THE EFFECT OF A MENTORING PROGRAMME

TARGETING SECONDARY SCHOOL

SCIENCE AND MATHEMATICS TEACHERS IN A

DEVELOPMENTAL CONTEXT

by

NORMA IRENE FRICKE

25387074

Submitted in fulfilment of the requirements for the degree

MASTERS OF EDUCATION (MEd)

in the

Faculty of Education

University of Pretoria

31 March 2008
## TABLE OF CONTENTS

List of acronyms ............................................................................................................................. 4  
Summary ......................................................................................................................................... 5 
Acknowledgements ......................................................................................................................... 6 

### Chapter 1 Introduction and Overview of this Study ................................................................. 7  
1.1 General Introduction: the need for INSET for maths and science teachers in the context of SA Education ................................................................................................... 7  
1.2 INSET strategies in common practice ............................................................................... 9  
1.3 Mentoring as an INSET strategy and introduction of the Teacher Mentorship Programme ...................................................................................................................... 11  
1.4 Putting the TMP in context: what is the level of operation of the TMP schools and teachers? ................................................................................................................... 13  
1.5 Initial challenges experienced by the Teacher Mentorship Programme ......................... 14  
1.6 Initial successes of the Teacher Mentorship Programme ................................................ 15  
1.7 Mentoring experienced teachers in developing contexts: a problem? ............................. 19  
1.8 The objectives of this study ............................................................................................. 20  
1.9 Research questions ........................................................................................................... 21  
1.10 Research Design and Methodology ................................................................................. 21  
1.11 Significance of this study .............................................................................................. 22 

### Chapter 2 Literature Review and Conceptual Framework .................................................... 23  
2.1 How does / should teacher support take place? ............................................................... 24  
2.2 What are the contextual factors affecting support programmes? ..................................... 30  
2.3 Which teachers respond best to professional development programmes and what can be achieved? ............................................................................................................. 32  
2.4 Conclusions from the literature: mentoring as recommended CPD methodology? ......... 36 

### Chapter 3 Nature and origin of the Teacher Mentorship Programme ................................... 40  
3.1 Introduction ..................................................................................................................... 40  
3.2 Role of the project leader / researcher ............................................................................. 41  
3.3 TMP Objectives ............................................................................................................... 42  
3.4 Selection of schools ......................................................................................................... 43  
3.5 Selection and characteristics of mentors .......................................................................... 45  
3.6 Initial design of the mentor intervention strategies .......................................................... 47  
3.7 Mentoring support programmes ...................................................................................... 53  
3.8 Strategy modifications for subsequent TMP programmes ............................................... 58  
3.9 Predicting the change process .......................................................................................... 65  
3.10 Framework of the research ........................................................................................... 66 

### Chapter 4 Research design and methodology ..................................................................... 67  
4.1 Choice of methodology / methodological framework ..................................................... 67  
4.2 Sampling .................................................................................................................... 68  
4.3 Research Design ........................................................................................................... 71  
4.4 Data collection ............................................................................................................. 77  
4.5 Data analysis ............................................................................................................... 84  
4.6 Trustworthiness of the research ..................................................................................... 87  
4.7 Role of the researcher ................................................................................................. 88
4.8 Limitations of the research ................................................................. 90
4.9 Compliance with ethical standards .......................................................... 90

Chapter 5 Data Presentation and Analysis .................................................. 92
5.1 Introduction .......................................................................................... 92
5.2 Demographics of participants ................................................................. 93
5.3 Research questions: analysis of data ....................................................... 105
5.3.1 Professional development of teachers .................................................. 106
5.3.2 Personal development of teachers ....................................................... 208
5.3.3 Social development of teachers: Teachers’ attitude to school and colleagues .................. 234
5.3.4 Comment on other aspects of the Teacher Mentorship Programme .......... 242

Chapter 6 Synthesis and Reflection ................................................................. 250
6.1 Introduction ........................................................................................ 250
6.2 Synthesis of the data: effect of mentoring on teachers ......................... 252
6.2.1 Professional development of teachers ................................................ 253
6.2.2 Personal development of teachers ....................................................... 261
6.2.3 Social development of teachers .......................................................... 265
6.2.4 Teachers’ comments on mentoring .................................................... 266
6.2.5 Mentors’ comments on mentoring ...................................................... 267
6.3 Implications for policy and practice ....................................................... 268
6.3.1 The need for CPD for in-service mathematics and science teachers .......... 268
6.3.2 The potential of mentoring as a CPD model ......................................... 269
6.3.3 Mentoring as a career path for teachers ............................................. 271
6.3.4 Mentoring themes and core functions of mentors ................................. 273
6.3.5 Mentoring as a change force .............................................................. 280
6.3.6 Further considerations for a mentoring model ..................................... 282
6.4 Limitations of the study ...................................................................... 283
6.5 Significance of the study ...................................................................... 284
6.6 Conclusion ....................................................................................... 285

References ................................................................................................. 287
APPENDIX 1 TMP matric results & learner numbers applying to study SET .......... 294
APPENDIX 2 Example of Profile of Implementation for science classroom ........ 297
APPENDIX 3 Year planner for TMP schools ............................................... 298
APPENDIX 4 TMP Educator report form ...................................................... 299
APPENDIX 5 Teacher questionnaire: General information ......................... 302
APPENDIX 6 Teacher questionnaire: Self-perception of competence .......... 313
APPENDIX 7 Teacher interview reference document .................................. 315
APPENDIX 8 Classroom observation document ......................................... 323
APPENDIX 9 Ethics clearance .................................................................... 330
List of acronyms

CASS  Continuous Assessment
CPD   Continuing professional development
DoE   Department of Education (National)
EBIT  Engineering, Built Environment and Information Technology Faculty
INSET In-service education and training
GDE   Gauteng Department of Education (a provincial department)
LO    Learning Outcome
NCS   National Curriculum Statements
OBE   Outcomes-Based Education
PEI   President’s Education Initiative Research Project
PDP   Professional development programme
PPT   Professional practice theory
SET   Science, Engineering and Technology
SPTD  Senior Primary Teaching Diploma
STEM  Science, Technology, Engineering and Maths
TMP   Teacher Mentorship Programme
TUT   Tshwane University of Technology
UP    University of Pretoria

Contact details: Irene Fricke

fricke@iafrica.com
rolf.irene.fricke@gmail.com
Summary

Many South African teachers have low levels of subject knowledge and poor teaching practices but are faced with the additional challenges of implementing a new curriculum and new methodologies for teaching and assessment. These factors combine to expose a teaching population that is generally ineffective, particularly in the case of mathematics and science teachers at under-resourced township schools.

The Teacher Mentorship Programme (TMP) is a mentoring programme for mathematics and science teachers focussed on remediating problem areas and revitalising teachers’ classroom practices. Mentors support individual teachers at their workplace and the programme includes all teachers in each of these departments at the schools.

This research inquiry is a case study of four TMP teachers. The effect of mentoring as an in-service training strategy is ascertained by considering the changes in their professional, personal and social development. The inquiry reveals firstly the effect of mentoring on the teachers and their practice and secondly what aspects of mentoring are responsible for bringing about such changes.

Using the teachers’ and mentors’ voices as informants and based on good practice as recommended by literature, a theory for a mentoring model is proposed as an effective and sustainable model for professional teacher development for mathematics and science teachers in developing contexts. The research findings of this study and the new mentoring model design may serve to enrich the knowledge base on INSET in the area of teachers who are situated in unsupportive schools in developing contexts.

Key Words:
Mentoring; mathematics; science; secondary school; teachers; developing context; INSET; professional development.
Acknowledgements

I would like to extend my deepest gratitude to a number of people who played a very important role in my life for so many years during the implementation of this project and subsequent completion of my research studies.

The TMP schools: Principals and teachers, with whom I worked so closely for more than three years and developed a wonderful rapport. Thank you for the initial toleration and subsequent real collaboration and the many hours of discussion. Thanks for allowing the mentors (and me) into your classes and particularly: thank you for your desire to grow and willingness to implement our suggestions into your practice. A great word of thanks in particular to the four teachers who were willing to share their experiences with me for the purpose of this research: as researcher, I am most grateful for the time you afforded me and your frank comments, while as project leader I am particularly thrilled that you recognised the potential this support model offered to help you to grow professionally and personally and the vigorous way in which you grasped all we had to give. Thank you.

The mentors: none of us knew how to do this thing when we started, and we all grew and learned together. Thank you for your professionalism and being open to treading an unknown path; thank you for being pro-active, sensitive to the teachers’ needs, flexible and dedicated. I am also grateful to you for allowing me to develop the project and put this research together by building on your experiences and insights that you shared with me in our many long meetings! You have had a great influence in education through your lifelong impact on the TMP teachers’ lives and classes.

My research supervisor, Professor Annemarie Hattingh: your observations were always incisive and astute and through these you assisted me to see the way to presenting a document which would be academically acute whilst allowing the ordinary voices to speak their minds (sometimes at length!). Thank you for supporting the concepts implemented in this professional development model and nonetheless being objective in assessing my research strategy.

Irene Fricke
Chapter 1  Introduction and Overview of this Study

1.1  General Introduction: the need for INSET for maths and science teachers in the context of SA Education

Mosibudi Mangena, Minister of Science and Technology, spoke of the importance of Science and Technology for the future economic growth and quality of life of South African people (Mangena, 2004). He addressed the issue of few black learners studying maths and science to matric, and pointed out the consequences: in a country where 79% of the population is African, only 13% of their youth (18 to 23) have access to higher education, and thus 79% of the population plays a minimal role in the workplace; some figures given were:

- Of 14000 engineers, only 2.6% are African.
- Of 33000 doctors, only 7.5% are African.
- Of 4000 dentists, only 1.6% are African.
- Of 500 actuaries, only 2.4% are African.

The Third International Mathematics and Science Study (TIMSS) in 1994/1995 and TIMSS-R (repeat survey in 1999) confirmed that South African learners are consistently weak in maths and science at the grade 8 level, compared with the other international participants. Amongst the many factors contributing to the low performance of these learners, a significant factor identified is the negative attitude and lack of competence of teachers: “On the whole, about half of the teachers reported feeling ill prepared to teach the content of either mathematics or the science curriculum. There appear to be few teachers with significant experience and a relatively small percentage have university level qualifications” (Howie, 1999, 38).

These problems are already apparent in a country where the Department of Education (DoE) is also introducing changes to the curriculum, requiring extensive and widespread training simply to support teachers in the implementation of these new approaches. Until recently, South Africa learners could study their subjects on the higher, standard, lower or functional grade, the first two generally being on offer in
most “academic” schools, but certainly the higher grade was preferable if a learner hoped to enter a field of tertiary study. In an attempt to please DoE exhortations to “improve your school’s pass rate” most schools simply disallowed or discouraged their learners from studying on the higher grade, so the school’s pass quantity may have looked good on paper but the quality was very poor. This syndrome was particularly prevalent in maths and science, two subjects historically regarded as “difficult”, but in reality this approach suited a very large percentage of the teaching population as their content knowledge was too poor for them to be competent in teaching their learning area on a higher grade level: the result was that many teachers omitted higher grade sections and in other sections taught to a lower level of understanding and application. Although this system of different grades will have been phased out by the end of 2008, the situation will in fact be more difficult for the teachers as all will be compelled to teach every curriculum section and generally to a higher level than that required by the standard grade requirements.

In a newspaper interview, Minister of Education, Naledi Pandor responded to the question of drawing more learners into maths and science by saying “…what we need is that all our schools, all 6500, must have competent, well trained teachers of maths and science” (Pandor, 2005, in Sunday Times, 19).

The problems addressed above are not exclusively South African: in a document “Before It’s Too Late”, a report by the National Commission on Mathematics and Science Teaching for the 21st Century in the United States of America, it is stated: “In an age now driven by the relentless necessity of technological advance, the current preparation that students in the United States receive in mathematics and science is, in a word, unacceptable.” The document refers to the students’ performance, as attested to by their TIMSS performance, amongst others, as “lacklustre”. Further, one of the messages contained in the report is “the most direct route to improving mathematics and science achievement for all students is better mathematics and science teaching” (Rosen, 2002, 7).

This national maths and science report attests that “the strongest predictors of lower student achievement are new teachers who are uncertified, or who hold less than a
minor in their teaching field” (Rosen, 2002, 18). The report therefore recommends improving the quality of teacher preparation and making continuing professional education available for teachers. The South African situation is not one of maths and science teachers being inexperienced beginners: by far the majority of them have been teaching for many years, but they are under-qualified for their posts. Therefore strategies adopted to improve teaching in these learning areas must recognise this fact, and address the situation by assisting and encouraging the teachers to reach their full potential within this limitation.

Professional development programmes for teachers are therefore advisable for all schools, no matter on what level they are functioning. Teachers in effective, well-resourced schools would benefit from programmes in which they are trained in the new methodologies, assisted to understand concepts, helped with assessment issues or get the opportunity to share ideas with colleagues. However, in the South African context, the biggest need for professional support and development programmes arises in the traditionally “black”, township or rural schools in which the biggest crisis in maths and science teaching and learning is evident.

1.2 INSET strategies in common practice

School development or school reform programmes may have an “outside-in” or “inside-out” format (Taylor, Muller & Vinjevold, 2003, 4), in which the former employs accountability measures to ensure improved levels of performance by teachers and schools, while the latter focuses on support activities within the school and may be specifically tailored to the needs of the school and teachers. While the former tends to emphasise the institution and products from the institution, the latter addresses the individual as essence to improvement within the school context; each suffers from limitations which would possibly be overcome were an approach adopted which incorporated both accountability and support measures, i.e. combining both inside-out and outside-in approaches. De Feiter et al (1995; 47) reference the term development as implying change that is internally guided, rather than externally imposed.
Taylor (2007) provides extensive discussion of education-improvement projects undertaken by both government structures and NGOs in the post-1994 period. Some approaches incorporating standards-based accountability resulted in “a dramatic turnaround in 2000” (2007, 525) but Taylor attests that it is difficult to ascertain what real improvements were made as the standard of the matriculation examination papers decreased in this period whilst further pass rate increases were provided for by changed moderation procedures. Other projects provided “a package of interventions” to poorly-performing schools but “the program did not fully meet its systemic intentions” although improvements in school results were impressive (Taylor, 2007, 525).

Systemic school reform projects exhibited success at the school and classroom levels in terms of school leadership and administration, financial planning and monitoring and support of teachers. Two problems were identified however: the “general level of management remained low” (Taylor, 2007, 527) and the fact that there is “virtually no support or monitoring from districts” (528) which are constantly in a state of flux; in particular, no monitoring is applied to grade levels lower than grade 12. A systemic initiative with a mathematics and science focus in certain schools made excellent gains at some schools but none at all in others: “such schools are impervious to the kinds of interventions applied to date by both the government and non-government sectors” (Taylor, 2007, 528). A second phase of this project changed focus to emphasise subject-specific content knowledge amongst teachers, providing monetary incentives for meeting certain criteria.

A 2004 survey by the South African Institute of Civil Engineers (SAICE) found more than fifty known organizations and corporate activities involved in outreach, awareness and support for mathematics, science and technology education at secondary schools but claimed that these generally had limited success and potential for sustainability (Horak et al., 2004, 6; Lawless, 2005). These activities included magnet / Saturday schools for learners and “adopt-a-school” policies by corporate bodies. Whilst there are many interventions attempting to address these or similar issues, many of them are “quick-fix” solutions (researcher’s opinion) as they offer support of learners already in their matric year, or support to grade 12 teachers only. It is doubtful if any of these interventions can bring about any sustainable change or
cause deep change as the learners’ foundations are already poor or they have already been committed to study on the standard grade.

Analysing 21 World Bank-supported educational change programs in developing countries, Verspoor (1989, 133, cited by Rogan, 2005, 5) points out that large-scale programs, whilst emphasizing the adoption of good strategies in principle, neglect the implementation process and hence achieve poor outcomes.

In a project involving extensive cooperation between Dutch universities and secondary schools in Southern Africa, three strategies were undertaken: bridging courses (learners leaving school and entering university); upgrading courses for teachers who were “un(der)qualified” (de Feiter et al, 1995, 4) and teachers’ in-service professional development programmes. However, the first two were phased out (for different reasons per country) and emphasis was placed on the INSET programmes. A number of different in-service strategies are noted incorporating elements of the following: exemplary teacher support materials, workshops, in-school teacher guidance, resource materials supplied to schools, teacher training courses and support to teacher associations (de Feiter et al, 1995, 7).

Although the combined affect of numerous intervention strategies in education has brought about generally improved pass and matriculation exemption rates, the number of learners writing maths in matric has decreased and while the percentage of learners passing on the Standard Grade has increased, this percentage has remained at between 4% and 5% for Higher Grade learners (Taylor, Muller & Vinjevold, 2003, 12).

1.3 Mentoring as an INSET strategy and introduction of the Teacher Mentorship Programme

What is mentoring?

Duncombe and Armour, (2004, 144) make the assumption that “every school contains expert and experienced teachers with a range of knowledge and experience that could be shared.” What if this assumption is incorrect, and one finds that there are none of these experts at the school? What if there is no range of experience but in fact the
teachers’ experience is exceptionally limited? What if there is no culture of sharing? This is the general experience with the schools in the Teacher Mentorship Programme (TMP). In these cases, a mentor may be Duncombe and Armour’s source of knowledge and experience, and through this intervention the pool of knowledge at the school could, over time, be enlarged whilst encouraging a sharing mind-set within departments or between groups of teachers, to build potential for future collaborative learning.

Mentors are defined broadly by Fish (1995: vii) as any teachers working in schools to improve the practice of student teachers. Edwards and Collison (1995) use the following descriptors for mentoring: “being a friend and counsellor” (7); being a “model and interpreter; … instructor; and … co-enquirer” (8) and ascribe to mentors functions which include caring, guiding and challenging. Thus, mentors would make life manageable for the teacher, “offer structured advice in joint planning sessions and making suggestions during evaluations of recent lessons” (8) and challenge teachers to reflect critically on past classroom actions or procedures. This last, however, was acknowledged as being undertaken by few mentors in their study. More detail on this question is covered in the literature review in chapter 2.

What is the Teacher Mentorship Programme?

This pilot professional development programme for teachers was initiated by the researcher in 2003/2004, within the Department of Civil Engineering at the University of Pretoria. The engineering industries in SA have for many years suffered from a shortage of manpower entering the field, from professional engineers to artisans and technicians, while the engineering departments at tertiary institutions are experiencing a shortage of matriculants applying to study in these fields, particularly from the historically disadvantaged schools. This recognition resulted in an education programme being initiated in an engineering faculty.

In an attempt to bring about sustainable change, the Teacher Mentorship Programme (TMP) addresses issues pertaining to maths and science teachers of grade 8 to 12 learners. The main thrust of the programme is focussed on the mentoring of maths and
science teachers and it offers on-site (in-school) support to the teachers, at individual meetings and classroom observations timetabled within the school programme.

This teacher-mentoring strategy is supported by a comprehensive programme, for both teachers and learners, of exposure to Science, Engineering and Technology (SET) and awareness of careers in the SET industry as well as management support for a variety of organisational issues. The ultimate outcome is intended to be the improved qualifications of the learners leaving school, in the hope that many more of them will enter the engineering fields. Detail on the mentoring process and nature of the programme is supplied in chapter 3.

1.4 Putting the TMP in context: what is the level of operation of the TMP schools and teachers?

There were between 48 and 52 maths and science teachers annually teaching in the five schools working with the TMP. Of these, less than 10% had the correct academic and professional qualifications to teach in their posts. The bulk of the teachers have Senior Primary Teaching Diplomas (SPTD), meaning they are qualified to teach to the end of grade 7. In addition, many of the teachers gained these diplomas at teaching colleges which were considered poor quality and phased out subsequent to the change of government in 1994 (Rogan, 2006, 17) and in many cases the quality or standard of the diplomas may be questionable (researcher’s own perception). The experiences with these teachers during the first year of the TMP implementation highlighted their lack of qualification, lack of teaching skill, and utter confusion with the OBE methodology introduced by the Department of Education in recent years, as well as their general incompetence with the various forms of assessment.

The schools involved in the programme could be described as “level one” in Rogan and Grayson’s (2003, 1188) profile of their capacity to support innovation: in summary, the physical resources are basic and textbooks inadequate, teachers under-qualified, learners have poor proficiency in English (the language of instruction), and school management is erratic. Implementation of TMP at a school assumes that the school timetable will provide the allocation of teaching periods to teachers and learners according to DoE regulations and then the TMP request is for timetables that
allow for the teachers to see the mentors in a scheduled free period (detail in chapter 3). Whilst the Principals welcome the presence of the mentors in the schools, frequently the practice of mentoring is difficult: for example, schools generally comply with TMP timetable requirements to a point, but are hesitant to fully implement the changes required by TMP staff for effective mentoring to be facilitated (particularly teacher and class allocations) or recommended for improved schooling (e.g. limiting non-teaching or “social” days, placing subject department meetings into the daily timetable, instituting monitoring systems for Principals and / or Heads of Department).

Rogan and Grayson (2003, 1175) cite Hopkins and MacGilchrist (1998) strategy of a “differentiated approach to implementation and professional development”, where a type-one strategy addresses the need to put low-performing schools on the road to becoming functional: in this strategy the small successes of achieving attainable goals motivates teachers by improving their confidence. Rogan (2006; 32) and Rogan and Grayson (2003, 1195) refer to a “Zone of Feasible Innovation” (ZFI): they recommend that new teaching practices instituted as a result of external intervention should be “realistic and achievable taking into account the capacity of the school”, and new strategies should only be just ahead of the teacher’s current practice. Such considerations guided the approach employed by the TMP with the participating teachers.

1.5 Initial challenges experienced by the Teacher Mentorship Programme

In their “Theory of schooling” Taylor, Muller & Vinjevold (2003, 83-84) identified four constructs necessary to address to bring about improvement in school functioning: curriculum design, school organisation, pedagogy, and evaluation. The experiences of the TMP confirmed that there are several factors within the school context which have an impact on running programmes of this nature in the schools, and hence a school-wide programme that addressed all of these issues concurrently would have the most chance of success.

The challenges experienced include general school organisational problems (incorrect teacher post allocation, non-functioning timetables, lack of book control and
monitoring systems, insufficient controls exhibited by principals); problems with teachers (lack of enthusiasm and commitment to the rigours and planning demanded by the programme, poor work ethic, lack of teaching or school role models to use as a reference point, lack of content knowledge and teaching skills) and occasionally problems that have their origins in the Department of Education or how the latter is perceived by the teachers. The TMP had to function as best it could within these limiting factors, always sensitive to the political environment in which it fell. For sustainability, a long-term project of this nature depends on the teachers involved remaining with the programme, but there is constant attrition of the teachers from the programme (for several reasons: personal, school-directed post changes and DoE-led teacher redeployment.)

Issues with the learners also contribute to the lack of enthusiasm and commitment on the part of the teachers: learners are unmotivated, and science and maths learners in particular do not see the relevance of these subjects in their lives. Poor socio-economic backgrounds contribute to many of the problems, for example hunger, absence from school, theft (of books, pens, calculators etc).

A dominant problem is the issue of language: none of the teachers or learners has English as their first language, but the language of instruction and assessment is English. In fact, in many cases the teachers’ English is so poor that they teach in the vernacular, further decreasing the learners’ chance of mastering the language. The written tasks set by the teachers are, in addition, frequently so poorly set out and explained that the learners do not understand what is required of them.

Whilst attempting to have input on many of these other issues, the TMP focuses on the teacher as the pivot to learner success.

1.6 Initial successes of the Teacher Mentorship Programme

Much of the following information on TMP focus areas and outcomes is extracted from a TMP proposal document.

The aims and objectives of TMP are to:
• Improve teacher attitudes to, and knowledge of, subject teaching.
• Increase the number of learners taking maths and science to Matric (Grade 12).
• Improve learner achievements at school, i.e. increase their maths and science pass marks to allow them to qualify for further study in STEM fields.
• Develop more positive teacher attitudes to STEM.
• Develop more positive teacher attitudes to careers in STEM.
• Improve a school’s overall pass rate in maths and science.
• Make learners more positive in their attitude to STEM.
• Instill positive learner attitudes to careers in STEM.
• Increase numbers of learners entering careers in STEM.

The TMP focus areas are said to be:

- **Teachers**: attitudes to, and knowledge of, subject teaching; attitudes to STEM, attitudes to, and awareness of, careers in STEM. At the end of the programme it was anticipated that teachers would be able to:
  - begin planning their lessons;
  - show improved time management in the classes by delivering more structured lessons and completing more work per class period;
  - follow a year plan;
  - demonstrate improved understanding of the syllabus content;
  - complete the syllabus;
  - be able to organize and set up a practical work session and find and use the apparatus;
  - use a range of assessment instruments with the learners;
  - be prepared to give their own time to attend workshops.

- **Learners**: achievements at school, attitudes to STEM, attitudes to careers in STEM. At the end of the programme it was anticipated that the impact of the *Teacher Mentorship Programme* on the learners would be indicated by the following:
- Improved Matric science and maths pass rates.
- Greater numbers of matriculants qualifying to do further study in engineering fields.
- Greater numbers of learners choosing to study science and maths (not literacy) to Matric.
- Even with an ensured high standard of evaluation, improved subject averages at every level.

In terms of the TMP focus areas and aims and objectives, initial successes were claimed in a report that was supplied to the programmes’ financial sponsors. Brief discussion on successes with teachers and learners (as claimed in the report) follows:

1.6.1 Teachers

It is not expected to see the “ideal teacher” when the programme finishes at the schools, or one who is demonstrating really excellent teaching practice in his/her post, as the teachers’ qualifications for their posts and backgrounds preclude such a possibility. Instead, it is necessary to look for those teachers who are improving their classroom efficiency, thus judging indicators of success to be based on “a framework of self-improvement” (Fish, 1995, 94). Clearly the most improved teachers are to be found within the ranks of those who remained in the programme for the duration of its implementation at the schools (three years).

Anecdotal evidence, teacher reports and informal, unstructured questionnaires pointed to some success in assisting the teachers in their professional development, as indicated by improved planning and general organisation, better time management and hence completion of syllabus and portfolio work, greatly improved content knowledge, and a greater understanding of assessment procedures and OBE methodology. The teachers now know what it is like to have mastered the teaching content and be able to complete the syllabus by sticking to a planner. They have experienced the difference it makes to their classes, and they now have a desire to stay on top of their work.
Science teachers are now able to organise practicals and use their labs, which are more structured; they now see the difference experimental work makes to the learners' understanding of concepts and motivation in class. Generally, teachers have better control of all of their resources, and there is improved collaboration within subject departments, taking joint ownership of the successes of the learners in their learning area. These all have implications for sustainability in terms of teachers’ self-motivation and new skills.

Some problems arise out of success: TMP teachers now generally try to do their marking in the holidays (as opposed to doing this the following term in period time, when they should be teaching) but this is often a problem with the staff of other learning areas at the school (TMP staff who wish to load marks at the start of the new term tend to push the other staff for their marks too) and cause clashes with DoE workshops which are scheduled for the holidays.

Success (in principle) can also be seen in the following incidences: several teachers who relocated after being involved in only one or two years of TMP support successfully introduced TMP-based systems into their new departments and at one TMP school the HODs of all subjects requested to meet with TMP staff to learn about the practices implemented by the maths and science departments.

A new teacher said after spending time with the mentor: “This is the best experience I have ever had in my life. I have learnt more in this hour than I have ever learnt before.”

1.6.2 Learners

Success in terms of learner achievements is judged by matric marks and numbers of learners applying to study in SET fields, both of which are outcomes of the project. However, it is clarified that improvements in these aspects are not to be attributed solely to improved teaching (from the TMP) but also to the motivation and encouragement received by the learners from the comprehensive TMP SET-support programme. These results are attached as Appendix 1.
However, most teachers observe that learners from every grade are now going through to the next level stronger, as they are benefiting from work that is well planned and well presented. As a result teachers do not need to do as much remedial teaching each year to compensate for poor foundations in the previous year.

1.7 Mentoring experienced teachers in developing contexts: a problem?

TMP employs a mentoring model to provide professional development to experienced teachers at under-resourced schools. Measurement of the impact of such a CPD strategy on the teachers is difficult and only anecdotal evidence from teachers (as referred to in 1.6.1) is used in the TMP reports.

As detailed in the literature survey (chapter 2), most teacher mentoring processes (and hence research into this topic) take place with induction (newly-qualified or student) teachers and such implementation is generally in the context of well-resourced schools which provide fully for all the mentors’ and mentees needs.

Herein lies a problem. For organisations or individuals wishing to establish mentoring programmes in the following context:

- with experienced but under-qualified teachers
- who have a great need for basic teaching support and CPD,
- who are situated in under-resourced schools in developing countries,
- in which the generally fragile education context does not support such professional development,

what information exists to inform these projects? Are improvements in teaching practice possible? If so, to what can such improvements be attributed?

There is little research in this field and a study providing a window into the practice of mentoring as a professional development strategy for experienced maths and science teachers in historically under-resourced schools has potential to inform where there are existing gaps in such knowledge.
1.8 The objectives of this study

The TMP is a comprehensive project focused on increasing the number of school-leaving learners with potential to enter SET industries. It does this by providing professional development of maths and science teachers through individual mentoring, but the project must facilitate this by also addressing many other systemic school problems which potentially have a negative impact on the project’s implementation at the schools. The project has as an outcome a whole-school improvement in the maths and science departments (therefore striving to bring about sustainable change), but this requires continuity of teachers receiving the mentoring support and has proved to be difficult to achieve due to teacher movement between learning areas or schools.

This study considers the effect of the programme on only one aspect: the professional development of maths and science teachers who have been receiving individual mentoring for the full three-year duration of the project and who have demonstrated improved teaching practices, according to the mentors.

In this way the study may cast light on the potential that a programme of this nature, i.e. individual teacher mentoring, may have for developing teachers in their professional capacity. Della Fish (1995, 158) expresses “good work in professional practice … (as) … a repertoire of skills, abilities, capacities, subject knowledge, personal attributes, personality and ability to work with other professionals” in the context of the teacher’s workplace. This study will highlight what can be / has been achieved by teachers in their professional development despite the apparent obstacles provided by the school and educational climate in which they find themselves and considers the possible sources of such improvements.

This study may also assist in reviewing the effectiveness of the TMP model (in the aspect of teacher support), and information gained may be useful to guide the next steps of this flexible, needs-driven programme. Literature research into the concept of mentorship undoubtedly has the potential to benefit the curriculum or reform implementation process, although most of the literature on mentoring has to do with
mentoring newly trained teachers at the start of their careers, and within education systems that are functioning efficiently.

It is in the field of teacher-mentoring in the context of generally unsupportive, under-resourced schools that this study has the potential to contribute new information to the general knowledge-base. The experiences of this programme may be of benefit to others involved in similar mentorship / teacher support programmes, particularly those in schools of similar nature to those within which the TMP finds itself and this study may have possible application and benefits to other INSET programmes. There are few research papers on INSET in the South African context; this study may serve to support the theories put forward in these papers.

1.9 Research questions

Research Question 1: Are there changes in the teacher’s maths and / or science teaching practices?
Sub-questions:

What are the teacher’s perceptions of the changes undergone in his / her own teaching practice?
What are the teacher’s observed (changes in) teaching practices?

Research Question 2: What aspects of mentoring influenced the changes (if any)?
Sub-questions:

To what does the teacher attribute such changes?
To what does the mentor attribute such changes?

1.10 Research Design and Methodology

A qualitative research design has been selected as being the best to use with this study that is located in an interpretive context.

Participants were selected through a process of purposive sampling as those teachers who had been with the programme for the full three-year duration and who were identified by the mentors as having demonstrated greatest improvement in their work.
Data were collected via two questionnaires, semi-structured interviews and classroom observations, followed by further unstructured follow-up discussions. Field notes were compiled from the transcripts of the interviews and classroom observations. The transcripts were subsequently supplied to the teachers for their approval and acceptance. In addition, some data were obtained from TMP instruments designed for teacher and programme assessment. Detail on the above is provided in chapter 3.

1.11 Significance of this study

The significance of this study is detailed in 6.5; however the significance may be summarised as the study’s contribution to the following fields of research in which there is a gap in the knowledge base:

- INSET in the South African context, particularly in the area of teachers with poor academic background who are situated in unsupportive schools.
- Research of an investigative nature (which models might best embody particular values) or evaluative nature (which models work best under specific conditions) in the South African context.
- Mentoring those teachers who have already been in the profession for some years, particularly in schools that are under-resourced and under-achieving.

The research findings of this study may be used to inform policy on the transformational process and act as a basis for making recommendations to the DoE or NGOs for the practice strategies of future teacher professional development programmes for in-service training.
Chapter 2 Literature Review and Conceptual Framework

A review of the literature dealing with the mentoring of experienced, in-service teachers as a model of professional development will serve to inform this study, particularly where the literature focuses on teachers in schools that are non- (or poorly) functioning. It will clarify concepts and hence provide a conceptual framework which will guide the inquiry and research and which will provide an academic base for researching the effect of mentoring on teachers’ practices.

The approach taken in this literature review will be to consider what the literature tells the reader about the aspect under consideration and thereafter relate it to the TMP situation. However, whereas there is extensive literature on mentoring new (beginning or induction) teachers and pre-service (student) teachers, the coverage of mentoring teachers who have already been in the industry for some years is more limited, particularly in schools that are under-resourced and under-achieving: the case of the TMP schools. Extensive literature is dedicated to research and discussion of mentors as providers of support and professional guidance to student teachers, but less attention has been paid to researching mentors in the role of counselling and developing teachers who already have many years of experience.

Maynard (1997, 19) reflects that mentors working with student-teachers during their last block of teaching experience must use different strategies from those applied when working with students on their initial school experience; this observation can thus be extended to apply to the mentoring of teachers who have been teaching for several years already: the development strategies taken with these teachers will of necessity be very different from those with student or first-year teachers. Nonetheless, the research with mentors of new teachers may be used to inform this present study as there are many elements and common strategies which may be transferable.

In propounding the desired attributes of mentors and their roles, Edwards and Collison (1995, 9) suggest that “mentoring consists of a set of skills that have to be learnt” and that good practitioners should not be expected to mentor others as simply another one of their professional school tasks, as “mentoring is not an instinctive activity”. However, Fish (1995: viii) notes that quality mentoring can be achieved
“dialectically and empirically, not by decree” (citing Alexander 1990, 72) and that mentors need to recognise their own strengths and uncertainties and remain open-minded in debating new ways forward from a “thought-through position”: thus, “a training for mentors would not provide the basis for fulfilling such responsibilities” (Fish, 1995, 29) but what is required is mentor education. Fish continues by listing desired competences for mentors as including consideration of government and legal matters, rights and responsibilities of mentors and teachers, relationship of theory and practice, various teaching practice strategies and assessment of student competences and issues relating to students, the school and professionalism (30-31).

What can be achieved by an INSET programme based on mentoring teachers at their schools? The focus of the literature search is on the intersection of these constructs, as indicated by the figure below:

2.1 How does / should teacher support take place?

Two broad views of teaching have been clarified by Fish as: a set of competences that the teacher must learn and mentor should advise and assess (technical rational: TR view) and/or a complex social activity which is dynamic and has a moral dimension
For the latter viewpoint the mentor must understand and recognise his/her own personal base to practice and that of the teacher being mentored, and understand how such beliefs and values impact on practice whilst assisting the teacher to engage in new approaches. Based on these views of teaching, Fish distinguishes between competency-based teacher education (1995, 45) (in which such competences may be observed and measured) and the reflective practitioner philosophy. The latter approach is acknowledged as being more demanding and requiring insight, intellect and energy, as it endeavours helping the teacher to be a member of the teaching profession, establishing “principled practice” (94) more than merely “learning to be a proficient classroom practitioner” (vii).

Duncombe and Armour (2004, 141) summarise the research of numerous others and recommend that “effective professional development is school-based, active, collaborative, progressive and focused closely on pupils’ learning” and that there is a need for subject-specific continuing professional development (CPD), which should be focused on individual teacher needs. Rogan (2006, 9) also speaks of the need for teacher development to be in-school, and furthermore goes on to say that both content knowledge and teaching strategies should be encompassed. These ideas are evident in the ideals and implementation of the TMP, in which programme the teacher support takes place at the teacher’s school during the school day, with on-going individual contact with a mentor who deals with the specific needs of each teacher, whilst focusing on the ultimate need to improve the learner’s potential to learn and succeed at school through improved teaching.

Such individual interaction between an inexperienced teacher and one who is more experienced (possibly a mentee and mentor respectively) allows the latter to better understand the mentee’s actual and potential developmental level and hence help her to achieve her personal zone of proximal development (Duncombe and Armour, 2004, 149). The zone of proximal development (ZPD) is offered as the distance between the teacher’s actual development level (what the teacher can do on his own) and potential development level (what can be achieved through the help of others).
Acknowledging the ZPD for a teacher’s learning of new concepts, Rogan (2006, 8) speaks of a Zone of Feasible Innovation (ZFI) applied to implementation of innovation: new strategies should only be just ahead of the teacher’s current practice (i.e. within her personal ZFI) and should build on this, using the concept of “scaffolding” to move the teacher into a higher development level.

Rogan (2006, 6) offers a profile of implementation (“an attempt to understand and express the extent to which the ideals of a set of curriculum proposals are being put into practice”, i.e. how Curriculum 2005 is being implemented): see an example of the profile for a science classroom in appendix 2. This profile is an attempt to “recognise current reality and then build on the strengths of various components of the educational system” (Rogan and Grayson, 2003, 1176) as opposed to identifying weaknesses and remediate them. Rogan’s observations in his researched school were that teachers currently operating on a level 1 on a profile of implementation (how Curriculum 2005 was being implemented) were being expected to implement the new curriculum on a level 4, (being closest to the ideal in terms of C2005 and also incorporating the practices of the lower levels) and hence were overwhelmed (Rogan, 2006, 24). What if participating teachers cannot be classified even on a level one in this profile? In such cases it provides a challenge to identify teachers’ strengths and avoid Rogan’s “deficit approach” (2003, 1176) of simply remediating weaknesses.

In Rogan’s opinion, (2006, 34-37) the teachers in his study required the following scaffolding and support: guiding effective group discussions to incorporate higher-level questions, time management, how to find and use information-rich resources (textbooks, newspapers etc), how to use science apparatus and present effective practical lessons, how to conduct open-ended investigations and experiments, how to incorporate societal issues into the curriculum, and particularly helping teachers to master the content of the subject they are teaching. A suggestion is made that the subject advisors (or curriculum implementers) should give much of this support: however, in the South African experience many of these advisors are not themselves able to do this effectively and hence the need for the services of other experts (possibly mentors).
Sweeney (2003, 123 – 124) recommends that in the case of university involvement in teacher professional development, one avoid an ivory tower mentality, but rather establish a level of trust; he advises not to critique the teacher’s classroom practice but to help him look objectively at his own practice (“why he did what”). The experience of the TMP supports these recommendations: the first year of the pilot programme, dedicated to establishing a relationship of trust and goodwill between the mentor and teacher, established a foundation from which the mentor and mentee in the following year collaborated to explore issues where the mentee teacher felt more vulnerable. The difference between cooperation and collaboration is stressed (Duncombe and Armour, 2004, 146) where cooperation may give advice and initial helpful discussion, but collaboration occurs when there is an active partnership with the same goal of solving a teacher’s particular problem areas.

Duncombe and Armour (2004, 143) make the observation that “courses” seldom provide successful professional development as they occur away from the school, not providing the teachers the opportunity to see the course usefulness in their own context, and seldom providing follow-up. In addition, teachers are seen as simply receiving knowledge at courses (2004, 148) and not having active involvement with it. Hence this “tradition” of teachers’ courses as the primary focus of teacher upgrading was intended to convey facts, skills and knowledge to teachers, whilst not measuring what was learned and subsequently implemented by the teachers (Duncombe and Armour, 2004, 156).

The participants in the inquiry-based science talks researched by Zhang, Krajcik, Sutherland, Wang, Wu, and Qian (2003, 498) solely participated in a “course” and there was no further follow-up to evaluate the impact of the course innovation on the teachers’ practice; however, the researchers recognize that the educators, while enthusiastic about the new approach, face real barriers to its implementation. The teachers in Rogan’s study (Rogan, 2006, 22) were positive about workshops they had received, but still wished for school-based professional development. The advantage of the TMP is that when such courses are given, the subsequent timetabled, regular
meetings of mentors and teachers allow for regular follow-up and progression towards effective implementation.

Lamie (2002, 138) sees key aspects in the process of implementing innovation to be relevance and feasibility, compatibility, knowledge, awareness of external factors, discussion and collaboration and adequate support and training. In emphasising the final point, she observes that imposed change will be unsuccessful unless teachers willing to undergo personal change are supported in this endeavour. Lamie (2002, 150) emphasizes giving teachers the opportunity to teach in practice sessions, building up their confidence and awareness, and allowing them to learn through the process of their teaching. Lamie highlights impact areas (or external / internal issues) that have a potential negative impact on teacher implementation of innovation: teacher confidence, practical constraints of textbooks and university entrance examinations; teacher and parental influence; teacher awareness of responsibility for own professional development and teacher training.

De Feiter et al (1991, 56) expound on three design criteria vital for the success of any in-service interventions: the design of the intervention, availability and design of support materials and existence / design of a structure to support teachers in integrating newly-acquired knowledge or skills into their repertoire.

Many opinions have been mooted as to the characteristics, roles and functions of mentors in teacher development programmes. Feiman-Nemser (1996, 3) cautions that “enthusiasm for mentoring has not been matched by clarity about the purposes of mentoring”; that lack of rigorous empirical scrutiny makes it unclear “what mentors should do, what they actually do, and what novices learn as a result” and that mentors may “promote conventional norms and practices, thus limiting reform” (1996, 1). She advocates that teachers be placed with mentors who are already reformers in their schools (2) and that the mentoring strategy of reform “be linked to a vision of good teaching, guided by an understanding of teacher learning, and supported by a professional culture that favours collaboration and inquiry” (1). This approach is echoed by Mohono-Mahlatsi and van Tonder (2007, 387) who refer to mentors as
skilled educators “who actively assist less experienced educators to obtain the expected experience and skills”.

The question of whether or not mentors should be chosen or assigned is acknowledged as difficult as “mentoring relationships are bound to be unpredictable” (Feiman-Nemser, 1996, 3) and that attempts at optimal matches should be eschewed for optimal conditions in which mentoring may take place. Whilst some mentor training may take place before mentoring duties commence, many mentors are untrained, more experienced teachers and “mentors are more likely to develop their practice as mentors … in the course of their work with novices” (Feiman-Nemser, 1996, 3). In their study of mentors used in a distance-education context, Mohono-Mahlatsi and van Tonder (2007, 384) point out that they have a role in promoting discussion and guiding responses. In contrast to a lecture-type approach, this approach challenges the mentored individual to ponder on and verbalise his/her thoughts on teaching practice and issues.

A definition of mentoring may include the following aspects: a deliberate, conscious, voluntary relationship that occurs between an experienced, employed, or retired person (the mentor) and one or more other persons (the partners/mentees); who are generally not in a direct, hierarchical or supervisory chain-of-command; typically focused on interpersonal support, guidance, mutual exchange, sharing of wisdom, coaching, and role modelling and with benefit to the community within which the mentoring takes place (Peer resources index, undated). These last points are echoed by Portner (in Mohono-Mahlatsi et al, 2007, 384) who claims that the four major functions of effective mentoring are relating, assessing, coaching and guiding.

If the model of implementation embodied by the TMP follows theoretically good practice, what is the potential for a teacher’s professional development when exposed to the mentoring over long duration and what are the limits imposed by the context in which s/he finds her/himself?
2.2 What are the contextual factors affecting support programmes?

De Feiter et al (1995; 44-47) cite the following as being constraints to teacher professional development: cultural differences, governance in education and quality of the teaching force.

Rogan’s construct Capacity to Support Innovation (Rogan, 2006, 7) incorporates four school factors that may either support or hinder implementation of new programmes: physical resources, teacher factors, learner factors and school ethos and management. The school under study in his research was poorly physically resourced, but well run with an ethos that appeared to support new innovations in education; the learners, however, were considered to have a poor attitude to their work, although they were cooperative in class. Rogan (2006, 36) asserts, in the context of supply of apparatus and materials to schools, “targeted provision should be based on what is actually needed, and what capacity exists to use whatever is delivered”. This last observation is echoed by Taylor (2007, 529) who suggests that it is not only what resources are in place at the school but how they are used that contributes to learning differentials. Students’ learning habits are also recognized to be factors in reform implementation by Zhang et al (2003, 478).

In contrast to the contextual factors in Rogan’s study, Sweeney’s (2003, 111) research took place in a large, well-resourced high school with a teacher who was extremely well qualified for his teaching post, desired to keep up-to-date with education research literature, had a broad range of experience, and encouraged the researcher’s involvement in his chemistry classes, which were given to honours and regular students. Few parallels are seen in the TMP experiences with their teachers, who generally are under-qualified for their posts and struggling with the most basic of teaching concepts.

Three out of four of Lamie’s (2002, 148) case study teachers were posted at academic high schools, in which most students aimed to attend university; although these were clearly motivated students this imposed its own constraints on the teachers as they were pressurised to teach “exam English” and therefore tended to de-emphasise the
implementation of the new curriculum. The hierarchical Japanese culture was pinpointed as having a profound impact on limiting a teacher’s personal development and change (Lamie, 2002, 149), thus highlighting the need for teacher development processes to include the whole school. In similar vein, the participants in the study of Zhang et al (2003, 481) were from schools interested in inquiry-based teaching and learning; almost all had a chemistry background and taught in schools or universities in strong economic areas (2003, 495). As in Lamie’s study, these teachers’ implementation of any innovative practice would be limited by the structure of college entrance exams (Zhang et al, 2003, 497).

In an earlier South African science education case study, Rogan (1985) revealed that innovative strategies for in-service education which proved successful in developed countries may also be applied in developing countries, but the context of the developing country generally requires additional tactics to be implemented. Duncombe and Armour, (2004, 144) in extolling the virtues of collaborative learning, make the assumption that “every school contains expert and experienced teachers with a range of knowledge and experience that could be shared.” If this assumption is incorrect and one finds that there are none of these experts at the school, may a mentor not perform the function of Duncombe and Armour’s source of knowledge and experience?

The concept of “developmental planning” (Rogan, quoting Hargreaves and Hopkins, 1991, 32), requires a school to take ownership of its own development, implementing some changes and postponing others to later, depending on what was achievable in terms of the capacity of the school (within the ZFI applicable to the school itself). This implies that the school principal recognize the importance of the new innovation (Zhang et al, 2003, 478). The lack of opportunities / time provided at schools for collaborative learning (or other on-site support programmes) to take place limits the potential for professional teacher development: school structures do not normally allow for such time- and space-demanding activities (Duncombe and Armour, 2004, 157-8). Therefore it is necessary, at the start of such a programme, for the management structures to acknowledge the need and potential benefits of such programmes, and allow for them to be written into the daily or cyclical timetable.
(This has indeed been done at the TMP project schools, but a common experience is that the stated support of the Principal does not necessarily remain active over the long period of involvement.)

Various researchers have suggested different categorization techniques for schools (de Feiter, 1995; 44-47) indicating capacity to support change and differentiated strategies to INSET acknowledging these different capacities (Rogan, 2003, 1175 citing Hopkins et al, 1998)

So if one accepts, as in the TMP programme, that the school management has accepted the presence an intervention programme of this nature, what may a teacher achieve in his/her search for professional development and would such impacts be sustained?

2.3 Which teachers respond best to professional development programmes and what can be achieved?

Typical problems seen in African science classrooms are teacher-talk classes with passive learners; lessons characterised by a lack of learner questioning; question-and-answer routines demanding only basic recall with incorrect answers generally ignored and whole-class activities of writing tracts in books (De Feiter (1991, 34) quoting Prophet, 1990; Horak, 2004 and Fricke, 2008). This was the starting point of most of the TMP teachers in terms of their teaching strategies.

Effective maths and science teaching is proposed by Carey (1989; cited by de Feiter, 1991, 35) to embrace three aspects: knowledge, understanding and problem solving, and “positive attitudes and equitable outcomes”, described as “personal development; appreciation of the relevance of science subjects”. It behoves professional development programmes to motivate and support teachers as they make changes in their classroom practice to present effective lessons. De Feiter et al (1991, 39) wonder “whether the innovation gap is too big to bridge”. They recommend prioritising conventional teaching approaches (making teachers competent and confident in basic skills) rather than striving to get teachers to master more complex, student-centred
approaches, but making teachers aware of and open-minded to these approaches. In this recommendation they are effectively proposing that Fish’s (1995, x) technical rational view of teaching be promoted in terms of a basis for teacher development programmes in the types of schools in which they worked, rather than her reflective practitioner view.

Teachers’ attitudes to change are frequently cited as a determinant of their change in practice; however, Lamie (2002, 146-148) identified that this is not necessarily the case. Although four case study teachers indicated a positive attitude to a certain aspect of their new implementation, none of them actually changed their practice; however, in other aspects of the implementation an initial practice change actually subsequently brought about a change in attitude, while in some incidences there was an observed change in attitude simultaneous with change in practice. However, Maree and Fraser (2004, 31) emphasise that to make meaningful change in their own practice teachers must understand and be certain of value that the change will bring.

Of the personal attributes of teachers identified by Lamie (2002, 148) as vital to successful professional development, teacher confidence and motivation are emphasised (a lack in confidence may have a negative effect on practice and attitude). She quotes MacDonald (Lamie, 2002, 150): “It is the quality of the teachers themselves and the nature of their commitment to change that determines the quality of teaching and the quality of school improvement”. 

Sweeney (2003, 109) suggests that teachers should develop their own theory of professional practice, reflecting their values and beliefs related to teaching, and be open to professional development (willing to learn about, practice and evaluate new teaching activities), social development (work with fellow teachers to construct their beliefs and knowledge about teaching) and personal development (take control of their own learning in professional growth). He recommends that teachers analyse the relationships between teaching and learning, students and subject content (Sweeney, 2003, 128).
Zhang et al (2003, 478) also recognize teachers’ beliefs as a “sustainable and critical factor” affecting their practice as well as their acceptance or rejection of new teaching innovation. Specifically, Ernest (1989, in Zhang et al, 2003, 480) is cited as saying teachers’ beliefs about the nature of science (NOS) and science teaching may be used to understand and predict how they “make decisions about teaching”. It was found that most teachers held two conflicting views (traditional / empirical and non-traditional / constructivist) of the nature of science simultaneously (Zhang et al, 2003, 488). All the participants in this study were from schools interested in inquiry-based teaching and learning (Zhang et al, 2003, 481); almost all had a chemistry background and taught in schools or universities in strong economic areas (495). (These factors are, in fact, recognised as limitations to their particular study.)

The chemistry teacher receiving support in Sweeney’s research displayed a strong desire to improve his own practitioner professionalism whilst showing a keen interest in science education research (he was already involved in Post-Graduate research of his own). The teacher found that he modified his personal practice theories (PPTs) as the mentoring period went on and he continuously analysed this thoughts and practice. He began to “actively relate theory to practice … to elucidate what was happening in his classroom and why” (Sweeney, 2003, 122). Sweeney (2003, 126) adds that this practice must include sound content knowledge and teaching techniques.

In contrast, Rogan (2007, 6) found that the teachers participating in his research programme had great difficulty in understanding the new curriculum, and its focus on outcomes: there was “confusion”, they “struggled to find ways of coming to grips on how to implement it” (19), said they needed “total retraining” (23) and were “overwhelmed by the enormity of the task” (24). Nonetheless, these teachers expressed a strong desire to learn (17), were motivated and dedicated and cared for their learners (18) and in fact were in favour of the new curriculum (19). However, they had serious misconceptions about implementing the methodology and many sections of work (content or skills), which should essentially have been addressed by teaching, were left to be discovered through learners’ group work (30). In addition
most of the teachers have poor understanding of the subject content (37) and showed problems with time management and planning (31).

