give them out to the girls. In groups they would discuss why the sentences are "good" or "poor". Then they would correct them in the group. If pressed for time, each group could tackle a different two sentences and then report back on those, or all the sentences could be corrected by all the groups and then each group would report back on a different set of two.

Many spin-off tasks were suggested to me in the assessment of this task; eg. teaching the use of pronouns: *A teacher is a person who likes to share HIS / HER knowledge* (not *THEIR knowledge)*; the use of the apostrophe; the eradication of "woolly thinking".

EA6B Examples of sentences written by leaners

NEAT SENTENCES EA 6A

1 A teacher is a professional who informs, instructs and demonstrates different concepts to young children.

2 An isosceles triangle is a shape that has three sides of which two are the same length.

3 A chair is a piece of furniture which can be constructed from a variety of materials and is used to sit or rest on.

4 Jealousy is an emotion experienced when someone possesses something that you do not, and, therefore, you envy that person.

5 Democracy is a concept that is put into place to allow all people to have a say and opinion on how something is carried out.

EA7 Reflection on sentence work lesson 2

EA7

REFLECTION ON SENTENCE WORK LESSON 2

The following points were noted during the lesson. The lesson was not finished in one period, so the oral feedback by the learners still needs to take place; however, I monitored the discussion very closely and noted some interesting points being made.

1. Most groups raced through the sentences in the beginning of the process, evaluating them as mostly "well-constructed". Consequently, I hastened to stop them and ask why they had not found anything wrong with, for example, sentence a). Once I had asked them to read the first five words of the sentence several times, they picked up the problem. This offered the opportunity to remind them to read closely and critically, not only other people's writing, but particularly their own. I am hoping that this will go at least a little way to the eradication of "woolly" or unfocused thinking and expression.

2. Some of the groups picked up the comma splice in b). At least one learner correctly identified it as such, which was exciting! (I haven't taught it, so well done to a previous teacher!) Unfortunately, the same group could not pick up the second comma splice in the same example.

3. Sentence c) yielded an interesting debate in at least one group. The group was split in their criticism of the sentence in terms of clarity of definition: two girls thought it was clear and two did not. The ensuing discussion produced the conclusion that a grade 8 might not find the sentence clear, but a grade 11 might, because grade 11s know what a noun and adjective is. That the sentence was interesting and creative was unanimous in the end.

4. Sentence h) was dealt with in an interesting way by one group in particular. A member of the group found that clarity could be determined if one blocks out the first two words: "Democracy is". She said that everyone would know that the word "democracy" was being defined if one only saw the end of the sentence.

5. In one group, most of the members glossed over the lack of finite verb in sentence j). One of the members, interestingly a less "intellectual" member, seemed to be quite sure that the sentence was not grammatically correct. After some thought, she worked out that there was definitely something wrong with the verb "being". She persisted in asking about the tense and "number". She remembered that a finite verb has to have a tense and a number. She was confused, but at least she knew the definition. Another member of the group suggested that the problem could be simply solved by replacing "being" with "is". She was correct but she did not know why this worked better. Clearly, the finite verb needs review using a similar method to the one used in this exercise. This group also needed a prompt about the incorrect use of the first comma in sentence j).

6. Sentence k) caused great amusement amongst the groups generally. I am happy to report that my learners have a healthy sense of humour, even about Mathematics!

Moving forward:

I need to allow the groups to report back about two sentences each. From this process I will decide on a strategy to review the finite verb and on what else needs to be taught or reviewed.

EA8 Sample of weak learner's work

1. One's first love of one's life is one's mother.

2. A cowboy is a male shepard that takes keare of a herd of cows whiles riding a hourse.

3. School is an institution to where pupils go to get taught and educated for the purpose of future use and successions.

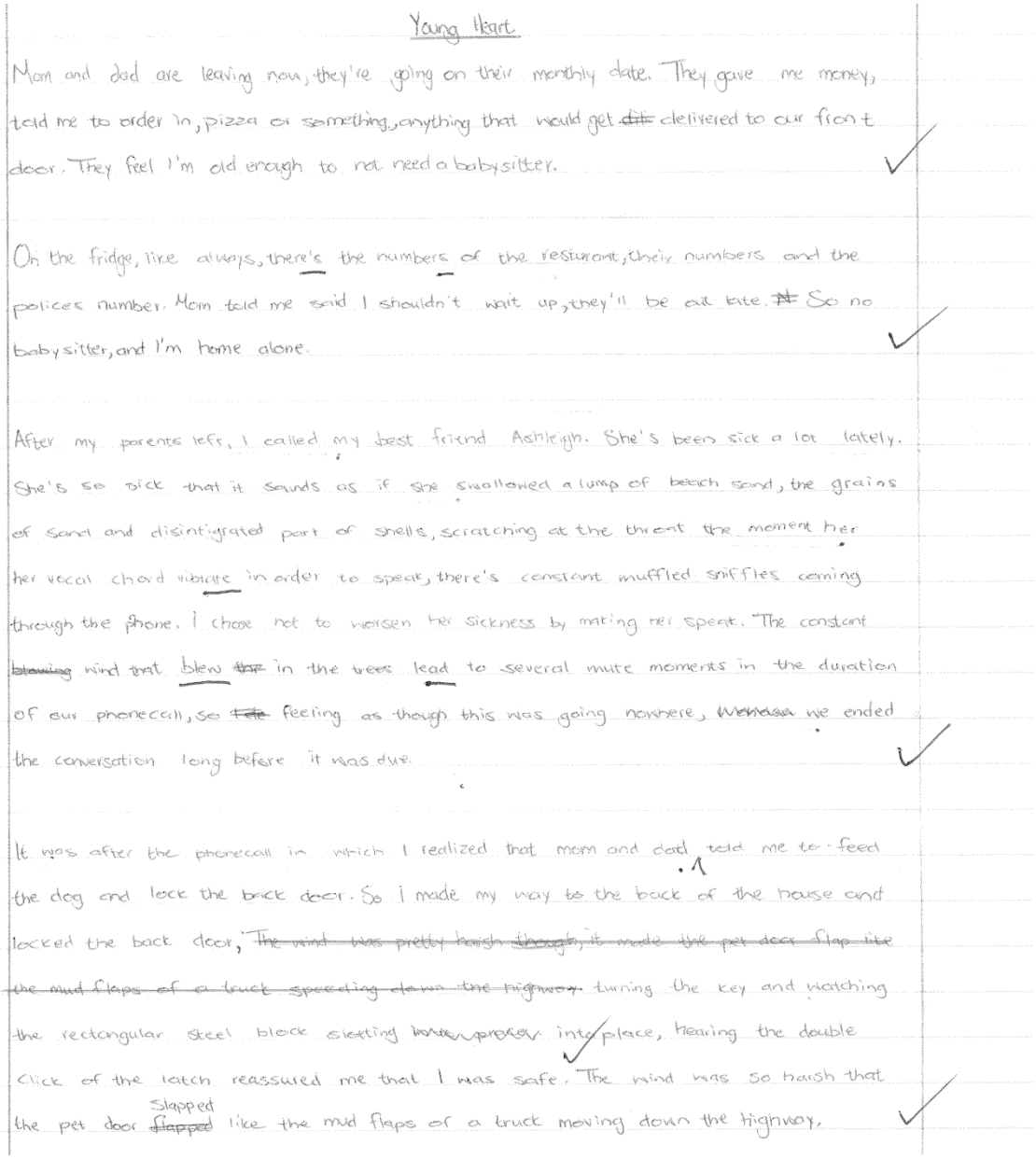
EA9 Teaching tense exercise

WRITING EXERCISE: TENSE USE

Read the following details and use at least **ten** of them in a short (one page) narrative. Pay attention to your **tense consistency** in the task. Plan your work before you write. Remember to paragraph properly. The details are in no specific order. Hand the task in at the end of the period.