Sweeney’s ideals seem lofty, when required from the teachers described in Rogan’s study, as certainly they imply higher-order thinking skills and attributes on the part of the teacher. Thus this research may be limited in terms of its generalisability; however, when the concept of a theory of professional practice is explored with the learning teacher in a trusting relationship (with a mentor, for example) it would be possible, and worthwhile, to assist that teacher to build up her professional practice theory (PPT). In many cases it would be the first time that teacher is forced to think about, and verbalise, her own teaching practice. Duncombe and Armour (2004, 144) suggest that in such a collaborative relationship the teacher could explore and find her “tacit knowledge”, which she possesses without knowing so or recognising or valuing it.

Naidoo and Parker (2005, 53) compared maths teachers’ personal pedagogic identities with expected official pedagogic identities “constructed by curriculum policy and by the CTA” and observed tension between the teachers’ absolutist philosophies and the fallibilist (social-constructivist) philosophy required by the DoE for implementation of the new curriculum (Ernest, cited by Naidoo et al, 2005, 55). Teachers in their study evinced subject-centred identities and based their teaching on “pure, mathematical knowledge and skills for epistemological access to the discipline” (2005, 53). This purist ideology is in strong contrast to the ideology of social change expected by the new curriculum, for which teachers are required to build a new pedagogic identity redefining their position in society as agents for social change, while giving learners access to mathematical knowledge and skills is to be used as the “means to achieving social justice, equity and development” (2005, 54).

Purist ideologies of mathematics are regarded as elitist as their educational aims can only be achieved by a minority (Naidoo et al, 2005, 57) whilst the new curriculum projects mathematics as “human, corrigible, historically embedded and changing” (2005, 59), contributing to social change, culture-bound and value-laden and having four orientations: for intrinsic worth, utilitarian purposes, critical democratic
participation and further education in mathematics. This reconceptualisation of the nature of mathematics requires a change in the teachers’ educational identity: a very difficult process as the educational identity, through systematic socialisation, becomes insinuated as strong subject loyalty (Bernstein, cited by Naidoo et al, 2005, 55): such change was rejected by the teachers in Naidoo’s study (2005, 65).

Teachers are therefore required to reject their old view of mathematics as absolutist, purist, elitist and isolated from context and become resocialised into a new subject loyalty that includes an understanding of the social and political role of mathematics in society as contextualized and accessible (Naidoo et al, 2005, 67). For this to take place without trauma, teachers must be supported towards their recognition of their role in epistemological, social and political empowerment of all learners, not a select few. Thus they require extensive and deep foundational knowledge upon which must be built the values and skills underpinning their transition to a fallibilist philosophy.

Teachers’ personal factors may be a potential barrier to successful professional development; in the case of a collaborative or mentoring process a teacher must see the mentor as approachable, and trust her enough to admit to a problem; teachers must be willing to change their practice and try new techniques (Duncombe and Armour, 2004, 159-160).

Strategies adopted to improve teaching in maths and science must recognise the fact that many of the South African teachers in developing contexts are under-qualified for their posts and although they have years of experience in the field, their exposure to excellent teaching practice may be limited. CPD programmes should address the situation by assisting and encouraging the teachers to reach their full potential within their individual contexts.

2.4 Conclusions from the literature: mentoring as recommended CPD methodology?

In the review of these literature articles, significant comment on the recommended methodology for teacher professional development was found (particularly of students
and induction teachers), the impact of the school context on this support, and the characteristics and achievements of teachers who benefited from the support. These are summarised here with reference to the current study framework.

**Nature of successful PDPs**

Theories put forward in the literature on how professional teacher development programmes should take place appear to share the following ideas: such programmes should be on-site, focused on individual teacher needs and building on current teacher practice and level of development in small incremental steps. They should encompass both content knowledge and teaching strategies, and should entail regular follow-up to ascertain if there has been successful implementation of new learned strategies.

Teachers must be willing to undergo personal as well as professional change, and must be supported in this endeavour. Sweeney (2003, 124) stresses the importance of “mentoring and the careful design of mentoring … programs”. He emphasises the usefulness of thinking about one’s own practice, but explains that most teachers are isolated from help or incentive in this process; a mentor-mentee relationship may alleviate this problem, if such a relationship is built on trust and support rather than critique. All of these strategies are implemented by the TMP.

**School contextual factors**

There are many contextual factors that could enable or impede the implementation of a PDP. Within the context of schools with adequate physical resources, a supportive school ethos and management that will take ownership of the school’s own development, where the learners are cooperative and motivated to learn and the teachers are not driven by a need to teach to an exam, it is likely that teachers’ professional development programmes will have a great chance of success.

The schools in which the TMP took place can generally be categorised as not being fully able to support a PDP: physical resources are inadequate (and those that are there are poorly managed); learners at the schools are unmotivated and have a very poor work ethic; the school management, while outwardly lauding the idea of the support programme and in some aspects facilitating its implementation in the schools,
provides blocks to other aspects of the programme implementation where it is seen to
tread on toes, while the management staff are often incapable of (or prevented from)
taking decisions that would facilitate the process. Additionally, there is in all
likelihood no “expert teacher” (Duncombe and Armour, 2004, 144) who could
provide collegial support and training for staff development. This context calls for an
external change agent (possibly mentor) to act as experienced colleague and possibly
managerial support until such time as skills transferred enable the school to provide
for its own CPD.

If the teachers’ basic training and school support system is poor they may change their
practice in a superficial and mechanical way, not in any way that is meaningful and
sustainable. The teachers participating in this study have such poor background and
are situated in such unsupportive schools. What have they achieved through this
model, if anything at all? What can this strategy for teacher INSET potentially offer
teachers?

Participating teachers in INSET programmes
As indicated by contrasting the experiences of Rogan (2006) and Sweeney (2003),
and the teacher competences described by de Feiter et al (1995) and Fish (1995) for
example, teachers have widely differing needs depending on their background; in the
context of many dysfunctional or poorly-performing South African schools, the
teachers have not contemplated issues of their PPT, and they need support with very
basic issues, in a strategy focusing on Fish’s technical rational view of teaching to
attain specific competences.

Some of the teacher characteristics identified in the literature as being essential for
development include their attitude to change, confidence and motivation, identifying
their own theory of professional practice, reflecting their values and beliefs related to
teaching (Sweeney, 2003, 109); they should be open to professional development
(willing to learn about, practice and evaluate new teaching activities), social
development (work with fellow teachers to construct their beliefs and knowledge
about teaching) and personal development (take control of their own learning).
However, personal factors may be a barrier to successful teacher reform, and further
research in an endeavour to pinpoint some of these factors or characteristics would certainly have potential to enrich PDP programmes.

A mentoring relationship has the potential for excellent collaboration to achieve the goal of solving the teacher’s problems, but the success of this relationship is somewhat at the mercy of the personality of the mentee (teacher being supported) and the context of his/her environment.

Duncombe and Armour’s (2004, 161) ten characteristics of successful collaborations include shared decision-making, long-term commitment, dynamic nature and manageable agenda. The first three factors are evident in the way in which TMP was implemented; perhaps the most difficult factor to deal with effectively is the manageable agenda: the amount of work to do, and support required by the TMP teachers, is too large to manage in the given time-frame, and the approach may therefore suffer and be inadequate as a result of the pressure. In cases of implementation in such schools, it is therefore vital that the project be very long-term, taking place over many years, as opposed to the short-term research projects of Sweeney (2003), Lamie (2002) and Zhang et al (2003).

It is in the area of teachers with poor academic background who are situated in unsupportive schools where the study has the potential to extend previous research, and fill in the gaps in the knowledge base. Very little research has been done in schools that are at a very low level of performance, so this research will have value in that it addresses an under-represented group.
Chapter 3  Nature and origin of the Teacher Mentorship Programme

This chapter provides some detail on the TMP regarding its origins, implementation strategies (and rationale behind changes thereto) and some problems experienced. This is by no means comprehensive but allows the reader insight into the complexities of initiating and implementing programmes of this nature in developing contexts.

3.1  Introduction

“(O)wing to inadequate opportunities and resources for teaching and learning in traditionally disadvantaged schools, black learners … find themselves in an educational situation that rarely promotes optimal actualization of their personal potential and satisfactory acquiring of new knowledge and skills” (Maree et al, 2006, 230). The Department of Civil and Biosystems Engineering of the University of Pretoria, mindful of the dearth of post-school students entering the fields of science, engineering and technology for study or employment, and the role of the learners’ schooling in this deficiency, provides ongoing outreach and awareness creation projects to teachers and learners from historically disadvantaged schools. The outcome of these is focused on increasing the number of learners motivated and qualifying to study STEM courses at tertiary institutions.

It became clear that the teachers were the most influential factor in learners’ school maths and science success and hence the Teacher Mentorship Programme (TMP) was developed and launched in 2003. The main aim was to mentor and give support to maths and science teachers at previously disadvantaged schools to ensure improved qualifications of the Grade 12 learners in the hope that many more of them would enter careers in science and engineering.
3.2 Role of the project leader / researcher

The TMP concept was conceived by Irene Fricke who at the time was contracted to the Department of Civil Engineering at the University of Pretoria to coordinate and implement several other outreach programmes.

A qualified secondary school maths and science teacher, my experience in science education had been with learners in secondary schools (teaching and running departments at “privileged” schools but also teaching “historically disadvantaged” learners at a unique school providing matric upgrading qualifications), and with secondary-school teachers (through providing “winter school” classes for teachers, also one-day workshops and particularly upgrading courses provided from the University of Pretoria). Extensive exposure to science education revealed broad teacher needs and many problems in the system and prompted me to design a programme of long duration that provided extensive contact between teachers and support providers that could possibly address these needs and facilitate sustainable changes.

The apparent needs in science and maths education overlapped with the needs of the engineering community and highlighted the opportunity for the latter to invest in a programme that would address the problems of few learners (particularly from the “township” and rural schools) entering the SET industries. Thus, with financial sponsorship from engineering organisations, TMP was implemented from the base of the Engineering, Built Environment and Information Technology (EBIT) Faculty.

The project leadership and management, fund-raising and strategic development were all undertaken by the project leader, as was all interaction with Departments of Education, funding companies and the schools (except for the actual mentoring of teachers). Feedback to the EBIT faculty was always well received whilst representatives from the faculty were invited to all appropriate functions and workshops.
As project leader and programme creator, I relied on extensive educational experience, knowledge and instinct in the initial project design, but implemented regular internal assessments with teachers to assess under-addressed needs, the impact of the programme on the teachers and their attitudes to it. The TMP is flexible and dynamic; with no static point of departure, needs are addressed as they arise. The mentors were also involved in teacher and strategy assessment on an on-going basis and this frequently resulted in changed strategies as more was learned about the teachers and their teaching context. I enrolled for this particular study (Masters’ Degree in Education) partly to serve the purpose of informing the project’s implementation strategies and partly in an attempt to do an academic assessment of the programme’s impacts.

Therefore, the project’s creator, leader and manager is also the current researcher. Whilst this has great potential for bias, I also believe that my in-depth knowledge of all aspects of the project enable me to make informed assessments and decisions and facilitate a focused search for truth. The possible limitation of being both researcher and project leader is discussed further in section 4.6.

3.3 TMP Objectives

The objectives of capacity building in the pre-pilot were defined as follows (Horak and Fricke, 2004):

- Change educators’ mindset: assist them to see mathematics and science as not difficult, just different.
- Help educators to understand and apply the techniques of teaching and learning.
- Assist each educator to develop a portfolio of evidence of professionalism.
- Motivate educators and restore their confidence and self-esteem as a result of being better informed.
- Restore educators’ belief in teaching and learning.
The TMP aims and objectives for further programmes were extended to:

- Improve teacher attitudes to, and knowledge of, subject teaching.
- Increase the number of learners taking maths and science to Matric (Grade 12).
- Improve learner achievements at school, i.e. increase their maths and science pass marks to allow them to qualify for further study in STEM fields.
- Develop more positive teacher attitudes to STEM.
- Develop more positive teacher attitudes to careers in STEM.
- Improve a school’s overall pass rate in maths and science.
- Make learners more positive in their attitude to STEM.
- Instill positive learner attitudes to careers in STEM.
- Increase numbers of learners entering careers in STEM.

However indirectly, the TMP intends to address the skills shortage in the country by focusing on fundamental capacity building, i.e. by working directly with teachers in the schools. The aim is to provide a programme that is sustainable.

3.4 Selection of schools

Early funding and support enabled the implementation of a pre-pilot study in the second semester of 2003, in a school nominated by the funders. This pre-pilot implementation was very useful as a reference to develop the real (pilot) TMP implementation and sort out procedures and problems.

Having received permission from the Department of Education and relevant district office to initiate the pilot programme in their schools in 2004, the TMP project leader initially met with the Principal and Heads of Department of science and mathematics at each school in the Mamelodi area in the last quarter of 2003 to introduce the project concept to them and invite them and their maths and science teaching staff to a TMP workshop at the local teachers’ centre. At this workshop those present were informed in depth of the programme details, potential benefits and implications for the school and the teachers. Subsequently, Principals were invited to apply for the programme to
be implemented in their schools: it was believed that this buy-in process theoretically ensured that all those involved really desired change and wished to be part of the programme.

Problems experienced during the phase of informing schools were as follows:

- It was not always possible to see the Principal and Heads of Department of science and mathematics at the school meetings, or one or more promised to attend but failed to do so. However, at every school the information about the subsequent workshop was communicated to the management structures.

- Whilst it was expected that approximately nineteen secondary schools would be represented at the subsequent open meeting, only nine schools attended. However, this was taken to be the first part of the screening process to eliminate those schools that did not wish to participate.

- Not all maths and science teachers were represented at the open workshop. This was unfortunate as full understanding of all aspects of the project by all prospective participants was regarded as being desirable before a school applied for the project.

- Only five schools of those represented at the meeting applied for the programme. Those schools participating proved to be some of the neediest in this area of Tshwane; although their matric pass rates ranged from 45% to 84%, the high percentage pass rates did not indicate quality passes, particularly in maths and science. The pre-pilot school had previously (2002) had an overall school pass rate of 88% but with no learners studying maths or science on the higher grade and pass rates of between 28 and 36 % for these two subjects. These facts indicated that the science and mathematics departments were not functioning efficiently and effectively, and justified intervention and support.

The participating schools signed a “Memorandum of Agreement” with the University of Pretoria and the Department of Education to formalise the relationship. A pilot
The project was thus started in January 2004 with six schools in the Tshwane area (five in the Mamelodi Township that had been through the application process and the one in Atteridgeville Township that had been used for the “pre-pilot” study) with non-University funding.

Regrettably, one of the Mamelodi schools (the only private school on the TMP roll) was removed from the programme during its second year of implementation due to non-compliance with many TMP requirements and hence making it impossible for effective mentoring to take place and for any progress to be made with the school. Before termination of the programme an extensive period of discussions between all three parties to the Memorandum of Agreement was held in an attempt to obtain the collaboration of school management, but to no avail.

3.5 Selection and characteristics of mentors

Two skilled and experienced teachers (one maths, one science) resigned their current DoE teaching posts to offer their services as TMP mentors. It was considered important that the mentors evidence the following attributes:

- Current skilled teachers at secondary schools (current knowledge of education systems was required and the mentors themselves should have achieved great success with their learners: in the mould of Mohono-Mahlatsi and van Tonder, 2007 and Duncombe and Armour, 2004);
- Positive attitude to the newly-implemented DoE methodology changes and had informed themselves of the new procedures;
- Previous experience as head of department and evidence of being proactive in this role (already reformers in their schools: Feiman-Nemser, 1996) and / or cluster leader (positive attitude, tolerance and understanding of working with other teachers were sought. Clusters are groups of schools that meet monthly to discuss issues, share tasks and moderation. Schools are grouped by the DoE hence each cluster contains teachers from schools of different backgrounds and cultures.)
- Previous experience with designing material to be used by others;
• Previous experience with workshop presentation.

The role of the mentor was to include the following functions:

• Assist educator to understand and master content of teaching material.
• Assist educator to understand and apply the techniques of teaching and learning.
• Assist educator to implement the new teaching methodology: a gradual move over to the new approach for ease of implementing change.
• Assist educator to understand need for, and become proficient in, time management strategies.
• Assist educator to manage resources.
• Facilitate implementation of departmental meetings.
• Assist HODs to realise the scope of their work.

The approach taken in the identification and appointment of mentors acknowledged mentoring techniques as skills to be learnt empirically (Edwards and Collison, 1995; Fish, 1995) and that mentors need to recognise their own strengths and uncertainties and remain open-minded in debating new ways forward to “actively assist less experienced educators to obtain the expected experience and skills” (Mohono-Mahlatsi and van Tonder, 2007, 387). It was necessary to be mindful of the fact that, in the case of TMP as opposed to most other education mentoring programmes, the teachers to be mentored were “less experienced educators” not necessarily in terms of years of experience but rather lack of exposure to excellent practice.

Half-way through the scheduled three-year programme, the project leader and mentors received training in mentorship and mentor principles through an independent mentor-training company which also ran two short workshops for the TMP teachers, to assess their progress and motivate and revitalise them for the last half of the programme. Feedback from the mentor-training company was exceptionally positive and indicated that the strategies being put in place were of sound basis and reaping rewards, whilst teachers indicated very positive responses to the process in which they were involved. Some ideas put forward by the training
company to facilitate the termination of the project were put in place in the last six months of the final year (detailed in 3.8).

3.6 Initial design of the mentor intervention strategies

TMP intervention was designed to be school-based (Duncombe et al, 2004, Rogan, 2006): to take place during the teachers’ free periods in school time, at their place of work, by experienced mentor teachers, occurring once in every seven-day cycle for at least a three year period to ensure sustainability.

This meant that all the TMP schools worked from the same year planner and 7-day cycle to facilitate ease of mentors’ rotation to schools: thus both mentors (maths and science) attended at the same school on one day in each cycle, during which time every maths and science teacher was timetabled with an individual meeting with the mentor. The mentors attended another school the following day and so on, until all schools had been seen in a cycle. The last two days in the cycle (days 6 and 7) were given over to office work at the university, during which time mentors prepared for the following cycle. These two “free” days (uncommitted to a particular school) also provided for flexibility in the cycle and were used when the schools requested a change if they had other commitments one week in their scheduled cycle plan. For elucidation, a sample year planner is included (appendix 3).

3.6.1 Mentor meetings

The TMP is needs-driven and therefore the underpinning philosophy of the mentors’ approach was to identify and meet the needs of the teachers (protégés) (Fricke et al, 2008). For a successful three-year contact period the first issue was to establish a relationship of trust (Sweeney, 2003) and goodwill between the teachers and mentors; and for this the teachers were initially asked: “How can I help you?” Without exception, the initial teacher concerns were Outcomes Based Education (OBE) methodology, Department of Education (DoE) requirements, assessment criteria and techniques (particularly for the teachers of grades 8 to 10) and portfolios and assessments (for the teachers of the more senior grades). There was no evaluative
component (except of the programme itself) and no critique of the teacher involved, bar assisting the teacher to self-assess.

It was only once these issues had been adequately addressed (a process that took almost the first year) that the mentors could initiate discussion about other teaching aspects (content issues, investigations and laboratory practicals) that they had identified as being the teachers’ needs, but about which the teachers were either unaware or felt vulnerable and exposed and hence did not raise themselves. It was found that no assumptions should be made about a teacher’s prior experience or understanding of a new task / concept that the mentor is introducing: concrete demonstrations or examples on the most basic level must be provided in almost every case. Individual interaction between an inexperienced teacher and one who is more experienced (protégé and mentor respectively) allows the latter to better understand the protégé’s actual and potential developmental level (after the theory of ZFI, Rogan, 2006).

Allowing for individuality, the teacher requirements have still been found to be remarkably consistent and very much in line with those opined by Rogan (2006). The teachers in his study required support in mastering the content of the subject they are teaching, effective time management, lesson preparation and how to: find and use information-rich resources (textbooks, newspapers etc); use science apparatus and present effective practical lessons; conduct open-ended investigations and experiments; incorporate societal issues into the curriculum; guide effective group discussions to incorporate higher-level questions and control their own resources (from files to science apparatus): to locate what resources they have, manage them, and learn how to use them.

The mentors assist the teachers to develop a portfolio of evidence of professionalism, but initial observation suggests that control resides with the mentors, as teachers tend to use the TMP instruments rather than create their own. The mentor must also act as a de facto Head of Department, whilst assisting the HOD to understand the breadth of his/her role and master such tasks.
3.6.2 Classroom observations

These are performed when the mentor has no scheduled meeting with any teacher. It is vital that the mentor observe the teacher while teaching, to adequately assess his or her mastery of the content, implementation of the mentor’s advice, teaching skills and classroom interactions. These also afford excellent opportunities to identify particular teacher needs.

Initially, mentors seldom saw the teachers addressing a new topic or explaining the work, except in those cases where the teachers were fully comfortable with their relationship with the mentor: it quickly became apparent that when the teacher knew the mentor was coming to observe a lesson, he/she conducted a revision class in order that the mentor sees a good lesson with children more on top of their work! This tendency changed early in the programme when the teachers realised the purpose of the observations.

Nonetheless, teachers were found to respond better to the mentors after a classroom observation - perhaps they felt more relaxed; knowing that the mentor had seen them at their worst and continued to accept them without judgement (Fricke et al, 2008). It is significant that TMP teachers by and large are happy to receive mentors into their classes and frequently request that they observe them teaching, understanding this to be informative and have great potential for their further professional development.

The mentors must walk a tight-rope: on the one hand they must be constantly supportive and non-judgemental of the teacher whilst assisting them with their teaching, and on the other hand they are obliged to expose their weaknesses before these can be addressed to help the teachers to become more professional. The mentors only rarely and only on request teach small portions of lessons to demonstrate to teachers how to introduce new sections or how to apply a new methodology.
3.6.3 Subject department meetings

In an attempt to facilitate subject department meetings, these were initially held under the control of TMP staff, often as combined maths and science meetings due to the fact that the issues were similar. Minutes taken and distributed were welcomed, as in many cases these were the only minutes the departments had of meetings and they were used to placate DoE representatives! School-driven subject department meetings were encouraged, for which the teachers were cajoled to set up agendas, draw up minutes, and discuss departmental aims, exam setting and marking policies, teacher progress, file preparation and organisation, science laboratory organisation, stock control and management.

This aspect of the programme has seen limited success; partly because the control of such meetings is the responsibility of the Head of Department, who has little interest, feels he/she does not have authority, or has no idea what to do (frequently being a Biology teacher). Subsequent to their teacher observations made at mentor school visits (see d below) TMP teachers have frequently assembled in small grade groups, but meetings are generally not recorded in minutes. It is necessary to obtain the support of the Principal, who should be encouraged to demand to be informed of meetings and receive minutes, which he should counter-sign with the HOD.

3.6.4 Mentor schools

It has become evident that many teachers, Heads of Department and even Principals at the “previously disadvantaged” TMP schools are evidencing very limited success in their jobs, not because they cannot do so or do not wish to, but because they are not entirely sure of what the job description entails. Most of these educators were themselves learners at dysfunctional schools, without good role models as exemplars. In some cases, these incumbents have also never had experience in another school with the benefits that would bring. As a consequence their frame of reference for professional practice is possibly another dysfunctional or inadequate teacher / HOD / Principal (Fricke et al, 2008).
“Mentor Schools” (local schools selected for their excellent results and potential as good role models) were thus solicited to become involved as a source of expertise and further resources. In one phase of this initiative, each science and maths teacher, each HOD, and each Principal from the TMP schools spent a day at a mentor school, armed with TMP-designed observation instruments in order to obtain the maximum benefit from their visit. The TMP teachers visited mentor schools on days in which the latter were holding subject department meetings: in this way, the TMP school teachers saw, in practice, the systems and methods that their mentors are trying to encourage them to adopt. The purpose was to develop a sense of professionalism in teachers and help them to define a notion of what constitutes “good practice” in the classroom and as a professional teacher. These mentor schools have a climate of learning and atmosphere which is, in many cases, not evident in the TMP schools.

The school visits were followed-up by TMP staff-facilitated subject meetings at the TMP schools, at which goals were set to implement those observations that were seen as being of potential benefit to the schools. TMP teachers responded positively to this initiative, which was reciprocated when interested teachers from the mentor schools spent a day at the TMP schools. This benefits both parties as the teachers from the mentor schools consequently obtain a realistic idea of the TMP teachers’ circumstances and become better empowered to assist them.

All senior science learners (grade 11 and 12) were provided with the opportunity to conduct portfolio experiments in the well-resourced laboratories of one of the mentor schools. This activity proved to be very stimulating to the learners: for the first time, they were able to do experiments themselves, practicing skills, making observations and drawing conclusions. However, in many cases it became apparent that teachers do not know how to prepare learners for practicals. This intervention was therefore also of benefit to the teachers, often because they themselves sometimes saw the experiment for the first time, and it also gave them the opportunity to assess their learners accurately whilst they were working in small groups.
3.6.5 Teacher Workshops

Duncombe and Armour (2004) observe that “courses” seldom provide successful professional development as they occur away from the school, do not demonstrate to teachers the course in their own context and seldom provide follow-up. Hence teachers’ courses are intended to convey facts, skills and knowledge to teachers, without measuring what was learned and subsequently implemented by the teachers.

The advantage of an on-site support programme such as the TMP, using workshops only as an add-on strategy, is that the mentors provide regular follow-up during their scheduled meetings with the teachers thus ensuring that new methods are understood and implemented correctly (Fricke et al, 2008).

Hence, compulsory Saturday workshops are held four times per year, the content of which were dictated by the teachers’ needs as identified by the mentors. Excellent speakers are outsourced and all workshops were received positively, as indicated by post-workshop evaluation questionnaires and subsequent teachers’ comments. An unexpected benefit of these workshops has been that the maths and science teachers from all five TMP schools have developed a bond and an identity, support each other in departmental cluster meetings and act as peer-assessors for a recently-introduced Departmental initiative. The group dynamic has also proved to be very motivational for individuals.

3.6.6 Programme assessment

Various strategies were used to assess the programme itself and teachers’ progress with the programme. Teachers are required to submit educator report forms to the mentors quarterly (incorporating a tool for self-evaluation and a tool for mentor evaluation: see appendix 4) and further teacher evaluation is done by means of classroom observations and annual feedback questionnaires.

Feedback was also received specifically on the nature of the intervention strategies used from an externally-appointed mentor-training organisation (discussed previously). A formative assessment was undertaken by an independent education
specialist towards the end of 2005, with a twelve-teacher sample, selected to represent teachers who were exhibiting a range of progress with TMP support. This revealed that the mentors were excellent and achieving good progress with teachers in terms of their content knowledge and some of their teaching practice. The generalised findings included: teachers are more confident in their classrooms and encourage more learner interaction and involvement in the lessons than previously, and they are able to submit comprehensive portfolios of higher standard than before to the DoE. The assessor believed that the issues most hampering large-scale improvement in learner results at that stage were lack of teacher preparation and insufficient work done by the learners. Both of these issues were held to go to work ethic and teachers’ lack of accountability for learners’ success. A further observation was that the programme is unable to adequately address broad systemic issues in the school (e.g. management issues) which directly impact on the efforts of the teachers.

3.6.7 Learners’ Incentives Scheme

Established half-way into the pilot programme, this awards scheme for learners at every grade level (initiated and financially supported by one of the main funders) became very motivational for learners and teachers alike.

3.7 Mentoring support programmes

3.7.1 General school issues

There are many contextual factors that could enable or impede the implementation of a Professional Development Programme. Rogan’s construct Capacity to Support Innovation (Rogan, 2006) incorporates four factors in this regard: physical resources, teacher factors, learner factors and school ethos and management. The schools involved in the TMP could be described as “level one” (of four levels) in Rogan and Grayson’s (2003) profile in their capacity to support innovation. Their physical resources are basic and textbooks inadequate, teachers are under-qualified, learners have poor proficiency in English (the language of instruction) and school management is erratic (Fricke and Horak, 2006).
The project leader engaged in meetings with school principals at least once per term (quarter) with a formal agenda to discuss issues pertaining to TMP in the schools and query problems on the part of the school. TMP experience of management has been that generally school issues can be discussed openly with the school management who are happy to hear of options, but in reality it takes a very long time for these options to be embraced and implemented as a new system at the school. Examples would be compliance with TMP requested timetable modifications to ensure mentors can meet with teachers; consideration of strategies across all learning areas to limit erosion of learners’ education time (for example, ensure that teachers are in class and teaching during period time; academic use of “social days”) or general TMP advice to facilitate smoother running of school systems.

The Principals’ attendance and involvement is also sought in subject department meetings in which goal-setting tasks are undertaken and require the Principals’ buy-in for implementation support and monitoring (for example particularly subsequent to comprehensive programmes e.g. teacher visits to mentor schools).

3.7.2 Resources

*Teachers:*

Teaching resources in general are in short supply and those actually at the schools are either poorly managed or not accessed at all (Fricke et al, 2008). Muwanga-Zake (2003, 3) confirms situations in other previously disadvantaged schools where equipment was not even unpacked due to the lack of familiarity with the equipment. In the case of the TMP schools, some were supplied with state-of-the-art computer rooms by the Provincial Department of Education, but these have never been used (or, in some cases, rooms even opened) in our time of working with the schools, due partly to fear of theft but mostly from a total lack of staff capacity to use the computers.

TMP maths and science teachers are assisted with stock-taking and shown how to use their resources. Where apparatus is lacking, this has been sourced from supporting schools and occasionally directly from suppliers, at cost or as a donation. Textbooks,
desperately needed by the teachers, are obtained by TMP from suppliers or supporting schools. Another valued support has been the supply of calculators to teachers (via a sponsor) and at cost to learners.

*Learners:*

Lack of learner textbooks is a very large problem: the schools have few textbooks, and certainly not sufficient for learners to have their own, either in class or to take home. The initial strategy adopted by TMP was to select workbooks for supply to the schools (sufficient for each learner to have his/her own) for the duration of the Teacher Mentorship Programme (i.e. 3 years) after which time they became the property of the schools. The books chosen covered the syllabi completely and provided learners and teachers with an extensive range of examples to use, for class work and homework. The answer books were given to the teachers.

This strategy failed, as learners did not bring the books to school or many teachers did not involve the use of the books in their periods. Hence the strategy was altered: mentors subsequently supplied relevant worksheets for every learner at the appropriate time in the curriculum, in an effort to ensure that all learners had sufficient learning materials to master the work and prepare themselves for assessment.

Another strategy was implemented in an attempt to address the language problems at the schools. With the permission of the DoE and school Principals, English language proficiency tests were administered to sample groups of learners from all grades. The results indicated that, based on the norms expected per grade, not one learner in the test samples at any of the schools has an English language proficiency even up to that of a grade 7 learner and there is no trend indicating an increase in marks as the learner progresses through the school, to higher grades. This is despite the fact that all learners attend English lessons daily; it would appear that the English classes are having no impact on the learners’ English proficiency. These results confirm observations that the TMP staff has made at the schools.
The Teacher Mentorship Programme is attempting to address the issues of maths and science teaching and learning at the schools, but language problems with both teachers and learners have a large negative impact on potential progress with the teachers and learners. Some of these problems are learners’ achievements in maths and science assessments not reflecting accurately their maths and science mastery but also their lack of understanding of the text; teachers’ language of instruction frequently taking place in the vernacular and poor teachers’ use of language in design of assessment material, as a result of which the learners do not actually understand what is required of them.

TMP staff compiled multilingual maths and science dictionaries for grades 8 to 12 and supplied these to the schools in an attempt to assist the learners to understand their maths and science text. Whilst many teachers made maximum use of these resources and were outspokenly positive about their benefit to both the learners and themselves, some teachers did not go to the trouble of giving learners access to the books.

3.7.3 Collaboration with the Department of Education

Full cooperation with the DoE has ensured that District officials support the programme. However, observations of some school organisational problems indicate that extensive assistance is required from the District IDS (Institutional Development and Support) officials. These problems included timetable issues, teacher allocation to classes and classrooms, poor use of school facilities and resources. Unfortunately IDS officials have many schools in their portfolios and do not appear to have time to identify and then attend to all the schools’ problems (Fricke et al, 2008).

In addition, District subject facilitators (advisers) seldom have time to assist teachers (Fricke et al, 2008). The DoE is currently introducing changes to the curriculum, in the FET phase, requiring extensive and widespread training of teachers for its implementation. The new curriculum requires extra content knowledge to be mastered as well as bringing with it a need to re-structure the school timetables.
Extensive Departmental training and support will be required from the subject facilitators and IDS officers to ensure that this proceeds effectively.

It is vital to liaise with District officials regularly and maintain open lines of communication with them as they can support requests to the schools thus giving greater likelihood of school cooperation (some experience has indicated lack of facilitator involvement where it is seen that other NGO support (i.e. TMP) is already being given) (Fricke et al, 2008). A downward maths trend at one school highlighted the need to keep District IDS officials and facilitators involved in the process, so that they have the correct expectations of the schools and can support the staff in the changes they are going through (see 3.9 for details).

One of the most vital aspects is for the DoE to ensure continuity of teachers within their teaching posts, to monitor teachers’ progress and provide them with positive support.

3.7.4 STEM support

If a learner is stimulated by maths and science, can see their value in his/her world, and is aware that there are options open to him/her in terms of possible careers in the field, then that learner will be a pleasure to teach and the teacher can fully explore his/her new teaching ideas and skills.

Thus in support of the more focussed mentoring and whole-school strategies a comprehensive programme is provided, for both teachers and learners, of exposure to STEM and awareness of careers in the STEM related industries. This includes other University of Pretoria outreach programmes including learner engineering workshops, speakers at schools (from industry, university students and successful school matriculants as they progress from the schools) and science-curriculum experiment workshops. An attempt was also made to influence the strategy of the University of Pretoria (UP) in terms of its programme for careers support to schools: where the TMP schools were previously not prioritised and omitted from the UP programme this issue was addressed to include them in the UP structure.
3.8 Strategy modifications for subsequent TMP programmes

Continuous reflection on the success (or lack thereof) of the various strategies resulted in new techniques being piloted at intervals throughout the programme. The following extract is taken verbatim from the 2005 TMP report to funders and DoE (made available in January 2006) and further changed strategies are discussed briefly at the end of this extract:

Lessons Learned: What did we learn? (Extract from 2005 TMP Report)

1.1 Mentoring Strategy

Yearly approaches may be recommended as:

- **Year 1:**
  - set up the initial framework between partners: contract, rules and expectations;
  - establish a relationship of trust between the teachers and mentors;
  - All meeting periods operate on the basis of “crisis management”: deal with teacher requests as to what they think their greatest needs are; supply a lot of material, particularly textbooks; encourage teachers constantly to adhere to the cycle plan to finish the syllabus. This year is specifically driven by the teachers’ perceived needs.

- **Year 2:**
  - focus on the subject content of what teachers are teaching,
  - continue the emphasis on planning, insisting on effective time management
  - Assist teachers in taking stock of what resources they have, organising them and mastering their use.
  - Identify requirements and work with the teacher and principal to endeavour to access these needed resources.
  - Initiate subject department meetings and guide their constructive use.
  - Most time is spent in meetings with teachers in the first half of the year; in the second half alternating cycles may be used purely for classroom observation, depending on the teachers’ needs.
- **Year 3:** This year involves new strategies to give more flexibility and increase potential for sustainability.

  - **First 6 months:** cycles of meetings alternate with some cycles of school visits for classroom observations; these may be done on different days from normal TMP days. This is followed by meeting cycles for feedback etc. The observation cycles allow for teachers to be observed unprepared, and with different classes, and give opportunity for flexibility and more individual focus, where more time may be spent with those teachers who need it. The mentors in this time act as “travelling HODs.”

  - **Second half of the year:** institute a “Freeze-unfreeze” period (a 3-cycle period of no visiting by the mentor helps teachers to focus on their requirements and needs and attempt to address them without the mentor’s help; the following unfreeze cycle allows them to direct contact sessions with the mentor to address these needs).

  - “Network mentoring” sessions are included in subject department meetings, where the mentor has questions directed at her from individuals within a group structure. This way all the teachers will benefit from each others’ questions, and see the benefit of subject discussion within a peer group.

### 1.2 School Selection and Teacher Strategy

The schools selected for the programme were those that applied, on the basis that if they wanted the programme in their schools the teachers would be motivated to work with the mentors. This assumption has proved accurate, but additional problems have been evident: the schools that applied for the programme did so because they were struggling particularly in their maths and science departments; this was because many of the maths and science staff were in temporary posts (contributing to lack of continuity and high staff turnover) and most of the teachers are unqualified and totally unsuitable for the posts they are in. Although this problem is not very evident in the teachers of grades 8 to 10, it becomes very obvious in the senior (grade 11 and 12) teachers.
This therefore limits the progress that any teacher-upgrade programme can make with these teachers, as they may be incapable of becoming excellent maths / science teachers. The most the programme can achieve is to enable the teachers to reach their potential in this field, but such potential is unlikely to facilitate any learners with potential to excel. Thus, in schools like these, other means would have to be employed in conjunction with the teacher support, to allow these learners to achieve good matric marks.

TMP made the most progress with the school which had been nominated due to its recent showing of great potential without external support. Hence the best strategy to implement in terms of school selection for such a teacher development programme would be:

- Identify those schools showing reasonable maths / science results without support;
- They should already have a number of learners on the HG (indicating a positive attitude amongst teachers to learner achievement and potential for careers);
- They should have virtually all maths / science staff in permanent posts.

### 1.3 Strategy for Teacher / Learner Support Material

**Teachers:**
Teachers desperately need textbooks to use as resources, and these were supplied by the programme; however, the teachers must also be driven to use the books as resources to help them understand the material, and to prepare lessons / assessments etc from them.

**Learners:**
- Textbooks are generally in very short supply, (in part due to incompetent school controls);

The TMP supplied maths and science workbooks to the schools, for use by every learner, in the first two years of the programme. However, it was found that 90% of learners did not bring them to school (some say they will be stolen, others forget, others are too lazy; some are probably lost or sold). To compound the problem,
teachers do not insist on learners using their books, and do not source sufficient exercises from them. Therefore the learners still did insufficient work during the course of the year to enable them to pass, let alone achieve success.

To address this, there is a new strategy: TMP will now supply excellent worksheets with neat, clear diagrams and questions for consolidation. These will be copied and given to the teachers to distribute to their learners at the end of every chapter for pasting into their books, timed according to the TMP planner. The Principals have been requested to do random checks on learners’ books, to see that the work is pasted in and completed. In this way the Principals can monitor that learners are doing sufficient work and that teachers are keeping up with the syllabus and covering the whole chapter.

- Learners do not bring calculators to school for fear that they will be stolen. Most in fact do not have calculators and mathematics construction sets, making it very difficult to teach the syllabus sections requiring these. Casio supplies calculators to the learners at cost, through the TMP. The demand for these is increasing, indicating that the learners and teachers are no longer merely accepting that it is ok to study these subjects without the tools and learning the required techniques.

- Dictionaries
Maths and science teachers are encouraged to give learners all new words at the beginning of a section and allow learners to look them up in the dictionaries. They give the new word list to the language teachers who use these words in their own lessons to support the other departments.

1.4 Management Support
Supporting the management structure of the schools is critical to achieving progress within certain subject departments. In many cases the Principals did not understand what how to implement new education structures, nor did they really know how to monitor or manage their schools.
Planning discussions with the Principals for the following year should include the following recommendations:

- **Timetable:** Include cyclical maths and science departmental meetings in the timetable;

- **Class allocations:**
  
  **Mathematics:** Grade 10 to 12 learners: Timetable all the maths learners (those studying science and those studying business subjects) to take maths together, where possible, then try to group the stronger learners to be in the same class, whether they are on SG or HG;
  
  **Science:** Grade 11 and 12 learners: Allocate all the strong science learners to the same classes, and the weak learners to another class, where possible;

- **Teacher allocations:**
  
  - Principals were asked to minimize the number of teachers that are sharing two subjects, as this weakens the departments, makes the mentoring process less effective and gives it less chance of sustainability.
  
  - They were also asked to allocate more than one teacher to a particular grade, to allow for collaboration and support between teachers and the need to work as a team.

- **Head of Subject:** Principals were asked to appoint a senior teacher in each subject to be in charge of the department and to act as an HOS: this was to enable the mentors to work with the appointees and support them to learn the roles of an HOS and increase the potential for sustainability of TMP progress.

_Schools’ Implementation of Recommendations:_ In general, although Principals receive TMP recommendations very positively and clearly see the benefit of these shared ideas, in many cases these ideas do not get implemented. There are several possible reasons for this:

- These recommendations are not communicated to those in charge of that role at the school;

- The staff do not vary from procedures used for many years which have become habit and require less effort;
Staff do not know how to implement what they have been advised. (To address the latter, various experts made themselves available to assist on request, but were not called in.)

1.5 Learner Support

The schools with which we work previously supplied few learners to the local University; the latter in turn has information-supply programmes in place, but only for those schools with a good track record of learners coming to study at the University.

However, with a comprehensive learner motivation programme now in place at these schools, the learners must be simultaneously addressed in terms of criteria for admission to further study. Therefore links with the staff at the institutions for further study should be established, in order to ensure that the schools are placed on their normal visiting programmes.

Different strategies have been used in each year of the programme to allow for maximum professional development on the part of the teachers, to promote sustainability and to ensure that the mentor-protégé relationship does not stagnate.

A strategy implemented to promote sustainability of changes and process was a “freeze-unfreeze” period of three cycles towards the end of the last year of the pilot programme. Recommended by the external mentor-training body, it allowed teachers to prepare themselves for the coming year, when the mentors would no longer be with them, in order that they not be found unprepared for problems they might face. Teachers were able to identify their needs in this period, motivated to try to address their needs of their own accord, and used their peers / colleagues as resources / mentors to solve their problems.

A head of department at one of the schools commented after the freeze period that because the mentors were not coming to keep an eye on them, they (science and maths departments) decided to meet every day at 7 am and again at 1 pm to keep in touch. They held meetings, run by grade leaders, where they shared material, planned
tests and did general organisation. The HOD said “Everybody gains from it” and they may continue with it. A mentor commented that many teachers had needed help but had turned to colleagues for assistance, and generally schools were up to date when the mentors returned.

Subsequent to this 2005 report, two strategy modifications have been implemented in the roll-out of the next TMP project in different schools:

- Application for TMP: TMP staff held meetings at the schools in August for those schools who wished to apply for the new TMP programme starting the following year (2007). It was mandatory for all maths and science teachers and a member of management to be present at the meeting, in which the nature of TMP operation and requirements were discussed openly and all legal documents were handed out and their implications discussed.

- Service Level Agreement: A SLA was drawn up and signed by every teacher, HOD, Principal and TMP representative. This guided teachers as to what was incumbent on them for their participation in the programme and also delineated what the benefits would be to them in terms of the service they would gain from TMP staff. This SLA was a legal documentary requirement in addition to the Memorandum of Agreement signed between the three parties (DoE, UP and school).

- Frequency of contact: the degree of teacher need has been found to be so great that on many occasions when the mentors met with teachers in the next cycle (7 work-days later), teachers were found to be already floundering with work discussed at the previous meeting. The present (2007) TMP project in new schools was implemented with an even more intensive structure: mentors meet teachers almost twice per cycle, once to meet and once to observe their lesson (frequently on an unscheduled basis). This allows a trusting relationship between mentor and teacher to develop very early, as contact is so frequent and teacher needs are being addressed more immediately. The planned project has been shortened to two years (from three) in expectation of more rapid progress with the teachers.
3.9 Predicting the change process

This is an extract from a document supplied to one of the TMP schools and the district office after the school called us in to help them to understand their poor marks at the end of the first year of working with them:

*It is unwise to expect learners’ marks to show immediate improvement. In fact, it would be correct to expect them initially to show a downward trend. There are several reasons for this:

- Initially teachers may feel destabilised, uncertain and lose confidence in themselves as they are exposed to and are expected to teach new material; or find that what they have been teaching was incorrect.
- Before a mentorship project starts in a school, the following may be found:
  - Teachers teach only certain sections of the syllabus (those where they are familiar with the content),
  - Evaluations consist of tests covering only these few chapters, and
  - These sections are tested frequently and therefore mastered by the learners.
- With the implementation of the programme:
  - Teachers are expected to finish the syllabus, therefore must spend time teaching sections with which they are not familiar and less time on sections that they know well. One of the biggest complaints by the teachers is that the “pace is too fast” and that they are losing the slowest learners.
  - Many assessments are moderated (or set) by the mentors, therefore are of a consistently good standard and cover a broader scope of material.
  - The learners are required to work much harder than before to cover the syllabus.
  - It is clear that most learners do not have the necessary work ethic and the teachers are unable to change this.*

*End of extract*
It is significant that the subsequent improvements in this school, on individual teachers, departmental and whole-school levels, were particularly noteworthy.

3.10 Framework of the research

This research:

- is located in the context of teachers operating in school systems that do not or cannot fully support PDPs and
- assumes (from extended observation and anecdote) that the mentoring approach fulfills most of the criteria propounded, in the literature review, to be potentially successful strategies and
- specifically considers teachers who have participated in the pilot TMP programme for its duration (three years) and who are considered (by the mentors) to have shown great positive change during this time.

Within this framework, the research tries to identify areas in which teachers demonstrate improved practice and in which they show attitude change, and it attempts to identify to what factors such positive progress may be attributed.
Chapter 4  Research design and methodology

This chapter provides a rationale for the choice of qualitative research, describes the methods used for data collection and analysis, and considers the issues of validity, reliability and trustworthiness. It also appraises the limitations of the study whilst discussing the role of the researcher.

4.1  Choice of methodology / methodological framework

According to Brown and McIntyre, (1993, 39) when teachers were asked to describe and evaluate what they were doing in their daily teaching, they chose to use the following categories (amongst others): maintaining interest and enthusiasm of learners, building up confidence and trust, diffusing discipline problems, interaction of class planning and actual management, approaches used to take into account individual learner characteristics and dealing with learner errors.

The nature of these themes indicate that teachers find themselves conducting their practice in situations that are fluid and changing, dealing with situations that are unique and allowing the context to dictate their approach to each situation. Thus forced to apply an interpretive approach to their work in acknowledging “the subjective world of human experience” (Cohen, Manion & Morrison, 2000, 22) as that of their learners’ worlds, it is necessary to acknowledge the teachers’ unique individual perceptions of their world in one’s choice of research methodology.

This indicates a need for qualitative research, to allow the researcher to see and understand each teacher’s world via a research process that may be described through the terms of Cohen et al (2000, 272): capturing uniqueness, capturing particularity, individuality, valuing quality, interpreting, subjective facts, illuminative, unstructured. This research project therefore is an attempt to visualise and understand the changes in four teachers’ professional and personal lives in their individual contexts. It uses the four case studies to obtain a deeper understanding of the participants’ experiences.
within the mentoring programme and hence to gain an awareness of the potential, if any, of such a support model for teachers exposed to it.

Essentially, the teacher is there for the learner: the critical teacher will see his or her role as assisting learners in their education, their growth in knowledge of syllabus and mastery of skills, and as such teaching success may be indicated technically by looking at the teachers’ successes in mastering the various skills in the classroom, as evidenced by such constructs as technical expertise, efficient systems, and fixed, measurable, controlled standards.

Thus the teacher may show ideology with “a reflective, theoretical and practical side” (Cohen, Manion & Morrison, 2000, 30); in fact Zhang et al (2003, 488) found that most teachers held two conflicting views (traditional / empirical and non-traditional / constructivist) simultaneously.

Despite the fact that the reflective practitioner (RP) approach to teaching and learning to teach is regarded by many as being a more holistic method causing more long-term teacher improvement, this approach demands a higher level of teacher cognition and skill than does the technical rational (TR) approach. Much of the TMP mentors’ strategy is focused on teacher competency, in recognition and acceptance of the teachers’ baseline skills and competencies, rather than personal introspection and professional development through higher-order thought processes. However, such thinking skills and approaches are also elicited by the mentors in meetings through encouraging teachers to contemplate their professional activities, past and present. A research inquiry should acknowledge both views of teaching and, using a constructivist paradigm, acknowledge the present level of development of the teachers to subsequently assess their progress on the level of technical competence change as well as changes in personal and professional issues such as attitude, confidence, motivation and openness to professional development.

4.2 Sampling

The research strategy essentially adopted a qualitative approach using case studies.
Merriam (1998, 75) describes a case as “a unit around which there are boundaries”. The phenomenon under study, the Teacher Mentorship Programme mentoring model, provides the greater boundary, but within this there are further boundaries to assist in limiting the case and providing the sampling strategy:

- The TMP is a comprehensive programme incorporating teacher, learner and management support. A research of the mentoring aspect of this programme further draws the boundary in, to delineate the case to be only the teachers receiving mentoring in the programme.
- Since the programme was of long duration (three years) it was necessary to study those teachers who had participated with the project for almost the entire period.
- It is acknowledged that all projects have better success with some teachers than with others (myriad factors may influence the extent to which a teacher benefits from an INSET programme, including personal, professional, contextual and social issues). The aim of the research was to identify aspects (if any) in which a teacher mentoring model may potentially impact on the lives of those teachers participating in the programme, so to ascertain the potential of this particular model a decision was taken to consider the case of those teachers who were deemed to have progressed most in the time for which they were involved with the programme.

“In qualitative research, a single case or small non-random sample is selected precisely because the researcher wishes to understand the particular in depth, not to find out what is generally true of the many” (Merriam, 1998, 208). Purposive sampling of representative cases for this research study was therefore the chosen strategy used, with the following rationale for teacher selection:

- Four teachers were selected by the researcher on the recommendation of the TMP mentors, who had spent almost three years working with them; the decisions were based on anecdotal evidence of improvement, on reports previously supplied by the mentors and teachers, and on previous classroom observations and questionnaires.
The analysis of the data was undertaken at all times mindful of the fact that in the three-year period that was under scrutiny, there were other factors that would have impacted on the teachers' lives and that may have contributed to their progress.

Qualitative case studies have been described (Merriam, 1998, 77) as characterised by three features: they are particularistic (focus on a particular program or phenomenon, and important for what it reveals about the phenomenon), descriptive (providing rich, “thick” description of the phenomenon) and heuristic (to illuminate the reader’s understanding of the phenomenon, confirm what is known and/or facilitate discovery of new meaning). Case studies are useful when researching the effect of a strategy: they “can be an important approach when … there are no reasonable indicators of programmatic success which can be formulated in terms of behavioural objectives or individual differences” (Kenny and Grotelueschen, 1980, cited by Merriam, 1998, 87).

Thus, four in-depth case studies were done: desirable participants were teachers (two natural and/or physical science teachers, one mathematics teacher and one teaching both mathematics and physical science) who had been involved with the Teacher Mentorship Programme for the three year duration and who responded most positively, showing professional development in terms of (amongst others) attitudes, skills and content knowledge and who are therefore considered to represent the nature of the impact that TMP may potentially offer participating teachers. One teacher had been away from the programme teaching at another school for some months during the second year, but she was deemed to have made great progress during the time she was involved with the programme and her activities while at the other school contributed other useful information about the model. Although the sample size is small, a number of research instruments were used to “obtain additional corroborative data by way of validation” (Cohen et al, 2000, 95).
4.3 Research Design

Bell (1998) in Sweeney (2003, 109) speaks of a teacher’s professional, social and personal development as constituting his / her “practitioner professionalism”.

- **Professional**: open to learning about new teaching / learning / assessment activities; willing to practice and evaluate these with support and feedback;
- **Personal**: Accepts need for on-going professional growth, takes control of own learning; reflects on own growth;
- **Social**: Liaises and works with other teachers to re-construct what the role of the teacher is.