1. Alone at home.
2. Anxious.
3. Late at night.
4. Ticking clock.
5. Wind in the trees.
6. Branch at window.
7. Sound of glass shattering.
8. Double lock on door; catflap.
9. Shadows in yard – movement.
10. Parents' instructions.
11. Conversation with friend.
12. Television.

EA10 Sample of learner's work – correct use of tenses



Young Heart

Mom and dad are leaving now, they're going on their monthly date. They gave me money, told me to order in, pizza or something, anything that would get ~~dlit~~ delivered to our front door. They feel I'm old enough to not need a babysitter.

On the fridge, like always, there's the numbers of the restaurant, their numbers and the polices number. Mom told me said I shouldn't wait up, they'll be out late. ~~It~~ So no babysitter, and I'm home alone.

After my parents left, I called my best friend Ashleigh. She's been sick a lot lately. She's so sick that it sounds as if she swallowed a lump of beach sand, the grains of sand and disintigrated part of shells, scratching at the throat the moment her her vocal chord vibrate in order to speak, there's constant muffled sniffles coming through the phone. I chose not to worsen her sickness by making her speak. The constant ~~blowing~~ wind that blew ~~that~~ in the trees lead to several mute moments in the duration of our phonecall, so ~~I~~ feeling as though this was going nowhere, ~~because~~ we ended the conversation long before it was due.

It was after the phonecall in which I realized that mom and dad told me to feed the dog and lock the back door. So I made my way to the back of the house and locked the back door, ~~The wind was pretty harsh though, it made the pet door flap like the mud flaps of a truck speeding down the highway.~~ turning the key and watching the rectangular steel block slotting ~~in~~ ~~proper~~ into place, hearing the double click of the latch reassured me that I was safe. The wind was so harsh that the pet door ~~flapped~~ slapped like the mud flaps of a truck moving down the highway.

EA11 Writing activity instructions

WRITING EXERCISE



Using Consistent Verb Tenses in Your Writing

The different verb tenses convey a sense of time. They indicate whether something occurred or existed in the past, the present, or the future. When you use verbs, be careful to choose the tense that will express your precise meaning. Mistakes in tense will confuse your readers.

Very often you will have to use a variety of verb tenses. For example, if you were a campaign manager, you might write about yesterday's press conference, today's speech, or tomorrow's election. Having consistent verb tenses does not mean using the same tense for each of these activities. Instead, consistency means using past, present, and future tenses appropriately so that your reader will be clear as to the time of each event.

A Report Your assignment is to write a short report on the first movie theater in the United States. You want to emphasize the difference between that theater and today's movie houses and to make an educated guess about what theaters will be like in the future. *Step 1:* Read the prewriting notes that follow. Select those you wish to use in your report and list them. List some notes of your own about current and possible future movie theaters.

PREWRITING NOTES

first movie theater opened on April 14, 1894
Thomas Edison opened his theater at 1155 Broadway in New York City.
How much did a movie ticket cost?—one nickel → 5cents
The first viewers either saw Eugene Sandow lift weights and perform gymnastics or Buffalo Bill ride a horse.
Edison patented moving film strips—viewed by one person at a time through a special projection box

Step 2: Write a one-to-three-paragraph report, using past, present, and future tenses where appropriate. *Step 3:* Ask a classmate to read your report to check for consistency of tense and for the logic of your prediction. *Step 4:* Revise your report with your classmate's suggestions in mind. Pay special attention to consistency of tense. *Step 5:* Proofread your work and prepare a clean copy.

Step 2: Write a three paragraph report, using past, present and future tenses where appropriate. Step 3: Read and edit, making sure of your tense use in each paragraph. Step 4: Rewrite and hand in.

Be brief in your report.

(Source: English Houghton and Mifflin Grade 11)

EA12 Samples of two learners' work

22 July 2011

Writing Exercise

Lights, camera, Action: The History of Motion Pictures

theatres

Movie ~~theaters~~ ~~theatres~~ have, and will always, change accordingly to the technological advances ~~occuring during~~ of the time.

theatres

One of the first movie ~~theaters~~ opened in New York City on the fourteenth of April 1894. The ~~theater~~ theatre was opened by Thomas Edison. In the late nineteenth century film content was limited to short silent moving clips of either Eugene Sandow lifting weights and performing gymnastics or scenes of Buffalo Bill riding a horse. Movie viewing cost five cents and a person would be left to watch these moving strips in a one-seater projection box.

However,

In the 21st century movie watching has changed drastically with movie houses being situated in almost every shopping centre globally. The movie industry is ~~also~~ also premiering new films every fortnight making this industry one of the biggest in the world. With the advent of improved ways of viewing films, such as in three-dimension, has caused cinemas to expand and film prices to rise. A film today costs over $15 to watch with another hundred and fifty people simultaneously.

s/c - Review

Good!

No-one knows what will happen in the future: movies may be engineered to stimulate all of the five senses or the familiarity of a trip to the cinema may die out as technology will grow smaller and leave people watching movies from the palm of their hands. Yet there will always be a need for film makers in our society - and prices will, without a doubt, rise further!

The Past: Movie theaters were completely different from modern day ones.
The first ever movie theater in New York, opened on the fourteenth of April 1894, by Thomas Edison. That Movie theaters then, only showed short scenes of either Eugene Sandow lifting, lifting weights and performing gymnastics or moving scenes of Buffalo Bill riding a horse. When one went to watch a movie, they paid five cents and watched the moving film strips in a one-seater projection box.

The Present: Movie watching in the 21st century has changed drastically. Movie houses are situated in almost every shopping centre throughout the world, with new films being premiered every second week. This makes the film industry one of the biggest in the world. With the advent of improved ways of viewing films, such as in three-dimension, has caused film prices to rise as well as movie theaters to grow in size. A film today costs over R45.00 to watch, but one does not watch it alone, one watches it with another hundred and fifty people simultaneously.

The Future: Technology will increase drastically as it has done in the past, which will lead to movies not only affecting one's visual and hearing senses, but also the sense of touch, smell and taste. No-one knows what will happen in the future. Movies may be engineered to stimulate all five senses or realistically they will grow smaller as the globe grows accustomed to technology in a compact form. The film industry will still grow and movie tickets will most likely increase further.

EA13 Extension exercise

TENSE CONSISTENCY

When you are writing, you need to keep your tense the same throughout, unless you have a very good reason for changing it.

For example: *When I was young, life was tougher in many ways than it is now, but it was also less complicated and, in some ways, easier.*

The sentence above should **not** read:

When I was young, life is much tougher in many ways than it is now, but it was also less complicated and, in some ways, easier.

Why is the second sentence incorrect? The "is" after "life" should be "was".

Now study the sample below and then correct the sentences 2 to 10, underlining the mistakes and writing the corrections in the space provided below the sentences:

(Source: English Houghton Houghton Mifflin (Grade 11))

SAMPLE Herman Melville lives in New York City and worked as a customs inspector there.

ANSWER Herman Melville lived in New York City and worked as a customs inspector there.

2. Melville spent the first eleven years of his life in New York City, but then his family had moved to Albany, New York.
3. Melville then works in his uncle's bank and later taught school in Massachusetts.
4. Melville had been traveling in England for many years before he will serve as a cabin boy on a merchant marine ship.
5. Shortly after he will return to the United States, Melville wrote a book about his adventures on the merchant ship.
6. Melville will have married Elizabeth Shaw before he had moved to New York City.
7. At this time, Melville wrote three unsuccessful books, and now he wants to start *Moby Dick*.
8. In 1850 the Melvilles buy a farm in Pittsfield, Massachusetts, and met Nathaniel Hawthorne.
9. Melville completes *Billy Budd* but kept the manuscript in a drawer instead of trying to publish it.
10. By the time Melville dies in 1891, he will create some of the world's most enduring fiction, including *Moby Dick* and *Billy Budd*.

2 "his family moved to Albany.
3 Melville then worked in his uncle's bank.
4. ... before he had served as a cabinboy.
5. Shortly after he returned to the United States
6. Melville had married Elizabeth Shaw before he moved to New York City.
7. And then he wanted to start 'Moby Dick.'
8. In 1850 the Melvilles bought a farm in Pittsfield.
9. Melville completed 'Billy Budd'.
10 ... He had created some of the world's most enduring fiction.

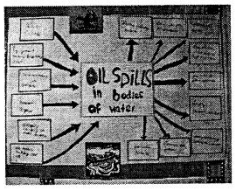
Designs for Thinking - Thinking Maps®

EA14

designs for thinking

THINKING MAPS® TRAINING RESEARCH RESOURCES ABOUT US HOME

Thinking Maps - A *Language* for *Learning*



Thinking Maps® were developed as a language for learning in 1988 by Dr. David Hyerle. There are eight maps in this language that are used by teachers and students (K-12; pre-K; adult education, university and business) for reading comprehension, writing process problem solving, and thinking skills improvement. Through quality training, materials and support services, Designs for Thinking will support learning communities with the tools necessary to become successful thinkers, problem solvers, decision makers, and ultimately, lifelong learners. Thousands of whole schools from across the United States have received in-depth training and follow-up using Thinking Maps. Internationally, Thinking Maps are also being used and promoted in Canada, the United Kingdom, Australia, New Zealand, Brazil, Egypt, Ethiopia and other countries.

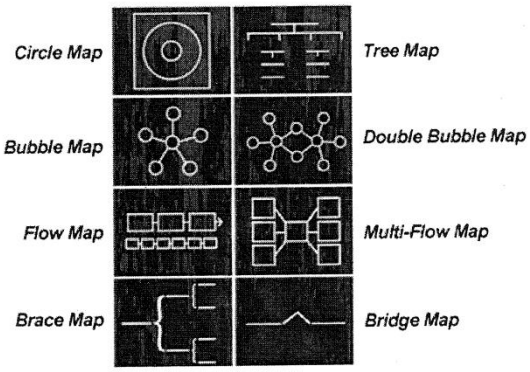
Thinking Maps® INCORPORATED

Each of the eight Thinking Maps is based on a fundamental cognitive skill such as comparing and contrasting, sequencing, classifying, and cause-effect reasoning. Much like carpenters using a set of tools, multiple Thinking Maps are used as a eight maps icon toolkit by students for constructing knowledge: for improving the basics of reading, writing, and mathematics as well as for problem-solving and the development of higher-order thinking abilities. A wealth of research and published articles supports the use of different types of Visual Tools generally, and Thinking Maps specifically. New brain research provides even greater insights into why most students perform better when using Thinking Maps.

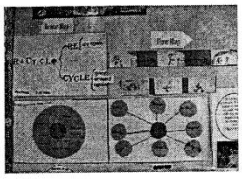
Benefits:



- Students learn more effectively and more efficiently
- Objectives are covered in less time with greater retention
- Thought processes are represented similarly throughout the curricula
- Schools also promote integrated thinking and interdisciplinary learning
- Teachers can easily gauge student knowledge prior to a specific lesson
- Student performance can be tracked accurately over time
- Students gain effective tools to use across their academic and working careers
- Lifelong thinking tools



What researchers, school leaders, students and other educational leaders are saying about visual tools and Thinking Maps:



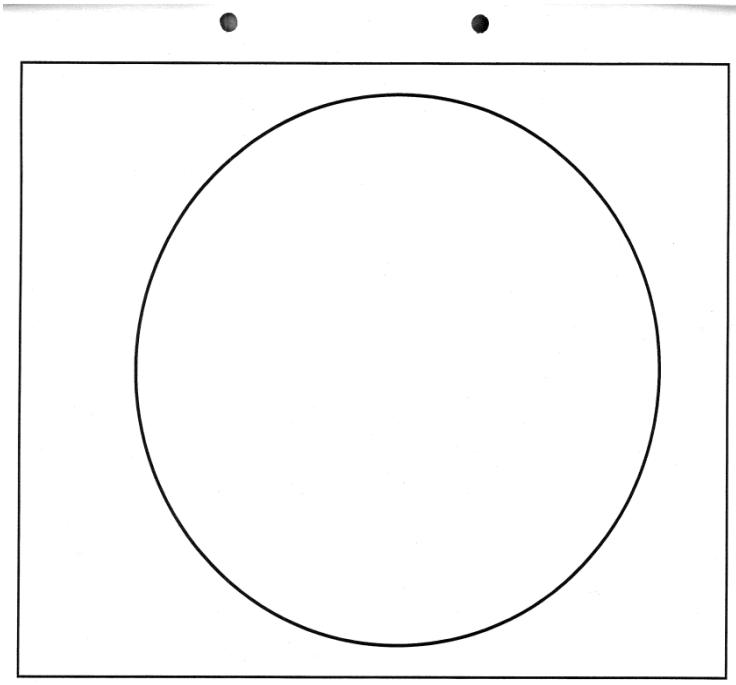
Pat Wolfe
"Neuroscienteist tell us that the brain organizes information in networks and maps."