Using these aspects as a framework, it is possible to expand these constructs and describe sub-constructs that would be useful in exploring the picture of that teacher who has demonstrated improved teaching practice whilst working with the mentoring programme: these constructs (as shown in the table below) were used to guide the content of interviews, observations and questionnaires.

<table>
<thead>
<tr>
<th>Constructs of Practitioner Professionalism</th>
<th>Sub-constructs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional development</td>
<td>Planning, preparation and general organisation</td>
</tr>
<tr>
<td></td>
<td>Confidence in subject knowledge</td>
</tr>
<tr>
<td></td>
<td>Skills and techniques</td>
</tr>
<tr>
<td></td>
<td>Assessment</td>
</tr>
<tr>
<td></td>
<td>Use of resource material</td>
</tr>
<tr>
<td>Personal development</td>
<td>Self-discovery and attitude to professional self-development</td>
</tr>
<tr>
<td></td>
<td>Pedagogic identity</td>
</tr>
<tr>
<td></td>
<td>Teachers’ attitude to the teaching profession</td>
</tr>
<tr>
<td></td>
<td>Teachers’ attitude to learners</td>
</tr>
<tr>
<td>Social development</td>
<td>Teachers’ attitude to school and colleagues</td>
</tr>
</tbody>
</table>
Mtetwa and Thomson (2000, 313) recognise five dimensions of professional development: personal, career, practitioner, ecological and political. The aspects clarified within their personal and practitioner dimensions correlate remarkably with the sub-constructs used in this study for Bell’s personal and professional constructs while there is overlap between their ecological and Bell’s social construct. Mtetwa and Thomson advocate “a conceptualisation of teacher professional development that is holistic” and hold that typically research has not focused on all dimensions: “the concentration is on what we have called the practitioner dimension much to the exclusion of the other dimensions” (314).

For each of the Bell sub-constructs above, one can look at many aspects and question the present standpoint of the teacher. Thus, many teacher characteristics may be identified as indicators (criteria) of good (competent) teaching practice. Any evidenced improvements in these criteria during the teacher’s involvement with the TMP (as attested to by the teachers and confirmed by the mentors) may be used to represent the impact / benefit that participation with TMP can potentially offer to teachers, when other possible causes are ruled out.

Within the professional development sub-constructs, further guidance on definition and measurement for science teachers was obtained from Rogan’s (2005, 41) profile of curriculum implementation, whilst this was used as a guideline for criteria of comparable ilk for maths teachers as some of the dimensions “are generic in the sense that with minor changes they could apply to any learning area” (Rogan and Grayson, 2003, 1182).

Note that there is overlap of sub-constructs: for example, a teacher’s attitude to learners may have been considered under the template of professional development, rather than personal. However, these constructs simply provided a framework for the researcher to guide and structure the research process: the analysis of the data and reporting of findings, although guided by the sub-constructs, do not depend on the categories. The latter synthesis integrates the sub-constructs to weave a picture of the teachers in his / her complexity and allows recognition of the impact of each aspect on the others.
With reference to the Bell (1998) constructs, some of the aspects explored with the teachers were as follows:

PROFESSIONAL DEVELOPMENT
This construct and the sub-constructs given above provided the base for exploring teacher changes in his / her professional development. In looking for the “picture” of teacher changes, the researcher included the following perspectives as further guides:

In their report of the President’s Education Initiative Research Project, Taylor et al (1999, 145) stated “(t)he researchers found that the content and structure of lessons did not aid the incremental development of concepts… even when teachers provided learners with a mix of activities these were generally not integrated or organized sequentially in ways that assisted the learners to practice the necessary concepts and skills incrementally”. This lack of lesson structure indicates the teachers’ needs for support on many levels, including epistemological and methodological, but also particularly indicates a need to guide teachers in understanding the role of planning and preparation for lessons. Hence, lesson planning and preparation and general organisation formed a significant part of the TMP strategy and likewise of this research with the teachers.

Taylor et al (2003, 78 and 133) hold that confidence in teaching the material arise from a teacher’s knowledge of the material and structure of teaching which are attributed to subject knowledge and prior experience. Thus teachers’ confidence in the content knowledge was a further researched aspect.

Rogan’s profile of implementation (2005, 41) provides a useful guideline in identifying a teacher’s level of practice, where a level 1 teacher will, for example, present content “in a well organized, correct and well sequenced manner, based on a well designed lesson plan.” A teacher rated at level 4 will evidence the above, as well as using textbooks and engaging learners (added by the level 2 teacher), probe learners’ prior knowledge (included in level 3 teaching practice) and facilitate learners as they take major responsibility for their own learning.
In debating Rosenshine and Stevens’ (1989) reduction of teachers’ classroom behaviours to “instructional functions”, Onwu and Stoffels (2005, 81) grant that, although this tends to “reduce the complexities, multidimensionality and unpredictability of classroom life to a sequence of small steps”, this construct “provides a useful theoretical lens” for observing teachers’ practice. The “instructional functions” discussed in their research include: homework review, presentation of new work, guiding student practice, providing feedback, allowing independent student practice and providing for systematic review of previously learned material. These “instructional functions” have been used as a framework for observing teachers’ skills and techniques in this research, which were further broken down to the following:

- Sequencing lesson content and development of new knowledge from previous knowledge (show planning of curriculum delivery, assess the learners’ mastery of the previous lesson as pre-knowledge and attempt an interesting introduction to her lessons, attempting a logical lesson structure, presenting content to indicate recognition of the “scaffolding” required (Rogan, 2005, 9), structuring work to achieve a desired outcome and use of period time (indicate pacing and an attempt at coherence; finishing the syllabus): “learning gains are proportional to the degree of curriculum coverage” (Taylor, 2007, 534),

- Learner-centredness in lessons (Does the teacher try to maintain the interest / enthusiasm of learners (Fish, 1991, 97), link everyday knowledge with curriculum knowledge, allow and manage learner interaction?),

- Homework procedures and controlling the learners’ work (does the teacher give homework, acknowledge its need, and review learners’ workbooks? does the teacher stimulate a work discipline in the learners?),

- Conducting group work, practical work, projects and investigations (does the teacher use these as part of the teaching and assessment strategy, and believe they contribute to learners’ enjoyment and development of skills?).
The variety of assessment tools used by the teacher was considered, particularly in light of the requirements of the new curriculum for continuous assessment and a move away from a pure test / examination routine to one reflecting more accurately a learner’s range of skills.

Use of resource material was considered: Does the teacher make use of resources available to her including textbooks, or improvise resources? Does the teacher control her resources? The use of resource material must be an indicator of teacher initiative, not actual success with the material (s/he may be too scared to use it) or reflection of how much resource material available at the school. Taylor (2007, 536) holds that we must find ways of enabling schools to use their resources more efficiently: a central problem and “one which we know least about”.

PERSONAL DEVELOPMENT

Within the ambit of the sub-constructs described in the table, teachers’ general characteristics, for example adaptability, ambition, pro-active nature, determination; drive/energy; showing initiative and creativity; self-confidence and self-motivation were considered; an investigation was also made if the teacher had discovered anything about him / herself during the course of his/her involvement with the programme.

The teacher’s attitude to professional self-development and change and his/her pursuit of “personal mastery” (Edwards & Collison quoting Senge 1994) were considered. This required contemplation of the following: Is there evidence of the teacher using all opportunities and showing willingness to learn / be a life-long learner? Does s/he show open-ness and approachability to free unsolicited supportive help? Is the teacher willing to trust and accept the word of the “expert” that the new practice will be beneficial and feasible? What are the teacher’s feelings about change efforts (Edwards & Collison, 142 quoting Grossman); is the teacher’s practice presently indicating an attempt to try to understand the new curriculum (Rogan, 2006, 29)?

Exploring the teachers’ pedagogical identity and their beliefs about teaching and learning, questions were asked pertaining to the following: Does the teacher have a
personal theory of professional practice? How do the teacher’s expressed views and perceptions of his/her practice correlate with his/her demonstrated instructional practice (Sweeney 2003, 108)? Is the teacher willing to change practice? Does the teacher demonstrate moral accountability in teaching? Does the teacher recognise the importance of his/her learning area (subject) to life and society, and does s/he promote awareness of this to her/his learners? Priority in teaching was considered as an indicator of teacher attitude and belief: the most important part of a teacher’s job may be considered by some to be the subject itself (the learning area as superior in focus to the learners or their mastery of it); the content per se (and assisting the learners to master it) or others may put the learners first, above the learning area, and see education as being overall learner growth rather than subject-specific change.

The teacher’s attitude to learners could be indicated by: keenness to go into class and teach / share with her learners and spending time in class actually working with the learners, (rather than completing other duties during that period, for example planning, marking, test setting). Does the teacher show passion for learners to succeed, and overall caring? Does the teacher try to achieve a high level of cognitive demand of the learners and portray / demand a strong climate of learning? Is s/he results-oriented? (Will s/he be motivated to change and learn for improved results?)

SOCIAL DEVELOPMENT
Silins et al (2002, 30) define four factors for consideration in measuring the effectiveness or potential of schools to act as learning organisations: trusting and collaborative climate (general school support and atmosphere), taking initiatives and risks (lee-way and support afforded to the individual), shared and monitored mission (common goal within a department) and professional development. The teachers used in this research may experience their own growth potential as being enhanced or hindered by the context of the “learning organisation” in which they are nested.

Thus these four constructs helped to inform research into the context of each teacher’s professional environment. In terms of his/her attitude to present teaching situation / school context: What is the teacher’s present level of frustration, and has the teacher done anything to try to alleviate this? Does the teacher have resilience and
determination within the context of the school? Will the teacher change practice within the context of the school, even if there is little school support? Does the teacher show an openness to participate in teamwork, e.g. at subject meetings?

The outcome from the research is not intended to be generalisations of results that can be widely transferred to different teachers in different contexts, but a better understanding of how teachers in certain contexts may be supported by such a mentoring model, and which aspects or elements of the model are of particular use and benefit, such that this knowledge may be useful for the design of other INSET strategies.

4.4 Data collection

Ensor and Hoadley (2004, 81-103) warn against untrustworthy claims about pedagogy brought about by data collection using tools or methods that are not linked to theories of pedagogy, but rather are based on generally educationally socially-accepted discourse, resulting in non-specific data which cannot be accurately analysed. The design of the research tools and strategies employed in this inquiry were informed by the literature and intended to develop a deeper understanding of the participants and their experiences with TMP in their schools.

Mindful of the need for triangulation of methods to ensure validity and credibility (see 4.6), data were collected using a combination of various strategies and instruments over a period of approximately three months, incorporating (for teachers): questionnaires, interviews, classroom observations and teachers’ self-analysis and also mentors’ questionnaires and interviews. In all dealings with teachers, they were treated with “respect, sensitivity and authenticity” (Smit, 2001, 129) to create a rapport and ensure feelings of trust. A description of the process undertaken with each of the four teachers individually follows:

In the first meeting with the teachers I discussed with each of them the nature of the research, specifically communicating the fact that the focus of the inquiry was to determine the impact, if any, that the Teacher Mentorship Programme may have on
participating teachers. Teachers were informed of what strategies and instruments were to be used, and told of their rights to withdraw or not complete part of the process (Cohen et al, 2000, 245). Confidentiality and anonymity were guaranteed. The teachers, once agreeing to participate in the study, signed acceptance letters to verify their informed consent for their participation.

In a brief second meeting with each teacher, they received the first questionnaire, with a covering letter providing detail of practical issues. They were given two weeks to complete the questionnaire, which was returned to me at the start of the interview session. The data from the questionnaire were processed to form the first of a set of field notes for each teacher.

The interviews took place at the teachers’ schools in the afternoons after they had finished teaching, on days convenient to each one (further detail is supplied below). The interviews were, with the teachers’ permission, recorded and later transcribed verbatim. At the end of the interview each teacher was given the second questionnaire to complete, for which they were given a week.

After processing the second questionnaire, I embarked on the classroom observations. In the case of each teacher, I conducted at least two prepared observations and one classroom observation for which they were not expecting me. All classes were taped to enable my own confirmation, when writing up my field notes, of teacher questioning and responses or learner involvement. During activities in class where the learners were involved and teacher not requiring their attention, I looked at random samples of learner books, observed their interaction whilst working in groups, and observed the teachers’ interaction with the learners.

In each case I requested samples of learners’ books (a range, from poor learners to academically strong) and the teachers’ files. From these sources I attempted to establish, amongst other things, the frequency with which teachers checked learner work, gave tests or other assessment tools, their resource control and organisation.
After processing the data from the teacher interactions, I supplied the mentors with questionnaires which were specifically designed to explore their opinions on issues that I had covered with the teachers. This was used for comparison with the teachers’ statements and the researcher’s observations, and provided a means of triangulating the data. Finally, after processing the mentors’ questionnaire returns, I interviewed each mentor individually for about two to three hours for clarity on further issues about the teachers and mentoring in general.

- **Teacher Questionnaires:** Two questionnaires were given to the teachers and used to provide mostly factual information and opinions:
  - The first, completed by teachers at the start of the research process, was used to provide background information for the teachers as well as inform on their general and specific classroom practices and assessment strategies. This information was obtained by asking the frequency with which teachers undertook certain practices, both before they became involved in TMP and their current practice in this regard. This aspect of the questionnaire subsequently formed part of the observation document for the researcher’s verification of the teacher’s claims in his/her questionnaire response; the questionnaire was based on that of Hattingh, Aldous and Rogan (2007, 37-64). See Appendix 5 for the questionnaire.
  - A second questionnaire was given to each teacher at the time of the interview, investigating the teacher’s self-perception of competence in the teaching of each section of his / her particular learning area. Jarvis and Pell (2004, 1792) examined changing attitudes and cognition of primary teachers during a two-year in-service programme. The methodology included confidence and attitude questionnaires as well as a cognitive test and included in the confidence questionnaire was a section on self-rated competence. Jarvis’ construct of self-perception of competence has been used in this inquiry with TMP teachers as a means of informing the researcher on a teacher’s perception of his/her own progress in this context; the teachers responses were then correlated with those of the mentors for verification. Where discrepancies were found, theory has been put forward as to possible reasons: see chapter 5 for this data analysis.
During the implementation of the TMP, in various strategies to evaluate the programme’s performance, the TMP project leader and mentors themselves developed instruments to be used in on-going assessment. TMP staff was disallowed by the GDE from performing cognitive tests with the teachers; as a result this potentially useful source of information is not available and hence the use of Jarvis’ construct of self-perception of competence. The teachers were specifically asked to describe how they perceived their practice to have changed as a result of their participation in the TMP project. This is not a standardised questionnaire, but this was not a survey study and the information gained was used for further background information on the teachers and to formulate further questions for data-collection via the interviews and observations; it was also used to validate teacher claims and used as a baseline for mentor validation. Self-reporting data may be a limitation but nonetheless forms a source for baseline information. See Appendix 6 for a questionnaire sample.

- **Teacher Interviews:** This method of data collection was feasible because of the small sample group, and information obtained has been used to validate and supplement that obtained in the questionnaires.

  The topic themes for the interviews were (in order in which they were addressed):
  
  You, the teacher, and your beliefs and experience before TMP came to your school.
  
  Your general school experiences (your work environment)
  
  Your experience of TMP.
  
  Your experience of mentoring.
  
  Your teaching during the third year of the programme.

One-on-one semi-structured interviews were conducted to obtain detailed information about the teachers and their practice and provide opportunity to confirm or contradict some of the information supplied by the teachers in their questionnaire. The interviews were what Cohen et al (2000, 271) refer to as “Interview guide approach” providing facility to collect a comprehensive range of data but keeping a conversational tone to the interview. Whilst the researcher had a clear plan of issues to be addressed and questions to be answered, the teacher was encouraged to express his / her ideas more widely than would be facilitated in a structured interview. It was
stressed that there were no right or wrong answers, and that everything they had to say was beneficial to the research in allowing me to gain a perspective on their circumstances and their experiences of the programme. The most garrulous teachers ended up being involved in the interview situation for four hours, whereas in the case of the least chatty or most succinct teachers the interview was of approximately two and a half hours duration.

The interviews took place after the first questionnaire had been completed to allow information from the questionnaire to highlight issues requiring further probing. In addition to factual information, the interviews were used to probe the respondent’s values and beliefs through some open-ended reflective questions (e.g. exploring the nature of teaching and what it means to be a professional teacher); while these have no correct answers, they have served to indicate the depth of the teacher’s thinking and wish to grow and reflect about his / her present situation. As discussed in 3.2 (research design), the content of the interviews covered professional, social, and personal issues (where the discussion was regularly directed to explore the impact, if any, of mentorship on these issues) as well as issues of context. I was informed by literature, particularly Bell (1998), Sweeney (2003), Taylor et al (2003), Rogan (2005 and 2006), Edwards (1996), Fish (1991), Onwu and Stoffels (2005) and Silins (2002).

Kitwood (1977) (cited in Cohen et al, 2000, 267) describes three conceptions of interviews: that of a means for information transfer, a biased transaction and an everyday encounter. With reference to the second point, the transaction “inevitably has bias, which is to be recognised and controlled” and recommendations are given for means to control such bias. My task was to establish whether there had been any change in the teacher’s thoughts about the profession or classroom practice, so questions in this vein predominated. However, to limit the extent of teachers providing answers that they expected were required of them (or to please me) at no stage did I juxtapose any questions on prior practice with a question on the same topic but relating to their present practice. The open nature of the interview resulted in considerable to-and-fro in the teachers’ conversations: whilst in the questions on “prior practice” they would refer forward to present, and vice versa. Whilst making data analysis more difficult, this provided rich data and facilitated the possibility of
validity checks within the interview itself. I am confident that the design and process of the interviews facilitated the capturing of data that would have been no different had another interviewer undertaken the process.

What was significant was that three of the teachers claimed after the interview that the actual interview process had been of value to them, and they had themselves gained from it by verbalizing their experiences and being forced to think back on their prior practice. Implications of this have been discussed in chapter 6.

The interviews were followed up by supplying the transcript / report to the teachers for discussion and their approval to validate and give authenticity. Further unstructured interviews occasionally took place at times before and after classroom observations, allowing the teacher to express thoughts and concerns on the actual lesson for example; such information would be valuable to the researcher as the teacher’s self-criticism and observations. See Appendix 7 for the interview document.

- Classroom observations: Non-participant observation periods were performed to validate the information obtained in the questionnaire and provide new data and descriptive material. They allowed an opportunity to see the teacher in practice, and compare the actual classroom practice with what was declared in the questionnaire and interview.

At the start of the periods, the teachers generally introduced me to the class groups, after which I greeted the learners and discussed what I was to do in their class. In my explanation I stated that I wished to observe a lesson but my presence there should not in any way change the way their classes were generally conducted: neither the teacher nor the learners should behave in any way differently from their normal manner. In every case, the learners were accustomed to having the mentors sitting in on their classes so I reminded them of the mentors at their schools but told them that I would not participate in the lesson (the teachers sometimes ask the mentors for input during class). I then sat at a table provided by the teacher in the classroom and jotted down notes and observations, guided by observational documents, whilst recording the entire lesson for confirmation during transcription, if necessary. Neither the learners
nor the teacher appeared to be in any way perturbed by my presence. The field notes were anecdotal in nature and the observations did not involve coding transactions, events or exchanges into observational categories every few seconds. Almost immediately after the observation period ended, the notes were recorded for use in analysis later.

The observation documents used to guide my data-gathering were based on two sources: firstly the first questionnaire that the teachers had been asked to complete (they had attested to their general and specific classroom practices and assessment strategies, much of which was informed by Hattingh et al (2007, 37-64), and the observation was intended to confirm or contradict that data). Rogan et al (2004, 315) present profiles of implementation for science and maths education as “a construct to help understand, analyse, and express the extent to which the ideals of a curriculum are being put into practice”. These profiles were used as the second guide to the classroom observations. The sub-constructs of the Profile of Implementation of Rogan et al are “the nature of the classroom interaction (what the teacher does and the learners do), use and nature of science practical work, incorporation of science in society, and assessment practices” (Rogan, 2006, 6). The profiles summarise characteristics to look for during classroom observation; these were also incorporated into the decisions on interview questions and thereafter classroom observations. Appendix 8 provides an example of a classroom observation document.

- **Mentor questionnaires:** It was necessary to validate the information supplied by the teachers in their questionnaires (going to prior and present practice and competence change) as well as numerous aspects of their present teaching practice. To do this the mentors were questioned on the frequency of some of the teacher’s present teaching practices and asked how these practices had changed from the teacher’s initial (pre-TMP) practice. Although a definitive answer on pre-TMP practice was difficult for the mentors to supply, it was supposed that since they had worked with the teachers for three years, observations of the teacher’s practice during the first year of TMP would provide a reasonable representation of their practice in the previous (pre-TMP) year. The information supplied by the mentors on the teachers’ present practice was used to supplement that gained during the classroom
observations. The mentors were given both teacher questionnaires to obtain this information, modified for their use.

- **Mentor interviews**
  The processing of the mentor questionnaires was followed by informal, semi-structured mentor interviews, during which discussions I established the validity of some of the teachers’ claims, delved into the possible reasons for contradictions in statements between teachers and mentors and explored their theories on the nature of mentoring and its potential impact on teachers’ professional development.

- **Educator report forms**: the TMP project itself required that teachers complete Educator Report forms in which they were required to use a rubric to assess their own classroom practice, as well as being given opportunity to rate the service they received from TMP and specify further requirements. These have also provided valuable information on the teacher’s classroom practice and were used for triangulation to ensure validity of the research. See Appendix 4 for an example of the standard educator report form devised by TMP.

**4.5 Data analysis**

This involved “organising, accounting for and explaining the data” (Cohen, 2000, 147) to find patterns, themes and trends that would answer the research questions. Data analysis was on-going, taking place throughout the data collection process, as the gathered data was recorded and perused for similarities and differences, categories and themes. After each incident of data collection, the data were processed (including transcription, synthesisation and organisation into manageable units) and during this process of data structuring it became clear what was further required for clarification or to build on what I had. In this way, the data analysis informed the data collection process and the two processes of data collection and analysis may be regarded as iterative processes.

All interview data were transcribed verbatim, (in certain areas where the recording was unclear this was noted by the transcriber, and in some cases these areas were able
to be clarified with the teachers) and the transcriptions of the interviews were supplied to the teachers for confirmation of accuracy and to allow for further clarification on their part, if required (none of the teachers requested this step and all confirmed that the final transcriptions were accurate.)

It must be noted that, as with all novice researchers, the reliability of my interpretation of the data is a concern: is the meaning interpreted from the teachers’ verbalisations consistent with their intended communicated meaning? Bruner (1986, 25 as cited by Rogan, 2004,11) maintains that ‘the narration is not the meaning itself’ but at best is a "guide in a search for meaning among the spectrum of possible meanings" and thus perhaps represents a "true for now " reliability that has a contextual usefulness’.

Acting on the basis of this contextual usefulness, the data were processed: a template was constructed for each teacher in which facility was provided to store the data for comparison of the teachers’ perceptions of prior and present practice (from the interviews) and the researcher’s class observations. Themes and sub-themes (constructs generally as per the Bell constructs and further sub-constructs, as having been set up by the initial design of the data collection documents, and new ones coming through as important during the data collection process) were used as broad headings for data grouping. This template table had the format as on the following page.

Where appropriate and relevant (particularly under the “professional development” construct) the teachers’ prior and present practices were ascribed levels of practice according to Rogan’s (2006) profile of implementation and areas of change / improvement were sought.
Soon after receiving the transcriptions of each teacher interview, relevant data were identified and stored in the table, along with the question reference number to allow ease of referral back to the original interview document. Although each question had been appropriately focussed in the interviews, the less structured nature of the interview resulted in considerable overlap of sections and the analysis and identification of relevant data for the table proved to be an onerous task. Subsequent to each classroom observation, the field notes were transcribed and again relevant data was copied into the table above, for each teacher.

This table was invaluable in facilitating the data presentation and analysis (chapter 5), for the first draft of which I grouped all of the four teacher’s experiences with the others, by theme, and juxtaposed the teachers’ interview comments with the pertinent classroom observations. During this process of grouping the data from all four teachers by theme, it was necessary to beware of “the tendency for analysis to atomise and fragment the data … thereby losing the synergy of the whole” (Cohen, 2000, 282). However, with the purpose of the research being to assess the teacher development model, the “units of meaning” (282) generated for each teacher’s
practice and changed practice (per theme) only added value to this research when compared with and contrasted to the thematic units of meaning for each of the other teachers.

Finally the data from the teachers’ questionnaire responses and mentors’ inputs (questionnaires, interviews and educator report forms) were analysed per theme and the information woven into the data presentation and analysis.

Cohen et al (2000, 150) clarify that “the theory derives from the data – it is grounded in the data and emerges from it.” Hence a prudent and careful analysis of the data may inform the research on the teachers’ practice and specifically, change in practice (if any) during the teachers’ participation with TMP.

4.6 Trustworthiness of the research

Validity and credibility
Smit (2001, 130) equates credibility with internal validity and transferability with external validity, while Mertens (1998, 181) defines research to be credible “if there is a correspondence between the way the respondents actually perceive social constructs and the way the researcher portrays their viewpoints”.

In this research, the teachers were allowed to speak for themselves: their voices tell the story of their perceptions and experiences, with little interpretation by the researcher. However, validation has been achieved by going through the reports with teachers afterwards, allowing them to check the appropriate transcripts and confirm their veracity, while validity has been enhanced by triangulation, made possible through several strategies for data collection and subsequent cross-referencing for confirmation or identification of contradictions. Combination of data from these techniques provides richer data, with more layers and dimensions. Ultimate validity was confirmed by providing each of the teachers with “their” section of the completed data analysis for verification of the researcher’s interpretations of the data.
Reference has been made to Merriam’s (1998, 208) injunction that “In qualitative research, a single case or small non-random sample is selected precisely because the researcher wishes to understand the particular in depth, not to find out what is generally true of the many.” However, it is useful to analyse data and seek elements of transferability while other researchers may wish to access data and interpret findings in order to facilitate possible implementation of such in their own practice. Transferability is enhanced by the researcher in provision of sufficient detail (“thick” description) while the reader must make his / her own judgement of similarity of the research site with his/her reading context: “transferability is the responsibility of the reader” (Smit, 2001, 131).

Reliability and dependability
Dependability, the qualitative parallel of reliability, is “the fit between what is recorded as data and what has actually occurred in the setting under study” (Smit, 2001, 132). She continues by suggesting that dependability of an inquiry is enhanced with multiple methods for data gathering (133): in this vein, several data collection strategies were incorporated and four cases of teachers were used (information obtained from each of these strong / positive teachers enhances and strengthens the theory derived from the others and it was possible to identify areas of common benefit in addition to areas in which no benefit was evident, per individual or group).

4.7 Role of the researcher

It is important to note that the researcher was the original designer and manager of the TMP programme, who had been involved with the programme, the schools and the teachers since the initial identification and appointment of the mentors and those schools that would participate. (See also role of project leader in 3.2).

This fact holds many implications which are discussed below.

- The position of the researcher as manager / project leader of the programme puts her in the critical position of being able to critique and gives her in-depth knowledge of the programme, the context and the participants.
The researcher was extremely well acquainted with the teachers involved in the study on a professional level; this meant that the teachers were completely relaxed in the interview situation and classroom observations, as they were familiar with TMP staff observing their classes and not using this strategy for the purpose of criticism or evaluation except for the purpose of evaluating the usefulness of the programme itself.

In considering this research to have possible ethnographic elements, one can look for the desirable attributes of ethnographers as interviewers, as provided by Cohen et al (2000, 268). They list three attributes: a relationship of trust between interviewer and interviewee that “transcended the research … and joint pursuit of a common mission rising above personal egos”; a curiosity or desire to know the interviewees’ beliefs, perceptions of facts and stories; and finally a naturalness or unobtrusiveness that would “secure what is within the minds of the interviewees, uncoloured and unaffected by the interviewer”. It is the researcher’s contention that her position as programme manager imparts to her these attributes and hence contributes to her situation as being the ideal person to conduct the research interviews.

The fact that the researcher is the project leader brings potential limitations to this research; such issues are discussed in 4.8.

The researcher undertook this role in responsible fashion, applying research methodology rigorously and adhering to measures that would ensure trustworthiness. Data were collected, transcribed and analysed sensitively but methodically. Recognising that “all accounts of social settings … and the social settings occasioning them are mutually interdependent” (Cohen et al, 2000, 25), reflexivity (self-scrutiny) was a constant tool to inform the researcher on the role she was playing and to maintain a focus on validity and credibility of research. This was particularly pertinent during the course of the interviews and observations, during which time I became part of the teachers’ social world and needed to ensure that their actions were not modified due to my presence.
4.8 Limitations of the research

- The fact that the researcher is the project leader brings potential problems of subjectivity and positive bias. However, triangulation of the information received by cross-referencing between questionnaires, interviews, observations and mentor interviews (incorporating their own teacher observations) is believed to provide for trustworthiness.

- It is possible that the teachers would wish to “please” the researcher and hence would give answers during the interview that they believed would paint the programme in a good light (despite the fact that the teachers were exhorted to be completely open and honest in their responses). However, triangulation should serve to limit this potential bias and make the research more trustworthy.

- It is possible that the researcher’s lack of psychological training or experience may bring potential problems in conducting the interview or the researcher may project her thoughts onto the teacher.

4.9 Compliance with ethical standards

Ethics concerns the morality of human conduct and has impact on issues of qualitative research. To comply with ethical standards, the researcher must be accountable through the entire research process: from the design of the research strategy and data collection instruments through the interfacing with the teachers to the final data analysis and use of interpreted data in the dissertation write-up. Before the research process was begun, the researcher complied with ethics standards of the tertiary institution under whose banner she was doing the research, and obtained ethical clearance (certificate attached as appendix 9).

With these issues in mind, teachers were informed fully of the focus and aim of the research (although Cohen et al (2000, 142) attest that there may be a claim against informing participants as “the more participants know about the research the less naturally they may behave” and hence there may be a case for overt research) as well
as the process to be undertaken until the production of the thesis. It was clarified that the teachers’ participation in the research process would not have any bearing on their participation with the on-going TMP project, and they were informed of the rationale behind their identification as research candidates. They were informed that their participation was voluntary and that if they declined to participate it would have no bearing on the mentoring process or their daily involvement with TMP. Once teachers were clear about the aim of the research, research question and design and process with which they would be involved, they were apprised of the confidentiality of the data and the fact that in any transcription of the data they would remain anonymous. This matter was considered by the researcher as being of great import as much of the research revolved around the teachers’ perceptions of the programme and the methods used by the mentors.

Once the above issues had been clarified, teachers gave their written consent to be participants in the data-gathering aspects of the process; it is the researcher’s belief that this was made easier by the fact that the researcher already had a positive professional relationship with the teachers (this having been established over the previous two to three years of programme implementation). However, at each stage of the data gathering, consent was re-negotiated as teachers were again asked if they were still satisfied to continue with the next step of the process.
Chapter 5  Data Presentation and Analysis

5.1 Introduction

The Teacher Mentorship Programme is people-focussed. The project, driven by the needs of the South African mathematics and science communities for more school graduates to enter these fields as areas of study and work, is essentially a skills-transfer programme that tries to achieve its aims by providing mentors who support teachers in these learning areas with intensive individual guidance and assistance in the complex array of skills and competences that is the locale of being an educator. The programme is not solely about Curriculum 2005 but issues related to implementation of this new methodology and curriculum are addressed along with other teaching issues.

In this chapter, the participating individuals (teachers and mentors) are introduced to the reader, after which the data is presented. The data are grouped into themes (constructs) considering the professional, personal and social development of the teachers (based on the Bell constructs: Bell (1998) in Sweeney (2003, 109) as discussed in 3.3) and further divided into sub-constructs. Within each sub-construct a general finding is presented, followed by the evidence: the voices of each of the four teachers and their mentors, data obtained from research processes discussed in chapter 4, my observations on their practice and finally a synthesis with consideration of a message to be gained from the pattern emerging.

The patterns will point to answers for the following research questions and sub-questions:

- Question 1: Are there changes in the teacher’s maths and / or science teaching?
  
  Sub-questions:
  
  - What are the teacher’s perceptions of the changes undergone in his / her own teaching practice?
  - What are the teacher’s observed (changes in) teaching practices?
• Question 2: What aspects of mentoring influenced the changes?

Sub-questions:
- To what does the teacher attribute such changes?
- To what does the mentor attribute such changes?

5.2 Demographics of participants

Who are the teachers?

The participants in the research process are all teachers at secondary schools in a township area outside the city of Pretoria, South Africa. Betty, Jane, Jill and Joe (pseudonyms) teach at three schools: Betty and Jill teach at the same school, with Betty teaching junior maths and Jill presently teaching senior science and maths; Jane is a senior maths teacher at another school, and Joe teaches natural sciences at the third school. Betty is qualified to teach primary school level, as is Joe, but he is in fact qualified as a language teacher. Both Jane and Jill have BSc degrees, but Jane has no teaching qualification while Jill does. Some background on the teachers and information on their current teaching posts may be pertinent and assist with understanding their perspectives:

Betty

Betty is in her forties and holds a three-year College of Education diploma in mathematics teaching for junior schools. Nonetheless, she has taught for nine years in senior schools (five of which were at her current school) and in that time has taught from grades 8 to 12, as well as some technology; she is presently teaching grade 8 to 10 learners, the latter in Mathematics literacy. Although her home language is not English, she says that she does all class dealings in English.

Betty says as a learner she enjoyed maths and science because “the teacher who used to offer maths and science was so good, he was so good that I didn’t even want to miss one of his classes”. She saw this man as her role model and she decided to go into teaching saying “I like the subject very much” and deciding that “I’m going to teach learners the way he used to teach us”.

93
When asked what her expectations of her learners then were, she said: “I’ll dream of having maybe 90% pass rate in my class or 80, (but) I’ll get the opposite, 10%”. Queried as to what she believed were the reasons for this, she said the learners were slow, but also she did not give them enough examples to practice and she also admitted to leaving sections out… “I had a problem with graphs so if the chapter gives you a problem, you automatically end up hating it and then you leave it.” Although she tried going to her HOD for help, he was generally unable to assist her and she would remain frustrated.

The school at which Betty and Jill teach has a better learning and innovation culture than the other two. This is indicated by more frequent subject department meetings than the other schools, an annual internal EXPO, an attempt at a learner-mentoring programme for the grade 10 learners and a technology teacher who tries to be creative with her learners. However, these initiatives were generally driven by one determined individual and not necessarily embraced and actively supported by all the staff.

The appearance of the school is reasonably neat, but it is very overcrowded as they presently occupy an “interim” school with the promise of getting another built for them: this has not come about. As a result many classes are held in the primary school next door. The school has a vegetable garden in front of it, tended by local people, but the condition and appearance of this fluctuates greatly.

The Principal is very eloquent but said to be dictatorial. He becomes frustrated that teachers spend so much period time not teaching but seems unable to address this. In 2006 he put a new system in place where learners stay in their classes and teachers walk to them: he reasoned that if teachers stay in their classes and learners go to them, the teachers do not teach but sit and do their own work while keeping learners quiet. Our observation was that teachers spent less time teaching with this new system in place as they were constantly retrieving required items from the staff room… and becoming waylaid! The Principal is a maths teacher, but this is a poor system as he is often away and misses his classes.
The teaching staff was very unbalanced in terms of load, with an excess of commerce teachers (all of whom have many free periods) and a shortage of maths and science teachers (at a stage, the senior science learners had virtually no science teaching for 2 to 3 months). TMP advised ways of improving the staff allocation but the Principal said he was unable to implement the suggestions TMP had made as one teacher was not reliable (does not come to school regularly and not an effective teacher). It was our opinion that favouritism was being shown to certain staff members. This situation was partly, but insufficiently, addressed by the DoE more than a year after it was brought to their attention.

The school’s overall pass rate in 2003 was 55% and by 2006 it had improved to 89%. The maths and science results changed over the duration of the programme as indicated in the table below. 2003 results were those before TMP started at the school while 2006 were the matric results reflecting the last year of TMP’s involvement with the school. The 2006 matric group was very small.

<table>
<thead>
<tr>
<th></th>
<th>Entries</th>
<th>Pass rate %</th>
<th>Average %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths HG</td>
<td>4</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>Maths SG</td>
<td>75</td>
<td>38</td>
<td>27</td>
</tr>
<tr>
<td>Science HG</td>
<td>10</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>Science SG</td>
<td>23</td>
<td>24</td>
<td>65</td>
</tr>
</tbody>
</table>

The following changes from 2003 to 2006 should be noted:

- Increase in maths HG average percentage;
- Increase in maths SG average percentage and pass rate;
- Increase in science HG average percentage and pass rate;
- Increase in science SG pass rate.

**Jane**

Jane, in her thirties, has no professional teaching qualification but holds a 3-year BSc degree in mathematics. She is presently teaching grades 9 to 12 in mathematics, and this is her third year at the current school but her twelfth year of teaching maths. Also
not speaking English as her home language, she says she speaks English most of the
time in class.

Whilst a learner, Jane did not wish to teach at first because “I didn’t love it because of
the attitude of learners in the classes” but as she grew older she changed her mind; she
also particularly enjoyed the subject. Maths was regarded as a difficult subject but “I
have to go and teach and show these kids that mathematics, if you are serious about it,
then there’s nothing difficult about it” and “because I have the passion of kids at heart
so that’s why I had to teach.” At first “the main priority was to teach these kids
content for mathematics”.

Jane’s school is on the west side, in the older part of the township. Since there tend to
be older families in the area, the school is not full and a whole double-storey wing
was locked off and unused at the start of TMP’s intervention there. The wing looked
derelict, with windows, doors and shelving broken, although the general appearance
of the rest of the school was not quite as poor. The district office began a system of
bussing learners in daily from the informal settlement on the east of the township:
these made classrooms crowded and placed generally extremely unmotivated children
into the classes.

During the second year of TMP presence at the school the Principal decided to make
use of the extra wing, particularly as it had potentially useful large rooms
(laboratories). The school struggles financially however, but they were able to use
local people in doing some renovations and subsequently the classes were used for
examination purposes.

The Principal is very supportive of the TMP programme as he sees it as very
professional in its approach: making time for school staff and setting meeting times
with the Principal as opposed to imposing on the school and its staff (most teachers
and Principals complain about the District office practice of arriving unannounced
and requiring accommodation summarily). The Principal is the only one of all TMP
schools who actually chases teachers back to their classes at the end of break, and
walks around the school checking on teachers and learners. However, he does not
monitor staff other than in that regard, and appears unaware, for example, that the HOD for maths never holds departmental meetings and does not involve himself in monitoring or training his teachers.

The Principal is a science teacher and shares the teaching of grade 12 learners with the other science teacher. TMP regards this as a poor system in practice as the principal is often away from his classes; in addition there is professional rivalry between the two science teachers and the Principal does not support his colleague but is constantly critical of him: TMP also saw this evidenced with three other science teachers. It was TMP opinion that favouritism was being shown to certain staff members, practiced possibly on the basis of tribal associations.

The school’s overall pass rate in 2003 was 55% and in 2006 it was 57%. The maths and science results changed over the duration of the programme as indicated in the table below. 2003 results were those before TMP started at the school while 2006 were the matric results reflecting the last year of TMP’s involvement with the school. The increased numbers of SG entries reflect mostly the large group of (unmotivated) learners bussed into the school from the informal settlement in the east.

<table>
<thead>
<tr>
<th></th>
<th>Entries</th>
<th>Pass rate %</th>
<th>Average %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
<td>2006</td>
<td>2003</td>
</tr>
<tr>
<td>Maths HG</td>
<td>1</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Maths SG</td>
<td>58</td>
<td>91</td>
<td>19</td>
</tr>
<tr>
<td>Science HG</td>
<td>1</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>Science SG</td>
<td>21</td>
<td>48</td>
<td>71</td>
</tr>
</tbody>
</table>

The following changes from 2003 to 2006 should be noted:

- Increase in maths HG entries, pass rate and average percentage;
- Increase in maths SG entry numbers but no change in results. The maths SG results confirm two facts: firstly that the mathematics department is floundering (their HOD is not competent nor willing to change) and secondly that a large percentage of the learners taking SG maths do not do science: these are the commerce learners who historically do extremely poorly in
maths (interestingly, the commerce teachers tell the learners that maths is not important if they want to study accounting: a misconception which TMP attempted unsuccessfully to reverse).

• Increase in science HG entries while average percentage unchanged;
• Increase in science SG entries but poor pass rate and average percentage.

These results were worse than those in 2005, probably reflecting the particular lack of work ethic of the bussed-in learners.

Jill

Jill registered for a BSc at Vista and completed the degree in statistics and mathematics, intending to work in industry in these fields. However, she heard that the DoE wanted learners doing maths and science and provided an afternoon programme at which Jill taught as an alternative to registering for honours. She enjoyed the teaching and so registered for her HDE.

Jill has only four years of teaching experience, the first year in 2003 before TMP started at the school, having been in other industries before entering education. In her four years she has taught maths for the entire time and the natural and physical sciences for a year each, along with two years of technology; she is presently teaching grade 10 to 12 physical science and some mathematics. Also in her thirties, she studied a BSc with a third year in maths and only first year in chemistry (her highest level of physics is grade 12) followed by a higher diploma in education. Also without English as her home language, Jill admits to using English “most of the time” in class but often doing explanations in her home language.

Jill was the only one of the four research teachers that did not have absolute continuity with the TMP: during her first year with the programme she taught maths, then she moved away to another school for some months after which she returned to her original school, but this time to teach science. However, while working with TMP she showed a great desire to learn from the mentors and their systems, and in fact in her few months away (after only a year with TMP) she reports on applying TMP systems and being regarded as somewhat of an expert at her new school: “It was the first time I was teaching grade 8 and 9 and the teacher there who was teaching natural
science, then I said to her, can you give me your work programme so that I can see how far you are. Then she said to me I don’t even have a work programme. Then remember it was in February … I had to bring my own work programme. Then I said, let us sit down, we are going to sit here. Then I was mentoring the teacher… It was great. It was really nice, then I said at least I’m mentoring somebody.”

Jill’s teaching context is the same as that of Betty: please refer above for the detail.

Joe:
Joe is a College of Education graduate who is in his forties and has grade 12 as his highest academic qualification in chemistry, physics and maths. He is formally qualified as a primary school language teacher. He has been teaching for 24 years, all at the same school to grade 8 and 9 natural science learners. Also not speaking English as his home language, he says he speaks English most of the time in class to the learners.

Joe did not want to become a teacher; he had no respect for the teaching profession due to experiences as a learner: “Most of the teachers couldn’t reach me” and he criticised teachers’ focus on themselves, not the learners: “… the competition among staff members doesn’t benefit the kid in the classroom”. In fact Joe wished to become a health inspector, but finances were always a problem.

However, he entered the teaching field because bursaries were made available from the Department of Education; but in 2000 he wanted to quit teaching: “if I could just get a way out, run away from this field, then I’d be happiest”. He attributed his unhappiness to the fact that there was no true leadership and support in the field, but instead political jostling and “I lose trust in the Department sometimes”. “I lost hope during that (time), it was so frustrating for me, prior to the mentorship programme”.

The school at which Joe teaches is very run-down and neglected in many areas, indicating its poor financial situation and lack of District office support. However, great effort is put into the small gardens at the front entrance of the school, in an annual entry to the “Best school garden” competition. This belies the state of the
laboratories, library and huge pile of broken chairs and desks at the back of the school; however the latter is found next to a neat and productive vegetable garden, well maintained by local elderly folk.

TMP’s first observation was the lack of teacher work ethic: groups of teachers would stand outside their classrooms, talking and smoking, sometimes while they were supposedly teaching a double period matric class! Joe often speaks of “the conditions under which we find ourselves”.

The Principal spent no time patrolling the school, and was either unaware of this or powerless to stop it. When TMP constructed a striking “time management” document/poster for him, he made sufficient copies for every classroom to have one and put them up, with a monitoring booklet in which learners were to take note of teachers’ times of period attendance!

When TMP started at the school, most learners studied functional maths, with a few studying on the standard and higher grades. The maths staff had a problem with geometry which most teachers avoided teaching. At the start of TMP in 2004 the mentor was asked by the maths department to give them a year before they teach higher grade maths to grade 11, which she allowed. Nonetheless, they had grade 12 learners doing HG in 2004 and almost all failed. The school has a system of acknowledging their top ten students in each grade every quarter by giving them certificates.

The school’s overall pass rate in 2003 was 66% and this was the same in 2006. However, during the first two years of TMP’s presence at the school the rates first dropped to 48% and then increased to 82% with intensive support from TMP and the district office. We are of the belief that an overall school pass rate of 66% is an accurate reflection of the school and its learners, but are happy that there has been some improvement in the quality of the maths and science marks.

The maths and science results changed over the duration of the programme as indicated in the table below. 2003 results were those before TMP started at the school
while 2006 were the matric results reflecting the last year of TMP’s involvement with
the school. The 2005 matric group was huge, with 107 learners studying SG maths
(these were the large group of originally functional grade learners leaving the system)
while the 2006 group size returned to its normal number.

<table>
<thead>
<tr>
<th></th>
<th>Entries</th>
<th>Pass rate %</th>
<th>Average %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
<td>2006</td>
<td>2003</td>
</tr>
<tr>
<td>Maths HG</td>
<td>5</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Maths SG</td>
<td>25</td>
<td>23</td>
<td>4</td>
</tr>
<tr>
<td>Science HG</td>
<td>5</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Science SG</td>
<td>25</td>
<td>18</td>
<td>24</td>
</tr>
</tbody>
</table>

The following changes from 2003 to 2006 should be noted:
- Lack of 2006 maths HG entries: the maths teachers are very fearful of HG
teaching content;
- Increase in maths SG pass rate and average percentage;
- Increase in science HG pass rate and average percentage;
- Increase in science SG pass rate and average percentage.

Who are the mentors?
Elise and Jean are both highly experienced teachers in their fields (Elise in
mathematics and Jean in Science) who resigned from their positions with the schools
in the government’s Department of Education to take up positions as mentors with
TMP.

Elise
Elise has a BSc degree in mathematics and computers and an HED (teaching diploma)
in mathematics and general science. She also completed a university course in
Facilitating Lifelong Learning.

Elise taught maths and science at secondary schools for 11 years, during the last few
of which she was cluster leader for 14 schools. This post included regular meetings
relating to Continuous Assessment Portfolios for Grade 9. She is fully trained in OBE
and NCS and amongst her other professional activities has presented OBE training at University of Port Elizabeth to Eastern Cape teachers, hosted regular training sessions relating to teacher/learner assessment, was responsible for the compilation of a manual for assessment of Mathematical Sciences for the department of Curricula Studies at UP, assisted in the development and hosting of workshops at the annual Association of Maths Education in South Africa (AMESA) congresses and is particularly skilled in doing Mathematical Investigations for which she has presented several workshops even prior to her TMP experience.

The main motivation for Elise leaving her teaching post at an excellent, highly-respected local girls’ secondary school to join TMP was because she was tired of certain facets of the staff interactions at her school and desired change. The new position appeared more interesting than to start simply another school teaching job: Elise had previously enjoyed presenting many workshops for teachers and wanted to work with adults and she saw this post as attractive, with its potential for sharing her knowledge with other teachers.

Elise’s motivation for education is the learners: she is passionate about the need for learners to receive a good education and all aspects of her working with teachers are ultimately directed towards the teacher’s understanding that the learner must be assisted to master all the work in the curriculum.

Asked what characteristics made her right for this position as mentor, Elise claims it is her willingness and ability to share her skills and knowledge with others. She has extensive experience “of ways that really work” in teaching and desired to share these with other teachers who had no access to such knowledge. However, she admits that the characteristic that she most had to suppress was that the teacher “should do it my way” and not to try to make the teacher into her.

Elise was asked what she believed to be the most important part, or characteristic, of a mentor’s job. This mentor saw as critical to her position the need to help the teachers understand how to make their own jobs easier: through better understanding of content, planning and administration and doing all aspects of their job in a better way.
Mentors were required to assist the teachers to then apply what they had learnt and then do extensive “checking up” to see if they in fact were applying such skills, strategies and techniques. Elise refers to her desire to build within teachers an excitement for teaching and enthusiasm to better themselves for their roles. She says that in her job as a mentor, although she was a role model in certain aspects, she was generally not able to “set an example” as the teachers seldom saw her in action as a teacher; it was for this reason that Elise perceived the mentor school visits undertaken by the TMP teachers to be vital: to see other teachers implementing the systems and procedures advocated by the mentors.

Elise clarified her thinking on mentoring in general: she believes that commonly a mentor is initially approached by a prospective mentee, but in this programme the teachers are summarily assigned mentors. However, an outcome, after a short period of time, is that the teachers actually do approach their mentors for help in specific issues (some more than others); thus the TMP mentor’s jobs were to mentor, coach and constantly engage in extensive follow-up.

Elise discussed the difficulty, in the context of under-resourced schools, of having expectations of teachers and assessing their practice, or even requiring that they assess their own practice. On what / whose perception of a good teacher is basis for judgement made, when the reference backgrounds are so variable? For example, teachers may rate their use of resources the same when both have access to few resources but one uses those available to the best of his/her ability while the other actively seeks out own resources. With reference to Rogan and Grayson’s (2006, 41) profile of implementation, Elise claims that generally the TMP teachers cannot be classified in many sections as being on a level one status: in fact that level is frequently the TMP goal for mentoring.

Jean

Jean has a BSc degree in physics and mathematics and an HED teaching diploma. She also studied courses in Health Physics. Jean’s work experience includes 4 years teaching at a technical college, 3 years at a nuclear facility and 17 years of secondary school teaching. During her period at schools, Jean, over-and-above her normal
teaching duties, was involved in various organisational and management aspects of schooling including timetable planning, examinations officer and head of science department.

Jean applied for the position as TMP mentor because she was frustrated in education (particularly with the administration and pressures of working at a government school) and wanted to try something else and she felt that she had always “received a lot” and wanted to “give back”.

Before her first experiences of going out to the schools, she was not aware of how bad the situation was at those schools and was initially shocked. However, she was also disappointed in some aspects: for example she had been under the impression that the schools had no resources, only to find that these particular schools did have such but were not using them. She was also disappointed at the poor qualifications of the teachers for their posts and despaired for the whole system.

Jean feels that her strongest characteristics making her suitable for this job are her talents in working with people: she empathises with others, focuses on building a relationship with them and is slow to anger with non-cooperating teachers, but rather tries approaching problems in a different way that is non-aggressive. As a result the teachers are not afraid to meet with her and willingly speak up when there is a problem. Jean believes it is most important, in this mentoring job, to suppress one’s irritation and anger, as well as one’s frustration at an apparent lack of progress and/or boredom at having to repeat work or oneself constantly. She tries to handle all issues sensitively, solving problems without argument and avoiding confrontation. She is nonetheless very strict with the teachers but avoids situations that might jeopardise her relationship with them: without a strong, trusting relationship with a teacher Jean feels there will be no mentoring possible.

There are many aspects to a mentor’s position: Jean claims that teachers (in her experience) have no skills therefore one must teach, coach, push; one must take over the role of the HOD, the Principal and subject facilitator in many ways. In examining Rogan and Grayson’s (2006, 41) profile of implementation of Curriculum 2005 for a
science classroom, Jean agrees with Elise in saying that the TMP teachers, before TMP intervention, may not even be identified as level 1 teachers, although there are some aspects in which one or two teachers show attributes of such a level. For example, she believes that a few teachers may present work in a “well sequenced manner” but they make many mistakes in content; a few teachers try to use “examples and applications from everyday life to illustrate scientific concepts” but they use inappropriate examples and apply them incorrectly. Therefore all teachers need individual support, to assist them to identify and address their needs whilst building on where there may be strengths.