Robert Marzano, Ph.D.
"Knowledge is stored in two forms: linguistic and nonlinguistically. Research proves that the more we use both systems of representation the better we are able to think and recall knowledge."

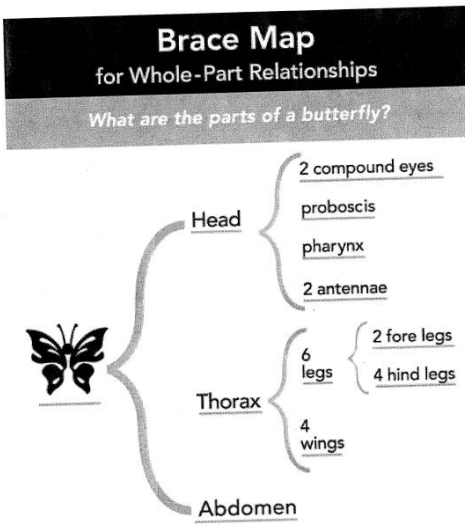
Art Costa, Ph.D.
"School is a home for the mind"

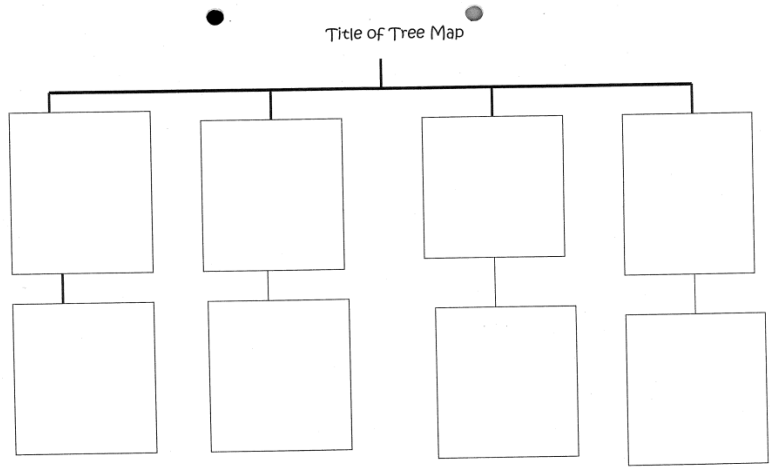
Thomasina DePinto, Ph.D.
"Thinking Maps is within the reach of any school, replicable, and may refine and even reframe reading and writing

http://www.mapthemind.com/thinkingmaps/thinkingmaps.html 2011/09/28



Circle Map





Tree Map - Classification

EA15 Note on teaching how to write an essay in response to a picture prompt

LESSON PLAN – INTERPRETING PICTURES FOR CREATIVE WRITING RESPONSE

Purpose: To help learners appreciate what the parameters of interpretation are. What are acceptable interpretations and what are not. To provide learners with a methodology for successfully responding to pictures.

Learner target: Learners are able to identify reasonable responses from those that are too removed from the original picture.

SMART GOALS

Strategic and specific – Specific, significant, stretching

Measurable - Measurable, meaningful , motivational

Attainable - Agreed – upon, attainable, achievable, acceptable, action-orientated

Realistic - Realistic, relevant, reasonable, rewarding, results-orientated

Time-based - Time-based, timely, tangible, trackable

EFFECTIVE FOCUS LESSONS

a) Modelling
- * Direct Explanation
- * Demonstration

b) Meta-cognitive awareness
- "What am I trying to accomplish"
- "What strategies am I using"
- "How well am I using the strategies"
- "What else could I do?"
- * Public problem solving

c) Think –alouds
- * Shared reading
- * Write-alouds

Materials: Picture for discussion – "Outside looking in" (Title and text removed)

---

1. Teacher hands out picture to each individual in class.
2. Teacher asks learners the following question:
   "You are given this picture and asked to write a creative essay in response to it. How would you respond and feel confident that your response is 'acceptable' or appropriate? What would your topic be in response to this picture?"
3. Five minutes given for learners to study picture.
4. Topics proposed given with no discussion – teacher tries to show diversity of responses. (Responses written on board). Suggest a few 'wrong' topics if none are forthcoming. Teacher

asks the question, "How can we be reasonably sure that our response is acceptable given such a wide variety of topics?"

5. Teacher likens response to picture as similar to a response to a poem. That is, a good place to start is with a literal understanding of what is being talked about.
6. Teacher asks for **literal descriptions** of what is seen in the picture. Learners must write down seven different descriptions of what they see in the picture.

"There are three window cleaners hanging from ropes. They are seated an small seats attached to the single rope."
"People inside are oblivious to the actions of the window cleaners"
"People inside are at tables with chairs – looks like a restaurant."
"City landscape in the background"
Etc.

7. Learners share their observations and add to their own list new observations of other learners.
8. Once picture has been fully described, teacher asks learners to look at their list of descriptions and make a new list of **figurative symbols or metaphors** that their descriptions may suggest.
9. Learners share their ideas.

* Reckless behaviour – window cleaners hanging from ropes
* Class distinctions – working class and leisure activity
* Stages of life – Tables contain one, then two, then three people
  Single, married and family

Etc.

10. Teacher writes up a list of topics on the board:

City life
Risky lifestyle
Suicide
City traffic
Life in room 103 – Hilton Hotel
Good conversation
Isolation

Learners must decide which topics are definitely off-topic.

11. Teacher asks learners to consider why examiner chose this picture. Discuss.

HOMEWORK:

Mind-map chosen response to picture. No draft. Just the mind-map.

Assessment of the effectiveness of lesson.

One learner made an interesting response to the question of how do we ensure that we are interpreting picture appropriately . The suggestion was to make sure when planning and mind-mapping to write in references back to the topic to ensure the reader understands your link to the picture.

Many learners were helped to make the transition from literal to figurative understanding. Many learners were initially puzzled by what more could be seen in the picture besides the literal description.

Many learners understood the importance of stating the link between picture and topic – making explicit the link between the response and the picture.

The more topics were discussed the more evident it became that there was a need for stating or making clear the link between response and picture.

EA16 Picture prompt essay topics (one example)



EA17 Introductory discussion on teaching interpretation of visual texts

ASSESSMENT OF GENRES OF VISUAL LITERACY

Present the visual texts. They should be:

1. Three different magazine ads
2. A general cartoon strip
3. A political cartoon strip
4. A political cartoon

Questions should revolve around:

1. Intention
2. Target Audience
3. Source
4. Mood / atmosphere / tone
5.
6.
7.

Some questions might be:

1. What is being depicted, in the text (picture), literally? (What can be seen, literally?)
2. In a maximum of two sentences, describe your personal response to the picture.
3. What is the intention of the advertiser or cartoonist?
4. Compare your response with the intention of the advertiser or cartoonist.
5.
6.
7.