5.3 Research questions: analysis of data

The approach to be taken in this chapter on data presentation will be to deal with the two research questions and sub-questions simultaneously, whilst presenting the data in themes. Thus each theme and sub-theme (construct and sub-construct) will be presented by giving the following:

- The teachers’ perceptions of the changes undergone in his / her own teaching practice (data extracted from both of their questionnaires and the interview),
- The observed (changes in) teaching practices (data obtained from both the researcher’s classroom observations and that obtained from the mentors, current and at the start of the programme).
- The question of mentoring, and what aspect of this, if at all, was instrumental in the changes, will be discussed during the presentation of each theme: from the point of view of both the teachers and the mentors, and information as obtained from questionnaires (teacher and mentor), interviews (teacher and mentor) and mentors’ observations over the course of their three years’ involvement with the teachers.
5.3.1 Professional development of teachers

a Planning, preparation and general organisation

Introduction

If a teacher is to complete teaching the syllabus / curriculum in the time allocated, as well as incorporate time for other teaching or assessment tools (for example tests, projects, practicals, investigations, review), s/he must be very structured and show excellent time management. A teacher’s task is facilitated in this regard if there is a pre-structured, specific plan from which to work. Thus, the following types of plan strategies may play an important role in helping teachers to manage their time:

- Year plan: This is also referred to by the teachers as the work programme. This plan breaks down the curriculum into sections appropriate to complete in certain time periods. A year plan will thus indicate time allocations per topic, for example, but in addition will also reflect the holiday periods, DoE-allotted assessment/exam periods, school test weeks and other social days (if relevant), days allowed for completion of projects or investigations and finally allow for end-of-section review or test days.

- Cycle plan: This plan has the format of a table with 8 blank squares each representing a period in a day; in the case of TMP since the schools were working off 7-day cycles the cycle planner would have 56 blank squares. Into each square would be written shortly what new work was to be covered in that period, while the cycle planner would also reflect days allowed for projects or investigations, test days, etc.

- Lesson and topic plans: It is necessary for teachers to have a very clear idea exactly how much time they have available to teach a particular topic or chapter / section, if they are to cover the curriculum completely at the correct pace. Thus a topic plan would break the section down into units to be covered per lesson: it would also indicate time allocated for assessment strategies. A lesson plan delineates what the teacher will do in a given lesson: in many cases the lesson plan was detailed within the topic plan document. It reminds the teacher what homework to review, what activity to use to introduce a new
topic, page references for the new section and questions to cover in class as consolidation of the new material. Finally it will specify page and question numbers of homework for the learners. Lesson plans, if not drawn up as separate documents, may be drawn up in the teacher’s diary or on the cycle plan. However, a teacher should have her lesson plan open at her desk while she is teaching. Without having this plan, a teacher will probably waste an inordinate amount of time and learners may become unmotivated and unruly in the unfocussed time.

This section of the research considered to what extent the teachers did planning and general preparation for their teaching as well as their general organisational strategies and systems.

General finding

Before exposure to the mentoring programme, generally teachers did not plan topics or themes, did not prepare for the next day’s lessons and their general filing and organisation was poor; however in some cases they did not know what planning meant or entailed, and how to go about it.

After their involvement with the programme, most have improved considerably in these aspects, although are not completely prepared at all times, but they feel that they can now do their own preparation and are willing to do so, recognising its importance and impact on, inter alia, self-confidence and pace of teaching and therefore syllabus completion.

Evidence: the voices

Betty
Betty’s practice prior to TMP typically did not include attention to planning, preparation and general organisation. She says that before she worked with the TMP she “was doing preparation, but not thoroughly… I wasn’t preparing every day, I wasn’t doing that. I was not good at filing my … then, because my file was not
organised, it was just a file for the sake of it being a file...” and she had no system from year to year: “If I did this, this year: next year I’ll do some other things, but not the same at all… I didn’t … I can’t make a continuation… I need to be honest (laughs)

In her questionnaire assessing her self-perception of her competence change, Betty gave herself a rating 4 of maximum 5 (“My teaching practice has improved somewhat in this aspect”) to her general planning and organisation (creating and working from lesson plans, cycle plans, year planners; building up and controlling teacher’s files and resource files) and planning for investigations. The mentor, Elise, had however not seen evidence of plans that Betty had created herself: Betty’s strength appears to be in working from the plans designed and given to her by the TMP mentor. This is confirmed on a TMP educator report form: Betty allocates herself the rating for cycle planning which claims “Planning done according to work schedule and keeping up with it” while the mentor rates her at “Planning done but sometimes struggles to keep up”. For lesson preparation, she allocates herself: “Lesson planned well in advance, where activities run exactly according to plan with all LTSM available. In this case the mentor indicates Betty’s lesson presentation as “Well planned lesson presented without interruption caused by disorganisation.”

In the interview, Betty claimed of her practice now: “a lesson that I’m supposed to teach tomorrow I prepare it at night, at home… I use my work schedule and my lesson plan sheet and my cycle planning, cycle planning makes my lesson plan easier because I wrote all my topics on a cycle plan and when I prepare it becomes easier… Weekly planners; plan night before (what content teach; what work for learners to do etc.) : I write it down, even the homework I say it’s on page this and this, exercise this and this, number 1,2,3”.

This was confirmed whilst in Betty’s classroom: it was observed that she files effectively, with well structured resource files and a daily file with lesson and cycle plans; she uses cycle plans fully to pace her teaching. Betty is very proud of her files and the fact that other teachers ask her if they can use them. Her lessons were well
prepared and paced, but on one occasion the homework had not been fully detailed or planned beforehand.

Elise points to Betty’s improvement in planning and preparation as being her most remarkable change. The mentor says that Betty “realised the importance of it and started doing it herself”.

Jane

Jane’s prior practice (before the TMP programme) was similar to that of Betty: no preparation before teaching and poor organisational systems. She describes her lack of preparedness for class teaching and assessments in her previous teaching practice as “truly speaking not that well prepared, some of the things I used to think of them when the learners come to class to say ‘today is Tuesday what did we do yesterday?’, you find that sometimes you can’t even remember to say yesterday I gave them class work, today what are we supposed to do, you ask learners to say, ‘yesterday what did we do, did I give you any homework, any class work?’, then they tell you ‘yes yesterday we had a class work so we have to do corrections now’. So I wasn’t that well prepared beforehand, and you will … that if you want them to write a test you tell them that ‘tomorrow we writing a test or in two days time you writing a test’. You don’t set when the test come you tell learners stories to say, ‘the machines are not working in the office so I was unable to set a test for you’.”

Jane acknowledged: “I knew that I had to prepare but sometimes we take these kids for granted to say they don’t know, so you just come to class and sometimes when you not prepared, you come to class, become very angry, you check their books on the day to say you did not write, even if I knew that I had to prepare to say today this is what we going to do, but didn’t do it that much.”

On the odd occasion when Jane did prepare, it was perfunctory and did not have enough detail: “I prepared to say I have to know this specific topic because that’s what I’m going to teach today, so that was all, I did not prepare to say I have to present this lesson, then after presenting this lesson, this is the exercise that the kids are going to write, … now when you have to give them class work, you take your
book, still have to page it back, can’t even remember the chapter in the book, page back then find the page then you write the exercise…”

Jane allocates herself ratings of 4 or 5 (of a maximum 5) in her self-perception of competence change for all aspects of her teaching that involve planning and organisation; the mentor’s rating of Jane’s creation of lesson and cycle planners also accorded her a 4 rating, i.e. confirming that her teaching practice has improved somewhat in this aspect.

On a TMP educator report form rubric Jane allocates herself the rating for cycle planning which claims “Planning done but sometimes struggle to keep up”. For lesson preparation, she allocates herself: “Lesson planned well in advance, where activities run exactly according to plan with all LTSM available”. Mentor Elise confirms both of these self-assessments.

Jane says she now prepares regularly “on a daily basis or weekly, let me say daily normally since the (TMP) programme, I arrive here at school very early, normally at 06:45 I am here, .. now I plan my days... I need to mark... Normally I leave here at school around 5, .. from 2 until 5 if I need to set a test for five days to come, … then I set the test, if I need copies, do those copies and plan for tomorrow to say when the grade 9s come I have to write their class work because sometimes when I do my cycle planning, I write down what I’m going to do for this day, ... now I’m using those lesson planning book that she (the mentor) gave me.”

Jane’s general planning is now much improved: “very different, to say before I didn’t have those formal lesson preparation and the cycle planning and it’s very hard when you do it for the first time because you have to spend a lot of time, but once you’re there then it becomes easier and the following years because you now know what to do…”

Her general organisation was previously not efficient (“I would have files but you would find that the files don’t even have dividers, everything is just in here, it’s a mess, ... And it didn’t have any cycle planning, didn’t have any year planners.”) but
she believes it is now “… very efficient. I know that I have to take out this file, it has got my cycle planning, I have that file that has got the portfolios, so it’s very efficient.” Elise believes that Jane’s improvement in planning and preparation as being a very evident change in her teaching practice. The mentor says that Jane, like Betty, “realised the importance of it and started doing it herself”.

Jane keeps her lesson planner (which had detailed all parts of the lesson) and cycle planner next to her on the table for easy reference, as seen in the observation class. It was observed that all her files and educator portfolio are well organised.

Jill
Jill describes how, prior to TMP, planning was not done before term started, but is now completed well in advance. She refers to the benefit of starting one’s teaching year with planning already done: “… a year before, ever since TMP came, let’s say our planning, we plan for next year … somewhere in October, November: (then) next year we are not frustrated. So what we used to do before is, January we need to sit down with your colleagues, then where are we going to start, then we just start our planning. It’s time consuming, wasting time, wasting periods, because you just go to class, let me just teach, then I will follow my work programme as soon as I’m finished with it, rather than having the work programme before, then it’s easy, you are having direction… they have helped us a lot in the planning, because January we don’t panic, we are having everything, we know where to start, I think the planning part I like it about the mentors.”

On the TMP science educator rubric, in terms of her science planning and preparation, Jill generally accords herself a 3 rating, with which the mentor is in agreement, attesting that her planning is done but she sometimes struggles to keep up and her lessons are well planned and presented without interruption caused by disorganisation. As with the other TMP teachers, Jill perceives her change in competence in regard to planning and organisation to be worthy of a 4 rating for her science teaching: the science mentor confirms this 4 allocation, her teaching practice having “improved somewhat” in this aspect. Jean confirms in particular that Jill’s grade 10 planning and preparation was initially not good as she concentrated on
grades 11 and 12, whereas this improved during the programme as the TMP supplied assignments and summaries.

On a TMP maths educator report form rubric, Jill allocates herself the rating for cycle planning (maths) which claims “Planning done but sometimes struggle to keep up”. For lesson preparation, she allocates herself: “Lesson planned well in advance, where activities run exactly according to plan with all LTSM available”. Elise confirms Jill’s self assessment of improvement but in fact accords her a higher rating for planning than Jill gives herself, saying that Jill never fell behind in her curriculum presentation. Elise says that since Jill began her teaching career she has had TMP support and simultaneously TMP pressure to work at a good rate so she never developed bad habits of slow work.

Jill is reminded that in the following year the mentors will no longer be at the school, and asked if they will be able to continue and set up planning material. Her response is: “yes, ja, we can do that, we have to do that because we have seen how easy it is if you are having your planning.” During her second year with TMP, Jill went to another school for a period of a few months, during which time she was teaching science and technology. The previous year she had learnt TMP systems whilst working with the maths mentor, and so at her new school she applied these systems and principles and “mentored” teachers there: “… natural science I was very confident … then I became the TMP, also in technology I did the same thing because I found teachers there, they said they don’t know what to do. Then I said no, we will sit down and talk, then they were also calling me the HOD for technology. Then I said no, we will sit down then I will tell you what to do. Let us check, let us try to draw our own work programme.”

Referring to general planning for daily lessons, Jill’s comments are: “… you need to give yourself time to plan.” Jill plans and organises extensively for experiments with her learners, appointing learners as lab assistants to prepare the afternoon before, giving the group allocations to learners the day before, and then “normally I remain behind in the afternoon and do the experiments and see what will happen”. No comparison may be made with prior practice in this regard, as Jill previously solely
taught maths. However, it is believed that principles and systems that she had learnt from the maths mentor probably also guided her approach to science teaching.

Jill clarifies what lesson preparation entails: “I think if you are well prepared for your lesson, I think you know exactly what you are going to tell the learners. You start with your introduction then after doing your introduction, what am I going to do? Then from there I think that’s what I’m calling preparedness for a lesson and you need to understand the concepts.” She prepares in advance of the lesson: “… sometimes it’s a night before; sometimes you do it maybe a week before ... you must make sure that before you go to class you have prepared something.”

In my classroom observations it appeared that Jill prepared more for her science classes than her maths; she is very familiar and confident with maths and says she therefore has no need to do this.

Asked if her organisation used to be efficient, (incorporating resource files, minutes of meetings, planning etc) Jill said “No …. Really not”, but commented that the practice of making work programmes brings about improved organisation: “I think now it’s a little bit better because before, remember the work programme, if you don’t have a work programme then you end up saying, what am I going to teach today and normally when it comes to that, you normally teach the sections that you like, if you don’t have a plan.” Observing her systems, her resource files included TMP file front pages (indicating the need to file departmental policy, subject assessment guidelines, school policy, CASS recording sheets, but no information was filed in these sections), lesson plans and cycle plans. The files also included assessment banks (tests (4/5), exams (notes and portfolios etc in here), assignments, pracs and research project.)

Joe

Joe’s planning and organisation prior to TMP was definitely not adequate. He speaks of his previous experiences with planning and preparation as being difficult as his timetable was overloaded with teaching and he had too few free periods for organisation. “… come to the planning generally, … it was bad, it was poor …. You didn’t have that time to sit down. As departments we used to have meetings maybe
twice in a quarter and we … didn’t have this cycle planning, no. … usually I used to do them the day before, but there are certain things …, when it comes to organisation and planning, they kill your spirit sometimes, you become discouraged… I was drained. So somehow you find yourself not being able to finish the syllabus…”

Rating his change in competence from his own perception, Joe allots himself either a 4 (“My teaching practice has improved somewhat in this aspect”) or in some cases a 5 (“I believe my teaching practice has improved significantly in this aspect”) for aspects of his planning, preparation and organisation. Jean in principle supports this self-perception of competence change as she allocates a 4 rating to all aspects of Joe’s planning and organisation. She notes that in his prior practice he was sometimes prepared to teach but “did not consider time constraints … (and)... did not finish syllabus” whereas now cycle planning helps him to complete the syllabus and use the period more productively.

In TMP educator report rubrics both Joe and Jean describe Joe’s lesson preparation as “Well planned lesson presented without interruption caused by disorganisation”. Joe describes his “Planning done according to work schedule and keeping up with it” while the mentor puts this at “Planning done but sometimes struggle to keep up”. Jean explains that Joe sometimes distracts himself during the period: whilst teaching a topic, he will use a word which is relevant to the section but then will expand on that word in terms of other contexts and for this reason he will occasionally not finish the lesson.

Joe comments on his preparation now as being adequate for his teaching: “… I can’t say almost everyday I’m prepared – I will be fooling myself, but most of the time I try my best to prepare.” However, Joe now has a different understanding of what planning means and entails, and says that he previously misunderstood the concept: “in the past whenever you talk of planning, planning to me it meant making sure any document you are having, an important document … in my file.  But now although it is difficult, … your lesson preparation is the purpose of this lesson, what do you want to achieve in this lesson, go to class, assisting the learners, will you be able to achieve your outcomes, your objectives, … somewhere we are better as compared to the past
... We know that we are supposed to be at this point, but we are not yet there, but we know how to get there.”

Looking through Joe’s resource files, TMP file and fairly comprehensive teacher’s portfolio, it confirms that Joe is thorough in his control of his material: the TMP file is up to date and contains lesson plans, cycle plans and minutes of meetings held. Lesson preparation was evident but sometimes on a loose piece of paper: Joe says he has so many classes (of differing natures and abilities) per grade that he cannot be prescriptive beforehand but must be flexible.

Joe refers to the role TMP played in improving his planning and preparation as “… if you can ask our colleagues, maths, even science, mostly will say this programme has put a lot of pressure on us but at the end we are the best.”

*General mentor comments*

Echoing Joe’s claim of “pressure” from TMP mentors, Elise comments on the mentors’ general approach: they frequently focussed on curriculum completion, asking “where are you now?” and if necessary getting the teachers to re-plan if they had fallen behind their planner. They emphasised time management as it was discovered that very few teachers at the township schools (if any) completed the curriculum with their learners, and the latter would have to resort to “self-study”: an unacceptable situation, particularly in view of the lack of learner resources. Jean believes the most important aspects in working with teachers as far as planning, preparation and organisation are concerned are to instruct teachers how to do it, follow-up regularly and chase teachers to implement the skills they have learned. She says it takes time before the teachers understand the importance of these skills and strategies so they must trust the mentors that they are not “enforcing on them things not necessary”.

Elise explains that the mentors approached the concept of planning, preparing and time management from the perspective of the learners: they explained to teachers that to be ready to write year-end assessments and be promoted to the next grade, learners
must have completed their work and been exposed to the whole curriculum, hence the need for teachers to keep up with the pace. Jean agrees with this and further explains that many teachers are content to spend six months covering a single chapter then pushing the rest of the curriculum into the remaining half year. She believes that many teachers are content that they have “done their job” if they simply finish the syllabus but do not consider this through the eye of the learners and do not understand that learners need time to assimilate each section. In addition, the teachers do not consider the presentation of the curriculum to be linked to the number of marks allocated per section: they do not manage time allocations per section in line with relative importance of sections, based possibly on time allocations.

Thus it may be concluded that the mentors’ emphasis on time management (through planning, preparation and organisation) ultimately helps the teachers to use as a lens the learners’ needs and hence to implement strategies that guide their teaching to serve these needs.

Discussion of other aspects of teaching practice change (including use of period time, completion of syllabus, assessment and use of a variety of assessment tools) further on in this report will also have relevance in this section on planning. In general, it may be said that the programme takes the following approach:

- Time management and lesson / cycle / year planning:
  - Teachers are shown how to divide topics into sections to be dealt with in discrete periods of time, and thus to construct lesson and/or cycle planners to manage the presentation of the sections;
  - Teachers work from TMP-supplied time-management planners and are encouraged to keep pace accordingly;
  - Teachers are assisted to re-plan when they fall behind;
  - Teachers experience pride at completing the syllabus for the first time and acknowledge that this is due to time management.
  - Preparation of the year planner in the previous year allows teachers to start teaching immediately at the start of the New Year, enabling easy discipline and early control of classes and improving their confidence.
• Organisation of resource and teacher files:
  o Teachers find benefit in easily accessing work done the previous year, to save them time in the current year;
  o Teachers receive admiration and requests from help from teachers of other learning areas;
  o Teachers receive commendation from departmental facilitators when checking the teacher’s files.

Synthesis: Planning, preparation and organisation
The benefits of the TMP to the teachers in terms of planning, preparation and organisation appear to have been considerable, as confirmed in general by teacher testimony and mentor and researcher observation. The teachers attest to the following changes:
• Betty’s practice prior to TMP was to do no preparation nor organise files for ease of work and continuity. Now she has excellent filing systems, uses cycle plans and prepares lesson plans the night before. She has a new recognition of the importance of these aspects of teaching.
• Prior to TMP Jane did no preparation and when learners came into class she did not know what she would teach them. She informed learners of tests but then did not prepare them and her organisational systems were poor. Like Betty, she also now recognises that planning and preparation is vital and it forms an important part of her work.
• Jill claimed that any start-of-year planning was done in January when school was already under way, whereas subsequent to TMP year planning was done in November of the previous year, giving “direction” to teaching from the beginning of the year. Her practice prior to TMP did not include planning and as a consequence she used to teach sections she liked; her filing and general organisation was poor. However now she says that due to the use of work programmes her organisation and preparation has improved and has become a lot easier. “I think the planning part I like it about the mentors.” She is observed to prepare more for science than for maths as she has more years of maths experience and is very well planned and organised for practicals, having put in excellent systems with learners as laboratory assistants (on the
advice of the mentor). When temporarily at another school, she showed the teachers the TMP systems and helped them to use them.

- Joe’s practice prior to TMP evidenced inadequate planning and preparation and he did not finish his syllabus (the mentor attests that he did not consider time constraints). Joe says that prior to TMP he did not know what “planning” meant but he demonstrates that he now has an excellent grasp of its intentions and he now does his planning, makes more productive use of his periods and has good filing systems.

- The mentors attest that aspects important to addressing these issues are to instruct teachers how to plan, prepare and organise, follow-up regularly and constantly encourage teachers to implement the skills they have learned. Although the teachers do not immediately understand the importance of these skills and strategies, the relationship must be such that they trust the mentors that the process being advocated is vital to good teaching practice. After a while the impact of these strategies on their teaching becomes evident and the teachers become encouraged and self-motivated. The mentors’ rationale for introducing these strategies into the teachers’ arsenal is entirely for the sake of the learners, thus representing to the teachers a different lens for contemplating and justifying their teaching practices.

In every case the teachers did not use lesson plans in their practice prior to TMP but all use them presently. Rogan (2003 and 2006) describes a level 1 teacher as using a well-designed lesson plan: this would indicate that the teachers were previously operating on a level lower than 1 (level zero?) but their practice had improved to a level 1 in this regard. Each of the teachers rated their planning and preparation change as a 4 out of maximum 5 (two allocated themselves 5 ratings in a few aspects) indicating that they believed their teaching practice has improved somewhat in this aspect. In every case, the mentors confirmed this rating of changed competence.
b Confidence in subject knowledge

Introduction

South African teachers have very low levels of conceptual knowledge (over 50% of practicing mathematics and 60% of science teachers have had no formal training in these subjects (Rogan, 2003, 1175 citing Arnott 1997)), a poor grasp of their subjects, poor reading skills, lack a spirit of enquiry and make errors in the content and concepts presented in their lessons. These observations were echoed and underscored by the President’s Education Initiative Research Project (PEI) (Taylor and Vinjevold, 1999, 139 and 160).

Actual measurement of teachers’ knowledge was disallowed by the GDE, precluding the possibility of a “pre-TMP” and “post-TMP” knowledge comparison. In addition, it was difficult for the mentors to quantify each teacher’s improvement in knowledge; however such changes were most obvious when dealing with teachers involved in new curriculum work.

In this section I have relied on the teachers to comment on their content knowledge change and explored the impact that improved knowledge of the material has on their confidence.

I suggest that a teacher confident of his/her work experiences greater success in other areas, including ability to present that material in a well sequenced manner and to motivate, interact with and manage learners.

General finding

All teachers believe themselves to have benefited from the mentoring process, comparing their current confidence with their teaching content with the situation prior to TMP, in which they “dodged” or omitted chapters which they did not understand, or taught from the textbook or blackboard with no understanding of the material.
There are few schools in which the HOD (or other teachers) are able to be of help to the teachers as they themselves have problems with understanding many sections.

The mentors confirm the teachers’ assessments of their current mastery of the syllabus. The mentors describe the procedure undertaken in “coaching” the teachers, explaining that classroom observations reveal each teacher’s poor foundations and confirm that they must make no assumption of syllabus mastery but rather teach the work to the teachers from a foundational level, as if they were addressing a class. Teachers benefit from this approach and in addition use it as a guide to presentation of the material to their own classes.

Evidence: the voices

Betty

Betty says that she was previously not at all confident of her content knowledge and admits that, for example, she used to hate graphs, a section of the syllabus that she did not understand. She would “go to my HOD, sometimes you’ll find, he’s just the same as you, so you sit and can stay with your frustration and then go back to class and then you carry on with the other stuff” in this way she used to “dodge” teaching graphs.

Asked what her expectation was of having a mentor before the programme started and in what ways did the programme meet those initial expectations, she indicated the need most worrying her was her lack of content mastery: “I wanted them to help me to be okay with the chapters that I’m not quite alright on them, to know the content thoroughly, ... yes they did meet my expectations.”

Speaking of her knowledge now, she says: “If I talk about the content, they’ve (the mentor) helped me a lot with the content, I gained a lot of experience on this. How to approach these parabolas and the hyperbolas and so on and so on. I’m okay… now I can say …, there is no chapter that I cannot handle correctly, I can handle all of the chapters, I can treat them correctly, so I can teach them the way I’m supposed to, I’ve improved… yes I am, very much confident of content knowledge unlike before…We
have learnt so many things from them, so many things. We no longer “dodge” chapters.”

Attempting to convey what she believes to be her improved strength in subject knowledge, Betty indicates (by allocations of 4 or 5 ratings on her questionnaires dealing with her self-perception of competence change in her grade 8 to 10 maths teaching) that her teaching practice has mostly “improved somewhat” or “improved significantly”. However, in a few cases of sections in her grade 9 and 10 maths she feels (rating of 3) that her teaching practice may have improved, but not very noticeably to herself or her learners. In TMP educator report feed-back rubrics, Betty often puts her subject knowledge at a 3 (of 4) indicating good command of the sections taught. The mentor confirmed this as she also rated her practice in this regard as a 3.

In an observation of Betty’s grade 10 class, she was very confident with the work, approached the problems methodically and systematically, and was able to identify and rectify learners’ misconceptions. She is fond of asking learners to give her another example (“any or from the textbook”) and is very proud of her ability to do all the problems so tends to show this off to the class. However, in a grade 8 class on another occasion, she did not appear to be confident enough with one section and was unable to identify another learner’s misconception, although generally it was a soundly-addressed lesson.

Jane
Jane admits that “When I started teaching I wasn’t that confident, er, especially that with the knowledge that, you find that learners have got a problem.” She describes how she taught theorems as: “… I used to write the theorems on the board as they are and the sketch, then when I explained to these kids I was looking at the theorems on the board because I wasn’t that confident, not sure that what I’m saying, is it true or am I lying, so I had to write the theorems on the board and from there explain them whereas they are on the board, not asking these kids questions, so I was the one talking all the time until I gained that confidence after some years. ... when time goes on, as you teaching you learn these things and you know them. So after two to three
years … you know the theorems and when you prove them you know that you have to engage the learners.”

Later in her career, if there was a section of the syllabus Jane did not understand, she taught herself the work from the textbook before getting to class. She explains why she became motivated to do this as “even those sections that maybe you did not treat (teach) before to say these were the difficult sections, as years goes by you realise that what I’m doing is unfair, you need to do these sections because these learners are expected to know their sections, so as year comes in and goes, you feel that I have to do them because it’s becoming unfair to kids. So I had to build on top of what I did the previous year.”

It is clear from classroom observations that Jane is now very confident of the material and presents it in a systematic manner. She allows learners to question and identifies misconceptions readily. However, she refers to several instances in which she gained more knowledge through the mentoring process: “I’m saying I attribute it again to the programme because I’ve learnt something, imagine after 12 years of teaching! So we are learning each day, all the way.”

Jane indicates (by allocations of mostly 5 ratings on her questionnaires dealing with her self-perception of competence change in her grade 9 to 12 maths teaching) that her teaching practice has generally “improved significantly”. However, in a few sections she feels (rating of 4) that her teaching practice has “somewhat improved”. Elise clarifies that Jane’s content knowledge for the more senior grades was good, but she required extensive support with the new material of the grade 9 curriculum and it was in these areas that Jane evidenced tremendous improvement.

Jill

Jill has a university degree in mathematics but worked in industry, not using school maths per se. However, when coming upon sections she did not understand in her teaching her approach would be to “I will call them (her friends at the school) and tell them I’m having this particular section. I really don’t understand the section; I don’t know how to approach it because it’s the first time I teach that particular section …
and try to read as many different books as possible because I think you going to get one of the books which explains that particular section, thoroughly, you must try to find as many books as possible.”

Attempting to convey what she believes to be her improvement in subject knowledge, Jill indicates (by allocations of 5 ratings on her questionnaire dealing with her self-perception of competence change in her grade 11 maths teaching) that her teaching practice has “improved significantly”. Elise confirms this, clarifying that Jill had previously worked in an environment where mathematics was not required in her daily work and as a result her content knowledge was totally inadequate when the mentor first met her.

Jill is a little unsure of the sciences as it is her first year of teaching this learning area: “…sometimes I become so frustrated before I start introducing the chapter. But then when I go home and prepare, I find that no these things are very easy, ja, because sometimes I say, ooh, will I remember that particular section, the halogens and the halides, will I remember what is happening there. But immediately when I page through the textbook, then I say ag, I know these things.” However, if there is a section of the syllabus she does not understand “I ask (mentor), if she is not here normally I consult different textbooks.”

As far as her science teaching is concerned, Jill allocates herself ratings of 4 or 5 for her grade 10 to 12 learning areas, therefore identifying that her teaching practice has improved “somewhat” in most cases but “significantly” in some; her science mentor, Jean, is in agreement but in fact in many cases rates her change as more significant than Jill sees it herself. It is possible that Jill, in view of having less experience with science than maths, is harder on herself in her self-perception of competence evaluation with this subject; Jean perceives Jill to occasionally doubt herself in the realm of her science teaching as she often queried with the mentor and felt that she was “not doing it well”.

On her TMP educator report rubrics, Jill assigned herself ratings of 4 (of 4) for her science subject knowledge: Good command of the sections taught with a profound
knowledge of the subject matter. The science mentor differed in allocating her a 3, indicating good command of the sections taught but not recognising her as evidencing profound subject knowledge. Jean clarifies this apparent contradiction by explaining that Jill always prepared well before a lesson, asking the mentor for her help. Thus when she presented her lesson it was well done, reflecting good knowledge in that section, but the mentor was aware of what background help had been required and the areas in which Jill’s knowledge was still lacking.

Observing Jill teaching, it is evident she is excellent at identifying learners' misconceptions: in a class she recognised where the grade 11 learners were going wrong (confusing factors and multiples), pointed out the misconception to them and clarified. This happened on several occasions with grade 11 learners and there were similar instances where she handled Pythagoras misconceptions in a grade 10 science lesson. She rigorously ensures that the learners’ basic maths is sufficient and spends time going over foundation concepts.

Joe
In terms of his content knowledge before TMP, Joe says there were some parts about which he was confident, but there were other parts not. He was never afraid to seek help for this: “I used to consult (statement repeated) because I know pride doesn’t pay sometimes, one has to swallow his pride, go to your colleague and consult. And if maybe there is a part that both of you don’t understand, find some means, get to other schools ...” He confirmed that if the solution was not found out, that section was left out.

Asked if he is confident now: “I will say mostly yes, with the aim of er allowing some improvement and again not knowing what will happen tomorrow because the curriculum keeps on changing, so I might come across with part of curriculum that I don’t understand, I will need some help, but mostly yes... there is something in front of you that has done wonders towards your teaching, towards your .., to be empowered, in a way: mentors I think, to me all this I will direct them, my arrow points at mentors.”
In Joe’s self-perception of his competence change in the aspect of various knowledge areas, he generally accords himself ratings indicating that his teaching practice has “improved somewhat” or “improved significantly”; the exception is in the “Planet Earth and Beyond” section of the grade 8 syllabus, where he admits that his teaching practice may have improved, but not noticeably so. The mentor’s assessment of Joe’s competence change in these areas corresponds fairly well in terms of acknowledging his improvements, except that she claims that his teaching practice has not changed in some of the grade 8 and 9 “life and living” sections and clarifies that she believes he can improve in these. Interestingly, she believes his teaching of the “Planet Earth and Beyond” sections as having improved significantly: she explains that this is the first time he has taught it and is unsure and uncertain of it, hence his reticence in acknowledging his very real progress in this area.

It is clear to see that Joe is confident and has good content knowledge when observing him in his classroom; he is very confident in his dealing with the learners, and on one occasion had to teach them out of his normal classroom while being observed but showed no insecurity in the different situation. Joe organised a sudden unplanned observation efficiently: he arranged for a poster to be sent to the other teacher’s class, contacted learners, told them where to go and to bring books. He displayed confidence in the way he dealt with the material (a natural science lesson), invited questions, and welcomed input after completing the section. He asked questions of learners; when he received an incorrect answer he handled it well, and thanked the learner for the contribution.

Joe points to the long-term benefits of his increased confidence: “You know, I don’t know what is going to happen tomorrow, but I think the confidence that I’m feeling right now, to me it’s an asset, it will last forever and because of that I will be able to utilise it even if mentors have part ways with me.”

*General mentor comments*

Jean believes that the aspect of mentoring which is crucial in improving the teachers’ content knowledge is patience and no assumption of foundational knowledge on the
part of the teacher. She explains that these problems became obvious to her through previous experiences with other teachers as an HOD and working with others at workshops or in clusters. It is during class observations with the teachers being mentored that it becomes apparent how many problems these teachers experience with their foundational competence.

Maths mentor Elise described her approach when starting a new section with the teachers: she would introduce the topic in an interesting manner, indicating its relevance to our world, and then teach the work to the teacher as if she was teaching a class. She is certain that all teachers benefited from this approach of teaching the work as if to a learner and in fact several teachers have claimed that if she had not used that method they would not have mastered the work. She agrees with Jean that it is important that mentors not assume extensive prior knowledge on the part of a teacher, which would lead them to discussing said topic from some point “in the middle”. Each section should rather be approached from a baseline of zero, affording the teacher the opportunity of getting new ideas on the topic introduction as well as being able to build on his/her personal existing knowledge. This constructivist approach has as much validity for teacher support as it does for learners.

**Synthesis: Confidence in subject knowledge**

Teachers appear to have improved in terms of their content knowledge, as both they and the mentors attest, and their confidence levels have grown.

- Betty, by her own admission, had poor subject knowledge and used to avoid teaching some chapters; she is now confident of her content knowledge and proud of her mastery of all the chapters she must teach. She attributes this to the mentor’s intervention and says there is no subject support at the school as other teachers and the HOD do not have knowledge of the work either.

- Jane also left out sections with which she was unfamiliar, but did attempt to teach herself from the textbook before addressing her classes. At the start of TMP her knowledge of the senior maths syllabi was quite good but she required extensive support from the mentor with the new grade 9 curriculum. She says: “I’ve learnt something, imagine … after 12 years of teaching!”
• Jill’s maths qualifications were very good but she had worked in industry and not applied school maths directly; however where she was unsure she used resources to teach herself (colleagues or textbooks) and admits (confirmed by the mentors) to having learned a lot from the TMP, now evidencing excellent mastery of the curriculum. She was very unsure in science, a subject less familiar to her, but in her first year of teaching her practice benefited from the mentor’s support.

• Joe, prior to TMP, would try to get help from other teachers but resorted to leaving sections out if he was not aided. He claims the mentor has helped him to master his content and his confidence has improved. The mentor confirms this.

• The mentors attest to requirements of patience with teachers and addressing the issues of subject coaching from a baseline assumption of almost no foundational knowledge on the part of the teachers, building the topic up as if they were teaching a class. In this way no omissions are made, the teachers see excellent constructivist principles in practice and while mastering the material learn new ways of topic introduction, linking previous to new knowledge and sequencing of content.

c Skills and techniques

Sequencing lesson content and development of new knowledge from previous knowledge

General finding

Rogan (2006, 41) describes level 1 teachers as those who “present content in a well organised, correct and well sequenced manner...” and a level 3 teacher “Probes learners’ prior knowledge”.

Two of the four teachers could be classified as level zero prior to TMP support, improving through mentoring to level 1 for well-sequenced material and level 3 for
probing learners’ prior knowledge and constructing new knowledge. The other two teachers, prior to TMP, evidenced these practices in their teaching, possibly already being level 1 for these practices, but both improved (by their own admission and mentor report) in their general class presentation.

Evidence: the voices

Betty
Betty described the start of a general lesson (after checking homework) as “you start with what the learners know before you introduce the unknown, you try by all means to try and link them. Let me say you lead them to the answer, I can say that.”

She explained that she is far more careful about this now than before TMP; prior to TMP she would typically: “I would treat exponents, after that I go to the chapter that trigonometry, there’s no link, moving from trigonometry I will go to geometry, you see, I will do this and that, so I will be confusing the learners...so there’s no link. I choose the sections that I like the most and I treat them, the ones that I don’t like sometimes I don’t treat them, I just leave them.” This approach would indicate that she could not even be classified as level 1 on Rogan and Grayson’s (2006, 41) profile of implementation.

Her current excellent procedure of sequencing material was confirmed in a grade 9 observation where she built on work recalled from the previous day, and in a grade 10 class she referred to grade 9 work and spent some time reviewing it before going on with new work. This would be indication of probing prior knowledge, putting her into the level 3 bracket of Rogan and Grayson’s profile.

Explaining how she starts a new topic now: “Okay, for example I talked about transformation as a whole... We have translation, reflection and so on, and then I explain the term reflection and then I tell them what is to reflect and so on. So if I go and tell them about reflection, they already know what reflection is and then I told them … I give them things that are dealing with reflections there on the chalk board …”. This explanation was a little confusing, but was clarified somewhat when asked
if this way of introducing a new topic had changed from before, as she replied: “yes it has – before if it was reflection, I was just going to read the text book and then tell them reflection is this and this and this, reading with the learners, not explaining to them… You need to give them practical examples.”

Asked for her self-perception of competence change in her grade 8 to 10 teaching as far as sequencing lesson content systematically and logically is concerned, and developing new knowledge from previous, Betty indicates (by allocating herself a 4 rating) that her teaching practice has “improved somewhat” in this regard. On a TMP educator report form, Betty allocates herself the rating for lesson presentation claiming “Good presentation where the teacher uses more than one teaching technique” (this is block 3 of 4 on the rubric) and mentor Elise wholly confirms this.

Her introduction of symmetry in an observed class was good: she introduced with symmetry in hands, then extended it to kites, then more difficult shapes. She provided good analogies and developed the material systematically from simple to more complex. She is methodical in her approach to solving problems, identifying relevant equations and then doing substitution steps. This good sequencing of material would allow her to be acknowledged as level 1 of the Profile of Implementation.

Jane
Discussing how she previously (prior to TMP) introduced new topics to learners, Jane said: “The introduction would be to say if we are doing parabolas, I would just say today we are going to do parabolas, then that’s an introduction.”

Her comment about her present topic introductions indicates a different approach: “… especially on introductions, you don’t just introduce a topic part to say, we are doing transformation; you involve these kids and let them do it before you can say ‘do you know what you have been doing now? It’s this’. So it’s different especially for the younger ones, and the younger ones you need to have them at your fingertips otherwise they go out of hand…. when starting a lesson now I no longer start it like before to say today we going to do that. I first relate it to something that the kids know … some way or the other I want to relate it to something that they know, real
world or something that they’ve done in the past to say I start from the pre-knowledge before I go to something, then I am going now what is new. So that’s how I start my lessons.”

Giving her self-perception of competence change in her grade 9 and 10 teaching as far as sequencing lesson content systematically and logically is concerned, Jane indicates (by allocating herself a 4 rating) that her teaching practice has “improved somewhat” in this regard. However, she attributes 5 ratings (indicating significant improvement) to this aspect of her grade 11 and 12 teaching (these are areas with which she is more familiar). Elise agrees that Jane showed significant improvement.

Jane’s assessment of her competence change in developing new knowledge from previous is one of significant improvement on all levels. On a TMP educator report form, Jane allocates herself the rating for lesson presentation claiming “Good presentation where the teacher uses more than one teaching technique” and the mentor entirely confirms this self-assessment (this is block 3 of 4 on the rubric).

Jane’s systematic and structured approach to lesson presentation, building on existing knowledge, was evident in her class observation (for example, discussing symmetry in hyperbolas, she started by taking a paper circle off the pin board and showing them the fold lines from a previous lesson to remind them what symmetry meant and contrast infinite numbers of axes of symmetry with one axis. She then introduced hyperbolas and went on with new material). In a lesson of which the main aim was an activity using Pythagoras theorem she first revised polygons: threw questions out, learners volunteered; if an incorrect answer was given (e.g. quadrilateral) the teacher put it on the board and involved all learners in discussing if it was correct; ultimately getting to the definition and then referring to the poster on the back wall. She then assessed prior knowledge about triangles, identifying and addressing misconceptions readily (also referring learners back to grade 9 work) then she built on this to get to right-angled triangles and proceeded with an activity incorporating Pythagoras theorem (the teacher initially gave a hint reminding them of bearings i.e. NSWE, which they needed to know). She displays confidence with the material and presents it in a well-sequenced, systematic manner.
Jane could currently be identified as level 1 on Rogan and Grayson’s profile for her well-sequenced lessons and level 3 for her probing of learners’ prior knowledge and linking it to existing knowledge.

**Jill**

Jill explains how she introduces a new chapter as: “… normally I say to them, I will give them a scenario, I will start using the scenario and then I will say what do you think about this, what do you think will happen before I start introducing the chapter, especially in science”. Her sequence of teaching in a regular lesson is: “… normally you start by, let’s say, what you have done yesterday, you try to link it with what you are going to do today, remember yesterday we talked about 1,2,3, the examples that I have given you, today we are continuing with this particular section. From here then … because I think you lead from the simple to the complex, don’t just say they have started with the complex part … start with the simple part, so that they can get the connection of what exactly are they talking about.” Jill says that these ideas are not new to her classroom practice but she previously could not implement them effectively.

However, giving her self-perception of competence change in her grade 11 maths teaching as far as sequencing lesson content systematically and logically and developing new knowledge from previous is concerned, Jill indicates (by allocating herself a 5 rating for both) that her teaching practice has “improved significantly” in this regard. The mentor also considers her practice in this regard as having improved (giving her a 4 rating) but not so dramatically. On a TMP educator report form rubric, Jill allocates herself the top rating for maths lesson presentation claiming “Inspiring way of teaching which captivates and motivates the learners” and the mentor confirms this self-assessment. Elise comments that Jill is very certain of her material content and certain of what she knows.

As far as her science teaching is concerned, Jill’s self-perception of competence change indicates (4) that “my teaching practice has improved somewhat in this aspect”. Significantly, however, Jean does not agree with this: in every case she
accords Jill a 2, indicating that her teaching practice has not changed. Jean explains that Jill’s practice in this regard was good from the start of her working with the mentor and hence she cannot claim that Jill has improved. She makes two points: firstly that where Jill’s content knowledge is good it will impact automatically on the sequencing of material presentation, a link which Jill may not have considered, and secondly she believes that Jill’s improved overall confidence level has influence on how she considers her practice in other areas, causing her to believe that she is now doing this differently from before.

Jill’s lesson structure in her observed classes was very good: she questioned learners on facts/terms to explore if learners understood the basics before going on to new work; each step built on the previous and new material was developed systematically. At several points she showed the learners that they were applying what they had learned before, but in different problems.

Her development of theory is good, logical and systematic and her approach is very rigorous, with constant reference to first principles, theorems, definitions; she insists on the same with her learners. She applies maths to science (e.g. in an activity with Pythagoras theorem) and reminds learners to refer to their definitions or theorems. Jill refers learners to the “requirements of science” (e.g. think through the definition; give the answer, even if zero). She asks for questions from the learners, who are comfortable enough to respond by asking them. She sometimes uses the vernacular to explain concepts.

Joe

At the start of each lesson, even before TMP, Joe would do a recap of the previous lesson, direct some questions at the learners and identify information to be carried over, making the learners aware of this. “Sometimes I used to start my lessons by posing a question to the kids. I would pose a question and then from there you build on that question, meaning to this they must respond, to your question, then, it is then I built around that question to the kids.”
This general strategy has not changed; however, he feels more confident of his science lessons now, “because of those (TMP) workshops you are given different ways of attacking your lesson, how to structure your lesson, then why don’t you bring along another method …” Having done all the science experiments at TMP workshops, he can now integrate them into his lessons, while he has received different ideas of starting lessons and introducing new sections from the workshops and the mentors.

Joe assesses his change in competence in terms of sequencing lesson content and developing new knowledge from previous as having improved “somewhat” from prior to TMP support; Jean agrees with this assessment but in fact in some areas finds his improvement to have been “significant”. Jean explains that previously Joe used to get sidetracked, losing the sequence of the lesson, but he now has improved because of better planning and preparation.

In a class observation Joe introduced respiration by making them block noses and mouths; traced / followed the path of air flow systematically through the respiratory system then referred to a poster and drew alongside on the board as well.

*General mentor comments*

Jean believes that the mentors’ extensive content knowledge (of the material per grade as well as the curriculum from grade 8 through grade 12) assists them to show the teachers “where to start and where to go”: knowledge of the overall syllabus provides an understanding of the necessary foundational concepts required for each section and simultaneously the understanding of concepts from current teaching material that are essential for understanding future sections. Most teachers with poor knowledge of the material to be presented see each section as individual parts, unlinked to the others, and hence “they just jump in” and teach without linking it to previous appropriate knowledge, resulting in poor understanding on the part of the learners and teachers who are frustrated but do not know where the misconceptions arise.
Synthesis: Sequencing lesson content and development of new knowledge from previous knowledge

- Betty paid scant attention to logical sequencing and developing material before TMP saying “I choose the sections that I like the most and I treat them”, indicating that she was not even at Rogan and Grayson’s (2006, 41) level 1 category. Currently, she focuses on linking new material to the known in her teaching, and sequencing the work systematically, putting her into level 1 for this aspect of her practice, while in observed classes she probed prior knowledge, putting her into the level 3 bracket of Rogan and Grayson’s profile for this practice.

- Jane would introduce topics cold prior to TMP, i.e. not relating them to any learners’ pre-knowledge, but currently she presents material systematically, linking new knowledge to prior knowledge. It would therefore appear that while she previously did not qualify for a level 1 rating on the profile, she is now, as Betty, a level 1 for sequencing material well and level 3 for probing prior knowledge and constructing new.

- Jill’s classroom practice has always involved teaching in which she directed material from the simple to the complex, but her strategies have improved; her development of theory is good, logical and systematic and her approach is very rigorous. She may be considered to be at level 1 for well-sequenced lessons and level 3 for linking new knowledge to prior knowledge.

- Joe claims that he used to sequence his lessons well and build on prior knowledge; however, his lesson presentations have improved as he has improved content knowledge, more confidence, and integrates new methods into classes including different introduction techniques and experiments. He says the mentoring and TMP workshops have opened his eyes to these and improved his competence and the mentor concurs.

- No teachers write down learning outcomes on board, or make reference to these.

- The mentors’ extensive content knowledge assists them to show the teachers “where to start and where to go”; most teachers with poor knowledge of the
material to be presented see each section as individual parts, unlinked to the others, and hence teach without linking it to previous appropriate knowledge.

Effective use of classroom period time, frequency of classroom practices and syllabus completion

General finding

Teachers generally did not complete the syllabus, prior to TMP: many of them omitted sections which they did not like, spent too long on sections they did like and did not use their period time effectively. Grade 12 teachers, however, focussed on this level due to the pressure of external grade 12 exams and generally managed to complete most of the work; lower grades received far less attention and pressure. The mentors attribute this to the fact that the DoE only focuses on grade 12 results and all schools are measured by their grade 12 pass rates only.

The situation currently (post-TMP input) is different and teachers attribute the improvement in completion of syllabus to TMP support, focussing on the benefits of planners, the drive of the mentors to time their presentation strictly according to the planners and the mentors’ support with content mastery. Through this support, those teachers who initially intended to finish the syllabus but did not manage, were able to do so for the first time, while those who consciously omitted sections had a change in attitude and also recognised the importance of completing the syllabus (“your conscience becomes clear”).

Teachers report that the frequency of many of their classroom practices (contributing to more interesting and effective lessons) has increased and these are generally confirmed by the mentors. Where discrepancy in frequency assessment occurs, the mentor’s explanation is provided.
Evidence: the voices

**Betty**

Betty was very honest in admitting to not completing the syllabus, prior to TMP: “Yo, I don’t want to lie, no, no, no, no, no…. the learners, they were very, very, very, very, they were slow and I put the blame, also to me as a teacher because….um, I wasn’t giving them enough work. I sometimes leave sections out, like I said, I had a problem with graphs so if the chapter gives you a problem, you automatically end up hating it and then you leave it”. Also: “During those days I’ll spend, ah 3 weeks on data handling, because I like it, I’ll teach it and teach it and teach it…” with the result that other sections were not completed.

She claims that the situation is very different now that she has had TMP support, and attributes that to use of the planners and the insistence of the mentors: “…we as the teachers, we are doing our work on 100%, 100%. We finish the syllabus, we go to classes, you know sometimes teachers you would like to dodge classes, so we don’t dodge classes and go to classes. We work according to our work schedule, and then (mentor), every time when she comes, she’ll tell you, you should be here, so we are working with a program… If they say its 4 days, you’ll do it in 4 days, you’ll finish it and then you teach the graphs, you finish. There’s no chapter that you must jump, you’ll teach all the chapters.” She now feels she does not have enough time as she wants to be even more thorough: “I … now the way I’m doing my work … up to the standard, I think 40 minutes is too small because I want to do my work thoroughly. Last time it was okay because I was playing, dodging (laughs)”.

In terms of her practices related to teaching mathematics, Betty says that prior to TMP she would only give learners the opportunity to perform drill and practice exercises, allow them to follow worked examples then do own calculations, give them opportunities to discuss strategies and solve contextual problems and represent situations in various ways (e.g. table, graph) a maximum of three times a term. However, she claims that she now allows learners to do these daily. Elise confirms the frequency of drill and practice exercises, and says that Betty creates opportunities for learners to do real-life examples every day. Whereas prior to TMP Betty never got
learners to do mathematical investigations, work together as a group or use higher order thinking skills, she claims that apart from the former which they do once per week, the rest she involves learners in daily. Elise clarifies that Betty only does formal investigations (for the portfolios) with the learners once per term but that she does small investigative exercises with the learners frequently. (This is discussed further in the section on investigations).

With respect to time management, on a TMP educator report form, Betty allocates herself the rating for classroom time management claiming “The time is used productively to discuss homework, introduce new work and give homework” (this is block 3 of 4 on the rubric). In the same document, she speaks of her progress with portfolios as “All portfolio work for the term completed and marked”. Elise confirms both of these self-analyses.

Jane

Asked if she managed to finish the syllabus before TMP support, Jane responded “no, no, no, honestly speaking no … grade 12 only because in grade 12 when they write their exams they are expected to know everything.” Jane discusses the reason for her school’s emphasis on grade 12 teaching: “They focus more on grade 12 because at the end they will be judged about the grade 12 results... When the principal realises that this teacher is hardworking they take the teacher and put them in grade 12 to say they know that this one is consistent, he is a hard worker, he/she is always at work.” Therefore less qualified teachers would be teaching the juniors and the attitude often is: “meneer I don’t want to teach the grade 12’s because you expect miracles in grade 12 this has to start in grade 8…”

However the current situation is different as she claims that now she always finishes the syllabus with all grade learners. She was asked to what she attributes this: “… to the TMP again. Do you know it’s very difficult to work without a planner and to work without knowing basically your curriculum … even if you know, grade 11 this is what I have to cover and this section will take this time, so now because I have my planning, I know that this is what I have to do, then it works out much easier and you even get time to do your revision, because planning is of paramount importance.
Because if you have your planning, you have everything in place and then everything will go well. And I say to myself again, for wanting to develop and seeing that what I did before wasn’t right and I have to do the right things here so that when these learners go to the next grade or when they go out of school I’ve covered everything and you, your conscience becomes clear to say I’ve done everything. You even do revision then you say the ball is in your court, everything has been covered, done, so.”

When asked: “do you find any difference in the amount period time that you’re using effectively now, compared with say three years ago?” she responded: “Ja there is, there is because I need to structure whatever I do to say: today the first class five minutes we do this, then we do something new, we interact on what we have done then from there … work, so it’s not me talking all the time, or just relaxing; so whatever I do I need to structure it.” Jane expands on this, explaining that she manages time to go through homework more effectively now (see later discussion) and likewise time to do class exercises: “I give them a time frame to say the exercise that you writing now is very short, so it should take you five to ten minutes, you write it, you finish it off, we mark it we go on to something else.” Jane claims she is using her period time more effectively because it’s more structured and “because they know that they don’t have to sit and relax they have to work so that we should move on to something else.”

Jane expounds how her attitude and methods are different from prior to TMP: “… it’s different from before, altogether. Even if there’s a section that I did not enjoy, I do it with passion, with love, so it’s very different.” Asked what brought about this change, she replies: “I think both … attitude (change) contributed and understanding the section and having someone that you know will help you if you are encountering problems, so I think that helped a lot.”

Giving the frequency with which she currently implements certain mathematical practices, the mentor is in most cases in total agreement with Jane’s claims: in fact sometimes Jane conservatively under-represents the frequency with which she currently undertakes practices. Jane says that prior to TMP she would only give learners maximum of three times a term the opportunity to perform drill and practice
exercises, give them opportunities to negotiate meaning, represent situations in various ways (e.g. table, graph) and show learners the interrelatedness of the mathematics they learn. However, she claims that she now allows learners to do these weekly and in the case of the last example, daily. However, Jane claims to do investigations slightly more often (three times per term) than Elise observes (once per term), but, as with Betty’s situation, this discrepancy arises from the definition of investigation as the mentor is referring to a formal activity done by the learners for their portfolios and Jane is referring to a strategy that may be employed in concept across many activities.

With respect to time management, on a TMP educator report form, Jane allocates herself the top rating for classroom time management claiming “Productive use of time according to the work schedule (correct pace) – discuss homework, introduce new work and give homework”. In the same document, she speaks of her progress with portfolios as “All portfolio work for the term completed and marked”. Again, Elise has confirmed these self assessments in all documentation.

Jill
Jill has always been very driven to finish the syllabus: “… if you don’t finish, make sure that 98% is covered” and generally manages to do this now, although she did not manage as well before TMP started. She claims that the process is now better as the supplied TMP worksheets save time, and she now has better homework strategies from mentor guidance. She also says that “before they used to get 45 minutes of teaching teacher-centred, but then at least in this 45 minutes teaching now, it becomes interaction between the learner and the teacher, the learners also get a chance to interact” and she believes that because of this the learning period is more effective now.

Jill describes how she keeps looking to expand her knowledge base and that of her learners by identifying common misconceptions: “… maybe this year, you treat this particular section, normally when I mark the scripts, what I normally do, I have a book…” and she describes how she notes down common mistakes made by learners. “Then the following year when you go to class, normally you stress… After teaching
that particular section … you emphasise the mistake that they normally do in the
description. You just tell them, guys you do this particular mistake in exam, please
don’t ever do this because we are going to penalise you.”

In terms of her practices related to teaching mathematics, Jill says that prior to TMP
she would only give learners the opportunity to perform drill and practice exercises,
allow them to follow worked examples then do own calculations and give them
opportunities to discuss strategies and solve contextual problems a maximum of three
times a term. Prior to TMP she got learners to do mathematical investigations, work
together as a group or use higher order thinking skills and represent situations in
various ways (e.g. table, graph) only once a term. However, she claims that the
frequency with which she enables learners to do these now, having been exposed to
TMP support, has improved so that they are doing many of these at least once a week,
if not daily. Only her group work and investigations are done about three times per
term. The mentor confirms most of these aspects but differs only that she says Jill
only involves her learners in solving contextual problems about three times per term
and mathematical investigations are undertaken once a term.

Similar frequency analyses for her science teaching indicate that prior to TMP Jill
would only give learners the opportunity to construct science knowledge (for example
via recall and applying theories, models or processes in their own words, classifying
objects, translating information between different forms, identifying relationships
between variables, solving problems and accessing information) a maximum of three
times a term, while after TMP support she was giving learners the opportunity to
perform these tasks about weekly. For most of these, the mentor disagrees with Jill’s
assessment, claiming that she still uses these strategies in the same frequency as
before. Jean gives two possible explanations for this discrepancy in perception: firstly,
Jill teaches grade 10 to 12 but focuses on her grade 12 techniques for her self-
evaluation and secondly that it is a matter of interpretation: the mentor looks
specifically at how frequently each strategy is being implemented meaningfully (for
example involving learners in making predictions from data, doing group work or
investigations) while the teacher, having learnt a little more about each of these
strategies, is using them more frequently in her classes, which she acknowledges in the research questionnaire.

With respect to time management, on both the TMP maths and science educator report forms, Jill allocates herself the rating for classroom time management claiming “The time is used productively to discuss homework, introduce new work and give homework” (this is block 3 of 4 on the rubric). In the same documents, she speaks of her progress with portfolios as “All portfolio work for the term completed and marked”. Both the maths and science mentors confirm these self-assessments.

Jill’s class observations showed very good use of period time; in one particular case the planned structure and development was successful in communicating the material and achieving homework checks. Learners followed worked examples demonstrated by the teacher and then did some calculations on their own. When the example was done, a learner was asked to read another example from the textbook; the teacher then focussed on different aspects of the question, ensured learners knew what was required and understood the question. However, in another class Jill did not make the progress intended due to an excessive amount of time being spent on reviewing some basics that were poor.

Joe

Joe says of his teaching prior to TMP: “I don’t remember even a single year completing my syllabus.” He blamed this on a poor teaching pace and “the general planning in our schools, especially in our school.”

“And then we had to adjust, ... we would find ourselves keeping the pace, coping with the pace and we said, this pace is too fast for the learners and then (mentor) said, ‘no, no it’s... this is how you are supposed to work. ... make sure they do keep the pace, do your work, they will all follow’... and they did that! We are on the same pace with our learners, the one who is not working, she will stay behind, she will remain behind, but they are quite aware what they are doing in class, this is where we’ve been lacking. There’s a change, there’s change.”
The situation is therefore different now: “we can finish our syllabus but ..(unclear)
I’m going to push, but so far I think I’m going to make it, … last year I managed, I
could finish my syllabus last year, ..(because) of mentors, we managed to cover
almost the whole syllabus because of the pace, (in the past) we were stuck somewhere
with this low pace and we thought it was good for the learners only to find ..(it was
bad for) the very same learners.”

Questioned whether finishing the syllabus currently means that he leaves out sections
of the syllabus, his response was “you know … we’ve got the Pace setter, we follow
it, the mentors will say ‘how far are you’: those people have got ...a good memory.
You will say I’m here, ... then they give you some sheets ... then you think you are
clever, you skip, they will tell you politely, they will say to you ‘how about this one,
make sure that you come back to this one’, then you are forced to go back, but
politely because being straight and honest to the point then you are forced to come
back. Or if you tell them first I’ve skipped this part – ‘okay’, they will say to you,
‘make sure that when you are doing this you have to go back to this one’, because ..
there is logic that is why you need to go back.”

With respect to time management, on the TMP science educator report form, Joe
allocates himself the rating for classroom time management claiming “The time is
used productively to discuss homework, introduce new work and give homework”
(this is block 3 of 4 on the rubric). In the same document, he speaks of his progress
with portfolios as “Portfolio work done and future items planned and ready”. The
science mentor confirms these self-assessments. Joe’s mentor comments that prior to
TMP Joe “did not finish the work for the period most of the time” but is much better
planned now.

In terms of his practices related to teaching science, Joe says that prior to TMP he
would only give learners the opportunity to construct science knowledge (for example
via translating information between different forms, identify relationships between
variables, accessing information) a maximum of three times a term; the opportunity to
recall and apply theories, models or processes in their own words once a term; and
classify objects and solve problems once a week. However after TMP support Joe
says he was gave learners the opportunity to perform these tasks daily. For most of these, the mentor disagrees with Joe’s assessment, claiming that he still uses these strategies in about the same frequency as before. Jean explains that this discrepancy in perception possibly arises from a matter of interpretation of the questionnaire and its intention (as with Jill): the mentor looks specifically at how frequently each strategy is being implemented meaningfully or formally (for example involving learners in making predictions from data, doing group work or investigations) while the teacher, having learnt a little more about each of these strategies, is using them more frequently in his classes, hence claiming these frequencies on his questionnaire.

*General mentor comments*

The mentors stress the need to be polite but firm in assisting teachers to work according to their planners, manage their lessons rigorously and control the period time-usage. They treat teachers with respect but do not allow skipping of sections.

They attribute teachers’ focus on grade 12 level and relaxed attitude to the lower grades to the DoE. They claim this has come about due to the fact that the DoE only focuses on grade 12 results and all schools are measured by their grade 12 pass rates only. They attempt to build in the TMP teachers an awareness of this being incorrect and unfair practice.

*Synthesis: Effective use of period time, frequency of classroom practices and syllabus completion*

- Betty admits to not completing her syllabus prior to TMP but says that she certainly does so currently, as she no longer skips sections, no longer takes too long on sections she likes, but works according to the planner from TMP. The frequency of a variety of good classroom practices has increased. Elise confirms all of these claims.
- Jane also did not complete her syllabi prior to TMP, except for the grade 12 classes, as there is pressure on these due to national examinations. She claims that due to TMP she now has planners from which to work and support with curriculum content; she now completes all grade syllabi and has time for
revision. Her use of period time is more effective due to the structured lesson plans, new strategies and changed attitude and focus. The mentor confirms her current claimed practices as well as the fact that Jane involves many good classroom practices more frequently now.

- Jill, prior to TMP, did not manage to complete her syllabus, although she always intended and attempted to do so. She attributes a lot of the improvement to TMP worksheets and better homework strategies from mentor guidance. A variety of good classroom practices have increased in frequency (generally, but not always, confirmed by the mentors) and the mentors confirm Jill’s assessment of classroom time management and portfolio completion.

- Joe says he never once completed the syllabus prior to TMP but due to TMP support now manages to do it. He says the poor planning in the school contributed to a slow pace of teaching but his personal planning now has improved and impacts on his time management. Jean confirms Joe’s assessment of his classroom time management and portfolio completion and explains discrepancies with his self-analysis of frequencies of some of his teaching practices.

- Mentors’ polite but firm support of the teachers whilst following the planners, their assistance of teachers in understanding the concepts to be taught, introduction of new strategies for better period-time management, supply of excellent worksheets and exposure of teachers to a variety of good classroom practices are some of the contributing reasons for teachers’ now completing their syllabi and in some cases changed attitude to the need for this, particularly in grade 8 to 11.

Learner-centredness in lessons

Introduction

The concept of a “learner-centred lesson” is interpreted differently by many teachers, as evidenced in some of the teachers’ comments that follow in the “voices” below. Taylor and Vinjevold see current learners as taking “control of their own learning:
they are active, creative and self-regulatory” (1999, 108), a learning theory that is in direct contrast to the fundamental pedagogics doctrine taught to thousands of learner-teachers during the apartheid years, which entrenched authoritarian teaching methods (1999, 133). A learner-centred lesson could be activity-centred: Onwu and Stoffels (2005, 88) refer to “learner-centred activity involving amongst others learner-material interactions” and acknowledge the difficulty of learner-centred activities in overcrowded and under-resourced classrooms. However, by this interpretation of learner-centredness any teacher who evidences improved provision of meaningful resource material to learners is becoming increasingly learner-centred in his/her practice: TMP (as detailed in a later section) provides excellent material to learners as part of such a strategy and encourages all teachers to make these instruments available to the learners, a strategy that automatically improves the teacher in terms of Rogan and Grayson’s levels of implementation.

Rogan and Grayson’s (2006, 41) profile of implementation of Curriculum 2005 assigns various levels to indicate improving learner participation and engagement in the classes: in this regard, level 1 requires learners to remain “attentive and engaged” and respond to and initiate questions, while level 2 has them offering a contribution to the lessons on their own initiative as well as engaging in meaningful group work and using resources to compile notes. Rogan (2006, 41) describes a level 1 teacher as one who “Engages learners with questions” while a level 2 teacher “Engages learners with questions that encourage in-depth thinking” and a learner in this class will “on own initiative, offer a contribution to the lesson”. Thus a learner-centred lesson should be inquiry-oriented.

The new methodology presents the teacher as a facilitator, rather than a presenter of information; however Hattingh et al (2005, 22) suggest that a long-standing indigenous form of African knowledge transmission is that of oral learning, incorporating the art of rhetoric, and that this means of teaching has its place in large classes. In describing classes in his research sample in which learners were attentive and engaged, Gilmour (cited by Taylor et al, 1999, 144) noted that there was nonetheless little teacher-learner interaction and learners were listeners; however, the teacher’s skill, evidenced through his humour, story-telling and relating the content to
real life, resulted in learners who “sat enraptured … and evidently understood what he was teaching”. TMP teachers’ English language proficiency and oratory skills are generally not at excellent enough levels to make them good orators and it is useful therefore to use Rogan and Grayson’s Profile in facilitating an assessment of their level of practice in this regard in combination with recognition of the potential of traditional oral learning.

It was evident at the start of TMP involvement with these schools that generally learners were not even on a level 1 on Rogan and Grayson’s profile: learner participation in lessons from the point of view of answering or asking questions was not at all evident, particularly not involving learners in activities requiring higher-order thought processes: learners tend to be “seen and not heard” in these classes. Thus one could classify them as level zero on Rogan and Grayson’s scale. In like vein, the mentors comment that most of the teachers asked very simple questions: they “do not know how to ask open-ended questions” and do not know what is meant by this concept. However, access to TMP teacher-questionnaire responses at the end of the first year of the programme indicates that one of the big surprises to teachers was that learners were participating more in their lessons. It is surmised that teachers were asking more questions and allowing learner initiative as the teachers became more confident of their content knowledge and methodologies.

General finding

Although several of the teachers struggle to articulate the meaning of a “learner-centred lesson”, two of the teachers acknowledge that their classes, previously teacher-centred, now have a learner focus, and describe the role TMP played in this. Another teacher has changed her approach to classroom participation of learners through her own experience and TMP input was not involved in this while the fourth teacher was always more learner-centred in his approach to learners in the lessons although he acknowledges the difficulties of holding fully learner-centred classes.
Evidence: the voices

Betty
Discussing the participation of the learners in her classes prior to TMP, Betty responds to the question “how did you make your lessons ‘learner-centred’?” by saying: “I used to use um, it was textbook and chalkboard methods, I used to use those methods, textbook and chalkboard only… I normally encourage them to ask me questions. 30/70: 30 that are engaged, 70 that are just sitting in a class, not doing anything.”

She gives her opinion on learner-centred education as seen in her classes presently as: “now learners they do work and they know what are they doing unlike the last time. The last time learners used to sit and listen to the teacher. If you don’t know what you are doing, the learners also won’t know what they are doing, but today’s learners, these ones, if you are not doing the correct thing, they will tell you ‘ma’am, this is not the correct way of doing it’…” and the methods she employs to make the lessons learner-centred: “our teaching, preparing our work before going into the class and making them to work hard does help them too ..., and giving them a lot of work, it helps them to be centred, because they work.”

Betty explains why she believes that the learners participate more now: “Ja, they question, normally, they won’t leave me … they normally ask me questions ‘ma’am, why this and that, why, how do you read this, what happened..?’ they will always do that.... Before TMP, no they were playing, these learners, maybe .., I put the blame on myself, maybe I was not doing things the correct way, or I was not giving them a chance maybe... Now I ask them questions and I also encourage them to ask questions, they do ask questions and they are free to ask me questions, they are very much free.”

Asked if she generally finds her learners attentive and engaged in her lessons, she replied in the affirmative, saying “by participating in class, every time, after teaching when I ask them questions about what I taught them they will always participate, so they do get engaged … and they give me the correct answers – they will always give
me the correct answers.” Betty may be inclined to exaggerate in this regard in terms of learners always giving correct answers, but she uses learners’ answers (as opposed to a non-responsive attitude) as an indicator of their engagement with the material she presents in her lessons.

Betty claims that previously “learners had a terror for maths” but that now “a lot, it has changed a lot. I can say if we put percentages, during that time, maybe learners who used to like maths, maybe they were 30%, but now I can say 80% of the learners do like maths… just as some may .., they don’t work well on it, but they like it.”

Betty describes her present classroom atmosphere as “Relaxed, positive and industrious” according to the TMP educator report form; the mentor extends this to “Relaxed, positive and industrious, learners feel safe and encouraged to express themselves.” Asked for her self-perception of her competence change in her grade 8 to 10 teaching as far as making lessons learner-centred is concerned, Betty indicates (by allocating herself a 4 rating) that her teaching practice has “improved somewhat” in this regard. However, Elise indicates (2 rating) that she does not believe that Betty’s practice has changed in this aspect: she explains in an interview to clarify this that Betty’s way has in fact always been focussed on the learner.

Similarly, Betty allocates herself a 4 for learner questioning techniques (on facts / description; on ideas / explanation and encouraging learners to question.) Elise’s rating in this regard is a 3, but she explains that Betty’s identification of certain types of questions may be different from her own, hence the discrepancy. On a TMP educator report form, Betty allocates herself the rating for learner participation claiming “Educator asks thought provoking questions which encourages the learners to answer and participate” (this is block 3 of 4 on the rubric). Elise confirms this self-analysis.

The descriptions of Betty’s classes, questioning of learners and their own initiatives, both prior to TMP and post-TMP input would lead one to categorise her teaching on Rogan and Grayson’s (2006, 41) profile as a level 1, but her present practice probably reflects a level 2 in recognition of increased learner questioning and her asking of
thought-provoking questions”. Betty emphasises that the learners now respond more and “give me the correct answers”; this probably reflects her improved knowledge and presentation of the content rather than a different focus on learner-centredness.

Jane
Jane describes her typical classroom interaction prior to TMP: “There was that bit of interaction but it wasn’t that much, they had to listen to me, to what I’m saying, with that knowledge of saying I’m the teacher, and you have to listen to me and I’m the one who’s telling you to do one, two, three. … they weren’t that attentive no, no they were not attentive. I think … for them not to be attentive is that I did not engage them more, I was the one who was doing more of talking than they did and I used to explain a lot of things before I can find out or engage them in what I’m saying and one other thing I think I did not apply what I’m doing to real life situation, it was just mathematics, mathematics, so it wasn’t compared to real life, it was just maths, me talking, them listening to me. So I think that’s why in most cases they had to be bored and not listening so attentively.” She describes her lessons then as “teacher-centred, they had to listen to me.” Based on Rogan and Grayson’s (2006, 41) profile her learner profile would not indicate a level 1 for classroom interaction prior to TMP support, as by her admission the learners were bored and not involved.

Referring to her classrooms now, Jane believes “… there is much change because I think the learners are now more involved, it’s no longer teacher-centred, it’s a two way process to say we interact a lot, I do group works, if they have problems they can now ask, so there is that interaction between the learners and me as a teacher. … ja it has changed a lot and even if I have started but I think TMP helped me a lot to say there should be interaction.”

Jane believes she essentially makes classes learner-centred by getting the children to talk to each other and to talk to her, giving them tasks (individual and group), relating maths to their daily lives and the world around them. She says their involvement in lessons has changed because they enjoy maths more “… because they like relating to something that they know, they find it much easier.”
Asked if there was any impact that the TMP had in her work in this aspect Jane explained: “The positive side I think is approach, especially these lower classes, … it helped me a lot … that I was able to present and involve learners, especially that I’ve never taught these lower classes before … and it was through the help of mentoring … you find that the HOD’s or management don’t care a lot about these smaller grades.”

Jane had previously never taught OBE classes, and now describes OBE as: “OBE I think basically is about, is on Outcomes Based and it’s learner-centred, you as a teacher playing a role where if learners have got a problem, not necessarily that you have to put everything to the learners. You still … there as an educator to explain the problems that the learners are experiencing, so they are playing a role but me still as a teacher still play a major role to say I’m the one who knows the content more than they do, so I still need to explain some of the things to them, then once they have a clue what’s happening they have to be involved, it has to be a two way process to say they are the ones who are learning, they are the ones who have to participate more, and to engage in discussions with one another, with me because I sometimes say to them I give you two minutes to talk about what I’ve done now …”

Jane describes her classroom atmosphere as “Relaxed, positive and industrious” according to the TMP educator report form and the mentor entirely agrees with this analysis. She demonstrates her concern for her learners: “I’m not saying to these kids that you are stupid, I never say that to kids. I talk to them to say you are unable to do this because you are not prepared to know how to do it, but if you can be prepared there’s nothing difficult here.”

Observing Jane’s class, it can be seen that she regularly asks questions as well as encouraging learners to volunteer questions and answers. If a wrong answer is given, the teacher puts it on the board and involves all learners in discussing if it was correct; ultimately they got to the required definition and referred to a poster on the back wall. Learners are happy to ask questions if they do not understand, and content to volunteer comment, e.g. re a homework question a learner said “That was an interesting question” and the teacher then asked him to do it for the class. Based on Rogan and Grayson’s (2006, 41) profile her learner involvement (re classroom
interaction) would categorise her current classes as level 2, whereas they were previously probably not even level 1 in this aspect.

In another observed class the lesson started with mostly teacher talk and use of the blackboard but Jane constantly questioned the learners; they were all involved, attentive, not distracted and were participating (in the sense of answering questions or thinking about the problem). An activity was then done in pairs, and both learners seemed to be involved in every pair. Jane is skilled at identifying learner misconceptions and problems with understanding the language of instruction (when asked for an equation of an asymptote and a learner struggled, she referred back to what is meant by “equation”). She uses classroom space well (walks up aisles occasionally) to encompass all learners, but tended to focus on a few stronger learners. Learners were always focussed and very attentive.

Asked for her self-perception of competence change in her grade 9 to 12 teaching as far as making lessons learner-centred is concerned, Jane indicates (by allocating herself a 5 rating) that her teaching practice has “improved significantly” in this regard. Elise agrees (4 rating) that her practice has improved in this aspect but not by the same degree. Similarly, Jane allocates herself a 5 for “significant improvement” in learner questioning techniques (on facts / description; on ideas / explanation and encouraging learners to question.) Elise’s rating in this regard is occasionally a 4, for somewhat improved techniques, but generally a 3, indicating that she believes the teacher “may have improved but it is not very noticeable”, allowing that Jane possibly has a low opinion of some aspects of her prior questioning practices. On a TMP educator report form, Jane allocates herself the rating for learner participation claiming “Educator asks thought provoking questions which encourages the learners to answer and participate” (this is block 3 of 4 on the rubric). The mentor confirms this.

Jill

Describing her learner engagement now as compared with before, Jill says: “I think it’s very much different, because when it comes to explaining terms, especially in
physical science, I try to engage the learners, not like before, because ... before I used
to do this teacher-centred but now what I’m trying to do is make the lessons to be
learner-centred. Normally when I introduce a concept, I want them to do the
experiment themselves, even though they are in groups and I make sure that I monitor
that particular group.”

She describes her practice as being different from before because “in most of the
cases we used to make the lesson teacher-centred, not learner-centred ... Mostly what
I was doing was just giving them information, teacher-centred ... before they used to
get 45 minutes of teaching teacher-centred, but then at least in this 45 minutes
teaching now, it becomes interaction between the learner and the teacher, the learners
also get a chance to interact.” Jill agrees that the amount of class delivery is the same
but “the learning is more effective now because of the strategy”.

She feels that the biggest way that her teaching practice has changed in the last few
years, is the fact that she is now making it learner-centred; she attributes this to: “I
think it was a combination, the support from the mentors and ... the changes which is
happening within our department of education”. She explains that she understands
“learner-centred” to mean give learners the chance to express themselves; hear their
views (so the teacher can understand the learner’s thinking) and describes a way in
which she makes the lesson learner-centred: “normally I ask questions just randomly,
what do you think, then it’s not specifically for the person who has raised his hand.
... then I normally say to them, what do you think? ... how are you going to solve
that particular problem? ... so that everybody can have that particular interaction, so
that they can interact with me. Because normally when I start giving them the
answers, they just say ‘right’, so normally I say, ‘say something, anything that you
can think of, nobody is going to laugh at you, when they laugh at you then I will laugh
at them’.” Through this she tries to ensure that all the learners participate in the
lesson.

Jill describes her current classroom interaction and general spirit amongst the learners
as being very good except for one class: “the interaction with the learners is very good
for the classes that I teach except for one class ... for maths, the one that ...
learners are not willing to learn. I don’t know, they don’t have this particular spirit that we do this particular subject as one of theirs, they are not taking it seriously”.

Jill describes her maths classroom atmosphere as “Relaxed, positive and industrious” according to the TMP educator report form and the mentor supports this analysis. However, Jill describes her science classroom atmosphere “Relaxed, positive and industrious, learners feel safe and encouraged to express themselves”, an analysis which is also supported by the science mentor. Jill enjoys teaching science because “most of the learners that I am having they were very good learners, because normally the learners who are doing the science subjects … most of them are very much focussed.”

During class observation Jill’s approach to getting learners involved via questioning is apparent; in a grade 11 maths lesson, much of it was actually chalk-and-talk but the teacher tried to involve learners throughout by throwing questions at the class, and they remained attentive. She tends to cajole the attention of all by raising her decibel level and also appears to believe that she must get the class to answer / respond en masse to indicate learner involvement.

Asked for her self-perception of competence change in her grade 11 maths teaching as far as making lessons learner-centred is concerned, Jill indicates (by allocating herself a 5 rating) that her teaching practice has “improved significantly” in this regard. The maths mentor indicates that she cannot confirm or deny this aspect of Jill’s practice as she is unable to make comparisons: Jill had almost a year’s break from the school, before which she taught different grades from those in TMP’s third year there.

Similarly, Jill allocates herself a “significantly improved” rating for learner questioning techniques (on facts / description; on ideas / explanation and encouraging learners to question) in maths. The mentor’s rating in this regard is a 4, indicating that she is “somewhat improved”.
As far as her science teaching is concerned, Jill perceives that her learner questioning techniques and learner-centredness in lessons have mostly “improved somewhat” but the science mentor, Jean, in all cases claims that her teaching practice in these aspects has not changed. She clarifies this by saying that Jill’s practice in these aspects was good before the science mentor started to support her, particularly in terms of asking the learners questions to get them involved. Meanwhile, the science mentor describes Jill’s learner participation in science classes, saying “Educator asks thought provoking questions which encourage the learners to answer and participate”; in this same TMP educator report form Jill described her learner participation as “Learners are being encouraged to think creatively and to initiate discussions”.

Joe

Joe has always had a good understanding of learners and their needs and as a teacher he is empathetic and understanding. “Try to understand the person first, go to the learner’s level.” Joe’s learners have always been free to ask questions. Although he was in control, “whenever they get into the class they know I mean business” he tempered this with: “you carry on, make sure the atmosphere is relaxed. Then I could see these kids... they are with me. Even now, I am still struggling yes, but I am doing that. That is the way I am.”

Nonetheless, he struggles with the aspect of “learner-centredness” and explains how a teacher would resort to teacher-talk methods to complete the syllabus: “In the past a teacher used to talk more; now the learners do 90% of the talking. But ... to me it was difficult. It was a problem because there are these learners: you guide them, you support them, but at the end they relax somewhere, then you have to go out of the way to go and pull them from that area where they are stumped, show them the way. And they are supposed to have done 60% or 70% of the talk, you just facilitate here and there, but because of the syllabus sometimes, you end up following the very same old method where OBE is not being practiced. Then you are lost as a teacher. And that is what I have noticed as a teacher it was difficult for me to practice…”

Asked how he would explain to another teacher how to make lessons learner-centred, Joe says he would advise them to ensure the lesson involves the kids mostly, for
example by using activities in which they must participate fully. He feels it is easy to make them participate using individual activities; group activities are more difficult to get all the individuals involved. Joe feels that how actively he is involved in the period “depends on the type of resource that we are using, they will direct you, they will indicate to you how much time to spend or do you become involved – in most cases you will find that when doing practical work you are actively involved throughout the whole lesson, but not doing spade work sometimes, you find that kids are more active then you are there with them. Then you guide them, you support them.” Joe tries to create a relaxed atmosphere and he believes learners are involved 70% of the time. “Try to understand the person first, go to the learner’s level.”

Joe selects the option “Relaxed, positive and industrious, learners feel safe and encouraged to express themselves” to describe his classroom atmosphere and Jean, the mentor, agrees with this analysis. Jean describes Joe’s lessons even before TMP as involving the learners, but now he asks more open-ended questions and allows them to handle apparatus. Joe claims that there has been significant improvement in his questioning of learners on facts / descriptions, ideas / explanations, while his encouragement of learners to ask questions has improved “somewhat”; Jean believes that all of these areas have improved somewhat.

Observation of Joe’s classes confirms that he tries to keep all the learners interested and they generally are involved in thought (as demonstrated by the number of questions volunteered by learners, both specific to syllabus and of a broad range of related questions). The lessons seen tended to be teacher talk with reference to the board and a poster; learners watched and listened, but all were attentive. Joe made the lesson learner-centred by asking for odd contributions, and asking regularly “are we together?” to which he would receive en masse positive response! Joe tries to create a relaxed atmosphere and he believes learners are involved 70% of the time.

**Synthesis: Learner-centredness in lessons**

- Betty cannot really articulate what the expression “learner-centred” means, but describes classes prior to TMP which were essentially “chalk-and-talk”, in
which learners were playing but they were scared of maths, whereas they now listen, correct her if she makes an error and ask more questions. Using Rogan and Grayson’s (2006, 41) profile we might categorise Betty’s classes (pre TMP) as level 1, but her present practice probably reflects a level 2, recognising increased learner questioning and her asking of “thought-provoking questions”. Betty emphasises that the learners now respond more to questions and are attentive and engaged such that they “give me the correct answers”; this probably reflects her improved knowledge and presentation of the content rather than a different focus on learner-centredness.

- Jane was autocratic prior to TMP, running teacher-centred lessons with excessive teacher talking, no learner questioning and she did not apply maths to learners’ life context. Presently her learners are involved and she stresses interaction between teacher and learners, saying “TMP helped me a lot to say there should be interaction.” She particularly acknowledges TMP’s help in supporting her with her dealings with the lower grades and the concept of OBE. Jane understands the facilitating role of the teacher in the learners’ education and attempts to run her classes in this way currently. In terms of classroom interaction, Jane’s teaching has reached a level 2 profile from what was previously not on level 1.

- Jill understands “learner-centred” to mean give learners the chance to express themselves; she says her classes used to be teacher-centred but this has definitely changed. She explains that both the mentoring and the changed methodologies brought about by the DoE have had impact on this aspect of her teaching. Jill only had a year of teaching before becoming involved in the TMP programme so she evidenced most of the TMP principles from early on in her teaching.

- Joe worries that a learner-centred focus will result in teachers not completing the syllabus. However, he has always been a teacher that involved his learners by questioning them; the mentor adds that he has improved in the nature of his questioning (asks more open-ended questions now) and in practicals he allows learners to handle apparatus, thus involving them in the experimental work.
Homework procedures and controlling learners’ work

Introduction

TMP provided different strategies to teachers in terms of amount of work to give learners to complete, monitoring and discipline methods, and ideas on how to review the homework in class. The TMP focus was to encourage teachers to give learners a greater volume of work but to assist them with strategies for the subsequent review so that the follow-up procedures did not take up a whole period.

In line with these support strategies, TMP supplied all teachers with monitoring and disciplining documentation and date stamps to ease the burden of homework checking (the teachers can now quickly scan the learners’ books to see if the work has been completed and leave record of their monitoring. All of the TMP teachers were grateful to receive them but many did not sustain their use and some reverted to previous procedures, which was not to check work at all.)

General finding

Two of the teachers show improved strategies including a larger volume of work allocated to the learners, a greater percentage of them completing the work and improved monitoring and review processes. These teachers point to TMP–supplied resources and new strategy ideas for the improvements in this regard. The other two teachers show little change in these processes but their practices were adequate prior to TMP.

Evidence: the voices

Betty

Betty claims that before TMP she would typically only give learners “2 or 3 sums” for homework, and not every day, and that a very low percentage of the learners actually did the work. She gives them more now and checks immediately they enter her class; asked what percentage do their homework “some classes is 90, some is 99, I’m not
lying, 99% and … maybe the class that is not doing well maybe it might be 70, but then 70 is too much and trying to push them, I want them to improve.”

She claims that the checking procedure now does not take her long (she uses the date stamp provided by TMP for this purpose) and describes a checking procedure: “yes I use them, I continue using them, that’s why it’s easier for me to control them, it is because if I check, I put the stamp … and from there they exchange books and do the ticks, this one mark for this one, that one, like that and then they do the corrections with the answer”.

When asked how it was that this aspect of her teaching has improved, she explained that her discipline of the learners is better than before since she obtained homework control sheets from Elise that the learners must sign when at fault: “they sign on that form, work not done, incomplete work”. After too many times of not doing homework: “I’ve got some letters there, give a learner first chance, second chance, the third one I give the learner … she calls her parents.” Betty exclaims: “She has taught me, she has helped me a lot with that form.”

Despite the small amount of homework she previously gave the learners, she was not efficient in reviewing it: “Ok, in those days … I’ll start by checking the work I did with them yesterday and I check it (the homework). Sometimes checking the work of the learners it might consume your period because sometimes it takes a long time.”

Discussing the situation with learners’ work now: “I see a lot of improvement from my learners, they do their work, I can tell you, even if they don’t understand, some they don’t, they will always try, they don’t sit and say I don’t understand, they will try and try, they will try to do the work and then when I come and check, they will check and check, they will always tell me, before I ask them…” What brought about this change in the learners? “… the change is in me, I’ve changed a lot, so learners have also changed a lot, they are doing their work now, they take maths as a subject, they’ve removed that thing (referring to their original fear of maths).”
Asked for her perception of her competence change in her grade 8 to 10 teaching as far as the controlling and monitoring of learners’ homework is concerned, Betty indicates (by allocating herself a 4 rating) that her teaching practice has “improved somewhat” in this regard. Elise indicates (4 rating) that she agrees with Betty’s assessment of her practice change in this aspect.

During my class observation time I noticed that in one period she checked the learners’ homework at the start of the lesson while a learner was cleaning the board (children were told to stand if they had not done the homework) and in another she checked only at the end of lesson while they were doing work in class. Learners were reprimanded loudly if they had not done the work and told to come to class at end of school, to complete the work then; this is a procedure she uses to ensure that the work gets done, and in fact during that period she assists them should they not understand the work. Betty’s homework checks, as evidenced from the learners’ books, are fairly regular.

Jane

In her early teaching practice, prior to TMP, Jane gave learners homework and class work everyday; if they had finished their work in class they did not get additional work to do at home. However, Jane’s use of her periods for homework review currently are very different from her previous approach prior to TMP: “What I did we could mark that homework for the whole period, not presenting something new again, to say they had homework yesterday, today we just mark for the whole 45 minutes or 40 minutes, then from there sit down and do something else on my table, whereas the learners are sitting there making noise.”

She still gives homework every day, (from observation approximately six problems or sums per day) and from the corrections seen in the learners’ books she regularly goes through the work, but no teacher signatures or date stamp were seen. During a class observation she went through the homework thoroughly in class: examples were taken from the worksheet; all learners had the sheets, appeared to have done the work and were participating in the review. Learners volunteered answers; some problems were done on the board by her and in other instances she summoned learners to do the
problems on the board. Towards the end of the lesson Jane gave homework for the holidays and then the period ended. Jane’s use of the period to go through homework, present new material then give more homework was excellently timed.

Jane points out a system for homework review that she believes is effective and time-efficient: “I think one other thing that helps me is that I no longer do corrections for them all the time” and she explains a system using the learners working on the board simultaneously: “five minutes time they are all on the board. And the one that they don’t understand … then I explain that one … then move on to something else. So even when I have a single period I am able to do that”.

Jane describes how much she can now achieve in a period: “We are able to mark, if I’ve planned for another exercise to be written, they are able to write it in class, and again we are able to mark it, the exercise that they’ve been given in class and I’m able to present something after marking that exercise, able to present something again to them and give them homework, so which means basically in a day they are able to mark and I give them class work, mark it and give them homework again.”

Jane then describes how TMP helped to bring about the changes in her classes as far as these aspects were concerned: “I think what helped me a lot is the programme, and the mentoring to say you can’t do corrections for the whole period, now how do you finish your syllabus or your curriculum or else you are too relaxed and the learners must know that they have to work very hard. So I think I attribute this to the programme … So the programme helped me a lot to say er, time is very important and we need to have a sense of urgency because relaxing won’t help us a lot.”

Asked for her self-perception of competence change in her teaching as far as the controlling and monitoring of learners’ homework is concerned, Jane indicates (by allocating herself a 3 rating) that her teaching practice has not improved noticeably with grades 9 to 11, but has “improved somewhat” (rating 4) in this regard for grade 12 learners. Elise indicates (4 rating) that she believes Jane’s practice has improved somewhat in this respect over all the grades.
Perusing learners’ books during my class observation, it was clear the grade 10 learners had done a considerable amount of work: 17 pages had been done from 4 Sept to 20 Sept, including 2 worksheets and textbook work. Other learners in another class had also done a lot of work; all marked (by learners) and corrections done.

**Jill**

Jill discusses her approach to maths homework as always having been as follows: “What I like is I prefer to give them class work … after presenting a lesson, then let’s say you give them three sums. You say after you have finished with number one … if you are having any problem just raise up your hand then I will come to you. Then you just help them. And then you give them the homework…” In this way Jill refers to “classwork” which they complete during the lesson while she is available to help them, and then they should be able to complete the remaining (and additional) problems for homework. For science Jill normally gives them an activity from a textbook.

Monitoring if the homework had been done, prior to TMP, was by verbal checking and Jill explains that she would catch a few children out, after which other learners guilty of not doing their work would stand up. Jill’s homework system now is the same as before and also includes a means of allocating marks to ensure learners’ cooperation; after verbally checking if all have done their homework: “… then I say okay everybody must bring his class work book, then I’m going to give marks, I’m going to mark them myself, after school you must come and collect your books.... then I say to them it’s going to count towards the mark for portfolio, for continuous assessment, and then I say I’m not playing when I say go home and do your homework...”.

The TMP educator report form shows Jill describing her control of learners work as “Books are checked regularly with necessary follow up” for science and “Very seldom get round to controlling books” for maths. Both mentors’ reports support this analysis; it may be possible that Jill is paying more attention to her science classes in this regard as she is less certain of herself in her science teaching than in her maths teaching. Jill perceives her science teaching, in view of the practice of controlling and
monitoring learners’ homework, has improved “somewhat” but Jean sees it as not having improved at all, again clarifying that her practice in this regard was good in the first place.

Observing a class, the homework check was done at the start of the period and at the end Jill gave about 8 questions to do for homework. In another class (grade 11 maths), the teacher did not reach the point of going through homework; she said she would start the new material and go through homework in 15 minutes but spent time on revision of old work so no time remained to check homework. However, perusing the learners’ books there were plenty of homework checks, regular early in the year but fewer later.

Joe

Before Joe marks homework, “I have to check, move from one desk to another, just like that or sometimes I collect all the sheets and check them and then from there I’ll write the names of the learners who did not do their work and then I’ll make some follow-ups on that.” This is the system that he used previously and is still following the same procedure.

Joe speaks of his current practice: “… in terms of homework, er, I don’t think I’m satisfied with the amount of work I give to the kids, maybe it’s a question of having extra classes, last year I had six, this year I’ve got 7, so I’m not satisfied about it.”

Asked if he has better homework-checking systems than before, Joe admits: “… it depends, sometimes you want to check your work… but you will find that you forget sometimes to do some follow ups, the change really, I’ve not changed very much, I’m still following the same procedure that I was using.”

Joe guesses that now he checks homework about 25% of the time. A glance through the learners’ books confirmed this, and showed that approximately 24 pages had been done; two activities had been stuck in, marking was done and a few marks were given for the work. The date stamp (supplied by TMP) had been used occasionally at the beginning of the year. Some learners had use of the dictionary evident at the back of the books, under the heading “meaning”. Joe puts his self-perception of competence
change as “my teaching practice may have improved in this regard, but not noticeably to myself or my learners”.

General mentor comment

The mentors comment on strategies undertaken with teachers in connection with homework issues:

- Firstly, they emphasise that teachers generally give learners far too little work to do at home, stressing “4 or 5 sums is too few”. Obviously depending on the problem type, they suggest 10 problems almost daily to be a better number.

- To assist the teachers with their monitoring procedures they supplied them with date stamps and “intervention forms” (where learners sign if they have not completed their homework) and suggest methods of checking the learners’ work in a time-efficient manner.

- Finally they also recommend review methods for the teachers to ensure they adequately go through homework but manage their time to allow several more planned activities to be completed in the lesson. Whilst teachers are generally under the impression that they must go through every homework example in class (a reason why they give so few homework problems to the learners), the mentors recommend that they read out the answers to all the problems and only explain a selected few difficult ones on the board, emphasising that learners must also learn accountability for their progress and that they may go through the remaining problems with other more successful children.

Synthesis: Homework procedures and controlling learners’ work

- Betty, prior to TMP, gave very little homework to learners but found that a very small percentage of them did their work and she took almost a period in reviewing the work. Her current practise indicates a larger volume of work allocated to the learners, a greater percentage of them completing the work and easier monitoring processes and she points to TMP–supplied resources that helped her in her monitoring and disciplinary strategies in this regard.
Betty says that learners are now doing their work and are enjoying maths, no longer fearful of it, because “… the change is in me”.

• Jane always gave learners homework daily but admitted to spending a whole period going over the work prior to TMP. She now uses new strategies and is able to manage her period time very efficiently to review homework, teach new work and assign more work to learners. Jane credits the TMP with helping her with these strategies and showing her the importance of focusing on time: “we need to have a sense of urgency”.

• Jill uses verbal techniques to establish which learners have not completed their homework and encourages them to do it by allocating marks to it. Her practice has not changed through TMP input but the science mentor believes it was adequate initially.

• Joe’s practice as far as homework issues are concerned has not changed; he sometimes checks learners’ work but is not happy that he is doing it frequently or thoroughly enough.

Conducting group work

Introduction

Although TMP teachers were often seen to seat their learners in groupings of two or more learners prior to TMP, this was not any basis of an effective strategy as they did not promote learner-learner discussion or any form of meaningful group activity and likewise did not provide meaningful support in mediating or moderating the groups (Taylor and Vinjevold, 1999, 150).

Many of the TMP teachers find themselves facing very large groups of learners in small classrooms, a situation which makes effective and meaningful group work very difficult to facilitate except by the most innovative and talented teacher.

Rogan (2006, 41) describes level 2 teachers as those who enable their learners to “Engage in meaningful group work”.

164
General finding

Three of the teachers did no effective group work at all before TMP while the other claims he did a little: however, many sat their children in groups, believing such to evidence group work. Subsequent to TMP support, in which the mentors generally recommended strategies to the teachers to consider in their planning, implementation and monitoring of group work and supplied group work assessment tasks, two of the teachers have improved to a level 2 on Rogan and Grayson’s (2006, 41) profile while the other two have shown no improvement (one of these believes, however, that he has improved, while the other has exceptionally large classes in which meaningful group work is difficult). In many cases the group activities are facilitated by the TMP-supplied tasks.

Evidence: the voices

Betty
Discussing the concept of group work with Betty, she explained that in the past, prior to TMP: “I saw it as something that is not fair, especially for that bright learner, I saw it was, I thought it was not fair, because she was doing the work for them and they used to abuse it, a learner shouldn’t get zero, they must always get a mark so its not fair. She gets one, the one that doesn’t deserve it” and “With the groups, we were using the textbook, we were using textbook, only.”

Discussing her implementation of group work now, Betty says it is “100% percent through the help of Elise, 100% … the noise is not that much noise I used to hear, learners they work in the groups, … they all participate because she has shown me, if a learner doesn’t participate, you don’t give the particular learner the marks the same as the one who is working.”

Betty, having received TMP support and acknowledging the mentor’s input, currently feels more positive about group work because in the past “I was unable to do those things”. However, she has large classes and tends to involve the grade 8 learners in more group work than the grade 10 (who work individually most of the time) because
“their passing mark depends entirely on this, the portfolio work.” It would appear therefore that although Betty feels more confident about doing group work in the classes, she does it occasionally as a necessity rather than due to an inner acceptance that this is an excellent strategy for learners to be taught and assessed.

Asked for her self-perception of competence change in her teaching as far as implementing effective and meaningful group work is concerned, Betty indicates (by allocating herself a 4 rating) that her teaching practice has “improved somewhat” in this regard. The mentor indicates (2 rating) that she believes Betty’s practice has not changed in this aspect, but she confirms that no group work was observed: she explains that with Betty’s big classes of up to 70 learners it is not possible for her to do effective, meaningful group work. Therefore Elise says that in her mentoring of Betty she did not encourage “group work” which she thought would be “educationally ineffective” in such circumstances. Elise explains that Betty’s belief that her teaching practice has “improved somewhat” in this regard probably stems from the fact that Betty has more confidence in general as she feels she has more options now.

Jane

Jane did not do group work prior to her exposure to the TMP programme: “I felt it was a waste of time sometimes, to say group work, or basically I think I never planned of giving learners activity for group work, so I never thought it’s practical to present it. And basically I didn’t know how am I going to monitor it and the most important thing I think again it was planning to say: how do I plan group work? How do I monitor these kids when they are doing group work? So I never did group work in the past.”

Jane plans group work very carefully now, explaining: “if you don’t plan it, it can go out of hand…” Describing how she distributes her learners through the groups and informs them the day before of their groups and roles: “… and to say I give them direction, to say in your group there must be a time keeper, because you shouldn’t waste time on one thing. There should be a scribe, and if they are going to present it, there should be someone who is going to present what you’re doing. So basically I guide them, they know to say this is what you going to do, and if it’s for submission
then they know that that’s for submission and I tell them that this is how I’m going to mark it, I’m going to use a Rubric or I’m going to use a memo so they know that which method am I going to use”. (She distributes the rubrics at the beginning of the activity). The allocation of roles to individuals within the groups is a strategy recommended by the mentor.

Thus Jane does more of this type of activity now than she did before, but “I don’t do it regularly group work, I do it once in a while, for me it’s not that effective. Actually I prefer when learners are doing it in pairs, it’s much better than a bigger group, because now when they are in pairs they have to talk, it’s better than if they are 4/5, you get that someone won’t do anything…”.

Asked for her self-perception of competence change in her teaching as far as implementing effective and meaningful group work is concerned, Jane indicates (by allocating herself a 4 rating) that her teaching practice has “improved somewhat” in this regard. However, Elise did not have the opportunity to observe grade 9 group work (due to the timetable not allowing such) and the senior learners did not have do be involved in these activities.

In one of my observation lessons however, learners worked in pairs for an activity incorporating Pythagoras theorem. They were told to read through whole activity to understand it first, then given 15 minutes to complete it, but went on a little late. The pairs worked together effectively and Jane walked around checking on them and commenting, intervening with general class guidance when required. Although the groups were very small in this case, the activity proved to be very meaningful for the learners and it might be assessed that Jane’s level of practice in this regard has improved from level zero (no group work) to level 2 (based on Rogan and Grayson’s (2006, 41) profile of implementation).

Jill

Asked if she previously used group work, Jill responded: “no… maybe because I did not use it properly”. However, she says that she now does group work and “… now it’s working because you find in some cases, the learners find it very easy to get the
concept from their colleague, if the colleague explain the concept to them it’s very much easy.”

Jill describes in detail her current group work strategy, from informing the learners of the activity the day before, to how the learners in their groups first “discuss the first part of the question, you discuss, you discuss the questions, you don’t write any answers, you discuss. What do you think, how are you going to solve this particular sum, just discuss.” Then the individual question papers are handed out “the same as the questions that they have discussed, normally I make them on a separate paper”. After the group discussion of the questions: “And then I say guys … you are going to write individual work” (but learners put the group number on their scripts). “Then normally … I split the group members … Then I can see whether the group members were participating or not.” Jill changes the group members regularly.

When asked if her changed strategy was influenced by the cluster groups of schools or DoE she said a definite no to these, but said that the mentor had an influence in this: “… because this particular strategy for having individual work it came from (mentor), … normally … she has structured some group work assessment…”. Thus it is clear that the group activities are facilitated by the TMP-supplied tasks.

Discussion with the maths mentor on this issue revealed that when she structured group work activities for classes, she ensured that the teachers knew to give each child in the group something different to do or different aspects of the overall task required, as this provided for individual work within the group context and eliminated the possibility of copying.

The science mentor explains that group work is always done with practicals so “prac work = group work”. Jean clarifies what particular strategies Jill has learned through TMP in this regard: she “had always been unsure of her approach” and has now found that she must always instruct learners first, before the lesson takes place, for the group work to be done meaningfully. She also benefited from TMP in terms of group management: she now puts learners into small groups to discuss how to solve problem
questions and moves from group to group to assess their progress and identify learner contributions to the discussion.

Based on Rogan and Grayson’s (2006, 41) profile of implementation, it is possible that Jill’s practice has improved to a level 2 in this regard, from no group work previously.

Joe
Referring to group work as he implemented it in his classes prior to TMP, Joe says “theoretically it was there (repeated) but practically it was difficult. We could just arrange tables around here, around there, but how to go about conducting …? … each in his groups? It was difficult … it was difficult. Because you are going to implement something that you… of course you are not sure of. .. the group work was there but it was not effective.”

He describes how his practice has changed to a limited extent by referring to a current project that the learners have done together and which they will be presenting as follows: “right now they are doing presentations for example … it’s a model there, then although the model is done ..(unclear) when they present it, one will introduce the group, and one will identify some of the parts, and one will need ..(unclear) the part there and describe it, one will come with the functions, on the morning. And I’ve designed practical work, then they know about it and then at the bottom there, I’ve made a table there, sort of blocks, group member’s names appear there. Then if anyone doesn’t participate there, next to his/her name there, she/he will get different marks as compared to others because I’ve put their names there. But if there is co-operation, they work as a group, let’s say one has forgotten to mention a certain point, the other one has got the right to say this is the other one, to add on that. Then from there there’s a mark for it.”

The group project presentation described above is for the biological side of the natural sciences curriculum, but the mentor believes that his teaching practice has not changed in this regard in terms of the physical sciences and his group work in this regard, where attempted, is not effective and meaningful. In his self-perception of
competence change, Joe however describes his implementing effective and meaningful group work as having “improved somewhat”; however Jean clarifies this by explaining that whilst this is true for the biological aspects, Joe seldom actually does group work for chemistry and physics but rather performs many demonstrations to different groups instead of providing each group with the apparatus and chemicals; as a result Joe took too much time over these sections. However he seldom divides the class into small groups but sees the whole class as a large group. Jean says that Joe had previously done no experiments at all so now believes that what he is doing is group work since “prac work = group work”.

*General mentor comments*

Elise says that in her mentoring she did not encourage “group work” if the teacher had very large classes, as she thought this would be “educationally ineffective” in such circumstances.

In support of those teachers in whose classes it would be possible to conduct group work effectively and meaningfully, the mentors structured group work activities and ensured that the teachers knew to give each child in the group something different to do or different aspects of the overall task required, as this provided for individual work and also eliminated the possibility of copying. It is clear that in many cases the group activities instituted by the teachers are facilitated by the TMP-supplied tasks.

Some strategies with which the mentors assisted the teachers were to instruct learners first (before the lesson takes place) in terms of individual roles within the groups for the group work to be effective and meaningful learning exercises for the learners; how to manage and monitor groups; how to assess learners individually within the group context.

*Synthesis: Conducting group work*

- Betty did not undertake group work prior to TMP, not believing that it offered a fair way of assessment to all learners. However, although she now believes
she has the skills to carry out group work, it is not apparent that she does so: her classes are extremely large and it is likely any group work carried out in class would not be meaningful. Betty’s practice has therefore remained on level zero, but possibly due to circumstances rather than lack of competence.

- Jane did no group work prior to TMP as she thought it was a “waste of time” but also was ignorant of how to plan it and monitor it. She currently does use this strategy in her classes although not regularly; when she does so, she plans it carefully and allocates roles to every learner to ensure their individual involvement. The mentor could not confirm this but I was able to do so in an observed lesson; the implication (based on Rogan and Grayson’s (2006, 41) profile of implementation) is that Jane’s level of practice in this regard has improved from level zero (no group work) to level 2.

- Jill previously did no group work, being unsure how to go about it; however, it was also not a requirement for her senior teaching at that stage. Currently, she implements group work effectively and enjoys the process; as with Jane, it is possible to allocate her a level 2 rating in this regard from zero previous group work. Jill credits the mentors with their help in terms of how to set up the groups and their excellent resources (assessment tasks).