EA18 Examples of visual texts for interpretation (one example)



8.3.3 Sample Mathematics artefacts

MA 1B Reflection questions on journal article and PLC journal reflection question

MATHEMATICS NLC

Programme Outline

Week 2

- **Questionnaire**
- **Reading:** Exploring Mathematics through the Analysis of Errors *R. Borasi*

Discussion questions

1. What do errors in the learning and teaching of mathematics tell us? Discuss in relation to the following:
   a. Are errors an indication that something is horribly wrong? Elaborate in relation to teaching and in relation to learning.
   b. Are errors an indication that something is going right? Elaborate in relation to teaching and in relation to learning.
   c. Can errors be used to grow understandings of mathematics and the discipline itself? In what ways? Give an example if possible.
2. Do mathematicians make errors? If possible, think of an example and explain the error.
3. Do teachers make errors? Think of your own experience as a teacher and reflect on an error that you made.
4. Can the statement $\frac{3}{4}+\frac{6}{7}=\frac{9}{11}$ be correct?
   a. Explain why/when the above statement could be correct or not.
   b. What are the different ways in which the statement could be used by learners (and teachers?) and still hold for their sense-making.
5. There are particular issues that Borasi raises.
   a. Borasi argues that errors can be used as "springboards" for exploration in mathematics.
      i. What do you understand by this statement?
      ii. How/where could you apply this statement in your own classroom?
   b. Are there any other important issues that Borasi raises...
      i. With respect to errors that are worth noting for mathematics learning and teaching?
      ii. Write about real examples of these issues from your own classroom experience.

- **Analysis of ICAS Tests**
- **Journal Entry**

  How do you think you could incorporate error analysis and reflection in your teaching? Do you think it would be useful? If you already do it, do you find it useful? Do you think you could change it in any way to make your teaching more productive? Would you have any reservations or concerns about using it? *Please explain in as much detail as possible.*

UNSW EDUCATIONAL ASSESSMENT AUSTRALIA

THE UNIVERSITY OF NEW SOUTH WALES
SYDNEY • AUSTRALIA

MA3

PAPER G

ICAS

INTERNATIONAL COMPETITIONS AND ASSESSMENTS FOR SCHOOLS

MATHEMATICS

2009

DO NOT OPEN THIS BOOKLET UNTIL INSTRUCTED.

40 QUESTIONS
TIME ALLOWED: 1 HOUR

STUDENT'S NAME:

Read the instructions on the **ANSWER SHEET** and fill in your **NAME**, **SCHOOL** and **OTHER INFORMATION**.
Use a 2B or B pencil.
Do **NOT** use a pen.
Rub out any mistakes completely.

You **MUST** record your answers on the **ANSWER SHEET**.

Mark only **ONE** answer for each question.
Your score will be the number of correct answers.
Marks are **NOT** deducted for incorrect answers.

There are **35 MULTIPLE-CHOICE QUESTIONS** (1–35).
Use the information provided to choose the **BEST** answer from the four possible options.
On your **ANSWER SHEET** fill in the oval that matches your answer.

There are **5 FREE-RESPONSE QUESTIONS** (36–40).
Write your answer in the boxes provided on the **ANSWER SHEET** and fill in the ovals that match your answer.

You may use a ruler and spare paper.
A **CALCULATOR** is required.

1. 23 kg + 120 g = ?

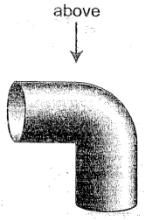
(A) 23.120 kg
(B) 24.200 kg
(C) 35 kg
(D) 143 kg

2. The last 10 scores achieved by a cricket batsman were as follows: 101, 100, 110, 101, 120, 120, 101, 120, 102 and 101.

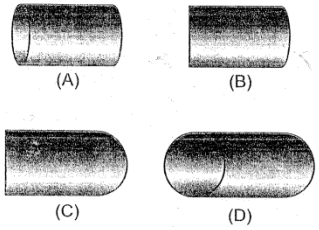
What is the mode of these scores?

(A) 101
(B) 101.5
(C) 107.6
(D) 120

3. A plumber has an angle fitting for joining water pipes.



What image will be seen when the angle fitting is viewed from above?



4. At noon, a thermometer measured the air temperature outside a ski lodge to be 12 °C. A few hours later, it measured –5 °C.

By how many degrees has the air temperature changed?

(A) –7
(B) +7
(C) –17
(D) +17

5. Simon was on holiday in Europe. He had to change some money from Euros (€) to British Pounds (£). The bank uses this formula to change the money:

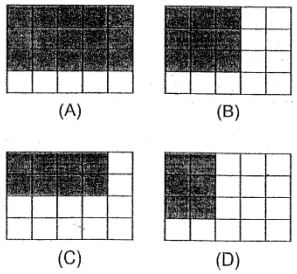
$$£ = 0.8 \times (€ - 2)$$

Simon received £600 for his Euros.

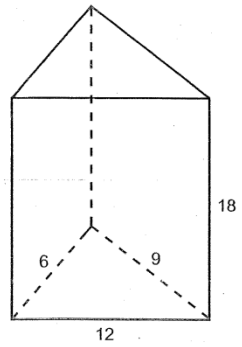
How many Euros did he change?

(A) 478
(B) 482
(C) 748
(D) 752

6. Which diagram shows three-quarters of two-fifths shaded?



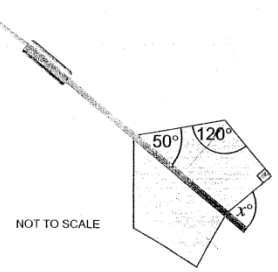
7. Similar solids have their corresponding sides in proportion.



Which would be the set of dimensions for another triangular prism similar to the one shown?

(A) 1 unit, 2 units, 3 units, 6 units
(B) 2 units, 3 units, 4 units, 6 units
(C) 2 units, 3 units, 4 units, 9 units
(D) 2 units, 3 units, 6 units, 9 units

8. The picture shows a design for a dart.



What is the value of x?

(A) 70
(B) 80
(C) 100
(D) 170

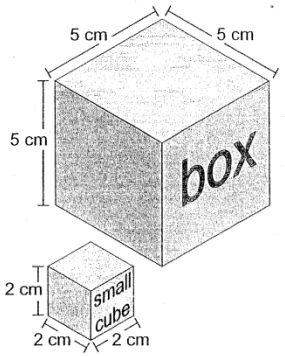
9. Peter, Alan and Stephanie had 35 biscuits to share among them.

Alan had 5 biscuits fewer than Stephanie. Peter had half as many as Stephanie.

How many biscuits did **Peter** have?

(A) 8
(B) 11
(C) 12
(D) 16

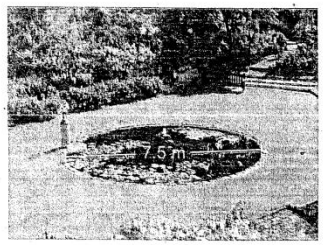
10. Khalid has a box and a number of small solid cubes.



What is the largest number of small cubes he can fit wholly within his box?