- Joe did little group work previously and claims to implement more of this strategy in his classes now. However, the mentor clarifies that in terms of real group work, Joe implements this during his practical work (see next section) but for no other lessons; rather, he conducts demonstrations for smaller groups.

- The mentors generally recommend strategies to the teachers to consider in their planning, implementation and monitoring of group work and they also supply group work assessment tasks which are largely instrumental in facilitating the group activities.
Conducting practical work

Introduction

Two TMP Saturday workshops at a mentor school (in which all TMP teachers, with guidance from the mentor and supporting staff, performed every one of the curriculum practicals) have assisted the teachers to master and understand the theory associated with each practical of the syllabus. In 90% of cases the teachers at the workshops performed the curriculum experiments for this first time, never having done them previously either as learners, students or teachers. In conjunction with this, the science mentor helped the teachers to locate and use their resources and organise their laboratories; she has provided assistance to the teachers with strategies for practical group work, preparation, monitoring and assessment tasks. The value of the regular follow-up after the workshops was that the mentor was able to observe the teachers doing the experiments and applying the knowledge they had learned and subsequently advise them where necessary.

In describing a profile of implementation for a science classroom, Rogan (2006, 41) describes the differences between teachers of different levels as follows:

- level 1 teachers “use classroom demonstrations to help develop concepts” and “use specimens found in the local environment to illustrate lessons”;
- level 2 teachers use demonstrations “to promote a limited form of inquiry” while learners assist in the planning and performing the demonstrations;
- level 3 teachers design the practical work “to encourage learner discovery of information” while learners “perform ‘guided discovery’ type practical work in small groups, engaging in hands-on activities … and .. can write a scientific report” and justify their conclusions in terms of data;
- learners in a level 4 teacher’s class “design and do their own ‘open’ investigations... reflect on the quality of the design and collected data, and make improvements ... can interpret data in support of competing theories or explanations”.

172
General finding

Both science teachers, originally level 1 or below on Rogan and Grayson’s (2006, 41) profile of implementation for science practical work, improved their practice: one to a level 2 and the other to level 3. Both acknowledge that they do more experiments now because they are required to by the DoE and also by the mentors, but both attribute their improvements in such activities to the TMP support: the workshops in which they performed the experiments themselves and the support of the mentor in meeting discussions on planning, methodology and monitoring; demonstrations and classroom support. Both teachers have alluded to, and demonstrated, a greatly improved understanding of the practicals and their links to scientific theory.

Evidence: the voices

Jill
Before she worked with TMP support for science (i.e. in the period that she left the current school and taught science at the other school) Jill says that she did all practical work as demonstrations, mostly because in that school she could not access the lab and the school had poor resources.

This is different at her current school: “Normally when I introduce a concept, I want them to do the experiment themselves, even though they are in groups and I make sure that I monitor that particular group…. normally in terms of the practical work I do a lot of practicals now.” Jill’s strategy is as follows: “… normally what I do, I inform the learners maybe a day before, then each and every class is having it’s own lab assistants…” (note: these are selected learners from the class), “… they come and take out, they check for the apparatus if we are having enough, the necessary apparatus to perform that particular experiment. If those learners are having enough chance, they do the experiment before. … in the afternoon, then tomorrow when you go to class, they come to the lab, then they sit in their groups, remember I briefed them before on what they are supposed to do. I give them a chance to do whatever they are supposed to do, then normally they say, ‘ma’am, how are we supposed to do
that particular thing?’ Then I say, if I help you then I deduct marks, because I told you yesterday what you are supposed to do …”

The modus operandi after doing the practicals: “…they must write the observation, even though it’s not for the portfolio in their class work books, what did they observe, their questions there. Then after doing the practical work, tomorrow when we go to class because obviously we will be having some questions, then I just select randomly. I’m just looking at them, this one was playing, then tomorrow I start with that particular learner.” The learners then discuss as, individuals, their observations and explanations and may not blame others in the group if they have not participated: “…he/she must not tell me about his/her group, our group, ‘I didn’t see anything’, then I say no, you must ask them what they are doing and you must also do what you are supposed to do, not to sit down and record everything. That is how I normally conduct the experiments.”

When she was asked what caused this change in approach to implementing practical work, Jill explained: “I think it was a combination, the support from the mentors and … the changes which is happening within our department of education.” (This has partly been forced on the teachers by the DoE as practical assessments are required for the learner portfolios).

In her self-perception of competence change as far as practical work is concerned, Jill claims “I believe my teaching practice has improved significantly in this aspect” for every grade, and Jean’s assessment is entirely in accord with this. The mentor says this has definitely come about through mentoring help and this is confirmed by Jill: when asked what contributed to her perceived improvement in practical work Jill said that in meetings (with the mentor) practicals were discussed: Jean explained how to do the experiments and occasionally would demonstrate them with one class, then Jill would do them with another. This strategy is confirmed by the mentor: according to her, Jill’s strategy is to clarify with her the details of the practical before the time, then to invite Jean in either to observe the way Jill conducts the practical lesson with her first class in that grade or to run the practical lesson herself, if Jill is still unsure, so
that Jill may learn from the observation. After this and receiving Jean’s comment, she feels empowered to conduct the practical lesson with her other classes in that grade.

TMP also held practical workshops during which Jill was given the opportunity to perform all the school syllabus science experiments and she attests these were also responsible for her practical improvement. Jill explains her approach to experiments: “(the mentor) told me if you want to prepare the experiment, the best thing for your experiment to be successful, you need to brief the learners exactly what they are going to do during the experiment.”

Jill prepares if she is unsure of the experiment “… normally I remain behind in the afternoon and do the experiments and see what will happen.” Not all practicals are done by the learners themselves; Jill sometimes done them as demonstrations: “…not quite often but I normally do them, if I feel that I have wasted a lot of time in a particular section, but I feel it’s important for the learners to see exactly what happens, and then normally I don’t ask them to do the experiment, I do the demonstration.”

Jean sees the biggest change in Jill as the fact that she is now able to do practical work and portfolio work and she adds that Jill allows her learners to conduct numerous practicals during the course of the year. Jean says that the practical work requirement to Jill’s teaching is new in the subject and hence Jill had not performed many practicals before TMP. However she says that there has clearly been improvement with the help of the mentor and also that her increased confidence with her subject content has enabled good practical work from Jill.

Joe
When it came to the practical /experimental side of science, prior to TMP Joe was not at ease. He was aware of the need for doing experiments but very fearful: “you have to do some experiments somewhere, but with me, before, before, I had a fear of chemicals, that’s why it was difficult. You just…er… do the few experiments that you can, but others, you tend to skip them because of not being used to some of these chemicals. But … experiments are important for the lesson … and then from there
you’ll go to your observations, what it looks like, and from there you use notes and in the end you get there.”

Even for those experiments with which he was familiar, Joe did them for the learners as demonstrations; thus we may possibly consider Joe to have been a level 1 teacher on Rogan and Grayson’s (2006, 41) profile except that he did not do all the experiments in the curriculum (by his own admission), possibly omitting the chemistry experiments, therefore he would be assigned below a level 1 teacher in this sense.

Joe was allowed the opportunity to perform all the school syllabus science experiments with other TMP teachers at the TMP practical workshops, subsequent to which he is more confident with touching the chemicals and performing the experiments in terms of knowing how to conduct them, understanding the observations and incorporating them into his lessons.

Joe in particular exclaims how the way he was taken through the most basic circuit experiments has been invaluable for him as he now uses the identical approach with his learners who now understand the electricity concepts more easily themselves. Unfortunately the circumstances at the school are such that there is no laboratory set aside for science teachers and Joe still conducts most of his experiments with the learners as demonstrations. However, Jean attests that Joe now allows the learners to handle the apparatus and tries to perform the demonstrations to smaller groups, both in an effort to make the experiments a more meaningful learning experience for them. This would put Joe at a level 2 profile teacher, an improvement from level 1.

Jean confirms that Joe did not do practical work prior to TMP but has improved a lot and says he now “has confidence to do experiments”, attributing this to the practical workshops and the mentoring. In his self-perception of his competence change in this regard, Joe claims “I believe my teaching practice has improved significantly in this aspect” and Jean agrees with this self-assessment.
**Synthesis: Conducting practical work**

- Jill’s previous practical work in class before TMP support involved only demonstrations. She now does extensive practical work with her classes even allowing learners to do some experiments which are not part of the DoE portfolio requirements. She provides opportunity for learners to use the practicals as meaningful learning experiences both as her laboratory assistants and during the practical work in groups. Jill prepares thoroughly before she presents her practicals, in discussion with the mentor, by observing the mentor doing the practical and by doing it herself prior to the class. In terms of her science practical work, it may be said that Jill has improved from a level 1 to level 3 in Rogan and Grayson’s (2006, 41) profile of implementation and she attributes this improvement to support from the mentor on planning and strategy as well as assisting her to understand the experiments and how to perform them.

- Joe did very few experiments before TMP as he was fearful of the apparatus and chemicals; those he did perform were done as demonstrations. Joe still does demonstrations now, limited by the fact that the school has no laboratory, but is more confident, does all the experiments required of the curriculum, and allows the learners to participate in the demonstration. His practice in this regard is considered as having improved from a level 1 (or below) to level 2 on Rogan and Grayson’s (2006, 41) profile of implementation for science practical work.

- The mentor considers the support offered by TMP to have been instrumental in the teachers’ progress: the TMP practical workshops as well as follow-up interaction between the teacher and mentor at meetings and classroom observations. She explains that it is necessary for teachers’ support in this regard to address the most basic issues and build up from there and to provide opportunity for the teachers to conduct the experiments themselves in a non-threatening environment.
Conducting projects and investigations

Introduction

Rogan (2006, 41) describes teachers as level 3 on a profile of implementation if they enable their learners to “engage in minds-on learning activities”. In this vein, the level 4 teacher will enable learners to “Undertake long term and community-based investigation projects” while the teacher “Facilitates learners as they design and undertake long-term investigations and projects.”

Investigations and projects are intellectually stimulating activities which have potential to provide learners with a great deal of enjoyment as they learn, particularly when focused on the learners’ life context; however the design of investigative tasks requires a range of skills which I moot that teachers at schools in developing context generally do not possess. In addition, few teachers in these contexts have previously been exposed to investigations as an education methodology and have no idea how to implement them.

The new DoE curriculum requires that learners conduct one investigation per term. This is an activity very new to the teachers’ knowledge base, and for which they feel ill-equipped to cope. The TMP mentors designed and supplied excellent investigations / investigative projects which were relevant to the learners’ world and of great interest to them. The teachers, once exposed to such thinking skills and approaches to teaching, embraced the technique and in many cases applied the same investigative approach to many of their learning topics.

The maths mentor clarifies that learners only need to do one project a year as per DoE requirements, while the science mentor explains that the learners must do either a project or an investigation for their continuous assessment mark. In most cases TMP supplied the resources which, as described by Elise, were appreciated by the teachers and enjoyed by the learners because they were “relevant, set in good language and thoroughly thought through”.
General finding

Three of the teachers had never provided their learners with projects or investigations before TMP support while one teacher admitted to giving learners activities from textbooks as projects. In some cases projects had not been required by the DoE while in others it was compulsory but had not been put in place because the teachers did not know how to go about it. In all cases the teachers now undertake projects and investigations with their learners, who thoroughly enjoy the tasks and appear to be as motivated by them as the teachers are. However the teachers admit and mentors confirm that if it was not for TMP-set tasks and support this would not now be the case. Having been exposed for the first time to these new thinking skills and approaches to teaching, the teachers embraced the technique and in many cases applied the same investigative approach to many of their learning topics.

Evidence: the voices

Betty
Betty admitted that in the past she gave learners no projects at all, whilst now the learners really enjoy projects “too much, they enjoy it too much… before (TMP) I didn’t know about projects.” She sees the benefits of doing a project as well as a regular test, since “the learners they work well on those programmes, even if they fail, they fail the test, but the project can help them, it helps them, it boosts them. At least they pass.”

Scanning Betty’s learner books and mark sheets it was clear that the grade 8 learners had done two projects while her grade 10 maths literacy learners had done no projects. What is clear is that Betty is motivated by the quality of the projects that Elise designs for her to use (there have been none supplied for maths literacy as this is not a subject for which TMP formally provides mentorship, so Betty has done no projects with this group).

Similarly, before TMP, Betty said that they did not do investigations at all; they knew that it was an activity to be done but “we didn’t do that, I didn’t do it.” She continued that she first started doing investigations as a teacher “since TMP came to my
school.... learners do benefit from the investigations, they do a lot, especially I had one dealing with number systems, … the triangular numbers, they enjoy it a lot. It shows them number patterns and so on and so on. So it was okay for them.” Betty’s grade 8 classes have done 5 investigations in the year and her maths literacy classes have done 2 (although no formal mentoring of maths literacy is provided, there are several common areas with mathematics where tasks provided for the maths group may be modified to use for the literacy group).

Asked for her self-perception of competence change in her teaching as far as the use of mathematical investigations is concerned, Betty indicates (by allocating herself a 4 rating) that her teaching practice has “improved somewhat” in this regard. Elise indicates (3) that her practice has indeed improved but only slightly in this aspect: her comment is that Betty’s baseline in terms of this skill was zero, and hence any improvement is most gratifying to her, resulting in an inflated self-rating, whereas the basis for Elise’s judgement is a different, more skilled, reference point.

Thus it may be concluded that although Betty is evidencing the practice of a level 3 teacher in Rogan and Grayson’s (2006, 41) profile this has come about due to the mentor-supplied resources and the teacher does not have a deep understanding of the processes involved in investigative projects.

Jane
Jane had never done projects before meeting TMP, and had the following to say of this aspect of her current teaching, with TMP support: “honestly speaking, the projects that are used are the projects that we’ve been given by (mentor), because I’ve never thought of projects before. So the ones that they gave us are the ones that helped us a lot. And normally we do a lot of projects in grade 9 … and the projects that we have been given they are … associated to the real world, because there are different projects that are given to us, so they are very helpful and they are very handy because they are dealing with something that they know and then they have to go out and look for information.”
Jane describes her current approach with assisting learners in managing their project completion: “because normally what I do, a project is something that they do in a longer period of time. You give them for two/three months. So normally I say to them in a week’s time I’m going to check where are you, because their projects guide them to say you have to do 1-10, so I say next week Monday you come with your project, I want to check whether you are at number 4…” This involvement of learners in long term investigation projects in which she facilitates learners would allow her classification as a level 4 teacher on Rogan and Grayson’s (2006, 41) profile.

Jane had not done investigations with her learners before either and she claims that her attitude to projects and investigations has changed “… because I viewed projects as something very difficult and once you are negative about something as a teacher, what do you expect from the learners. Because first of all you wouldn’t do it, you will leave it.” However she is now positive about these learning / teaching methodologies and notes: “I think the benefit is ..., I think is teaching these learners and yourself to be able to research in a way, because you know that when you doing an investigation you can’t concentrate on one thing. You have to look at all the sides that everything that you do would satisfy the conclusion that you make.”

Jane describes how she attempts to link maths to the learners’ world and show them the place of maths investigations in their world: “… So because these learners sometimes think that maths is different, investigation is different from an investigation outside. .. as I said with transformation to say “oh, transformation, transformation is change, so the same applies to transformation in maths” it is change. So now they are able to say these things are linked, they are the same, it’s an integration of some sort.”

During a class observation, a grade 10 class group was put into pairs to do an investigation with Pythagoras theory which they enjoyed and in which all learners were actively involved.

Asked for her self-perception of competence change in her teaching as far as the use of mathematical investigations is concerned, Jane indicates (by allocating herself a 4
that her teaching practice has “improved somewhat” in the planning and obtaining evidence and improved significantly (5) in terms of the discovery and conclusions. The mentor agrees with these analyses, stating that Jane grasped the facts and focus of investigations very well.

Jill

Asked if her natural science learners previously did projects for assessment Jill said: “…no, in most of the cases we were not doing these particular projects. Before TMP in most of the cases we used to do the tests.” Jill is presently teaching mostly senior science learners at her current school, so is not required to give projects as assessment tasks; her grade 10 learners did a research project on global warming and clay however. She explains: “…they give as part of CASS especially to grade 8 and 9s because in the grade 11s we don’t have these particular projects.” Jill’s science mentor explains that at that stage grade 10 to 12 learners were not obliged to do projects, and Jill chose to do investigations with them.

However, Jill likes to promote projects to learners: “…like they are doing the expo projects, there are many who volunteered to be in the expo, and normally we do have this particular science model competition every year, but normally what happens, what I realised is the grade 8s, the grade 9s and the grade 10s are the ones who are participating the most…”

Asked if she previously (prior to TMP) saw any benefits of open investigations compared with experiments or practical work, Jill said she had not. However, her opinion has changed and she now believes it facilitates development of different skills: “Open investigations I think is very good because it makes the learners to find the information. I think it’s a good thing to do, but also the practical experiments are very good, I think we need to do both … of them.” Jill did investigations with her grade 10 learners on rusting in water and Ohm’s law.

Asked for her self-perception of competence change in her teaching as far as the use of investigations is concerned, Jill indicates (by allocating herself a 5 rating) that her teaching practice has “improved significantly” in this regard for mathematics (in
terms of planning, obtaining evidence and discovery and conclusions) and this has “improved somewhat” (4 rating) for her science investigations. The science mentor confirms that Jill works well from the TMP investigations. Jean explains that, in general, TMP teachers said they were confused when faced with the task of doing investigations on environmental issues: the teachers cannot clarify for themselves what “environmental issues” are (for example they had all done AIDS projects or investigations as environmental problems) but once other ideas are pointed out to them (e.g. waste) they are stimulated and enjoy the investigations.

Joe
Joe’s comments on his difficulties with projects prior to TMP: “in the past projects to me it was just part of problem of the OBE, that was a problem because giving kids a project to do, you must be sure as a teacher, what type of project you going to give, ... and what is the purpose of doing that, maybe we needed someone to guide us. ... we lacked that interest, that love, that curiosity about this project, .... So you could just … maybe get to a text book, look at that particular page, … to give the kids under the banner of a project or what, not finding out whether this is the right thing to do, is it the correct project, ... as a teacher you are lacking something. You need someone to come and share with them. And no one could answer your questions based on the type of projects that are important, that are needed for the kids that are suitable for the kids. No one could answer that.”

His attitude to projects now is “I feel comfortable” as he has the support of the mentor to supply project ideas and support with implementation processes.

Neither did Joe do investigations before receiving support from TMP, but he now feels comfortable with them; he says his learners received great enjoyment from one on waste where they counted waste products, drew a table and converted the data to a histogram then pie graph. He says TMP has helped with a variety of tasks and he will try to come up with similar ideas when TMP has ended at his school. Jean explains that, as with Jill, at that stage projects were not compulsory, and Joe could choose to do long and short investigations with the learners.
Joe claims in his self-perception of competence change that all the aspects of investigations (planning work, obtaining evidence and the discovery and conclusions) have improved; the mentor comments that he has improved but is able to do investigations only when supplied with the material.

*General mentor comments*

In general, TMP teachers were confused when faced with the task of doing investigations or projects on environmental issues: the teachers cannot clarify for themselves what “environmental issues” are (for example they had all done AIDS projects or investigations as environmental problems) but once other ideas are pointed out to them (e.g. waste) they are stimulated and enjoy the investigations.

Jean believes that it will be very unlikely that teachers will be able to design their own resource documents for the learners. She explains in the design of such material the following points are pertinent:

- These resources must assess certain skills but the teachers do not see different Learning Outcome (LO) requirements as requiring different questions and cannot set up such questions or tasks unaided;
- Teachers do not have enough background to be able to identify links between objects or activities in the environment and different learning areas, or recognise the potential for this as a basis for a stimulating project or investigation. As an example, teachers would find it extremely difficult to see a power station in the area, identify (or theorise about) all the possible facets of its functioning and their possible environmental impact and compile a task for learners to investigate these issues, simultaneously covering appropriately-addressed questions to cover all the LOs required from the activity.
- Teachers are generally teaching in a language which is, at best, their second language but generally their third. Therefore they do not have the language capabilities to be able to compile a document that the learners will be able to access effectively;
- Teachers have little access to references and other resources to help in the compilation of such a task.
Synthesis: Conducting projects and investigations

- Betty did no projects or investigations prior to TMP but subsequent to their support now enjoys giving her learners these tasks and in fact learners have undertaken several of them. Betty is motivated by the quality of the projects (resource material) she receives from the mentor and the fact that the learners enjoy the activities. She sees her practice as having improved but Elise does not credit her with the same degree of improvement. She explains that Betty interprets the extent of her improvement from her feeling of confidence with these tasks, but that Betty’s improvement is not as great as the mentor desires; her improvement hinges only on the use of the mentor’s resources and not on actual understanding of the processes of investigative projects.

- Jane also typically undertook no projects or investigations prior to TMP but now facilitates her learners in long-term projects and investigations, enjoying highlighting for them the links between maths investigations and their worlds. Jane can be considered to be exhibiting level 4 teaching practice (Rogan 2006, 41) in this regard. She, like Betty, acknowledges the TMP resources particularly for her change in attitude, seeing them as being very motivational as linked to the real world context; however, she has also exhibited a great improvement in understanding the thought processes involved in investigative projects.

- Jill had, prior to TMP, not undertaken any projects as she did not see the value of them, even when teaching natural science learners. In her teaching currently she has little need to do projects however, as she has generally taught in the higher grades for whom it is not compulsory; however she has done projects with her grade 10 learners and in general values the concept of projects, therefore encouraging her learners to participate in Expo competitions. Also not having done investigations previously, she recognises the value of them now in facilitating development of different skills. Jill assesses her improvements in this regard to be “significant” for maths and “somewhat” for science: self-analyses with which the mentors agree. Jill is very impressed with and appreciative of the excellent and creative TMP resource material supplied.
Joe describes how difficult it was to undertake projects for OBE grades: he says he did not know what type of project to give or what the purpose was, and needed guidance, but “no one could answer your questions based on the type of projects that are important, that are needed for the kids that are suitable for the kids”. Joe also feels that teachers “lacked that interest, that love, that curiosity …” to search for project material, so used material from a text book “to give the kids under the banner of a project”. Similarly, Joe did no investigations with his learners, but he now involves his learners in both, saying: “I feel comfortable”. He also credits TMP with providing stimulating and relevant resource material and sees his competence in this aspect to have improved. The mentor agrees but states that he must be supplied with the resource material as he cannot design such himself.

The mentors point out that all the teachers have been enabled in conducting projects and investigations firstly by the receipt of excellent, stimulating tasks from TMP and then by being assisted with the strategies to follow in implementing the projects with their classes. They believe that the teachers are not able to design appropriate material themselves and therefore it is essential that they receive assistance in all facets of implementing these new methodologies.

d Assessment

Introduction

Education policy changes subsequent to 1994 elections and change in government included developing Curriculum 2005 (C2005), requiring a shift from “syllabus/examination dominated practices of the past” to “outcomes-based education principles… (incorporating) … child-centred learning and continuous, performance-based assessment” (Rogan and Grayson, 2003, 1172). In view of the types of assessment teachers undertake, Rogan (2006, 41) describes different levels of teacher profiles as follows:

- Level 1 teachers give written tests that “cover the topic adequately” with questions that are mostly recall but some requiring higher order thinking; the teachers mark and return the tests promptly.
• Level 2 teachers’ tests include questions requiring comprehension, application, analysis and/or practical work in at least 50% of the questions.

• Level 3 teachers’ written tests “include questions based on seen or unseen ‘guided discovery’ type activities” while the teachers assess their learners using other forms of assessment in addition to the written tests.

• A level 4 teacher’s assessment strategies will include learners’ portfolios of their best work and include assessment of performance in open investigations and community-based projects.

TMP started in the schools a few years after the DoE brought in outcomes-based education (OBE) and outcomes-based assessment (OBA). This latter required that teachers take a radically new stance in their assessment strategies, but teachers were ignorant of the new strategies and how to implement them and our observation was that most of them simply continued with their old testing techniques. For example, one of the C2005 assessment policy requirements is that all OBE teachers’ mark books have a mark for open investigations and community-based projects in their final learner assessments: therefore one would presume that every teacher would now reflect such in their mark books and as such be deemed to be assessing learners on Rogan and Grayson’s level 4 (above). The reality, from our observation, is that many mark books do not contain such assessments, or if they do the mark will not be an accurate evaluation of this particular type of assessment but more likely a mark obtained for an activity which the teacher, in ignorance, believes will suffice. Teachers have simply not received enough or effective training to implement such strategies, they struggle to design such assessments themselves and they are not supported on a regular basis as they attempt to implement policy. However, on Rogan and Grayson’s Profile of Implementation, it is only in the domain of assessment where more TMP teachers, prior to TMP input, fit the level one categorisation in that they generally give tests adequately covering the topic and mark and return them promptly; however, all questions are recall and none require higher order thinking, making it incorrect to attribute to the teachers a fully level 1 status.

Any change in assessment strategy on the part of the teachers involved in the TMP was in response to departmental requirements, but in most cases actually came about
because they now had support in learning and applying the new skills. For example, the DoE requires teachers to base assessment on more than written tests while learners are required to complete open investigations and create portfolios of their best work; however these are level 3 and 4 strategies on the profile of implementation and hence could be used to place a teacher into category 4. Therefore all TMP teachers meet the requirements of such high-level teaching practice in this regard, as the mentors assist them in the assessment practices and advise the learners on portfolio construction.

One TMP role in terms of assessment is for the mentors to moderate teachers’ test and exam papers, in the process assisting them to identify higher-order questions and distinguish them from rote whilst also classifying questions applicable to different LOs. Several assessment workshops were held by TMP covering, inter alia, general understanding of OBA, its terminology, strategies and requirements; exam-setting and investigations.

General finding

Prior to TMP teachers were only using tests and exams as assessment strategies, despite OBE requirements; they did not understand (and therefore did not use) rubrics and no moderating was being undertaken to ensure maintenance of standards.

The teachers currently understand what is required of them by the DoE in terms of the new assessment strategies and evidence changed practice in terms of type and frequency of assessment; rubric usage and design and show improved standard of their assessment instruments. Thus all teachers have attained level 4 practice on Rogan and Grayson’s (2006, 41) Profile of Implementation.

These changes are attributed to the mentor guidance, moderation and high quality resources supplied. Teachers also note that through improved standard of tasks set for learners by TMP they have become aware of learner capabilities and have increased their expectations of their learners.
Evidence: the voices

Betty

“Before, we were assessing our learners, I was assessing my learners with a test only, there were no assignments, there were no portfolios, there were nothing.” This is what Betty says about her typical assessment practices prior to TMP, and she admits that her tests were not of a good enough standard nor were they balanced. As an example, she describes how she would test only limited areas of work in her tests or exams:

“The June exam was supposed to be testing learners with the work that you did from January, up to June. But during that time, I can just test them with, if its data handling, I’ll only test them with what they handling and then its finished, so it not a reflection.”

“I was unable to use the Rubric until (mentor) came. She showed me how to use the Rubric. So I am 100% perfect about using the Rubric. I can even design my own Rubric. Now I’m assessing them with tests and their portfolio work and their tests are up to standard, we cover everything that they have done.” Betty claims that the variety of assessments she uses “has improved a lot and then it does no longer depriving learners from passing because last, before TMP I was using the test format, test it was depriving learners from passing, so now you can give them homework assignment and an investigation plus a test and assess the learner with three things, no longer with a test …”

As far as her perception of her competence change is concerned, Betty describes this by allocating a (4) “my teaching practice has improved somewhat in this aspect”, a comment with which the mentor agrees.

In terms of her frequency of assessment, Betty says that prior to TMP she would give learners tests monthly, class and homework weekly and very seldom projects, assignments or investigations. However, she claims that post TMP’s input, she has started assessing her learners more frequently and with an increased range of assessment task: she started testing weekly, giving class- and homework daily and the other assessments weekly. Elise confirms the class- and homework but says that the
other assessments are only performed per term, which is the portfolio requirement. She explains (as discussed previously in this research) the discrepancy between the teacher’s description of her practice and that of the mentor: many of the teachers, having gained a measure of competence in new strategies, use these strategies frequently but not on a formal basis (acknowledging this in their descriptions of frequency of usage), while the mentor’s allocation of the frequency of application of a task is based on formally implementing it for portfolio requirements. However, Elise acknowledges that Betty (with TMP help) puts into practice all the requirements for a level 4 teacher’ practice on Rogan and Grayson’s (2006, 41) Profile of Implementation.

A brief glance through Betty’s mark book shows that her Grade 8 maths learners have done crosswords, symmetries, tables, number sentences, and a card project (geometry patterns and reflection) while her maths literacy learners have done no projects, 1 assessment (data handling) and 5 tests. Thus she certainly is using a range of assessment styles with the learners of the subject in which she is receiving mentoring (maths) but the maths literacy is assessed in bulk by the old test-regime. It must be noted that the maths mentor is at the schools essentially for maths, and does not deal specifically with maths literacy. Where possible however (for example if the teacher is teaching both subjects) she will assist with planning where there is time, and often there is overlap of sections, as is the case of data handling, in which Betty was able to adapt the maths data handling assessment for use with the maths literacy learners.

Jane
Jane’s previous style of assessment, before TMP support “was basically on tests, it was test, test, nothing else ... not even informal test.” She goes on to speak of her present practice: “the assessment has changed drastically to say I no longer use tests only, there are different assessments that I use, do the group work, do the homework, assignments, investigations they do, not forgetting that I started being interested to investigations after I attended a workshop (TMP) … that was the first time I realised that investigations are so interesting, so they do investigations, they do projects, so there are different assessments that I do. And I no longer depend on the memo, I do have a memo but there are ... Rubrics that I use ... as I said the programme helped me
a lot ... I was not even interested in doing these Rubrics because I had an attitude, I couldn’t even do them ... But now I realise that something ..., if you interested in doing something you will be able to do it, and there’s nothing that’s standing on your way. So I’m using different assessments.”

In terms of her frequency of assessment, Jane says that prior to TMP she would give learners tests monthly, class and homework daily and never any projects, assignments or investigations. However, she claims that post TMP’s input, although she has not changed the frequency of her original assessment methods, she started giving assignments and investigations monthly and projects once per term. The mentor confirms the tests, class- and homework but says that the other assessments are performed slightly less often than claimed.

When asked about the standard of her assessments and how she judged it in order to maintain a high standard, Jane explains that prior to TMP she paid scant attention to standard but she attributed any improvement to the mentor’s guidance: “sometimes when you set these assessments, we didn’t check the standards that much … but (mentor) came in to say ….” and she describes exactly the process advised for setting a balanced assessment of accurate standard. Elise describes that when she met with Jane, the teacher always had a new assessment activity for her to look at and moderate, indicating a teacher who was creating her own assessment tasks and desired certainty of high standard. As far as her perception of her competence change is concerned, in terms of setting an assessment task of correct balance and standard, Jane describes this by allocating a (5) “I believe my teaching practice has improved significantly in this aspect”; the mentor agrees that there is improvement but says that Jane's practice has improved (4) “somewhat”. However, Elise acknowledges that Jane (with TMP help) puts into practice all the requirements for a level 4 teacher’ practice on Rogan and Grayson’s (2006, 41) Profile of Implementation.

Perusing the teacher’s mark book and the learner books and portfolios, a variety of assessment is indeed evident: for example her Grade 9 learners have done 6 tests/exams; 8 class / homework; 2 investigations and 2 assignments.
Jill

Jill describes her maths teaching prior to TMP: “… before TMP normally we used to do this home works, the class test, the standardised test and normally there’s nobody who’s going to moderate the paper for the ..., we would just set the paper and give it to the learners.”

After TMP started at the school, in conjunction with tests the teachers would give “... them assignments, you give them the group works, we give them the investigations, we give them research projects. The standard I think is very good because I’m having somebody who is moderating, the task that they are giving us sometimes is very good, the investigation that they are giving us, the assignments, then it means the standard is very good.” Jill claims that TMP has assisted her with OBE assessment strategies: “the assessment was very good because at least I was having an idea, we’re giving them the investigations; we were giving them the assignments.”

Jill also says that through the mentors’ moderation of her question papers she has become more aware of the learners’ capabilities: “…normally I set the paper, then they moderate for us but then sometimes you feel that no, eish, this thing is too much for them, especially when you see the grade 9s because normally I will say let me just see the grade 9 syllabi or grade 9 question paper, then sometimes I feel it’s very difficult for them. But then I realise that it is not difficult... the minute I start teaching the grade 9s, it’s what it is in the syllabus, they are supposed to do that. It means they were not doing that. Hence when they go to these higher classes you will see that learners don’t have the knowledge, they don’t have the skills, they don’t have the basic, the foundations.”

In terms of her frequency of maths assessment, Jill says that she initially gave learners tests monthly, class and homework daily; assignments were done monthly and investigations possibly once a year. However, she claims that currently, while other assessments have remain unchanged in frequency, she has started giving investigations once per term. The maths mentor confirms this.
The picture of Jill’s frequency of science assessment strategies is somewhat different from that of maths: initially, she claims she would give science learners tests, projects, assignments and practical assessments monthly, class and homework weekly; and investigations possibly once a term. It is worth remembering that Jill started teaching with the TMP support so at no stage did she do zero science projects or investigations, which is the case with the other teachers. However, she claims that now she has had almost three years of TMP’s input, while her testing frequency is unchanged, she has started giving classwork and homework daily, projects, assignments, practicals and investigations weekly. The science mentor confirms most of this reporting but says that projects are only done annually, investigations once per term and practicals monthly. Jean explains the differences in perception as before: the mentor only considers the assessments that are done for the portfolio, while the teacher, now having mastered several new skills, may apply them in a small way during many lessons, and includes these in her “frequency count”. However, Jean acknowledges that Jill (with TMP help) puts into practice all the requirements for a level 4 teacher’ practice on Rogan and Grayson’s (2006, 41) Profile of Implementation.

From Jill’s files it is clear that she uses TMP material in addition to her own and others set by colleagues. Her own tests appear to be balanced and of a fine standard. The Grade 10 portfolio has 2 tests, an exam, 2 investigations (chemistry and physics) and a project. There were other assessments done, but these are the ones used for portfolio. Grade 11 science had 4 practicals and 3 tests, but no project / investigation while Grade 11 maths had 6 tests, a group work assignment, 2 worksheets, a journal entry and an open assignment (translation).

Jill takes great care to explain to learners how final marking is done, in an effort to get them to give full answers: “Normally when you explain to them, especially when you just preparing for the examination, you rather tell the learners that when we mark, we mark according to steps. Let’s say you made the mistake, we don’t care about the answer, we just look at the steps, if you make a mistake here, then it means you are going to lose so many marks. But then if you write your steps correctly and you only lose them, you will only write the wrong answer. Then it means you are only going to lose one for the answer. But for the whole six you are going to get the full marks.
Unlike jumping into getting the answer, it is totally wrong. Normally that’s how I do it…”. She claims this information to them on marking strategies has resulted in much-improved exam scripts.

Joe

Joe describes his difficulties with understanding what assessment strategies were required in the new methodology: “OBE ‘Outcome Based Education’: the term itself to me it was a Latin, it was a Latin really … I was never sure whether what I am doing right now is the correct thing. It was difficult. And the concepts there: like for instance if you take these SO’s it took me long to understand; it was difficult really, it was difficult. And assessment criteria: another Latin word. To me it was difficult …, very much difficult, but I had to apply this. I had to follow this OBE. No one in this school was able to say: This is how OBE works. I remember one day a facilitator came here then we asked her some questions… And it was difficult to get the answer.”

Joe’s comment on his typical assessment strategies prior to TMP, even with OBE policy requirements, was: “there it was just the usual assessments; usually we used to use the tests and examinations in the past. By the way during the influence of even OBE, ja during OBE, (only) tests, examinations, projects.”

He notes that currently he uses a greater variety and frequency of assessing: “we’ve got the cycle tests right now and we’ve got assignments … the projects… and I think the pace has increased. You find that in a month, I can give a test, an assignment and also a short investigation … and then I’m able to do that… it is interesting.”

Discussing the standard of his assessments: “For the standard I think I’m satisfied about that because er, mentors … assignments, investigations, they are of high standards … At the end I could see it has an impact on the learners, even to me as a teacher.” Joe says he also sometimes sets his own assignments and assessments for the learners, and asked about the standard says: “I compare with that one of mentors to be on the same par, if it is slow, I could see this one is not the right one.. I want to match the standard, always I put to that one of mentors next to me.” However, his
assessment tasks tend to be either those supplied by TMP or from other staff in the department. Joe ensures that the number of assessments is more than that required by DoE, then he selects those he will use.

Joe’s mentor states that prior to TMP Joe’s assessments were not of a high quality but the standard and balance of his exam papers has improved a lot: this confirms Joe’s perception of his competence change in this regard where he allocates himself an “improved somewhat” rating. Jean says the TMP-supplied portfolio assessments are well received.

Joe claims that prior to TMP he gave learners class- and homework weekly and tests monthly. The frequency of the assignments and investigations are currently monthly while all others are now conducted weekly. Jean is not fully in accord with these claims: she agrees with the homework and assignments but says that Joe gives tests only per term, investigations twice a year and practicals as assessments monthly. However, she also says Joe gives classwork daily. Jean uses the same reasoning to explain the differences in perception of frequencies that she used for Jill. However, Jean acknowledges that Joe (with TMP help) puts into practice all the requirements for a level 4 teacher’ practice on Rogan and Grayson’s (2006, 41) Profile of Implementation.

*General mentor comment*

A mentor comments that the main contributing factors to assisting teachers as far as assessments are concerned are to provide resources (assessment material) of high quality from which the teachers can work and identify what is required of excellent assessment tasks and then to undertake regular moderation of the teachers’ own instruments (tests, tasks). It was found that teachers at these schools never moderated each others’ papers and neither did the HODs, who did not have the required skill competences for such a task.

Although the DoE supplies documents informing schools of the new requirements in terms of CASS, teachers find it very difficult to interpret and understand these
documents; the mentors informed themselves fully of such requirements and were therefore able to take teachers through these documents so they started each year with confidence, knowing what was required of them in this regard.

Jean explains how the mentors also endeavour to show teachers how to use analysis of assessments to guide them in their teaching practice: for example, teachers should use the portfolio-directed and examination mark allocations to identify for their learners “what is expected of them” and how much time will be allocated to each section.

Teachers also often struggle to differentiate between easy and difficult questions: in many cases a relatively difficult question will be thought easy as the teacher completes it quickly but is unaware that his/her method is wrong. The mentors on numerous occasions had to assist teachers to identify these problems, having observed them making the mistakes in class (as they had probably been doing for several years) and subsequently needing to help the teacher master the relevant content.

At the end of grade 9 learners are required to write national CTA assessments. The teachers were, in general, found to experience great difficulty with these tasks: in terms of managing the instruments and the testing process with the learners, as well as the questions themselves. Jean explains that the mentors must spend considerable time discussing the CTA documents with the teachers both helping them to plan the implementation and administration of the process and assisting them to master many of the questions themselves. She clarifies that questions which teachers see separately during the year as easy, “as soon as they are contextualised they see it as difficult (as they) do not recognise it.” Many of the teachers also do not understand the relevance of some of the questions as the context is not necessarily appropriate for all teachers’ lives: for example, they may not understand the concept of “alien trees” and even some of the indigenous knowledge may be understood by certain groups of teachers but is not accessible to all. However, once the mentors have assisted the teachers to understand the CTAs their confidence is increased and they enjoy the implementation process with the learners.
Synthesis: Assessment

- Betty, prior to TMP, had no range of assessments despite the fact that such was required for her OBE learners. She used only tests and exams, and these were not of good standard or balanced. She could not design assessment rubrics nor understand how to use those supplied to her. She now uses a variety of assessment techniques (as supplied by TMP) and assesses the learners more frequently than before, as confirmed by the mentor. She claims that she now understands how to use rubrics and can construct her own, attributing this progress to the mentor’s support, and says that her competence has improved in terms of setting an assessment task of correct balance and standard, with which the mentor agrees.

- Jane used only formal tests prior to TMP but now uses a range of assessment items, assesses frequently and finds many of them very interesting. She attributes her change in strategies and attitude to TMP: the investigation workshop, help in use of rubrics (which she was unable to use before) and general mentor support. Prior to TMP she took no care over the standard of her tests but now designs her own instruments which she regularly requests the mentor moderate for her. Her self-assessment of competence in terms of setting an assessment task of correct balance and standard, indicates that she believes it has improved significantly; the mentor agrees in terms of improvement but not in terms of degree, saying she has “improved somewhat”.

- Jill also only used tests in her maths assessment before TMP and on no occasion did she have them moderated. Her current assessment strategy also involves assignments, group work, investigations and research projects. She credits TMP with providing good resource material (tasks, investigations, assignments) of a high standard and she believes that through this and the mentors’ moderation of her own material she has been made aware of the learners’ capabilities, which she feels she has always underestimated and hence not taught to the correct level. She now has increased expectations of her learners. She currently informs learners of the marking strategies which has improved the standard of answers on their scripts.
Prior to TMP, despite OBE requirements, Joe only used tests, exams and projects (he was the only teacher to have done projects, however). His assessment practices currently include the above and also assignments and investigations and he assesses more frequently than before, commenting on the pace of assessment and yet proclaiming: “… I’m able to do that... it is interesting.” He says the standard of his own assessment tasks has improved (confirmed by the mentor) and attributes this to constant comparison of his tasks with the mentor-supplied tasks which he deems to be of very high standard.

The mentors comment on support that is required for teachers: supply high quality resources (instruments) to teachers to act as exemplars; moderate teachers’ instruments regularly; help teachers work through DoE documents (e.g. National Curriculum Statements, CTAs) and assist them in their preparation to implement the recommendations; help teachers analyse mark allocations and use them to guide time spent per section and inform learners of what is expected of them; and finally undertake classroom observations during assessment review sessions to become aware of where teachers make mistakes.

e  Use of resource material

Introduction

The situation at all of the TMP schools with written material (textbooks, notes etc) for the learners was shocking when the project was initiated at the schools: if there were any textbooks at all, there were only sufficient for sharing in groups of four or more, and copied notes were not (or seldom) supplied to the learners. Betty’s comment in this regard summarises the situation at all the schools: Betty said the learners did not receive photocopied notes “facilities was a problem, we didn’t have enough photo stat machines”. At other times, schools had copy machines but there was not enough money to purchase paper. However, in some cases (like Jill) the teachers did not supply notes to the learners because “maybe we were stereotyped or something… it didn’t enter into our heads.”
The TMP belief was that whilst supporting the teachers it was vital that the learners receive material that they could use as a resource, or the staff would face unmotivated children who could not put into practice all they were learning. In many cases it is also clear that class activities are facilitated by the TMP-supplied instruments.

The intention was also to demonstrate to the teachers how additional resources could be sought to access a variety of task ideas or compile instruments which would motivate both teachers and learners. However, it was our observation (as that of Taylor and Vinjevold, 1999, 178) that few teachers design their own learning materials: in fact few are able to successfully undertake this complex, time-consuming task requiring insight, skill and a good command of the language of instruction. However all are grateful for excellent provided instruments and motivated teachers may apply these instruments in their classes very effectively.

A programme of supplying workbooks to every learner was abandoned after the second year because the learners invariably did not bring the books to class (forgotten, stolen or often sold and the teachers did not follow-up); a system was then put in place whereby the mentors designed their own TMP material and had sufficient copies made to supply one to every child. The piles of notes were given to the teachers who were required to give them to the children at the appropriate time and ensure that they were pasted in the learners’ books and the work completed.

Additional textbooks were also supplied to the teachers, who were shown how to use them as resources and all of the TMP teachers in this research study used everything the mentors gave them, even though it meant extra effort. This was not the case across the schools: several other TMP teachers seldom used the material supplied, through laziness or old bad habit, and in this way the learners at their schools had no access to resources at all.

During the implementation of the TMP, dictionaries were compiled for the learners, to assist them in understanding their maths and science text: they are taught in English which is not their first language. Every maths and science teacher at the TMP schools received sufficient dictionaries for each learner in their classes to receive one in class;
the teachers were given strategies for their usage and encouraged to ensure that the learners received access to the dictionaries.

Rogan (2006, 41) describes a level 1 teacher as one who “Provides adequate notes. Uses textbooks effectively” while in a level 2 teacher’s class “Textbooks are used along with other resources” and learners “Use additional (to textbook) sources of information in compiling notes”. It is difficult to categorise teachers using such a profile as reference when they are situated in schools that do not have sufficient resources to allocate textbooks or printed material to all learners, but a motivated teacher will maximise the potential of what resources s/he can find and it is from this basis that the TMP teachers in this case study will be allocated levels on the profile of implementation.

**General finding**

Three of the four teachers supplied no notes to learners (putting them below level 1 on the Profile) prior to TMP, for a variety of reasons, but made learners copy from the board; one teacher in fact did so but did not use other school resources.

All teachers now value the resources (notes and dictionaries) supplied by TMP for the learners who also derive benefit from them and some teachers source other notes from elsewhere for the learners. It is clear that the resources supplied by TMP facilitate most classroom activities. The teachers also derive benefit from the extra textbooks that TMP supplies them and now are motivated such that they purchase their own additional material to use as resources. All teachers can now be considered to be level 2 on the (Rogan, 2006, 41) Profile of Implementation.

The mentors claim that a vital role in such a project is to compile excellent material that is stimulating and motivational for teachers and learners and most importantly to assist teachers in using all the resource material available to them: teachers frequently do not understand the material, cannot use it and it therefore cannot facilitate their transition from the old dispensation to the new methodologies. This view is supported by Taylor and Vinjevold (1999, 183).
Evidence: the voices

Betty
When asked about her provision of written material to learners before TMP came to support the school, Betty explains that notes were not available so she had the time-consuming task of writing notes up: “I used to write them on the chalkboard, if there are some notes I must give them, because there’s no.. textbooks were not so enough, there were not so much, so I used to write some notes on the chalkboard, but it will be an unfinished business, as I said (laughs), learners are so slow.”

Asked if these were her own notes, she responded: “Ja, sometimes I must design my, my own notes and then, and then write them on the chalkboard for the learners.” Betty was asked if she enjoyed the task of designing her own notes and replied “I don’t enjoy it …, it was strenuous … it was straining me.” Prior to TMP, Betty may be considered to be below level 1 on Rogan and Grayson’s (2006, 41) Profile of Implementation.

However, Betty comments: “… the mentors supplied us with good materials. They are supplying us with almost everything. Their materials is 100% perfect, it’s good and then its helping the learners very well, learners are doing okay with their material. Even we the teachers, things that they are giving us, the material that they are giving us, it helps us a lot. … I have their materials from the first year, second year and even now, I still have.” Asked if she is now better able to construct her own material, Betty responds: “yes in some sections I can.”

During the classroom observations Betty used the worksheets with her learners effectively, but a cursory glance through many of the learners’ books showed that not all of them had pasted their previous notes in; this had been left un-addressed by Betty, and the risk is therefore that the learners may lose these resources. However, it may be that these learners filed their notes elsewhere.

Elise related how Betty had, subsequent to TMP arrival, decided to buy her own reference books which contained worksheets, which she uses frequently in her lesson
plans. She explains that Betty did this because she “saw the need for something to help herself with”. According to Elise, Betty also uses TMP resources as she saw that they helped the learners. Betty can be considered as having improved to a level 2 teacher on Rogan and Grayson’s (2006, 41) profile.

Jane

Jane explains her approach to not supplying resources to the learners prior to TMP: “I didn’t give them notes... I just write it on the board, I felt they were not necessary, … what I understood was that they have to know how to solve this problem, so I depended more that these are the steps that they had to follow, so I didn’t see it necessary for them to have notes, so I didn’t give them any notes at all.”

Referring to the resource material supplied by TMP, Jane says: “I’m very happy, I’m very happy with the resource materials to say they do offer us books, they do offer us worksheets to say after you have done a section these are the exercise that your learners can do, so they are helping us a lot to say, I’m very happy about them because you would have different books, you wouldn’t use maybe the one that you had, and through their motivation, I for one before, I never thought of buying a book for myself, to say I could use. Now ... you ask them, if I use this book, how about using it, they would advise you to say go buy it, use it for your own references. And the references that they are bringing for us are quite good and they are quite excellent, so I’m happy about them.” Jane has now also purchased tapes to help her in preparation, which she uses in conjunction with the extra textbooks supplied by TMP.

For the learners, Jane places great value on the dictionaries “especially these new words for the grade 9s, so I use them, or I give them to say they should look for meaning and look at those meanings, explain them, do they understand them, especially for the new things that we starting …” and the notes supplied by TMP: “I think learners are not supposed to know maybe what you teach them only, … because if you read you gain more knowledge … So if learners have got notes, they have books, they are able to see ... because books and notes do have some alternatives that we don’t teach them.” Jane is particularly happy with the summary worksheets supplied by TMP and believes this is an excellent strategy, saying this is a strategy
that she will sustain. “…I think the summary worksheets that she is bringing in to say, once you have finished the topic there should be some extra work that you need to give to these learners to do. And making sure that those worksheets are in their books, they are pasted there and you check them that they are in their books, I think that I would sustain.”

Jane observes that some of the learners take particular responsibility with these TMP notes: “… there are those learners that have got their worksheets from the first worksheet that you gave them until the last one that you gave them yesterday, pasted in their books, in correct order and they do write them, some of them fold them if they are not photocopied on the back side and write then that this is for transformation. So there are those learners that do, even if there are those that are still and are not still on board.” Observation showed that the learners had indeed been given the notes and these were generally completed and pasted in the books.

In terms of Rogan and Grayson’s (2006, 41) Profile of implementation, Jane may be considered to have been below level 1 prior to TMP and to have improved to a level 2 teacher subsequent to the programme’s support.

**Jill**

Jill has always used textbooks to prepare for her lessons and has no access to any other resources. Describing how she used textbooks in her classes, she narrates: “… normally what we used to do, in most of the cases you used to write the definitions maybe on the board, you write and you end up having wasted a lot of time on a particular section because you were supposed to write on the board. The idea of saying let me just write on the paper, give them for photocopying, we were not doing that in most of the cases.” Asked why not, she explained: “I don’t know maybe we were stereotyped or something… it didn’t enter into our heads, it didn’t”. Then “… the children would copy the notes and then you will spend most of the time children copying the notes.”

Describing her current use of textbooks in the classes, Jill says: “… normally I try to explain, I don’t want them to look exactly into the textbook because they concentrate
a lot on the textbook… They don’t listen to what you are saying, and at the end of the
day you will find out, the learner is reading but he does not understand exactly what
he deserves.” She tries to supply supplementary notes as follows: “… maybe in a
chapter you make a summary for the whole chapter, you make copies, when you treat
that particular section, you know that they are having the task, and the assessments on
the activities for that particular chapter, and then it becomes a lot more easy.”

She places great value on the dictionaries and provides opportunity for the learners to
look up the meanings (in their own languages) of words they do not know. She also
comments: “… very good resource material especially for grade 10s.”

Perusing the learners’ books during a lesson observation, it was seen that most of the
learners in her grade 11 maths and grade 10 science classes had pasted and completed
their many TMP notes and also notes which Jill had obtained from the mentor school
on her one-day visit there, facilitated as part of the TMP support programme. The
maths, science and life science departments at Jill’s school have made it compulsory
for all learners to bring a ream of paper per year to facilitate the extensive copying
required.

Jill’s mentor says that as Jill started teaching science with immediate TMP support,
she has always used resources and showed an eagerness to use all that was available:
including the extra TMP-supplied textbooks and other resources, as she “was always
preparing”. In terms of Rogan and Grayson’s (2006, 41) Profile of implementation,
Jill may be considered to have been on level 1 prior to TMP but to have improved to a
level 2 teacher subsequent to the programme’s support.

Joe
Joe describes how, prior to TMP, he tended to use the textbook as his resource for the
learners: “I just refer them to a particular page and then I would start to … the topic,
the heading there and then usually whilst I am explaining … I gave the kids some
questions, maybe what does this word mean, and sometimes I referred them to other
resources like just try to go to the library then use these books there…” If there were
not sufficient textbooks the learners would share between them.
Joe explains how he ultimately supplemented the textbook with notes as he had originally been getting learners to copy from the board: “Usually I give notes before I take on a topic. ... And then try to read those notes to them that’s the different ways of supplementing.” This was not a strategy that he had always used, but he adopted this methodology later in his teaching: “But not something that is happening now and then; after a long period then I decided to give them notes because we used to write on the chalk-board; writing on the board is not easy ... I compiled some notes and there thereafter I had to write them on the chalkboard it was difficult.” In terms of Rogan and Grayson’s (2006, 41) Profile of implementation, Joe may be considered to have been on level 1 prior to TMP.

Joe’s current practice in using resources is similar to what it was: he uses textbooks (where the learners have them) and made particular reference to now using dictionaries that TMP had supplied to the learners.

He claims “it’s important to give learners some notes … because that serves as a reference. But you know … sometimes having no paper, that’s a problem.”

Discussing the notes that TMP supplied the learners, he says “it is easy when you’ve got copies, hand outs and you give to the learners to stick them... they are very much important, the learners are using them very well.” Joe describes his attitude to the notes from TMP and how the mentor helped him with them: “we could learn out of that, we could read them, and we would analyse them together … and where there’s a problem she’s there to guide you, how to go about this ... they are well planned, arranged, organised, you don’t have that burden to say I’m still going to sit down to design mine because you are still a toddler…”. However, Joe says he (and all teachers) focus on portfolios (as they come from DoE); some teachers say the TMP notes/consolidation sheets provide “too much work” and take too much time: “this is good … but no time … shelve it and use later”.

Looking through Joe’s learner books, two activities had been pasted in grade 9 books; some learners had use of the dictionary evident at the back of their books, under the heading “meaning”.
Joe’s mentor describes Joe as not having used his available resources prior to TMP: his school had apparatus and books but they were not being used. She believes that Joe did not use the textbooks available at that time because “there were many activities in them not done the way they were used to and therefore he did not understand”: she explains that many of the OBE books published at that time “went overboard” in their attempt to implement the new methodology and thus the current teachers found it very difficult to understand them and make the transition to the new methodology. However, now Joe uses all available resources and is “trying to find more”.

General mentor comment

Jean suggests that one of the aspects of mentoring which most contributed to supporting teachers in this regard was the organisational side: the mentors purchased extra textbooks for the teachers and regularly downloaded background or supplementary information from the internet, while they also provided teachers with activities for their learners that were well compiled. However, more important than simply supplying the material to the teachers, they were shown “how to work with it.”

Synthesis: Use of resource material

- Betty supplied few notes to learners prior to TMP and resorted to their copying off the board; there were not sufficient textbooks for all learners. She says that TMP-supplied material is excellent: learners enjoy using it as do teachers. Betty has organised her material from TMP such that it is available for subsequent years; she uses the worksheets effectively in class although some of the learners did not have them pasted in their books. Mentor Elise says Betty was so motivated that she purchased her own textbooks and uses them in lesson preparation. She can be considered as having improved to a level 2 teacher from below level 1 on Rogan and Grayson’s (2006, 41) Profile of Implementation.
• Jane “didn’t see it necessary for them to have notes” prior to TMP as the learners were simply required to follow the steps in maths. However she is currently extremely happy with the notes supplied by TMP to the learners and teachers and the textbooks supplied to teachers; referring to the mentors, Jane says that “through their motivation” she has become motivated to the extent that she has purchased her own mathematical tapes which she uses to construct instruments. Jane now values the use of the learner resources: worksheets / tasks and dictionaries and explains how she and the learners use them. Jane can also be considered as having improved to a level 2 teacher from below level 1.

• Jill always used textbooks to prepare lessons but would also make learners write notes from her backboard notes as “it didn’t enter into our heads” to supply notes to the learners and save time. Jill now uses textbooks with her learners but supplements them with other material. She values the dictionaries as well as the TMP instruments supplied for learners; she now also sources instruments elsewhere that she copies for her learners. Jill was a level 1 teacher prior to TMP and may have improved to a level 2 with TMP support.

• Prior to TMP, Joe used textbooks and notes with his learners in class and his current practice is not dissimilar. However, he particularly values the TMP dictionaries. He recognises the quality of the TMP notes and the guidance from the mentor in working through them with him. The mentor highlights the fact that Joe’s school had resources (OBE textbooks) prior to TMP but Joe did not use them because he did not understand them and needed support in using them to implement the new methodology.

• The mentor claims that many of the resources, if supplied to the schools (e.g. new OBE textbooks) were not understood or able to be used by the practicing teachers and hence did not facilitate their transition to the new methodology. The most important aspect of the mentors’ role insofar as resources are concerned is to supply excellent resources to the school to supplement what they have and particularly to help the teachers in working with the material.
5.3.2 Personal development of teachers

In this section some personal aspects of the teachers will be considered, both in light of how these personal attributes contributed to their successful professional development with TMP support in light of “the influence of teachers’ pre-existing beliefs and attitudes on their propensity to change” (Mcnamara et al, 34) and also in terms of any change in these personal characteristics that were precipitated by their association with the mentors and the programme.

a Self-discovery and attitude to professional self-development

*General Finding*

All the teachers in this study were, from the start, open to professional self-development and embraced the changes and challenges offered by TMP, making them excellent students of the programme and subsequently skilled teachers, knowledgeable in their learning area.

All teachers grew in self-confidence, for which they credit the programme, and made discoveries about themselves such as being “a positive, confident person who can achieve what she wants”, or finding that they possess the ability to face challenges, achieve success and grow professionally from them, or feeling confident enough now to practice her skills in a new environment: “I can go to other school and then I can teach maths freely”. The mentors did not use as a strategy a “deficit approach to curriculum change” (Rogan et al, 2003, 1176): that of identifying weaknesses and remediating them, but rather built on teachers’ strengths.

Three of the teachers had always desired to further their qualifications but before TMP input few of them had succeeded in this or even had the initiative or resolve to attempt it. However, in every case their openness to change and the commitment required by TMP resulted in their embracing the professional self-development offered by the programme and as a result they evinced improvement in most aspects of their teaching practice. Simultaneously, this successful exposure allowed them to grow in confidence, motivation and belief in themselves and as a result some
embarked on study ventures part-way through the programme (one teacher credits the mentor’s support for his passing) whilst others bought additional resource material to become self-reliant and better their practice.

*Evidence: The Voices*

**Betty**

Asked if there was anything that she found out about herself during the course of her involvement with TMP, Betty explains how her association with the programme has increased her confidence to the extent that she would now feel confident and positive to teach anywhere else; her self judgement is expressed as: “… they’ve taught me so many things, they’ve developed me very well…. I can say, I am 100% okay, I’m not afraid of it! I can go to other school and then I can teach maths freely…. They’ve developed me a lot.”

Betty’s attitude to the concept of professional self-development was always positive and she desired to learn more in her subject to improve her teaching but felt powerless and subsequently did nothing to address this issue: “I wanted to be developed, especially when seeing the learners failing so much, I thought the problems lies with me, I didn’t think the problem was with the learners, I thought, maybe there was something that I’m not doing correct, but I didn’t do anything about it, that was it…” She felt her main needs to be “content and maybe, changing the way I… address the class.”

Elise related that after TMP started at the school and supplied extra textbooks to the teachers, Betty became very motivated and of her own accord purchased extra books to use as further resources: she used them frequently. She also demonstrated that she was very thirsty for all the help Elise could give her. Betty still feels the same way: “I wish to develop myself, I want to register and do some courses” and is considering studying maths through UNISA.

Thus Betty demonstrates the attributes of a person who wishes to develop herself professionally and is open to change; this openness has contributed to her having
embraced the changes offered to her by TMP which has simultaneously motivated and enabled her to become self-reliant in her further professional development.

Jane
In response to the question: “Was there anything that you found out about yourself during the course of your involvement with this programme, TMP?”, Jane said that she found out that she is a positive, confident person who can achieve what she wants: “I found out that I’m a very good teacher, confident and it opened my eyes to say: sometimes … if you don’t have something, go out there, look for it, do it, so. And that ja, I think very positive, then I found out that I am very positive, so it helped me a lot.”

Jane wanted to leave the teaching profession in 2000 or 2001: “I registered for maths with UNISA, and statistics, so I felt I need to quit and go and work at ... being a statistician or something else, but now I realise that I needed to stay here.”

She takes pride in professional self development and says of having a mentor: “I think that a teacher would have professional pride to say you have someone who is mentoring you and helping you to be developed actually. So I think it goes with the profession … ja, with the pride.” Thus Jane has undergone a very meaningful professional change: from desiring to leave the industry to experiencing restored pride in teaching as a career.

Elise, Jane’s mentor, says Jane is ambitious and used everything TMP offered her, using the programme as a tool or stepping stone to her further progress in her industry. As with Betty, Jane’s willingness to explore change made her open to what TMP could offer her and this exposure allowed her to grow in confidence and belief in herself, affording her the opportunity in future to further her career.

Jill
As with the other teachers, Jill also gained a lot of self-confidence from the programme: “I think it built my self confidence because just imagine you go to class, not being sure what to tell the learners! But then if you know exactly, with the help of
the mentors, then it’s easy for you to go to class and tell those learners that: ‘no, this one is being done like this, this one I’m going to do it like this’, then it becomes very easy, it builds our, I think it built my self confidence.”

Jill has a very positive attitude to the changes in education, as indicated by her observation on other teachers who are against the changes brought about in teaching by the DoE: “… sometimes you feel a little bit frustrated and say ‘am I going to cope with this particular … or the changes?’ But there are times where you just tell yourself, ‘changes are everywhere’. Normally what makes maybe this particular NCS not to work, you find that in a school you are having too many people who are negative. They will say this particular syllabus won’t be implemented, it won’t be possible. But then if you take this thing with a positive perspective, I think everything would work well …Especially the ones who have worked for such a long time: they said this thing is time wasting, we used to work like that, but then I will say to them there is change in everything.” Jill’s experiences of the changes in education are different from those of many other teachers however, as she has only been teaching for four years, of which three were with TMP support. This supports the comment by Aldous (2004, 72) that change is more difficult for teachers with a longer history of teaching in the old curriculum due to their “long entrenchment in habit”.

Jill’s approach is to analyse situations, identify problems and attempt to bring about change and address them. For example, she describes how she feels she may need to change and seek further professional development in order to deal with a current problem class and learners: “sometimes I need to… I feel that I need maybe to change my style of teaching, like the class that I’m complaining about, the grade 11B, sometimes I just say to myself, is it me or is it the learners, but then it’s the only class.”

Joe

Joe was asked the question: “Was there anything that you found out about yourself during the course of your involvement with this programme, TMP?” In his response, Joe describes himself as a person who did not do things unless he had complete mastery of them: “I’m one person … if I want to do a thing, I go all out and if I’m not
prepared to do that thing I have to postpone it so that I can; I believe in quality, it’s either I do a thing or I don’t do a thing.”

He then relates how, through the programme, he has learned that he actually has the ability to face challenges, achieve success and grow professionally from them: “You know ... somebody (mentor) has told me … you can do it, although you cannot judge yourself because you are learning, you are still a student, as long as you are still alive, you are a student, but … that I can, I should do it. Ja ... there is change, there’s a change; and a change in the sense that you are able to turn your problems to your advantage, you make them ..., you utilise them in such a way that you benefit out of that. In the past whenever you see a problem ..(unclear) a problem, but now to me I’ve realised teaching is a challenge, it’s your challenge and that needs someone to be focussed all the time. Try your best to be focused... and then face it, you will make it.”

Joe describes how he wanted to extend his qualification from a 2-year diploma but was always too busy with school work. He explains: “I tried … to improve myself but along the way I failed, I didn’t achieve…” but goes on to describe how TMP’s support motivated him again and “fortunately … your first year here, when you arrived I registered.” Joe registered to study an ACE degree at UNISA in 2004 and has passed every year of this study. He attributes much of this to support he received from TMP; he started to believe in himself and got the courage to study further: “you know (mentor) is supportive, you know she would say ‘(Joe) you will make it’ … at the end I managed to pass … but it is because … your (TMP) presence truly speaking and I told (mentor) that you make me a better person and I feel I’m important right now, truly speaking …”

Thus Joe has always had a positive attitude to professional self-development and change but had not managed it on his own; again this positive attitude contributed to his embracing the programme and all the help it could offer him, increasing his confidence and motivation and enabling him to develop himself further. Jean explains that Joe originally did not have enough background in science to study a further
science degree but he is now contemplating extra science courses, since he has improved his baseline with TMP support.

**Synthesis: Self-discovery and self-development**

- Betty’s association with TMP increased her confidence to the extent that she now has belief in her abilities to offer her services as a maths teacher to any school. She has always been positive about self-development and desired to improve her professional skills but never done so. This openness to change has contributed to her having embraced the changes offered to her by TMP, motivated her and increased her confidence such that she purchased more resources for her self-betterment and now she wishes to study further.

- Jane found out that she is a positive, confident person and a good teacher who can achieve what she wants. Jane is ambitious, takes pride in self-development and used TMP as a stepping stone in her growth. As with Betty, her willingness to explore change made her open to what TMP could offer her and this exposure allowed her to grow in confidence and belief in herself, affording her the opportunity in future to further her career.

- Jill has a positive attitude to change: “take this thing with a positive perspective” and this attitude spilled over into her dealings with TMP, allowing her to grow professionally and “… it built my self confidence.”

- Joe learned through the programme that he has the ability to face challenges, achieve success and grow professionally from them. He has a positive attitude to professional self-development and change but had not achieved success with further studies on his own. However this positive attitude contributed to his embracing the programme and all the help it could offer him, contributing to increased self-confidence, belief in himself and his abilities and motivation to develop himself further; he registered for extra courses early in his involvement with TMP and has passed all of them. He gives credit to TMP support for his passing and says having TMP support makes him “feel I’m important right now”.

213
b Pedagogic identity

Introduction

Research undertaken by Naidoo and Parker (2005) revealed that maths and science teachers’ personal pedagogic identities tend to reflect absolutist (utilitarian or purist) philosophies while official pedagogic identities are based on fallibilist (social-constructivist) philosophy as “constructed by curriculum policy and by the CTA” (Naidoo and Parker, 2005, 53). Thus, for example, the goals of education would be different: to “transmit body of mathematical knowledge” (purist teachers) or for “critical awareness and democratic citizenship” (required fallibilist approach) (Naidoo and Parker, 2005, 56).

The introduction of Curriculum 2005 therefore required teachers to adopt a pedagogic identity in line with their teaching of maths or science as contextualised, not immutable, and having social impact. Thus teachers need to develop “an understanding of the relationship between education and the context in which knowledge and understanding are created and shared” (Taylor et al, 1999, 133) and view these subjects as having epistemological as well as social and political context (Naidoo and Parker, 2005, 53). However this philosophy is in contrast to most teachers’ existing purist view of the teaching of these subjects as “a system of algorithm transmitted by teachers to be committed to memory by their students” (Rossouw et al, cited by Taylor et al, 1999, 321) and the methodology too is in contrast to that of fundamental pedagogics, a teaching doctrine promoted broadly to student-teachers in the apartheid era which “justified authoritarian practices” (Enslin, cited by Taylor et al, 1999, 133).

Have maths and science teachers’ personal pedagogic identities changed to become more in line with official pedagogic identities? Has mentoring assisted teachers to shift their identity from pure subject-centred ideology (basing their teaching on pure, mathematical or scientific knowledge) to identities as agents for social change? Have teachers changed their beliefs on the nature of mathematics and science and hence their teaching strategy? This would necessitate a shift from purely rigorous teaching
of these subjects to teaching them for fun and an understanding of their world as well as understanding and applying the concepts. This section has overlap with previous discussion on group work, projects and investigations and learner-centredness and for the sake of brevity these aspects will not be expounded at length in the present discussion.

**General finding**

Teachers have generally not previously thought about a philosophy of teaching and cannot articulate their personal beliefs. When asked about these, they tend to refer to never missing class, always doing their planning or other similar functional aspects of their career.

However, their ideologies before TMP and subsequent to its implementation became apparent during the interviews: generally they were initially distinctly purist in their teaching of their subjects as knowledge to be transferred. Even though two of the teachers held firm beliefs about their subject’s relevance to the world of the learners, the learners were not exposed to their teachers’ thoughts in this vein either through their verbal communication or their teaching instruments. One teacher’s focus on maths and science is primarily towards their roles in learners’ careers and this has not changed with TMP intervention.

Subsequent to TMP, most of the teachers became more social constructivist in all of their dealings with the learners. This appears to have its core in the TMP–supplied learning materials which were based on OBE principles and gave the teachers confidence, while mentors helped them to understood what the OBE principles and strategies meant and represented. As a result the teachers embraced the theory and principles of OBE more readily and became conduits of these principles to the learners.

The mentors tried to make their learning areas real, applied and relevant to the lives of the teachers and the learners. They believe that many of the teachers, with TMP
support, become aware of the relevance of their own subject for the first time due to lack of previous exposure. TMP teachers have therefore been exposed to this new ideology and philosophy whilst receiving material and emotional support to facilitate their slow transition during their reconceptualisation of their subject.

*Evidence: the voices*

**Betty**

Betty believes that “… our every life … works with maths, … they must know maths so that they can be able to work with money and so on … So everything is math, everything is math, if you sit in a house, its maths, maths, you must know how to budget and so on …”.

Betty says that she has always held this belief seeing maths as a very important subject for life, but before TMP she taught only pure maths: “I used to tell them little about it … ja little. …Before TMP, I told them little.” Her belief about teaching in those days was to impart pure maths knowledge to the learners, indicating a purist approach in class: “… the most important part was to teach them so they must know what I’m teaching them… knowledge was very important to me.”

However Betty now enjoys the new methodology in which learners obtain exposure to the subject in life-context and she regularly brings mention of this into her classes, exhibiting social constructivist tendencies by for example exhorting them to compare prices of meals at restaurants and “I told them get MTN and compare with Cell C and they must choose the best option as they the scholars which one are they going to use and I told them we have contracts and pay as you go, so they must choose the best one for scholars. So they are enjoying it.” Betty says that the learners really enjoy projects and long-term investigations “too much, they enjoy it too much… before (TMP) I didn’t know about projects.” It appears that Betty, whilst herself holding fallibilist beliefs, did not evidence these in her teaching, possibly because she did not know how to do so, but became more confident in this vein after receiving the OBE-focussed TMP resource material.
In terms of the new methodology and learner-centredness, Betty has demonstrated a shift from autocratic, teacher-centred classes prior to TMP which were essentially “chalk-and-talk” to reflect a more fallibilist approach using increased learner questioning and asking “thought-provoking questions” (see Learner-centredness, section 5.3.1c).

Betty therefore seems to have accepted the shift to the new ideology in terms of her maths teaching, enjoys it and makes it accessible to all her learners. My class observations confirmed that Betty frequently observes how relevant this section is to their lives; related it to their present and future needs and asked them if they understood the relevance. She also emphasises the need to achieve well in maths for future careers: “they will be able to be CA’s and so on, so maths is needed everywhere in fact, engineers they need maths…”

Jane

Jane explains that she initially saw maths as a stand-alone subject to be learned and passed and points to her absolutist philosophy saying: “that time I thought the most important thing was for a teacher to impart knowledge to other kids, that was the most important thing that I realised then” rather than having relevance in society. Thus Jane’s belief about teaching maths previously was: “Basically I thought its maths, what they have to know is what you are teaching them and because I didn’t link it to something real I felt that it’s maths they have to pass it, then go to tertiary. I think it’s because I didn’t link it with anything in real life, so I think that’s how I saw it before… teach these kids, give them the content for mathematics.”

Her attitude has now changed, as indicated by her new standpoint: “I normally say to these learners that they don’t have to take maths as maths being done in the classroom, they have to apply it even at home to say maths is not about maths in ma’am (Jane’s) class only, we living maths, we eating maths, whatever you do it’s maths and I normally to them do they realise that maths is a gateway subject to them, to say if you have maths, then you won’t have any problems.” At no stage was Jane required to teach OBE methodology before TMP was at the school, but she credits her and the learners’ enjoyment of projects and investigations to the real-life
contextualised instruments received from TMP. On an occasion in an observed lesson Jane told the class “Remember to talk maths: maths is a language on its own”, exhorting learners to be specific.

Jane’s teaching was autocratic prior to TMP, running teacher-centred lessons with excessive teacher talking and little learner questioning (see Learner-centredness, section 5.3.1c). Presently her learners are involved and she stresses interaction between teacher and learners, saying “TMP helped me a lot to say there should be interaction.” Jane’s ideology therefore appears to have shifted from purist to social constructivist with the support of TMP.

Jill
Jill taught OBE classes for a few months for the first time when she left the TMP school temporarily. She discusses her experience of it as difficult due to poor resources: “It was a little bit difficult because where I was teaching they didn’t even have the resources because I think in the OBE if you are having enough resources and the class is manageable, because you could get a class of 60.” However when she returned to the TMP school she had support and claims it was easier because of the instruments available to her, saying it “… was very good because at least I was having an idea, we were giving them the investigations; we were giving them the assignments. At least it was a little bit different from when I started teaching.” She is presently teaching only senior learners and no OBE grades.

Jill’s focus on science and maths was, and still is, that of career impact. When asked if she speaks to the learners about the relevance of science in society, she affirms this and explains how she gives a careers talk: “Okay, normally as a teacher, because you know what is happening, because of the lack of engineers in South Africa, because of the lack of maths and science teachers, normally I do encourage my learners, and normally I say to them please don’t forget the teaching profession…”. She also talks to learners (whether at her school or in the townships) about other careers in the sciences as her community work. However, Jill also discusses how maths and science are important subjects to mould learners’ thinking patterns: “I think the maths and the
science part of it are ..., is helping the learners to think for themselves … it stimulates also your thinking.”

Jill explains that both the mentoring and the changed methodologies brought about by the DoE have had an impact on her improvement in learner-centredness (see Learner-centredness, section 5.3.1c).

Joe

Discussing the concept of relating his subject to society, Joe says his belief has always been to recognise the role of his subject in the real world: “As a teacher you are employed to teach these kids but not only for knowledge based in the classroom only. Even you have to teach these kids about real life outside, to live them, and then in such a way, okay, once you have managed to do that too, I think you will be developing the child in total.”

Although Joe evidences holding a fallibilist philosophy from his early days of teaching, he said that prior to TMP he seldom demonstrated this approach in his classes; however now he does so: “during my lesson sometimes I take a few minutes then I talk and discuss something about issues in real life, and then sometimes I link them with my lesson so that this child can see what is in this classroom is what is happening outside. They mustn’t just divorce my lesson from life experiences itself because this is what they will be experiencing.”

He sets great store by the impact of science on future careers, describing his thoughts as a learner himself: “… what I knew then was once I’m in this field of science you can get a job like that: I can become a doctor as I have got science subject in my certificate.”

During a natural science lesson on respiration, Joe applied social constructivist techniques in relating the lesson to the learners’ environment. The learners independently volunteered many questions, related to breathing or misunderstood general health; the teacher entertained all questions, even running into break (periods were only 30 minutes for that week): the learners were not concerned but interested.
When Joe could not answer a question, he promised to find out and let them know. In terms of a learner-centred approach to his lessons, Joe has always involved his learners by questioning them but the mentor observes that he has improved in the nature of his questioning (asks more open-ended questions now) (see Learner-centredness, section 5.3.1c)

General mentor comment

The maths mentor explained in an interview that she tried to make the learning area real, applied and relevant to the lives of the teachers and the learners. As a result she believes that the teachers started to look at their own learning area more laterally: they were seeing the relevance of their own subject for the first time due to lack of previous exposure.

Synthesis

- Betty has always held strong convictions of the large part that maths plays in people’s lives but previously did not bring this into her teaching, as she focussed the learners on the pure knowledge of maths. However she now stresses the contextualised nature of mathematics in her classes and notes the enjoyment the learners receive from participating in long-term projects and investigations. Despite the fact that she was previously teaching OBE grades, Betty did not use this approach until she received TMP support in this regard. Her practice has also shifted from a more teacher- to learner-centred approach. Therefore Betty’s maths philosophy tended to fallibilist, although she did not reflect this in her classes until receiving support and guidance in this endeavour from TMP.

- Jane previously only taught maths from the standpoint of its rigour and knowledge, not relating it to the learners’ lives. She now emphasises its contextualised nature to all of her learners (senior and junior) although she has only recently started teaching OBE classes. Jane’s practice has also shifted from a more teacher- to learner-centred approach and she credits TMP with her improvement in learner interaction. Her philosophy and ideology therefore appear to have shifted from absolutist to fallibilist, under the support of TMP.
Jill has taught OBE classes for a very short period but claims that it was difficult until she had access to the TMP instruments. Her focus on maths and science is primarily towards their roles in learners’ careers and this has not changed with TMP intervention. Her improved learner-centred approach she attributes both to assistance from the mentors and the requirements from the new curricular approach.

Joe, like Betty, previously held a fallibilist philosophy but did little to expose his learners to this thinking on their subject. This changed somewhat, however, with TMP support but mostly due to the excellent OBE-inspired instruments.

The mentors tried to make the learning area real, applied and relevant to the lives of the teachers and the learners. Many of the teachers, with TMP support, become aware of the relevance of their own subject for the first time due to lack of previous exposure.

c Teachers’ attitude to the teaching profession

*General finding*

Some teachers have strong views on the attributes of a professional teacher, and these views, along with their understanding of professionalism, have not changed significantly through association with TMP. However, in some cases the teachers’ actual practices previously did not reflect their theory whilst they currently evidence a more professional approach and in some cases the teachers believe they can more easily be professional now, having grown through TMP input.

Whereas some teachers were despondent about their profession before, (due to changes, lack of support, negative colleagues) they now have a different perspective on teaching problems. Teachers are more positive about the teaching profession itself because TMP has made it easier for them to demonstrate professionalism.
Evidence: the voices

Betty

Referring to previous years prior to TMP, Betty claims: “I can say, I was teaching for the sake of teaching ..., it was not nice as now, compared to now, now I’m enjoying it, I’m enjoying it. I’m enjoying it because of TMP, but before, sometimes I was getting so frustrated, mmmm. Especially when to, to handle chapters that you don’t understand very well, it was difficult, it was difficult. You don’t know, you don’t understand the chapter with the teacher, so what about the learners?” Betty refers to her previous “dodging” of classes (an issue discussed in 5.3.1b); whilst this was clearly unprofessional practice Betty saw no alternative as she felt she had no means to improve her knowledge.

Betty now has improved content knowledge and as such is enabled to demonstrate professionalism. She attributes the mentor as having changed her attitude towards teaching: “I can say the mentor has made me to enjoy my teaching, my work is easy now, I’m working very very light, my work is no longer heavy, it’s light now, I’m working very well now. I know what am I doing now. Unlike before.”

Jane

Jane comments on the attributes of a professional teacher: “According to me a professional teacher should be a teacher who has passion in what he/she does, motivated, self disciplined, responsible, taking the welfare of kids at heart, a teacher who is well prepared, well planned, organised, and a teacher who is able to embrace change as it comes, to say you can’t refute it all the time, one way or the other you have to accept it and a teacher who .., a person who is head up, your shoulders are up. I think that would be a professional teacher.”

Jane says that TMP made her more positive about the profession she is in because the programme has made it easier for her to be professional. Asked if or how TMP had changed Jane’s perception of teaching as a profession, she says: “They did, through their motivation I think and through their help to say ... because sometimes you viewed these things to be difficult and they are making them a bit easier for you ...”
Certainly, considering her practice currently compared with before (in terms of attitude to learners, improved planning and completing syllabus for example) she presently evidences a more professional approach.

Elise says that this teacher has tremendous ambition within the field of education and was therefore open to everything the TMP gave her to help her, as a tool in her professional growth. This was particularly true of planning issues.

**Jill**

Jill comments on her previous attitude to teaching prior to TMP, explaining that although she was happy, there were difficulties: “I’m very much happy to be in teaching but then sometimes you feel a little bit frustrated and say am I going to cope with this particular or the changes, but there are times where you just tell yourself, changes are everywhere.”

Asked if the mentors had changed her attitude to teaching, Jill responds by saying they have motivated her to want to become a mentor herself: “You know what the mentors have done for me, ... sometimes I just ... say I want to be expert guys, just like (mentor), I just want to be an expert just like (other mentor), because when you ask them a question, the answers are at their fingertips, they know most of the things... (and) they coming up with very good investigations... where do they get this particular information, because they’re having a lot of information there. I think one day I will be one of the mentors definitely.”

Mentor Jean reminds us that almost all the time in which Jill was teaching, she was supported by TMP. She is also one of the better qualified teachers therefore does not find the subject content or the process of teaching threatening; she finds it easy to read and understand the textbooks and is willing to prepare.

**Joe**

Whereas Joe, prior to TMP, was despondent about all the problems and challenges he perceived in teaching and wanted to leave the profession, he maintains now: “Ja there is change… in the sense that you are able to turn your problems to your advantage,
you make them ..., you utilise them in such a way that you benefit out of that. In the past whenever you see a problem, then it ..(unclear) but now to me I’ve realised teaching is a challenge, it’s your challenge and that needs someone to be focussed all the time.” Jean confirms that Joe, prior to TMP, “was very negative” in his attitude to teaching, but “now he sees a future in education”.

Joe continues: “having mentors now really has changed my perception of teaching, wanting to leave teaching, wishing if there is a hole somewhere, get out through that hole. Truly speaking I’m there … to face the challenges, I’m there. Although sometimes we find ourselves swimming in a pool of frustration, but that confidence … is still there and it will last forever ... (unclear) that is because of your (TMP) presence.” Joe often speaks of “the conditions under which we find ourselves”. He is frustrated by the school climate and blames it for many of his limitations in what he can do; the atmosphere “... sometimes makes you mad and you put off doing good things”.

**Synthesis**

- Betty claims that subsequent to TMP input she enjoys her teaching more than before as it is “no longer heavy”; because she knows what she is doing she can be more professional in her practice.
- Jane has strong views on the attributes of a professional teacher, which have not changed significantly through TMP. However, her practice evidences a more professional approach and she is more positive about the teaching profession itself because TMP has made it easier for her to be professional.
- Jill, previously nervous of some of the changes in her profession although happy to be a teacher, now (subsequent to TMP input) wishes to be a mentor herself, attributing this to the mentor’s motivation and to her respect of their knowledge and skills.
- Joe prior to TMP, was despondent about his profession due to numerous problems which he felt powerless to solve but now has a different perspective on teaching problems as challenges that he can face with renewed confidence. He credits TMP with his different perspective.
d Teachers’ attitude to learners

Introduction

Teachers may evidence either a “disposition to their job which rests on an internalised professional conscience” or “a disposition of a more civil servant cast … and does not rest on any notion of internalised personal responsibility” (Taylor et al, 1999, 137). This section examines the TMP teachers’ attitudes to the learners in their classes as being a pointer to their professionalism and questions their positioning of themselves in terms of responsibility for learners’ successes or failures. Ngcoza, Boltt and Irwin (2005, 2) make the link between teachers’ CPD and their responsibility for their learners and query whether “learning opportunities created for the teachers enabled them to take more responsibility for their actions in order to improve teaching and learning of science”.

Rogan and Grayson’s (2006, 41) Profile of Implementation describes a level 4 teacher’s class as having learners who take “major responsibility for their own learning; partake in the planning and assessment of their own learning”. However, synonymous with such learner responsibility goes the teacher’s responsibility to have facilitated this change in the learners from acceptors or responders to drivers and initiators. This recognition of their facilitating role in the learners’ own accountability for learning requires that the teachers first recognise that they are there for the learners, a lens through which they need to consider all aspects of their practice.

TMP teachers typically claimed to have learners as their priority and highlighted this using the fact that they always “wait for the slow learner” in their teaching because they do not want to “lose a single learner”. However, observation of teachers at school contradicted their claimed learner prioritising: teachers were frequently seen outside classrooms, missing periods; they seldom (if ever) prepared for classes or instituted any systems or methodologies to indicate an effort to complete the syllabus; in fact, their practice tended to indicate Taylor et al’s “disposition of a more civil servant cast”, a focus on themselves and their own daily comfort more than a drive to do what was educationally right for their learners.
General finding

Before TMP began at their schools, all four teachers claimed they believed they had to take some responsibility for the learners; however, the teachers’ understanding of this responsibility to the learners differed. In some cases the teacher saw his/her role to be responsibility for knowledge transfer only (in one of these cases the teacher did not care if the learner failed as long as she had conveyed the material and therefore done her job); in one case the teacher knew (from the Principal’s admonishments) what role she should play in the learners’ passing but did not undertake this role; in some cases the teachers did not have the capacity to take the full responsibility and accountability for learners passing or failing and were not prepared to go to the effort of enabling themselves.

The teachers are now, subsequent to their participation in the TMP, empowered to accept the mantle of responsibility for learners’ successes and failures and becoming actively involved in both skilled transfer of knowledge to the learners as well as playing a pastoral role in the learners’ lives. They have now been enabled in terms of their teaching (knowledge and methodology) and feel more confident in playing a more prominent role with their learners, currently also having higher expectations of the learners and thus able to help them visualise a better future for themselves.

Although some of the change seen in the teachers arose prior to TMP, growing gradually with years of teaching the learners, a large measure of the change came about through TMP as, whilst the teachers articulated a sense of personal responsibility for the learners, their lack of capacity made it difficult for them to accept such responsibility and their teaching practice therefore did not evidence their internalised professional conscience. TMP (through the mentors) endeavours to help teachers recognise their accountability to the learners by constantly demonstrating the programme’s learner focus in all its strategies. The mentors’ constant reminder to the teachers was to focus on “What was best for the learners” (Elise).
Evidence: the voices

This aspect of teaching practice is to be considered by looking at the teachers’ priorities in teaching, responsibility to the learners and sense of accountability for the learners’ (lack of) achievements in the teachers’ learning areas.

Betty

Betty said that her expectations and hopes of her learners prior to TMP were: “sometimes I’ll dream of having maybe 90% pass rate in my class or 80, I’ll get the opposite, 10%”. She was very disappointed that the learners did not all take responsibility for their own learning and was always distressed at the very high failure rate and exceptionally poor marks: “… they used to fail, our learners used to, before TMP, our learners used to fail, they used to fail very much…. things have changed so much. … Zero, a learner would get zero out of 150…” It is clear that Betty felt that she had a role to play, declaring “especially when seeing the learners failing so much, I thought the problems lies with me.”

However, Betty describes teachers who do not take responsibility for their learners’ passing: “There are teachers who don’t go to classes and, she absents herself too much … even if she is in class she sits, she doesn’t give the learners work. … she won’t cover up the syllabus and I mean at the end the learners are going to fail.” Asked if she used to evidence the same behaviour or take responsibility for her learners then, she responded: “not that much, the principal would always talk about it, calling us to order, putting a blame on us for failing of the learners and deep down we knew he was telling us the truth, but we would just say “ah”. Betty’s tendency to omit chapters from her teaching, rather than really making an effort to address those sections, are an example of how she displayed a focus that was not on the learners; however, this attitude is possibly understandable when one realises that there was nobody to help her with her epistemological needs.

Betty’s priority in teaching at that stage was “To teach learners and to mark their work and give them assignments and so on and so on and control their work…. (their) knowledge was very important to me.”
Now Betty acknowledges that she no longer omits sections of work (discussed in 5.3.1b) indicating a more professional approach and she shows how her role has grown to include guidance of the learners: “The teacher’s job is to teach learners, to teach them and guide them, guide them and teach them through the subject, even outside you can also guide them…. There is a time when I sit with them and then ask them their problems, some they will tell me, some they won’t but I will always guide them. They always come and tell me their problems and then I talk to them, give them advice, if I’m unable I refer them to the guidance teacher to talk to them.”

Jane

Jane’s expectation of her learners was, prior to TMP: “I expected them to do their work, to understand and I expected that they should pass if they are writing tests, and if they have homework, to finish it … sometimes I did not care: I’m working, so if they don’t write, they don’t pass, so what, it’s their own baby, so I didn’t take that much responsibility to say if they don’t pass how would I feel as a teacher?” Jane therefore did not previously demonstrate an internalised personal responsibility for her learners.

However, she takes greater ownership of the learners’ final achievements, these days: “yes I do, do you know when they don’t perform I feel very bad… I realised that the attitude is not okay, mine, (referring to her previous don't care attitude) if these learners don’t perform well it’s as if it’s a reflection of me to say I didn’t do my work well. Then I realised that I need to do something, I need to take responsibility of their performance.”

Jane’s general expectations of her learners now “… has changed … as I said that there are those that are self disciplined now, there are those that see maths in a different way, there are those that are motivated and there are those that willing to work very hard, to say, they would come to you and say we have a problem with approaching this, how can we do it…” In this way, Jane’s classes are showing elements of Rogan and Grayson’s (2006, 41) level 4 classroom.
To further elaborate on her concern for her learners’ success, Jane describes a recent incident: “You can’t believe it, the past Friday only 15 of them came to school, 15 and they are 52. I nearly cried on Friday, I looked at them and said “are you the only one’s here” … (and) I think last week on Wednesday I wasted a period talking to them, trying to motivate them, to say that do you know that you are important, but what’s happening?”

Prior to TMP, Jane’s priority in teaching was imparting knowledge: “That time I thought the most important thing was for a teacher to impart knowledge to other kids that was the most important thing that I realised then.” There was a slow change in Jane’s attitude whilst involved in teaching: “…bit by bit to say these kids come from different backgrounds so you have to learn to accept them as they come, so it came in with time.” Thus Jane’s priorities now are: “Imparting knowledge to the kids is the first one … and showing the learners that they have to take responsibility of their own doings… showing the learners that there’s nothing impossible … everything is possible only if you want to make it possible.” Her priority now “is not about knowledge only, it’s being a parent, playing your pastoral roles.”

Elise, her mentor, confirms that Jane was originally focussed on maths, her subject, rather than her learners. However, that has now changed as she currently puts more focus on her learners than the subject per se. A large measure of this change came about through TMP but the teacher had also started re-thinking her approach to her learners independently a few years before TMP.

Jill
Jill has always felt a sense of responsibility to her learners: “Obviously as a teacher you’re expecting your learners to pass even though the teacher, some teachers don’t go to class, but they expect their learners to pass achieve. … normally as an educator you must try to at least to encourage the learners at least to pass matric… I normally used to tell them (the learners), guys maths is very important. I don’t know it stimulates also your thinking. … You see things differently than others, because the others will think for that particular period, and normally the people who are very good in maths, they normally think about the future, not for now.”
She describes how she has helped numerous learners: “… I feel that I have helped most of the learners, not only the learners in my school but in our community because every day in the afternoon I’m having these learners who are coming to me, the ones who are staying next to me. Ja, sometimes it’s very much frustrating if you are having learners failing, it’s very much frustrating, because sometimes you feel that you are doing nothing, of which you are doing your best, but then some learners are not so motivated enough, they don’t even care whether they do pass or they don’t pass.” Jill’s experience was that most learners were not responsible for their own learning: “… not most of them, you will get maybe one person who was responsible for their learning.”

Jill now has higher expectations of the learners in her classes in terms of what they should be able to achieve due to the material supplied by the mentors for the learners: “Sometimes I felt that the pace in which they (the mentors) expect us to teach the learners is too high because we are having different learners from theirs. Because sometimes you feel that they give you these particular activities, they are very nice activities, but then if you think about your learners, then it becomes a little bit difficult for them. … but the principal used to say, teachers you think a lot for these learners, you think that they cannot do this, (but) they are able to do that.” Jill clarifies by saying that if you think learners won’t be able to do a task, they won’t be able to do it, but then her experience showed her that the learners could do more than she had presumed: “… you will find … learners at least having an idea, they will say, ooh, then you are doing this thing like that. But before, you will say definitely I won’t give my learners this task, it’s going to be difficult for them.” This has taught her to have higher expectations of her learners and they are achieving better.

Jill summarises her expectations of, and hopes for, her learners: “Obviously I expect them to pass, be better people in future, at least one day we expect engineers from them and … please don’t forget that we are having teaching as a profession, teaching as a career, …. ”
Before TMP her priority in teaching was “… the planning part of it and going to class every day, make sure that you don’t dodge classes.” Now Jill claims: “I think in teaching you need to be very patient and you need to be hardworking and creative… I think I need to see these learners being somewhere, being my product, being proud of them one day that these are the learners that I’ve taught… I want to see them being better people in future, really.” Mentor Jean believes Jill has two main foci in her teaching: to transfer knowledge to learners and to teach them to work independently.

Joe

Joe’s attitude is expressed in: “we have to be responsible in life, that was my main expectation, and again teach these learners to know that one day you will be forced to leave this school and to find themselves somewhere where they have to take that responsibility for their own lives.” Joe sincerely believes that “as a teacher …, you either build a future of the learner or you destroy it … always whenever I go to class I make sure that I contribute something, something that will improve their lives now and in the near future, I’m trying my best.” Joe has a strong sense of responsibility for his learners: “I see them being successful in life, being productive, if for example I come across my product, not being successful it must be of his making, not from my side and I will always make sure I encourage that.”

Joe speaks about his thoughts on teaching when he was at school: “I remember telling one of my classmates that if it had meant I should become a teacher, you know what; I will try my best to reach my kids. The majority … understand what I want and I make sure they enjoy … my periods. And I want to create that atmosphere where a child can be free, maybe to ask a question or even to laugh if the child wishes to laugh. Some that can understand know me…”

This teacher has a great sense of responsibility to his learners, evident in the fact that he never misses a lesson (even teaching when other teachers are off for a social day); he is always punctual for lessons, always organised for practicals and tries to focus on each as individuals. However, although Joe’s focus was and is on his personal responsibility to his learners, his teaching knowledge and practice prior to TMP was not such that he was actually able to take the burden on his shoulders. Joe now claims
that he is empowered to accept that mantle of responsibility: “We were so lost as teachers before you came to the school. I now have the confidence to go to … (other colleagues)… to ask them to help me. For the first time in my life I feel I am taking responsibility for the kids”.

His priority in teaching is not simply focussed on transfer of knowledge: “As a teacher you are employed to teach these kids but not only for knowledge based in the classroom only…. Develop the child in total… lead these kids towards being responsible adults.” What drives Joe most is “... to make a mark, an impact on the future of the learners, of our own kids. And to leave something like a legacy if possible...” His focus is on “developing the child in total” and he links class lessons with life outside.

Jean, Joe’s mentor, explains that Joe’s main focus prior to TMP was the transfer of knowledge to his learners and, subsequent to his involvement with TMP, for the first time has been able to shoulder increased responsibility for the learners and demonstrate a sense of accountability for their achievement.

General Mentor Comment

Jean describes how many teachers would claim “all my learners are failing” but their demeanour and tone would indicate that they apparently find this situation acceptable, or at least tolerable. She claims that previously many teachers shifted blame for unacceptable situations (for example poor results, non-completion of syllabus, lack of discipline or class truancy) away from themselves and onto their charges by sighing and saying “These learners…”, not seeing their own teaching role as a cog in the education process. Only with grade 12 learners were teachers seen to make an effort to make the successful completion of their charges’ education a priority.

Elise points out that the mentors’ full attention has always been to direct the teachers to consider their learners as primary focus: when debating any new strategy, the mentors encourage the teachers to consider its implications in light of the learners’ experiences of such a strategy. For example, many of the schools only supply learners
with their exam timetables the day before exams start, claiming that if the learners receive the timetables earlier they will immediately leave school and not return until the first exam day. Although in many cases this is a true picture of the learners’ attitude, this practice was discouraged by the mentors who advocated giving learners the timetables early and assisting them to understand that the purpose was to give them the chance, with teachers’ help, to structure and manage a study timetable. This is just one example of the way in which the mentors assisted the teachers to use a different lens in thinking about their teaching practices and possibly had some influence in changing the teachers’ perspectives on their learners.

The mentors may also for example demonstrate techniques to motivate learners, encourage them to “work with the learners that want to work” and exhort them to discuss with the learners possible career options or financial aid strategies whilst motivating them to “be the best they can”. It was also their task to point out that by waiting for the slow learners the teachers have negative impact on the potential success of those learners who are academically stronger and able to complete the syllabus.

**Synthesis**

- Betty knew that she had a role in her learners’ failing prior to TMP, but did little to change the situation. She demonstrated her changed focus subsequent to TMP input as her role has now grown to include guidance of the learners whilst she is now able to teach all sections and does not “dodge” them; her priority has changed from learners’ pure knowledge to include their lives and general problems.

- Jane admits to previously not caring if her learners did not pass, saying “I didn’t take that much responsibility…” Her attitude to learners’ successes and failures has now changed as “I need to take responsibility of their performance.” A large measure of this change came about through TMP but the teacher had also started re-thinking her approach to her learners independently a few years before TMP.
Jill has always held herself responsible for her learners but she now has higher expectations of her learners in terms of what they should be able to achieve, arising from the material TMP supplied to the learners. Her personal responsibility for her learners, always her driver, has been extended to challenge her learners to achieve their best.

Joe has always had an internalised professional conscience and thus felt a strong sense of responsibility for his learners and a concern that their education experience be valuable for them. However prior to TMP he did not have the capacity to act as that professional teacher and believes that the presence of the programme has enabled and empowered him in his role as a teacher who prioritises his learners.

TMP (through the mentors) endeavours to help teachers recognise their accountability to the learners by constantly demonstrating the programme’s learner focus in all its strategies. The mentors’ constant reminder to the teachers was to focus on “What was best for the learners” (Elise) but any change in attitude on the TMP teachers’ part came about not due to harsh mentor criticism of the teachers’ current strategy but rather a constant example set by the mentors in terms of attitude towards learners.

5.3.3 Social development of teachers: Teachers’ attitude to school and colleagues

General finding

The TMP schools generally do not offer potential or effectiveness to act as learning organisations; yet within these contexts the TMP teachers have shown conviction and resilience to effect their own changes and in most cases considerable change has been effected on departmental levels.

None of the management of the schools in which the TMP teachers are personnel are supportive of individual teacher initiative or generally open to change; in one case the teacher was honest and claimed that the school management was open to change but
only if it did not “threaten their position”. The schools did not have a trusting and collaborative climate either at whole-school level or departmental level prior to TMP.

Although the general attitude from school management was not perceived to have changed in most cases, the TMP teachers in this study proved resilient and determined to change their practice and definite improvements were seen on a departmental level in two of the three schools, allowing the teachers to change their practice. At none of the schools did maths and science staff reflect on, discuss or critically examine their practices, to see what they could improve, until receiving TMP support and guidance in this regard (currently one school is still not evidencing this professional growth in its maths or science departments). There is currently a greater spirit of openness and trust among maths and science teachers than staff of other learning areas.

Discussing attitudes to and working relationships with colleagues most teachers wished to liaise with their peers prior to TMP but found problems with professional jealousy, HODs who could not assist them and competition between staff. All teachers have improved working relationships within their departments now although in one case the HOD is unavailable and unable to help his staff. In most cases teachers from other learning areas ask the TMP teachers for professional assistance and one of the teachers now wishes to be a mentor herself, attributing this to the mentor’s motivation and to her respect of their knowledge and skills.

Note from project leader of TMP: The above comments from teachers in terms of their opinion of school management’s willingness to change and accommodate innovation reflect, in part, my own. Although the schools were open to change in that they allowed the TMP project to take place in their schools, in fact welcomed it because they hoped to address the weaknesses in the maths and science departments, this attitude did not encompass all TMP initiatives. In many cases changes to organisational system, methodology or general approach requested by TMP to support (in fact facilitate) the mentors’ roles were not approved.
Evidence: the voices

Betty

Betty teaches at a school in which school management and administration are not entirely open to change and if people have different ideas, they are not recognised or valued by the management. However, she says that her colleagues on the staff support a teacher who may evidence a desire to learn.

Asked if having the mentors at the school had caused some problems for them and/or the school or other teachers, Betty replied: “We as the science (and maths) teachers we didn’t have a problem, teachers from other learning areas they used to have a problem because, you know as teachers, there are some teachers who dodge during the classes and so on, so if the mentor people are here, they know them, they can’t dodge classes (she laughs), they must just be in class. You know teachers, how they are, they behave like school kids!” However, the teachers in the other learning areas no longer have a problem with TMP presence: “... for now they are used to TMP, but during the first year, they used to have, but second and third they are used to her, some they even go and seek help from them.”

Asked if the maths and science staff reflect on, discuss and critically examine their current practices, to see what they can improve, Betty agrees that they do now but this has only happened “Since TMP”. There is currently a greater spirit of openness and trust among maths and science teachers than other staff.

Describing her changed attitude to her colleagues, Betty explains how they work together and support each other now whereas they did not do so before TMP: “yes especially the ones that I’m in maths with, we are working a lot. We don’t have time to sit and talk and talk … we always talk about maths. … how far are you with this chapter, have you set the test, have you marked the project, where’s the Rubric, things like that, we always talk about.” Betty believes it helps with one’s teaching to discuss with colleagues certain sections of the syllabus that she does not understand, and also if it is possible they teach sections to each other’s classes as demonstration lessons for
Betty observes, “It’s different from before, now we work okay, before it was ‘indoda wa sibonela’ (everyone for himself).”

**Jane**

At Jane’s school the staff is not unified and do not have a shared sense of direction; high teacher absenteeism has a negative impact as the learners walk around the school during class and create a disturbance for all other classes.

Jane describes staff feelings: “There are (some staff) that feel that they are not valued or they are not treated fairly”. She explains that management do not like open discussions or a diversity of opinions, nor do they empower staff to make decisions. However, Jane says of her school management and administration: “I think they would be open to change” and if a teacher has an idea for an initiative s/he could feel at liberty to express it but “… it would come up, but the support would be very minimal.” Therefore this school does not really provide an environment that would support growth, vitality and initiative.

As far as school discipline is concerned, the “principal always take rounds to say, to check whether is there any teaching, basically not teaching as such, just checking there are learners outside, but HODs do not monitor teaching programmes, take in learner books or check the teacher’s files or have departmental meetings.” The staff does not reflect on, discuss and critically examine their current practices and Jane is unhappy about many of these aspects.

Describing her relationship with her teaching colleagues, Jane says that before coming to her present school, she did not consult with her HOD for assistance or support “because she was more of … Science based, so she was teaching Science and she did not know maths” and discussions with other colleagues “did not operate that well because a term would go by without any meeting, so basically we used to talk to each other … if a person had a problem on a specific topic to say how can I do this, so we did not have any meetings, so it was just an informal talking.”
The situation within the mathematics department at her present school is also not satisfactory in that the HOD does not organise departmental meetings; however, Jane works amicably with the other teachers and many often approach her for help as they do not get it from the HOD. Jane is determined about the correct way in which authority structures deal with staff and “even the Principal knows that when he says something that’s not okay, I will be the first one to raise my hand.”

Jill

Asked if the personnel of her school have a shared sense of direction, Jill exclaims: “No, totally no”; she explains that some of the teachers are very influential with the Principal and discourage other teachers. Jill does not get affected by this as she regards her interactions at school as professional and “if we are having our personal vendettas, let us do them maybe after school”. However, she claims that these personal issues are not as prevalent in the maths and science departments as with other learning areas in the school.

Jill says “maybe in our school we lack transparency” and attributes this to the Principal not being open with all the staff. He also does not allow HODs to be independent, and “I would say our HODs here are not doing enough … Our HOD for science I think she’s the one who’s always trying, at least she wants to be on line.” Generally, not all the staff feel valued, and there is not a complete feeling of openness and trust (“60 / 70%”).

Asked if management values open discussion and opinions which are different, Jill says that “most of the teachers don’t want to come up with their opinions because normally the principal will say: ‘no ma’am, you don’t understand these things, it works like that’. Hence in a meeting you will find that the Principal is the only one who is talking.”