(A) 16
(B) 15
(C) 8
(D) 6

11. The picture shows a circular pond with a diameter of 7.5 m.



What is the area of the pond to the nearest m²?

(A) 24
(B) 44
(C) 47
(D) 177

12. John starts a number pattern using 3 as his first term.

To make any new term in the pattern, John squares the previous term and doubles the answer.

What is the third term in John's pattern?

(A) 81
(B) 324
(C) 648
(D) 1296

13. Here are examples of a short notation for writing the sum of counting numbers.

$\varpi_2 = 2 + 1$
$\varpi_3 = 3 + 2 + 1$
$\varpi_4 = 4 + 3 + 2 + 1$
$\varpi_5 = 5 + 4 + 3 + 2 + 1$

What is the value of $\varpi_8 - \varpi_2$?

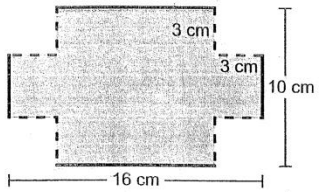
(A) 21 (B) 33
(C) 34 (D) 35

14. Gina is playing a game which uses two dice with twelve faces each. One die is numbered from 1 to 12. Only even numbers are shown on the other die.

Gina rolls the two dice at the same time. What is the chance that Gina will get an odd number shown on one die?

(A) one out of two
(B) one out of three
(C) one out of four
(D) one out of six

15. Four identical squares are cut from each corner of a rectangular metal sheet.



What is the area of the remaining metal sheet in cm²?

(A) 108 (B) 118
(C) 124 (D) 153

16. A shop sells two kinds of stools: stools with three legs and stools with four legs.

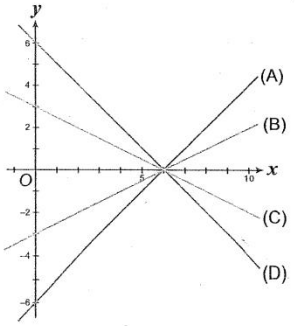


There is a total of 31 stools in the shop and together they have a total of 110 legs.

How many stools with three legs are in the shop?

(A) 18
(B) 17
(C) 14
(D) 13

17. Which line represents $2y = x - 6$?



18. Jake read that most people walk about 118 000 miles in their lifetime.

One kilometre is approximately equal to 62% of a mile.

About how many kilometres will most people walk in their lifetime?

(A) 73 000
(B) 118 000
(C) 120 000
(D) 190 000

19. A train travelled at a speed of 165 km/h.

Approximately how far did the train travel in one **second**?

(A) 3 metres
(B) 50 metres
(C) 600 metres
(D) 1400 metres

20. Alice had 40 strawberries to share.

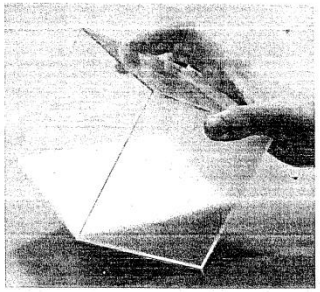
She gave each of her friends the same number of strawberries and had 5 left over for herself. Alice had fewer strawberries than each of her friends.

How many friends did Alice share strawberries with?

(A) 8 (B) 7
(C) 6 (D) 5

28. Claire has a vase that is a cube with sides of 10 cm.

She put some liquid in the vase. She tilted the vase so that the liquid covered one face and half of the base of the vase.

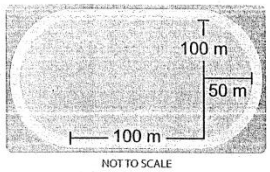


Claire then tilted the vase back so that the base was horizontal.

What was the height of the liquid in the vase when the base was horizontal?

(A) 1.25 cm
(B) 2.5 cm
(C) 5 cm
(D) 12.5 cm

29. This drawing shows a running track marked with white paint.



NOT TO SCALE

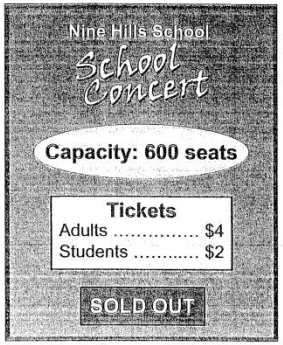
Sam runs 4 km every morning.

What is the minimum number of times that Sam must run around the track to run at least 4 km?

(A) 19 (B) 12

(C) 8 (D) 7

30. There were 600 tickets sold for a school concert.



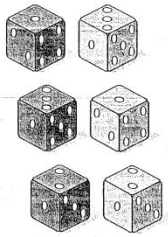
The total amount of the ticket sales was $1320.

How many student tickets were sold?

(A) 260
(B) 350
(C) 440
(D) 540

31. Alice rolls two dice and writes down the total of the numbers shown.

These pictures show the only three different ways that the dice can show a total of 4.



Which other total can Alice get in only three different ways?

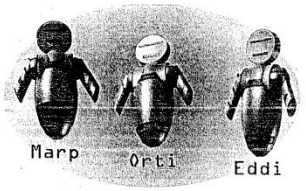
(A) 5
(B) 6
(C) 9
(D) 10

32. How many solutions exist for this set of equations?

$$ab = 1,\ bc = 2,\ ca = 8$$

(A) 1
(B) 2
(C) 3
(D) 6

33. A space station has three robots that make repairs.



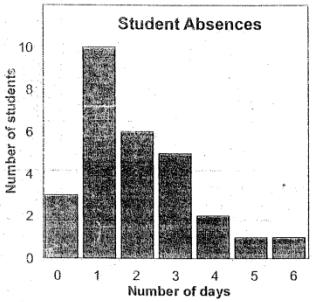
The Marp robot can make 12 repairs in 10 minutes. The Orti robot can make 10 repairs in 8 minutes. The Eddi robot can make 8 repairs in 6 minutes.

The space station needs 100 repairs.

Approximately how long will it take the three robots working together to complete 100 repairs?

(A) 27 minutes
(B) 34 minutes
(C) 41 minutes
(D) 83 minutes

34. The graph shows data of the number of days students were absent from a class.



What is the mean number of days students were absent?

(A) 2
(B) 2.7
(C) 4
(D) 4.7

35. Robert made this number pattern.

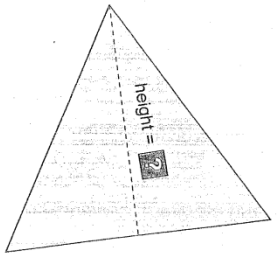
3	5	7	11	?
11	13	17	19	?
33	65	119	209	?

Which number should replace ? ?

(A) 345
(B) 315
(C) 299
(D) 273

QUESTIONS 36 TO 40 ARE FREE RESPONSE.

36. The area of this equilateral triangle is 7775 square units. The perimeter of the triangle is 402 units.



What is the height of the triangle to the nearest unit?

(Write only the number on your answer sheet.)

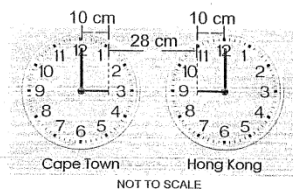
37. In this expression a, b and c can be any positive integer greater than 1 and less than 5.

$$(ac+b)^{(a-b)}$$

What is the largest possible value of the expression?

(Write only the number on your answer sheet.)

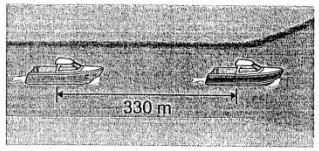
38. This clock has two dials and shows two different times. The distance between the ends of the two hour hands is given.



What will be the distance in centimetres between the ends of the hour hands three hours later?

(Write only the number on your answer sheet.)

39. Two boats were following each other 330 metres apart along a straight canal. Both boats were travelling at a speed of 5 km per hour.



At one point the canal widens. As each boat reached that point, it speeded up to 8 km per hour. One hour after reaching the wide section the first boat stopped.

How far apart, in metres, were the two boats when the first boat stopped?

(Write only the number on your answer sheet.)

40. Susan was investigating patterns in square grids of numbers. The diagram shows a pattern she found.

sum of diagonal = 1

1	2
3	4

sum of diagonal = 5

1	2	3
4	5	6
7	8	9

sum of diagonal = 15

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

sum of diagonal = 34

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

sum of diagonal = 65

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36

sum of diagonal = 111

The sum of one diagonal of a square grid forms a pattern that is related to the square number in the bottom right-hand corner.

Susan found that the diagonal sum of a square grid was 5335.

What number would appear in the square in the bottom right-hand corner of this square grid?

(Write only the number on your answer sheet.)

MA4A ICAS test – summary of learners' responses

Question Number	Category	Description	Ans	NLC Percentages						Difficulty
				% Ach	A	B	C	D	Blank	
1			A	39%	39%	7%	8%	43%	2%	4
2			A	62%	62%	8%	10%	14%	5%	1
3			C	48%	18%	15%	48%	13%	5%	2
4			C	33%	16%	31%	33%	19%	1%	8
5			D	26%	33%	24%	9%	26%	8%	16
6			D	31%	41%	14%	9%	31%	4%	10
7			B	20%	14%	30%	20%	24%	12%	24
8			B	23%	22%	23%	12%	40%	3%	20
9			A	25%	25%	13%	16%	36%	9%	18
10			C	29%	14%	19%	29%	28%	10%	11
11			B	25%	38%	25%	18%	10%	9%	19
12			C	27%	51%	12%	27%	2%	8%	14
13			B	46%	18%	46%	9%	25%	2%	3
14			A	23%	23%	24%	13%	37%	3%	21
15			C	26%	22%	25%	26%	18%	10%	17
16			C	27%	26%	13%	27%	19%	15%	15
17			B	23%	29%	23%	22%	18%	9%	22
18			B	36%	36%	21%	7%	23%	13%	7
19			B	13%	48%	13%	14%	9%	14%	33
20			D	21%	34%	29%	10%	21%	6%	23
21			A	37%	37%	19%	15%	16%	12%	6
22			B	38%	20%	38%	11%	21%	10%	5
23			D	16%	24%	21%	22%	16%	18%	28
24			D	13%	35%	18%	20%	13%	14%	34
25			A	18%	18%	23%	28%	21%	11%	26
26			C	19%	40%	18%	19%	8%	15%	25
27			D	15%	29%	18%	18%	15%	21%	29
28			B	29%	5%	29%	35%	16%	14%	12
29			A	9%	9%	16%	44%	13%	16%	35
30			D	18%	26%	19%	19%	18%	20%	27
31			D	14%	20%	34%	15%	14%	16%	32
32			B	29%	11%	29%	27%	15%	18%	13
33			D	33%	15%	19%	11%	33%	22%	9
34			A	15%	15%	18%	24%	22%	22%	30
35			A	15%	15%	24%	21%	12%	28%	31

ANSWER SHEET :

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
15	A	B	C	D
16	A	B	C	D
17	A	B	C	D
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D
21	A	B	C	D
22	A	B	C	D
23	A	B	C	D
24	A	B	C	D
25	A	B	C	D
26	A	B	C	D
27	A	B	C	D
28	A	B	C	D
29	A	B	C	D
30	A	B	C	D
31	A	B	C	D
32	A	B	C	D
33	A	B	C	D
34	A	B	C	D
35	A	B	C	D

36

37 $(ac+b)^{(a-b)}$
$=(abc)^{ab}$

38

39

40

Exponents Investigation

Steps for completing this investigation:

1. Fill in the **answers** from the letter **A upwards**.
2. Fill in the **exponent** column from the letter **B upwards**.
3. **Follow the pattern** in the **answer column** and fill in the answers from the letter **A downwards.**
4. **Follow the pattern** in the exponent column and fill in the **exponent column** from the letter **B downwards.**
5. Complete the pattern in the middle column by filling in the empty block.

	Exponential Form		Answer	
		$\frac{3\times3\times3\times3\times3}{1}$		
		$\frac{3\times3\times3\times3}{1}$		
		$\frac{3\times3\times3}{1}$		
		$\frac{3\times3}{1}$	9	
B	3^1	$\frac{3}{1}$		A
		$\frac{1}{3}$		
		$\frac{1}{3\times3}$		
		$\frac{1}{3\times3\times3}$		
		$\frac{1}{3\times3\times3\times3}$		

INVESTIGATION

Follow the pattern, to fill in the blanks.

1.

Expanded form	$\frac{1}{3\times3\times3\times3}$	$\frac{1}{3\times3\times3}$	$\frac{1}{3\times3}$	$\frac{1}{3}$	$\frac{1}{1}$ or	$\frac{3}{3}$	$\frac{3\times3}{1}$	$\frac{3\times3\times3}{1}$	$\frac{3\times3\times3\times3}{1}$
Exponential form	3^{-4}	3^{-3}	3^{-2}	3^{-1}	3^{0}	3^{1}	3^{2}	3^{3}	3^{4}
Positive exponential form	$\frac{1}{3^4}$	$\frac{1}{3^3}$	$\frac{1}{3^2}$	$\frac{1}{3^1}$	$\frac{1}{3^1}$	$\frac{3}{1}$	$\frac{3^2}{1}$	$\frac{3^3}{1}$	$\frac{3^4}{1}$
Answer	$\frac{1}{81}$	$\frac{1}{27}$	$\frac{1}{9}$	$\frac{1}{3}$	1	3	9	27	81

2.

Expanded form	$\frac{1}{2\times2\times2\times2}$	$\frac{1}{2\times2\times2}$	$\frac{1}{2\times2}$	$\frac{1}{2}$	$\frac{1}{1}$ or	$\frac{2}{1}$	$\frac{2\times2}{1}$	$\frac{2\times2\times2}{1}$	$\frac{2\times2\times2\times2}{1}$
Exponential form	2^{-4}	2^{-3}	2^{-2}	2^{-1}	2^{0}	2^{1}	2^{2}	2^{3}	2^{4}
Positive exponential form	$\frac{1}{2^4}$	$\frac{1}{2^3}$	$\frac{1}{2^2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{2}{1}$	$\frac{2^2}{1}$	$\frac{2^3}{1}$	$\frac{2^4}{1}$
Answer	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8	16

3. Write five different powers (with different bases) that will give an answer of 1.
$\frac{1}{2}, \frac{2}{2}, \frac{1}{3}, \frac{2}{1}, \frac{1}{1}$

4. When raising any base to an exponent of 0, what is the answer? 1

5. Write x^{-3} in a different way. $\frac{x^3}{1}$ $\frac{1}{x^3}$ (positive exponential form.)

6. Write down the steps for changing negative exponents to positive exponents. $\frac{2^4}{1} \rightarrow \frac{1}{2^4}$, when you put it like $\frac{1}{2^4}$ your answer will be in exponential form 2^{-4}

7. Simplify the following:

a. $5x^{-2}$
$5x^{-1} \cdot 5x^{-1}$
$= 25x^{-2}$

b. $(5x)^{-2}$
$(5x)^{-1}(5x)^{-1}$
$= 2$

c. $(\frac{2}{3})^{-4}$
$(\frac{2}{3})(\frac{2}{3})(\frac{2}{3})(\frac{2}{3})$
$= 1$

d. $2x^0 - (2x)^0$

Zaakir

INVESTIGATION

Follow the pattern, to fill in the blanks.

1.

Expanded form	$\frac{1}{3\times3\times3\times3}$	$\frac{1}{3\times3\times3}$	$\frac{1}{3\times3}$	$\frac{1}{3}$	$\frac{1}{1}$ or	$\frac{3}{1}$	$\frac{3\times3}{1}$	$\frac{3\times3\times3}{1}$	$\frac{3\times3\times3\times3}{1}$
Exponential form	3^{-4}	3^{-3}	3^{-2}	3^{-1}	3^{0}	3^{1}	3^{2}	3^{3}	3^{4}
Positive exponential form	$\frac{1}{3^4}$	$\frac{1}{3^3}$	$\frac{1}{3^2}$	$\frac{1}{3}$	3^0	$\frac{1}{3}$	$\frac{3^2}{1}$	$\frac{3^3}{1}$	$\frac{3^4}{1}$
Answer	$\frac{1}{81}$	$\frac{1}{27}$	$\frac{1}{9}$	$\frac{1}{3^1}$	1	3	9	27	81

2.

Expanded form	$\frac{1}{2\times2\times2\times2}$	$\frac{1}{2\times2\times2}$	$\frac{1}{2\times2}$	$\frac{1}{2}$	$\frac{1}{1}$ or	$\frac{2}{1}$	$\frac{2\times2}{1}$	$\frac{2\times2\times2}{1}$	$\frac{2\times2\times2\times2}{1}$
Exponential form	2^{-4}	2^{-3}	2^{-2}	2^{-1}	2^{0}	2^{1}	2^{2}	2^{3}	2^{4}
Positive exponential form	$\frac{1}{2^4}$	$\frac{1}{2^3}$	$\frac{1}{2^2}$	$\frac{1}{2}$	$\frac{2}{2}$	$\frac{2}{1}$	$\frac{2^2}{1}$	$\frac{2^3}{1}$	$\frac{2^4}{1}$
Answer	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8	16

3. Write five different powers (with different bases) that will give an answer of 1.
2^0; 1^5;

4. When raising any base to an exponent of 0, what is the answer? 1

5. Write x^{-3} in a different way. $\frac{1}{x^3}$

6. Write down the steps for changing negative exponents to positive exponents.

7. Simplify the following:

a. $5x^{-2}$ b. $(5x)^{-2}$ c. $(\frac{2}{3})^{-4}$ d. $2x^0 - (2x)^0$

MA 7B

Filmed Lesson Analysis

Discuss each row in the table below.

		Time Ref	Description
A	A time when you are **impressed** by a learner(s) thinking and why.		
B	A time when you are **surprised** by a learner(s) thinking and why.		
C	A time when you are **concerned** by a learner(s) thinking and why.		
D	A time when you are **unsure** by a learner(s) thinking and why.		
E	Something that happened in the lesson that you did not plan for in terms of the learners' mathematical thinking. How did you feel about it at the time and do you feel your response was successful.		
F	Something you did plan for in terms of the learners' mathematical thinking and how you feel it went (at the time and now).		
G	Something that you didn't think about at the time in relation to mathematical thinking but that you see on the video and your thoughts on this.		
H	Something that you feel is particularly challenging for you as a teacher and what you might do about it.		
I	After your discussion, do you have anything to say about the selected task?		
J	Anything else you would like to discuss.		

CHAPTER 10
APPENDICES

CHAPTER 10 APPENDICES

10.1 INTEGRATED STRATEGIC PLANNING FRAMEWORK FOR TEACHER EDUCATION AND DEVELOPMENT IN SOUTH AFRICA (DBE and DHET, 2011) ACTIVITY 3.3 (P. 14)

Full Version

Activity 3.3

Establish Professional Learning Communities (PLCs) to strengthen teacher professionalism

PLCs are communities that provide the setting and necessary support for groups of classroom teachers, school managers and subject advisors to participate collectively in determining their own developmental trajectories, and to set up activities that will drive their development.

a. The key players in the establishment of PLCs will be the provinces, districts, teacher organisations, subject-based professional teacher associations and, equally importantly, the teachers themselves.
b. In the initial stages PLCs will require substantial external input through well-trained facilitators (who could be subject advisors or trained mentor teachers); however, these facilitators must assist teachers to take control of their own development within a manageable timeframe. Specific projects, some already in existence, will be supported at the local level to enable the development and spread of PLCs.
c. While diagnostic self-assessments will help to identify areas that individual teachers must address, and engagement with appropriate CPD courses will be one way in which development will happen, the PLCs will also assist in this regard. Individual teachers will be able to highlight areas of weakness, and use expertise within the PLCs to help address their difficulties.
d. PLCs will assist teachers to integrate their own professional knowledge with the latest research-based knowledge about content and practice.
e. PLCs will allow groups of teachers to engage in a variety of activities including:
    - Developing expertise in the analysis of learner results on evidence-based assessments such as ANA and the NSC, among others, in order to determine teachers' own development trajectories;
    - Curriculum orientation activities e.g. activities to develop understanding of, and the ability to use, the Curriculum and Assessment Policy Statements;
    - Learning how to interpret and use curriculum support materials such as the workbooks currently being developed and distributed to teachers and schools by the DBE; and
    - Working together to learn from video records of practice and other learning materials.
f. The NICPD will support the work of PLCs by developing activities and materials that can help to stimulate their work.
g. DTDCs will be able to serve as the local central meeting venue for the PLCs, as they will be adequately resourced to support PLC activities.