Jill believes school management is not open to change: “no I don’t think so because I complain every year about the timetable… They should look at our qualifications before they allocate us.” Unfortunately, despite the principal making promises to do
so, he does not fulfil them: “Then the HOD submitted the names to the principal, but
to her surprise everything changed, it didn’t happen.”

Extra study courses are approved of by the school, but general school monitoring and
controls are not in place at all. However, Jill’s complaints generally do not extend to
her department: “in my department at least there’s this working, even though it’s not
so good, but we have this working relationship.”

Asked whether having the mentors at the school had caused some problems for her
and/or the school or other teachers Jill responded: “I don’t think I had a problem or
still have a problem with the mentors but the other teachers were complaining that
.(unclear) is Friday, then the mentors are here, sometimes they will say “eish”, maybe
it is month end, the mentors are there, then they feel that no today we wanted to leave
at let’s say 1 o’clock, the mentors are here, “hey” something like that..” However, in
terms of what one would expect to be the normal running of the school, TMP
implementation does not seem to present any problems.

Discussing her interaction with her colleagues, Jill describes how she was always
willing to work with others but sometimes they were either unable to assist or not
happy to share: “… used to consult with my HOD, but unfortunately normally I find
HOD, most of my HOD were biology teachers.” She claims that, with reference to
her other teaching colleagues: “… the working relationship was very good because
normally we used to communicate, if I’m having a problem I will go to the teacher
and ask ‘can you please help me with that?’, but then in some of the instances you
will find that some of the teachers are not so willing.” What Jill found teaching at a
school half-way through the TMP programme was that she was seen to be an expert
and other teachers consulted with her, while she assisted them with planning,
structuring their lessons, etc. Jill’s working relationship with her colleagues is
unchanged in her present school.

Joe

Asked if the school management and administration was open to change, Joe
responded positively but with a proviso that this would not affect individual benefits:
“yes on the face value, yes, but some things are still stuck somewhere… the change somewhere that doesn’t threaten their positions…” However, there are many problems in the school, often financial (tests may be stopped as there is no money for paper, for example) and teacher initiatives are not embraced: “you want to add … your inputs … you will do that and you know this thing is very much important. But it will never be carried out.”

There is apparently a difference in the way Joe works with his colleagues now, compared with several years ago. At that stage he claims that there was considerable professional jealousy between the teachers, largely brought about by different competences, for example: “we shared the same subject, different classes, kids are talking outside, … when teacher gets into this class, same topic, you go to another class, same topic, explanation somewhere different … no consultation. And then it happened one of the learners would come to you and say ‘meneer what about this, can’t you help me with this?’ then you explain… ‘but teacher so and so said this works like this’ … at the end that particular child loses that respect with that particular teacher, meaning that you are not building one another as colleagues.”

Joe claims to have seen a change in their school since the learners have seen other people showing interest and demonstrating that they care: “now there is a shift: right now there is a shift I have seen improvement somewhere especially in this school maybe it is a question of… I don’t know… Maybe it’s a question of having this programme, mentorship programme; there is a huge difference, a huge difference… they’ve seen some new faces in the school yard and those faces brought some changes.”

Joe frequently refers to the teachers as having different backgrounds but “because of your presence again, you have changed many things, the attitude of teachers, we are able to mix, we are able to share ideas somehow, meetings are held…why is because of your (TMP) presence, especially whenever you enter the gate, our management is like that to look all the areas, they are trying to fix some here and there, …”
He believes there is more consultation now than there was before, “you know ... I respect everybody, you know we’ve got a healthy working relationship, presently it is excellent” although “it’s a question of competition that nearly destroyed the working relationship.” Joe believes “you always have to consult, help one another, we need one another. Then the relationship I think to me is excellent.” Although the Science department meets formally less than maths, Joe approaches others in an informal fashion to discuss work issues.

Joe describes changes in his school: “Then, yes, after some few months, truly speaking I could see the two departments, Science and Maths, ... we used to work hard, worked harder, but it was difficult (because we used to relax) then a change always brings some problems here and there, but we had to stick to it.” He describes comments from the maths and science HOD at his school as follows: “I discussed this with (HOD), he said ‘you know (Joe) what you are saying is true ... Do you know what, these people are working, are working and I’m also working’. Then ... he said to me, ‘(Joe), honestly speaking those people ..(unclear) big help to us in terms of spirit of team work, in terms of having purpose ... in terms of ..(unclear) to prepare, preparations, in terms of the pace.’”

Responding to a question on whether having the mentors at the school had caused some problems for him and/or the school or other teachers, Joe said “I can’t say there are some problems, the only thing is the pressure, we had a lot of pressure ...” referring to time management and pace.

Joe describes his current experience of his school as follows: “everybody is working towards a common goal because at this school we’ve got a vision and mission especially our mission/vision having clarified by the inputs coming from the mentorship (programme)…”

Synthesis

- Betty is situated in a school in which general school staff does not have a shared sense of direction, are not open to change and management generally does not offer lee-way to individuals taking initiatives and risk. However on a
At the departmental level there have been great improvements since TMP: they currently reflect on, discuss or critically examine their practices and Betty works closely with her colleagues now, a practice that did not occur prior to TMP. There is currently a greater spirit of openness and trust among maths and science teachers than other staff.

- In Jane’s school the staff also has no shared sense of direction and management generally does not offer flexibility to individuals taking initiatives and risk. Unfortunately this has not improved and neither is there improvement in the maths department at her school as the HOD does not share the same mission as the other maths staff. Jane however is open to teamwork and assists her colleagues wherever required as they tend to approach her for help, the HOD being unavailable and unable to do so.

- Jill is situated in the same school as Betty is, and hence the same comments about the school and subject departments apply. However, Jill is resilient and determined and does not get affected by this as she regards her interactions at school as professional. Jill has always been keen to cooperate with her colleagues but finds that in the past this has not always been reciprocated or the HODs have been unable to help her.

- The management at Joe’s school also does not offer lee-way to individuals taking initiatives and risk but can be said to be open to change if it does not “threaten their position”. Discussing work relationships with colleagues, Joe claims there is more consultation now than there was before, as previously there was professional jealousy and competition between staff.

5.3.4 Comment on other aspects of the Teacher Mentorship Programme

Introduction

The teachers were asked to talk generally about the other aspects of the programme built in to support the mentoring strategy: the workshops, mentor school visits (the visits outside the school to supporting schools) and the freeze period. The strategies undertaken for these aspects of the programme are discussed in 3.6 c, d and 3.8 respectively.
General finding

All the teachers commented on the workshops being useful, worthwhile, interesting and motivational while one teacher said they had “done wonders” for him.

The mentor school visits were found useful by all teachers. While one teacher saw the difference in mentor schools’ resources as limiting the degree of comparison between schools, another remarked that those differences were obvious and yet learners there were similar to his and teachers at both schools were experiencing the same problems. In this case he saw great potential for knowledge transfer and opportunity for his growth. Some teachers request more opportunity for further visits to other schools, increasing their exposure to different role models, while others find one day sufficient. The mentors see particular value of the mentor school visits as providing exposure of the TMP teachers to other teachers who are evidencing the practices that the mentors are recommending to them.

All the teachers recognise the potential of the freeze period to increase their responsibility and independence, motivating them to be self-reliant in solving problems with other resources if the mentors were not present and maintaining excellent classroom practice without supervision. Although they miss the presence of the mentors, they use the opportunity positively and productively to achieve the aims of the strategy.

Evidence: the voices

Betty
Betty commented that she found the workshops useful and then spoke about the mentor school visits and particularly her observations on how colleagues in the mentor schools worked and interacted: “I saw how committed those teachers are, how hardworking are they, how are they doing their things, especially when coming to tests. If a teacher has set a test, they will sit during break; they sit in their learning areas. You won’t find a biology teacher sitting with a maths teacher, they sit in their
learning areas and always they discuss about the problems they encounter in class and the problems concerning the content, and they discuss about the tests and memos and so on, and so it was good, they’ve teach me something that I didn’t think we can do it here. You see in our school we just sit there, I can sit with a Zulu teacher, there’s no problem. During break we sit and talk about, we gossip. We don’t talk about the school work, we gossip!”

Asked if these observations will change the way Betty deals with her breaks, she responds: “yes, that’s what I want, I want to sit with the maths teachers or the science teachers and then discuss about the work of the learners.” Referring to what she gained from the mentor school visits, Betty added: “... actually I thought one day was not enough, maybe if you can give us three days or four days, … one day is not enough.”

Referring to the freeze period, Betty commented positively on this strategy: “I think it’s okay for our mentors to see if we can do without them, can we follow our work schedule, can we do what we are supposed to do, can we meet the days, the submission days and so on and so on. I think it’s good; they are training us to work even if they are not there, we must be able to work and then we are still doing that. We are working with the programme… I think we learn responsibility; we become more responsible, we are doing our work thoroughly. If I must treat this for four days, I will treat it for four days because I want... if (mentor) comes back, she must find me where I am supposed to be (laughing)”.

Jane

Jane commented on what she had found most useful about the mentor school visits: “The mentor school was useful in a sense that I personally learnt a lot of things from the school, time management very useful, structuring from lessons from the teacher that I visited ... And meetings, when do they hold their meetings, that was very useful too.” Unlike Betty however, Jane did not require more than one day at a mentor school: “I felt it was not necessary for us to go to these schools again this year, because I felt, personally, I’ve experienced everything that I wanted last year, so I felt for the second time is not necessary.”
Discussing the workshops, Jane commented that they were all worthwhile but focused on one particular presentation: “Even the workshops, to say for me they are all useful, content or motivation, for me they are okay. To say honestly speaking I had a negative attitude towards transformation; it’s a new topic that’s coming in. Then after I’ve attended the (transformation) workshop I was very happy, I could present that very super, it was very excellent when I had to do that with my kids because I’ve learnt something new, because I felt (before) it was a bit difficult for me to do that.”

Jane described her excellent understanding of the intentions of the freeze period: “I thought maybe the intention is for … because the programme is ending this year, to see whether teachers would be independent starting from next year, would they work well according to the programmes when the mentors are not here and will the planning be okay, will the portfolios run okay? Basically is to see whether we would manage with our planning when they are not here, and we should be able to see that, we are here to work, we are not here to come and impress them, to say you pushing the syllabus just because they will be coming on day two, so you have to push the work that you doing, so it’s for independence, to say we should be independent ... and responsibility: to say you have to take responsibility for your own actions, to say ‘if I did not do this what would happen?’ ” Jane managed very well with the freeze period, keeping up to date and solving her own problems, but says she did miss the mentor.

Jill
Jill describes the workshops as “… very exquisite, very interesting and then also they are motivating us.” Referring to her visits to the supporting mentor schools Jill tends to focus on comparing those schools’ resources with those at her school: “The visits are useful but then as we compare our school with their school, I think we are far more behind because if you look at the structure, to start with the structure of the school, look at our school, look at the schools that you are going to. The resources, they have so many resources, you look at the staff in general, you find that the staff is too many… the other thing they use a lot of worksheets …”
Jill was asked for her opinion of the freeze period and if it has potential to be useful. She responded: “Yes, but because for now, you need to work independently, next year the mentors won’t be in, what will you do, because sometimes I just say to myself, I’m having this particular question, then the mentor is not here, what am I going to do – then I say to myself, … don’t hang yourself that way, consult the other books. Then I did that, then I continued with my chapters!”

Joe

Joe describes his experiences of the workshops by saying: “... they’ve done wonders, really...” He gained particular benefit from the workshops on basic electricity concepts and remarks how much the learners have gained from the way he now introduces these concepts to them, based on what he learned at the workshop.

Referring to his mentor school visits, Joe, unlike Jill, did not see the difference in the schools’ resources as limiting his learning from the experience, but remarked how the problems experienced by the other schools are nonetheless so similar to his own and this provided opportunity for his growth. “If you visit other schools, the very same schools they’ve got certain problems ... so you are not alone in this boat. How do they tackle their problems, can’t you copy the good and bring them to your institution? It is not a question of being at a school like this, therefore you cannot solve problems.”

Joe explains that he sees the potential benefit and opportunity to share ideas with colleagues from other schools: “… as a teacher, er, you can share ideas. There’s always an answer to your problems, either from your fellow colleagues from other schools like (mentor schools); you can exchange if possible ... and we are a family and we depend on one another. And then you can see, when you think you cannot make it, you are able to do it, as compared to your colleague somewhere. Therefore you are not different from that person. You can’t just sit and say I’ve got problems; you have to do something! That’s what I’ve realised about the mentors, that is the most outcome as individual. Last time I was at (mentor school), I could see I am not different from my fellow colleagues, I could see. He experiences the same problems that I’m having, kids are kids. They are naughty, they are noisy in class, sometimes
he feels pressure and I’m feeling pressure sometimes. Therefore as long as you are in this field, you are not alone, you can depend on one another ... out of that comes a wonderful product.”

Joe was asked if he saw any value in the Freeze period and replied: “You know ..., this period it is important to have; as a toddler sometime or as a child you need your parents to give you ... to increase the distance between yourself and them ... and they are looking at you whether you are responsible or what, can you walk alone, having no parent next to you ... When they come back they will see this child is good. ... it is important so that you can prove ... mentors are not here, what can we do, are we going to walk alone this path?”

*General mentor comment*

Elise says that one of the most important aspects of the mentor school visits from her point of view is that they confirm what the mentors have told their teachers and allow the teachers to see their mentors’ recommended practices actually happening in class. Therefore in this way the mentor school teachers act as role models for the TMP teachers.

Discussing the freeze-unfreeze period, Jean commented that many of the teachers had used their TMP-supplied notebooks to jot down problems or issues that needed addressing, but they then approached their HODs or other teachers and in most cases solved the problems without waiting for the mentors’ return. The goals of the freeze period had been met by many of the TMP teachers, and particularly those in this study.

*Synthesis: Other aspects of TMP*

- Betty found the workshops useful and commented on teachers at mentor schools being committed and hardworking; she was particularly impressed with the extent of their peer interaction and cooperation and said that this has changed the way she interacts with her colleagues at school. Betty would like
three or four days to be set aside for these visits.

Betty approves of the freeze period saying the mentors are “…training us to work even if they are not there … I think we learn responsibility…” and says she will be up to date when they return.

- Jane learnt a lot from the mentor school visits in terms of time management, structuring lessons and subject department meetings. However she feels that one day is sufficient for her to maximise the potential of the visit. Jane found all the workshops worthwhile but commented particularly on the transformation workshop as having been particularly beneficial to her and her learners. She described the focus of the freeze period to be to encourage teachers to be independent, with their planning up to date and work done according to the programmes, portfolios run efficiently and teachers aware of their responsibility for their own actions; she points out: “we are here to work; we are not here to come and impress them…”

- Jill describes the workshops as exquisite, very interesting and motivational. She says the mentor school visits were useful but felt that the TMP schools’ lack of resources had a big impact on teaching at the TMP schools. With reference to the freeze period, Jill explains that she misses the mentor’s presence but it is teaching her independence as she had several problems that she worried about but motivated herself by saying “… don’t hang yourself that way, consult the other books.”

- Joe remarks that the workshops have “done wonders” for him. Regarding the mentor school visits, he did not see the difference in the schools’ resources to be a limiting factor in his learning from the experience, but explained how the problems experienced by the other schools are so similar to his own and this provided opportunity for his personal growth and will allow improvement at his school. He discusses the merits of sharing ideas with colleagues from other schools, saying: “… out of that comes a wonderful product.” Joe describes how the freeze period will contribute to his independence from the mentor and self-reliance in future problem solving.

- The mentors see particular value of the mentor school visits as providing exposure of the TMP teachers to other teachers as role models who are
evidencing the practices that the mentors recommend to them. They recognise the value of the freeze period in achieving the goals for which the strategy was implemented: teacher responsibility and independence in solving own problems and maintaining excellent classroom practice without supervision
Chapter 6 Synthesis and Reflection

6.1 Introduction

Many teachers in South Africa have very low levels of subject knowledge, apply ineffective teaching practices and make errors in the content and concepts presented in their lessons, indicating lack of mastery of the previous content-orientated syllabus. On this poor base, the DoE assumes that the imposed new curriculum and methodology are now being implemented in all schools and therefore that learners are receiving outcomes-based education and the corresponding assessment. This is erroneous: teachers have not received adequate training in the new methodologies and neither is their daily support sufficient for them to be able to make the transition from the previous content-orientated syllabus to outcomes-based learning. A further problem arises from the phasing out of the system of different grades for the new FET curriculum: teachers who previously avoided higher grade sections by teaching all learners on the standard grade are now compelled to teach every curriculum section, exposing areas of weakness that they previously kept hidden.

These factors combine to expose a teaching population that is generally ineffective, particularly in the case of mathematics and science teachers at under-resourced township schools. The reality is that many teachers omit sections, teach sections incorrectly, exhibit teaching practice that is not based on the philosophy supported by OBE; have no idea how to do an investigation nor design and manage a long-term project; do not assess the learners as required (their mark books reflect either a ‘trumped-up’ mark or one for an activity done by the learner where said activity will not meet the required criteria). Effective teacher and school monitoring by the DoE would highlight the myriad needs in this arena, but such monitoring is not taking place, the result of which is that teachers’ needs are not being honestly identified and addressed effectively.

The successful implementation of new policies in this fragile education climate requires initially that teachers’ knowledge and skills be upgraded “... and they realise the importance of improving their practice by means of CPD” (Lessing and de Witt,
2007, 53). However, the training programmes instituted by the DoE were not addressed at upgrading present inadequacies, but focused only on equipping teachers for the changes and furthermore “assumed a ‘one size fits all’ approach”; thus foundational teaching problems remained unattended and the process of implementation of C2005 was “hopelessly underestimated and inadequately resourced and supported” (Rogan and Grayson, 2003, 1173). These comments are echoed by Onwu and Stoffels (2005, 88) who claim that South African policy making ignores “the multiplicity of contexts and identities” and deals with issues in “generalised and homogenised ways”. Teachers require competence in constructivist and outcomes-based teaching but they do not understand these terms and have not seen them practiced; Onwu and Stoffels (2005, 89) point out that “neither have the trainers”. The result subsequently was “a considerable gap between what is intended and what is actually feasible” (Rogan and Grayson, 2003, 1175).

The participants in this study, teachers in developing contexts (at so-called “historically disadvantaged” or under-resourced township schools), are faced with considerable work stress; the challenges are faced by all South African teachers, but particularly in the under-resourced schools where their baseline competences are very poor (Rogan, 2003; Taylor et al, 1999). Joe echoes many teachers’ feelings as he describes his need for assistance: “…we need somebody from outside to come and help us because we, the family members, we are unable to help ourselves … I had no alternative as an individual, so I needed somebody who could bring a change …” He continues to describe the despondency of teachers and the school’s needs: “But the confidence of teachers, not being sure of what they are doing, not being sure the management do recognise their efforts, at the same time they are expected to do wonders in the class, but when you arrived … we wanted to see whether you will be able to turn us around in terms of attitude, in terms of injecting that spirit of hardworking, in terms of giving us a direction, in terms of giving us hope, in terms of coping with the changes that are happening in the curriculum…”

What effect did mentoring have on the teachers’ practices (if at all), as perceived by them and evidenced through investigation, and what aspect(s) of mentoring is (are) responsible for bringing about such changes? The purpose of this final chapter is to
synthesise the data obtained in the search to answer these questions, and the structure of the chapter is as follows:

- Summary of the findings to the research questions, and included in this data synthesis is further concluding comment from the teachers and mentors on mentoring;
- Implications of the findings for policy and practice and presentation of a model or theory for mentoring mathematics and science teachers in developing contexts;
- Limitations of the study are investigated;
- Significance of the study is explored;
- Conclusion.

6.2 Synthesis of the data: effect of mentoring on teachers

The effect of mentoring as an INSET strategy for teachers’ professional development will be ascertained through consideration of the changes evidenced by the teachers participating in this research. The changes will be considered in broad themes: those of the professional, personal and social development of the teachers, acknowledging however that such separation of themes obscures the fact that a change in one area may have impact in another. Acknowledging that “teachers’ perceptions of their own change may differ from their classroom practice” (Menamara, Jaworski, Rowland, Hodgen, and Prestage, 2002, 34), information obtained from their interviews was triangulated with other data sources and served to clarify the reality of the teachers’ expedited changes. Rogan and Grayson’s (2006, 41) profile of implementation provided a useful quantitative measure and was used extensively to identify professional change in many of the sub-constructs.

The research questions for this inquiry are:
Research Question 1: Are there changes in the teacher’s maths and / or science teaching practices?
Sub-questions:
  What are the teacher’s perceptions of the changes undergone in his / her own teaching practice?
What are the teacher’s observed (changes in) teaching practices?

Research Question 2: What aspects of mentoring influenced the changes (if any)?
Sub-questions:
  To what does the teacher attribute such changes?
  To what does the mentor attribute such changes?

6.2.1 Professional development of teachers

Planning and preparation
Campbell et al (2003, 348) hold that meticulous planning and preparation is an important proposition for effective practice and this standpoint is reflected in the TMP focus. The benefits of mentoring to the teachers in terms of planning, preparation and organisation appear to have been considerable, as confirmed in general by teacher testimony and mentor and researcher observation. Prior to the mentoring programme, generally teachers did neither planning (short- or long-term) nor preparation for the next day’s lessons; however it became evident that in some cases they did not know what planning meant or entailed, nor how to go about it. They therefore all required assistance in creating planners and lesson presentation and after their involvement with the programme, most have improved considerably in these aspects, recognising its importance and impact on, inter alia, self-confidence and pace of teaching and therefore syllabus completion.

The mentors show teachers how to plan, prepare and organise, follow-up regularly to see if they are coping and constantly encourage teachers to implement the new skills they have learned. Although the teachers do not immediately understand the importance of these skills and strategies, the relationship must be such that they trust the mentors that the process being advocated is vital to good teaching practice. Teachers at the start frequently complained about the “pace” of teaching and “pressure” but after a while the impact of these strategies on their teaching becomes evident and the teachers become encouraged and self-motivated. Mentor school visits also confirmed the wide-spread use of planners and good preparation amongst colleagues in the teaching fraternity. The mentors’ rationale for introducing these
strategies into the teachers’ arsenal was emphasised to the teachers as being entirely for the sake of the learners, thus representing to the teachers a different lens for contemplating and justifying their teaching practices.

Confidence in content knowledge
Teachers’ content knowledge and conceptual understanding required a great deal of support, but the needs were individual-specific and, although often highlighted by the teacher him/herself, frequently became clear only during a mentor’s observation of a lesson. All teachers believe themselves to have benefited from the mentoring process, comparing their current confidence with their teaching content with the situation prior to TMP, in which they “dodged” or omitted chapters which they did not understand, or taught from the textbook or blackboard with no understanding of the material. They attribute improvements to the mentors’ intervention and claim no subject support at the schools as other teachers and HODs have equally poor knowledge of the work.

The mentors confirm the teachers’ assessments of their current mastery of the syllabus and describe the procedure undertaken in “coaching” the teachers and teaching the work to them from a foundational level using a constructivist approach. This affords the teacher the opportunity to obtain new ideas on the topic introduction and evaluating constructivist methodology while building on his/her personal existing knowledge. Teachers benefit from this approach and in addition use it as a guide to presentation of the material to their own classes. The mentors confirm that this process demands great patience and tolerance on their part.

Sequencing lesson content and development of new knowledge from previous knowledge.
The researched teachers’ practices, in terms of probing learners’ prior knowledge and constructing new knowledge, sequencing material logically and systematically, and presenting content in a well organised, correct and well sequenced manner varied widely prior to TMP but reflected their different levels of qualification in the subject. However all teachers improved in this practice, by their own admission, mentor report and observation: two had previously made little effort at this style of presentation (one taught the sections she liked when she wished to, or started new sections “cold”
therefore being level zero on Rogan and Grayson’s (2006, 41) profile) while two who had previously attempted this approach in their daily practice (evidencing level 1 practice) subsequently improved in their strategies and techniques and general class presentation. All teachers now evidence level 1 for well-sequenced material and level 3 for probing learners’ prior knowledge and constructing new knowledge.

The mentors claim that most teachers with poor content knowledge see each section as individual parts, unlinked to the others, and hence “they just jump in” (Jean) and teach without linking it to previous appropriate knowledge; the mentors’ extensive content knowledge (of the material per grade as well as the curriculum from grade 8 through grade 12) assists them to show the teachers “where to start and where to go”.

**Effective use of period time, frequency of classroom practices and syllabus completion.**

Teachers generally did not make effective use of their classroom period time or complete the syllabus, prior to TMP: many of them omitted sections which they did not like and spent too long on sections they did like. Grade 12 teachers, however, focussed on this level due to the pressure of external grade 12 exams and generally managed to complete most of the work; lower grades received far less attention and pressure, a direct impact of the DoE focus on judging schools by their matric pass rates and a strategy which had a negative impact on learners’ foundational knowledge and mastery of their curriculum in more senior years. This exam focus limits the teachers’ implementation of any innovative practice (Zhang et al, 2003, 497; Lamie, 2002, 149).

The situation currently (post-TMP input) is different and teachers attribute the improvement in completion of syllabus to TMP support, focussing on the benefits of cycle and lesson planners, improved strategies (e.g. homework review), excellent worksheets, the mentors’ exhortations that they time their presentation strictly according to the planners and the mentors’ support with content mastery. Through this support, those teachers who initially intended to finish the syllabus but did not manage, were able to do so for the first time, while those who consciously omitted
sections had a change in attitude and also recognised the importance of completing the syllabus (Jane: “your conscience becomes clear”).

The mentors stress the need to be polite but firm in assisting teachers to work according to their planners, use a variety of good classroom practices, manage their lessons rigorously and control the period time-usage. They treat teachers with respect but do not allow skipping of sections and attempt to build in the TMP teachers an awareness of the practice of focussing on grade 12 learners only as being incorrect and unfair.

Learner-centred lessons
Although teachers generally struggle to articulate the meaning of a “learner-centred lesson”, two of the teachers acknowledge that their classes, previously autocratic and teacher-centred, now have a learner focus, recognising increased learner questioning and asking “thought-provoking questions”, as well as a new emphasis on learners’ interaction with each other and their resource material. These teachers may be said to have improved from level 1 or below to level 2 on Rogan and Grayson’s (2006, 41) profile of implementation in this regard. Another teacher’s changed approach to learner participation came about through her own gradual development and TMP input was not responsible for this, while the fourth teacher always desired a learner-centred approach but acknowledges the difficulties of holding fully learner-centred classes. This is in line with observations of other researchers in preparing the PEI report: “All indications are that these teachers have accepted the desirability of learner-centred pedagogy, but are unable to practise it” (Taylor and Vinjevold, 1999, 142).

One teacher says: “TMP helped me a lot to say there should be interaction” while the teachers acknowledge TMP help in dealings with the lower grades and the concept of OBE. Betty describes her learners’ interaction with her now as being voluntary and regular: “Ja, they question, normally, they won’t leave me…” The improvements in the TMP teachers’ interaction with learners reflects in part their improved content knowledge and presentation of the content: “Improving the conceptual knowledge of teachers … gives them the confidence … to engage children at more challenging
levels and undertake more adventurous learning tasks” (Taylor and Vinjevold, 1999, 161).

Homework procedures and controlling learners’ work
In terms of their homework strategies with the learners, two of the teachers show improvements including a larger volume of work allocated to the learners, improved monitoring and improved review processes, resulting in a greater percentage of the learners completing the work more effectively. The other two teachers show little change in these processes but their practices were adequate prior to TMP.

Discussing their improvements in this regard the teachers point to TMP - supplied resources and new strategy ideas for amount of homework, monitoring procedures, homework review and discipline. Teachers also credit TMP with demonstrating the importance of focussing on time: “we need to have a sense of urgency”.

Conducting group work
Three of the teachers did no group work at all before TMP while the other claims he did a little: however teachers believed that simply sitting their learners in groups was sufficient and led them to believe that they were thus implementing the new OBE methodology.

Subsequent to TMP support, in which the mentors generally recommended strategies for the teachers to consider in their planning, implementation, management, monitoring and assessment of group work, two of the teachers have improved to a level 2 on Rogan and Grayson’s (2006, 41) profile. These teachers plan their group work very carefully now, as Jane explains: “if you don’t plan it, it can go out of hand…” The other two have shown no improvement (one of these believes, however, that he has improved, while the other has exceptionally large classes in which meaningful group work is difficult). A teacher credits the mentors with their help in terms of how to set up the groups and their excellent resources (assessment tasks) and in fact in many cases the group activities are facilitated by the TMP-supplied tasks.
Conducting practical work

Both science teachers improved in this aspect of their practice, (originally level 1 or below on Rogan and Grayson’s (2006, 41) profile of implementation, one improved to a level 2 and the other to level 3) acknowledging that they previously undertook only demonstrations with their learners.

They do more experiments now, both because they are required to by the DoE and driven to do so by the mentor, but both attribute their improvements in such activities to the TMP support: the workshops at mentor schools in which they performed the experiments themselves and the support of the mentor in discussions on planning, methodology and monitoring of practical work as well as mentor demonstrations and classroom support. Whereas one teacher still does mostly demonstrations, he involves learners in them, for the first time allowing them to touch the apparatus. One teacher allows learners to do experiments that are not portfolio requirements and has established a system of using learners as lab assistants. Both teachers have alluded to, and demonstrated, a greatly improved understanding of the practicals and their links to scientific theory. The mentor stresses the need for teachers’ support in this regard to address the most basic issues and build up from there and to provide opportunity for the teachers to conduct the experiments themselves in a non-threatening environment.

Conducting projects and investigations

Three of the teachers had never provided their learners with projects or investigations before TMP support while one teacher admitted to giving learners activities from textbooks as projects (a strategy which he was aware was unacceptable). In some cases projects and investigations, although made compulsory by the DoE, had not been put in place because the teachers did not know what to do: how to design, plan, monitor or assess them.

In all cases the teachers now undertake projects and investigations with their learners, who thoroughly enjoy the tasks and are motivated by them. Teachers who previously did not see the value of projects and investigations have now recognised their value;
they are motivated by the quality of the TMP-supplied resource material and the fact that the learners enjoy the activities. A mentor explains that the supplied resources were appreciated by the teachers and enjoyed by the learners because they were “relevant, set in good language and thoroughly thought through” while one teacher recognises the TMP resources as being responsible for her change in attitude to this teaching strategy. However the teachers admit and mentors confirm that if it was not for TMP-designed tasks (resource material) and support in all aspects of implementation of these activities the teachers would not have begun undertaking them. In one case a teacher’s improvement in these areas hinges only on her use of the mentor’s resources and not on actual understanding of the processes of investigative projects, but in the case of the other teachers they now use investigative thinking skills and teaching approaches as a strategy in other learning topics.

The mentors claim that the teachers have been enabled in conducting projects and investigations firstly by the receipt of excellent, stimulating tasks from TMP and then by being assisted with the necessary strategies for implementing the projects with their classes. They believe that the teachers are not able to design appropriate material themselves and therefore it is essential that they receive assistance in all facets of implementing these new methodologies.

**Assessment**

Prior to TMP, teachers were only using tests and exams as assessment strategies, despite new curriculum requirements; they did not understand (and therefore did not use) rubrics and no moderating of the tests was being undertaken to ensure correct standard and balance. As a result of the mentors’ clarifications, the teachers currently understand what is required of them by the DoE in terms of the new assessment strategies and evidence changed practice in terms of type and frequency of assessment; rubric usage and design, and show improved standard of their assessment instruments. All teachers have attained level 4 practice on Rogan and Grayson’s (2006, 41) Profile of Implementation.

These changes are attributed to the mentor guidance, regular moderation of teachers’ tasks and high quality resources supplied. Mentors also devote time to discussing
CTA documents with teachers to assist them to understand the DoE requirements, helping them to plan the implementation and administration of the process and assisting them to master many of the questions themselves. Teachers also note that through improved standard of tasks set for learners (due to TMP mentors’ moderation of teachers’ material) they have become aware of learner capabilities and have increased their expectations of their learners.

The mentors stress the importance of the following in teacher improvements: high quality resources (instruments) to act as exemplars; moderate teachers’ instruments; help teachers work through DoE documents (e.g. National Curriculum Statements, CTAs) and assist them in their preparation to implement the recommendations; undertake classroom observations during assessment review sessions to become aware of where teachers make mistakes.

**Use of resource material**

Three of the four teachers supplied no notes to learners prior to TMP, due to poor school resources or “didn’t see it necessary for them to have notes” but made learners copy from the board; one teacher supplied notes but did not use other school resources available. All teachers can now be considered to be level 2 on the (Rogan, 2006, 41) Profile of Implementation and value the resources supplied by TMP for the learners who also derive benefit from them and some teachers now source other notes from elsewhere (colleagues or mentor schools) for the learners. The instruments supplied by TMP facilitate most classroom activities; their value lies in the fact that they are relevant to the learners’ lives, thought-provoking and challenging, well-planned and lucidly presented, enabling a clear understanding of what is required. The teachers also derive benefit from the extra textbooks that TMP supplies them and now are motivated such that some have purchased their own additional material to use as resources.

The mentors claim that a vital role in such a project is to compile excellent material that is stimulating and motivational for teachers and learners and most importantly to assist teachers in using all the resource material available to them: teachers frequently
do not understand their material, cannot use it and therefore their transition from the old dispensation to the new methodologies cannot be facilitated by such resources.

6.2.2 Personal development of teachers

Advocating a shift away from sole emphasis on only one aspect of teacher development, Mgetwa and Thomson (2000, 314) hold that historically, concentration has been on “what we have called the practitioner dimension much to the exclusion of the other dimensions”. They consider teacher professional development to be “the process and product of developing a fresh vision of being a teacher that can potentially enrich the experience of teaching” (313) and advocate “a conceptualisation of teacher professional development that is holistic”. They acknowledge that their definition of professional development is deliberately imprecise, recognising “being a teacher” to be a holistic state, explaining that fresh vision can be brought about by activating a number of aspects of teaching, and claiming that the fresh vision does not always guarantee “‘better’ or ‘improved’ or ‘effective’ performances”. The “practitioner dimension” of Mgetwa et al (2000) was dealt with in this study as Bell’s (1998) “professional aspects”; what follows is a summary of the exploration of the teachers’ changes in personal and social development in an attempt to visualize any teacher changes in a holistic fashion.

Self-discovery and attitude to professional self-development

All the teachers in this study declared themselves to be open to self-development from the start and embraced the changes and challenges offered by TMP, making them excellent students of the programme and subsequently skilled teachers, knowledgeable in their respective learning areas. As a result of their willingness to explore change they grew in self-confidence and belief in themselves, for which they credit the programme, and made discoveries about themselves pertaining to their ability to achieve their wishes or face challenges and regarding their worth to society.

Three of the teachers prior to TMP had nurtured a desire to further their qualifications, but before TMP input few of them had succeeded in this or even had the initiative or resolve to attempt it. However, in every case their openness to change
resulted in their embracing the professional self-development offered by the programme as a result of which they evinced improvement in most aspects of their teaching practice. Simultaneously, this successful exposure to TMP facilitated their growth in confidence, motivation and belief in themselves and as a result some embarked on study ventures part-way through the programme (one teacher credits the mentor’s support for his passing) whilst others bought additional resource material to become self-reliant and better their practice.

**Pedagogic identity**

Teachers have not previously articulated their personal beliefs or philosophy of teaching. However, their practices before TMP indicate their ideology to be initially purist as they generally taught their subjects as knowledge to be transferred. The current required approach to teaching is to see maths or science as contextualised, not immutable, and having social impact. Even though two of the teachers prior to TMP held firm beliefs about their subject’s relevance to the world of the learners, thus their philosophy tended to fallibilist, they did not reflect this in their classes: their learners were not exposed to the teachers’ thoughts in this vein either through the teachers’ verbal communication or their teaching instruments. This supports the observation of Zhang et al (2003, 488) that most teachers held two conflicting views (traditional / empirical and non-traditional / constructivist) of the nature of science simultaneously. One other teacher’s focus on maths and science was primarily towards their roles in learners’ careers and this has not changed with TMP intervention.

Subsequent to TMP, most of the teachers became more social constructivist in all of their dealings with the learners, stressing the contextualised nature of their learning areas in their classes and noting their learners’ enjoyment. This change in ideology appears to have its core in the TMP - supplied learning materials which were based on OBE principles and gave the teachers confidence in this methodology and mode of thought, while mentors helped them to understand what OBE principles and strategies meant and represented. As a result the teachers embraced the theory and principles of the new curriculum more readily and became conduits of these principles to the learners, shifting their identity from pure subject-centred ideology (basing their
teaching on pure, mathematical or scientific knowledge) to identities as agents for social change.

The mentors recognised the need for the teachers to shift from purely rigorous teaching of their subjects to teaching them for fun and an understanding of their world, as well as understanding and applying the concepts. As a result their mentoring dwelt on trying to make their learning areas real, applied and relevant to the lives of the teachers and the learners. They believe that, due to lack of previous exposure, many of the teachers were unaware of the relevance of their own subject in their, and the learners’, world and hence teachers exhibited purist principles in the teaching of their subjects. However, with TMP support, the teachers expanded the importance and relevance of the learning areas to beyond the absolute content and the subject’s career impact for the first time in the learners’ lives. TMP teachers therefore become exposed to this new ideology and philosophy whilst receiving material and emotional support to facilitate their slow transition during their reconceptualisation of their subject, from an absolutist standpoint to that of a social constructivist and hence allow their personal pedagogic identities to change to become more in line with official pedagogic identities.

**Teachers’ attitude to the teaching profession**

Some teachers have strong views on the attributes of a professional teacher, and these views, along with their understanding of professionalism, have not changed significantly through association with TMP. However, in some of these cases the teachers’ actual practices prior to TMP did not reflect their professional theorising.

They currently evidence a more professional approach and in some cases the teachers believe that their growth through TMP input has enabled them to put into practice their concepts of professional teaching practice. Whereas some teachers were despondent about their profession before, (due to changes, lack of support and negative colleagues) they now have a different perspective on teaching problems and their ability to address them successfully. Teachers are more positive about the teaching profession itself because TMP has made it easier for them to demonstrate professionalism.
Teachers’ attitude to learners

Teachers’ understanding of what it means to take responsibility for one’s learners differs. All four teachers claim that before TMP began at their schools, they believed they had to take some responsibility for the learners, but in some cases the teacher saw his/her role to be responsibility for knowledge transfer only (and in one case the teacher did not care if the learner failed as long as she had conveyed the material and therefore done her job); in one case the teacher knew (from the Principal’s admonishments) what role she should play in the learners’ passing but did not undertake this role; in some cases the teachers did not have the capacity to take full responsibility and accountability for learners passing or failing and were not prepared to go to the effort of enabling themselves.

In their own study, Ngcoza et al (2005, 2) query whether “learning opportunities created for the teachers enabled them to take more responsibility for their actions in order to improve teaching and learning of science”. The TMP study teachers are now, subsequent to their participation in the TMP, empowered to accept the mantle of responsibility for learners’ successes and failures and are becoming actively involved in both skilled transfer of knowledge to the learners as well as playing a pastoral role in the learners’ lives, thus evidencing elements of “principled practice” (Fish, 1995, 94). They feel more confident in playing a more prominent role with their learners, currently also having higher expectations of the learners and thus able to help them visualise a better future for themselves. Although some of the change seen in the teachers arose prior to TMP, growing gradually with years of teaching the learners, a large measure of the change came about through TMP as, whilst the teachers articulated a sense of personal responsibility for the learners, their lack of capacity made it difficult for them to effect such responsibility and their teaching practice therefore did not evidence their internalised professional conscience.

TMP (through the mentors) endeavours to help teachers recognise their accountability to the learners by constantly demonstrating the programme’s learner focus in all its strategies. The mentors’ constant reminder to the teachers was to focus on “What was best for the learners” and consider their learners as primary focus: when debating any
new strategy, the mentors encourage the teachers to consider its implications in light of the learners’ educational experiences of such a strategy.

6.2.3 Social development of teachers

The TMP schools generally do not offer a good climate of learning or potential or effectiveness to act as excellent learning organisations. In most TMP schools the staff does not have a shared sense of direction and are not open to change while management generally does not offer lee-way or support of individuals taking initiatives and risk. At one school the teacher was honest and claimed that the school management was open to change but only if such did not “threaten their position”. The schools did not, prior to TMP, have a trusting and collaborative climate either at whole-school or departmental level. Referring to attitudes to and working relationships with colleagues, most teachers wished to liaise with their peers prior to TMP but experienced problems with professional jealousy, HODs who could not assist them and competition between staff.

Although the general attitude from school management was not perceived to have changed in most cases, the TMP teachers in this study proved resilient and determined to change their practice and definite improvements were seen on a departmental level in two of the three schools. At none of the schools did maths and science staff previously reflect on, discuss or critically examine their practices, to see what they could improve, until receiving TMP support and guidance in this regard. There is currently a greater spirit of openness and trust among maths and science teachers than staff of other learning areas and teachers work closely with their colleagues now, evidencing a common goal: a practice that did not occur prior to TMP. This supports the claim that “mentoring brings stability amongst staff and creates a feeling of oneness” (Mohono-Mahlatsi et al, 2007, 389). One school is still not evidencing this professional growth in its maths or science departments as the HOD is unavailable and unable to help his staff and has no shared sense of direction with his department.

Note from project leader of TMP: The above comments from teachers in terms of their opinion of school management’s willingness to change and accommodate
innovation reflect, in part, my own. Although the schools were open to change in that they allowed the TMP project to take place in their schools, in fact welcomed it because they hoped to address the weaknesses in the maths and science departments, this attitude did not encompass all TMP initiatives. In many cases changes to organisational system, methodology or general approach requested by TMP to support (in fact facilitate) the mentors’ roles were not met with approval.

6.2.4 Teachers’ comments on mentoring

Discussing their relationship with their mentors, some of the teachers’ comments indicated their trust of the mentors who had a collegial relationship with them: “… like a sister … we worked harmoniously, she is so good, she assists me with everything … I trust her very much” (Betty); “… very excellent … we can relate on anything, …and even if when I’m down spiritually I would say … today I’m not feeling well but maybe after talking to you, looking at what we going to do I can be okay and I think I will cope, then she will say you will be okay, you fine, so that’s why I’m saying our relationship is fine.” (Jane)

Feiman-Nemser (1996, 3) asks for clarity on a mentor’s role and queries “what mentors should do, what they actually do, and what novices learn as a result”. When the teachers were asked what they believe the role of mentors is, having worked with them, Jane replied: “I think the role is on everything, everything in a sense of curriculum, the content, their roles is they have to know the content, the whole of it from grade 8 to grade 12, ... and planning, organisation, giving guidance where you have a problem, solutions on some sums where you have problems, er, how to relate to kids, giving you guidance on the relationship with you, with your kids, actually everything that involves class room management basically and the curriculum. So I think that would be the role.” She adds: “... their presence for me (TMP) has motivated me more than anything else”

Jill explains that she values the mentors’ visits to the school, particularly for class observations, and displays her trust of the mentor’s intentions with the class visits: “I think … the school visits are useful, especially when it comes to class observations.
Because sometimes if you are in class you feel that you are doing something correctly of which you are not, but then if somebody comes to your class and sees what is happening, and then I think that particular person she/he will help you, ...At least they are trying to guide us, that’s what I like most about the class visits of the mentors to my class. And also in the meeting, the meeting also plays a very important role, because normally you discuss your problems…. I don’t have an idea on how to approach that particular section, and normally they guide you.”

Joe touches on the mentor’s approach to assisting him with problem-solving: “...the outcomes of this mentorship, er, as individual teachers, you need to plan in such a way that at the end there’s something that you have to achieve... You can’t just sit and say I’ve got problems; you have to do something! That’s what I’ve realised about the mentors, that is the most outcome as individual.” Joe comments on the mentor’s constant positive approach and utterance of “You can do it!” indicating that the mentor does not adopt a “deficit approach” (Rogan et al, 2003, 1176) of identifying weaknesses and remediating them, but rather builds on teachers’ strengths. Joe says having TMP support makes him “feel I’m important right now”.

6.2.5 Mentors’ comments on mentoring

According to Elise and Jean, mentoring has potential to open teachers’ eyes to different aspects of their practice, including:

- The relevance of their subject, bringing it alive and putting it in context;
- Focussing their teaching on the learners;
- Eliciting enthusiasm for their own subject and for teaching, allowing them to have fun with it;
- Encouraging discipline incorporating time management and learners’ discipline;
- Teachers begin to expect more from their learners and hence the learners produce better work;
- A sense of professionalism: overall teaching responsibility in contrast to an attitude in which teaching is functional, commensurate with physically being in class and accepting the cheque at the end of the month.
These important practice-theories displayed by the mentors are frequently conveyed to the teachers intrinsically and sub-consciously, whilst dealing with more concrete daily practical issues, but the issues pointed out above play a vital role in increasing the teachers’ enjoyment of their work, improving learners’ achievements and ultimately ensuring sustainability of the changes brought about by the mentoring process.

6.3 Implications for policy and practice

6.3.1 The need for CPD for in-service mathematics and science teachers

The National Curriculum Statements envisage the following qualities of their teachers: they should be qualified, competent, dedicated and caring; they should be “mediators of learning, interpreters and designers of Learning Programmes and materials, leaders, administrators and managers, scholars, researchers and lifelong learners, community members, citizens and pastors, assessors, and subject specialists” (NCS Statements, 2003, 5).

These are demanding requirements when research into, and observation of, teaching in South Africa reveals small pools of excellence as demanded above but mostly areas of great need, suggesting that “CPD should indeed, be one of the priorities of the Department of Education (DoE) in order that teachers could be effective agents of change. Similarly, however, we conceive teachers’ CPD as an ongoing process of empowerment…” (Ngcoza et al, 2005, 1). Mathematics and science in particular are learning areas that are “vulnerable to poor instruction” (Maree et al, 2006, 230) and teachers of these subjects require support both in upgrading their baseline practices and implementing the new curriculum as the gap between the intended curriculum (policy) and implemented curriculum (practice) in South Africa is large (Hattingh et al, 2005, 21; Rogan, 2004).

Onwu and Stoffels (2005, 88), discussing current educational problems, explain the need for support of in-service teachers, referring to a paradox in the current poor learning climate: “relatively poorly qualified science teachers are a prime cause of
present problems. Yet … teachers are one of the few ways out of the problem. At the same time it is a lengthy process to produce better teachers and a hard task to retain them. In the interim what is needed is to find ways to assist practising teachers …”. South African teachers are generally under qualified for their posts and exhibit classroom practices that are not conducive to facilitating learning. However, there are no alternatives in terms of teacher re-placement so we must assist our teachers to reach their full potential within the context of their limitations.

6.3.2 The potential of mentoring as a CPD model

Would it be possible to construct a mentoring model as an effective model for professional teacher development for mathematics and science teachers in developing contexts, using the teachers’ and mentors’ voices as informants and based on good practice as recommended by literature? The research findings of this study and a new mentoring model design would serve to enrich the knowledge base in terms of teacher development strategies in developing contexts, may be used to inform the transformational process and may act as a basis for making recommendations to the DoE or NGOs for future teacher professional development programmes for in-service training.

What does the literature tell us about requirements from reform initiatives aimed at revitalising teachers’ classroom practices, and does a mentoring model fulfil these criteria? We need to “create a new ideological orientation consonant with the goals of the new South Africa” (and provide) “massive upgrading and scaffolding of teachers’ conceptual knowledge and skills” (Taylor and Vinjevold, 1999, 160); design such initiatives to meet the contextual needs of the teachers (Onwu and Stoffels, 2005, 88; Rogan, 2006, 5) and hence “distinguish between the ideal and the possible” (Rogan, 2006, 2); build on the specific needs of teachers, provide a continuous process since “isolated inputs which do not build on one another have little value for those attending the training” (Lessing and de Witt, 2007, 55) and provide monitoring and sustainability (Wheeler, 2001, cited by Lessing and de Witt, 2007, 56).
Any CPD programme should do more than address content mastery only, which was the realm of the old curriculum and methodology: it must focus on teachers’ development to facilitate their enabling their learners’ acquisition of knowledge, skills, values and attitudes (Maree, Aldous, Hattingh, Van Der Linde and Swanepoel, 2006, 230). This point is echoed by Vonk (1991, cited by de Feiter et al, 1995, 47) who defines professional development as the outcome of “a learning process ... directed at acquiring a coherent whole of the ... knowledge, insights, attitudes and repertoire a teacher needs…”

Campbell et al (2003, 352) propose that there is a problem in the development of generic, rather than differentiated, models for teacher effectiveness. They warn against identifying a general set of characteristics defining an effective teacher “as a Platonic ideal, free of contextual realities”, but rather explain that teachers may be differentially effective in different contexts and any model must be able to identify strengths and enable interactions amongst the different variables (355). This tends to point to a field-based model as offering potential for realistic and effective support.

Mentoring as a field-based INSET strategy theoretically has potential to meet all the criteria recommended in the literature as essential requirements for a CPD programme, while the data in this research and the literature point to the possible strengths of mentoring including: mentees’ acquisition of skills and knowledge; mentees obtain an improved self-image through their relationship with the mentor and they become aware of their potential for success in their teaching, while a greater spirit of openness and trust among maths and science teachers is brought about (Mohono-Mahlatsi et al, 2007, 389). Mentors are able to identify the ZFI for each individual teacher (Rogan, 2006, 8), and hence the specific scaffolding required to address the teacher’s needs, thereafter taking the teacher up the stages of Rogan’s Profile of Implementation, recognising “current reality and then build on the strengths of various components of the educational system” (Rogan and Grayson, 2003, 1176).

A mentoring model takes into account “the local context, including diversity that may exist within that context and psychological factors that influence learning and change” (Rogan et al, 2003, 1201) and is “advisory, developmental and facilitatory in
This theory of implementation for an on-site INSET programme which takes into account individual need within the developing context allows for “special attention to implementation problems, including continuous monitoring of the process and outcomes” (de Feiter et al, 1995, 53).

Feiman-Nemser (1996, 3) stresses the importance for optimal conditions in which mentoring may take place as superseding issues such as mentors being chosen / assigned or trained before / during their mentoring. In such a programme the model is based on a trusting relationship between the mentor and mentee (Sweeney, 2003, 123) and the mentor must be Duncombe and Armour’s (2004, 141) source of knowledge and experience to enlarge the school’s pool of knowledge whilst encouraging a sharing mind-set within departments or between groups of teachers, to build potential for future collaborative learning.

### 6.3.3 Mentoring as a career path for teachers

From where could mentors be sourced? Selection of mentors must include seeking excellent, experienced teachers who have a history of interaction with teachers of a range of cultures, experiences and skills. Mentors require extensive knowledge of current DoE requirements and general problem issues in the teaching fraternity and I contend that this point highlights the need to source mentors from the current teaching body, rather than from tertiary institutions, and indicates a potential for a further career path for teachers: that of a teacher-mentor.

This observation is supported in the literature: Kerry and Mayes (1995, 11) propose that lecturers can only give generalised advice, while mentor-teachers have access to the level of knowledge and experience required to give specific support to the mentee. A mentor, to be a successful instrument in aiding the teacher’s understanding of his/her environment and facilitating his/her progress, requires grounding in and understanding of a similar environment, thus suggesting that such a mentor must originate from the locale of secondary, rather than tertiary, education, to avoid Sweeney’s (2003, 123) “ivory tower mentality”.

271
A mentor teacher programme can assist in retaining capable teachers in offering greater rewards and opportunities (Feiman-Nemser, Parker and Zeichner, 1992, 1) and enrich the human resource support system offered by the DoE. This new role of teachers as mentors can be a “proper progression in the teacher’s role” (Kerry and Mayes, 1995, 2) and experienced teachers, possessing “an extensive repertoire of helping strategies” (Wildman, Magliaro, Niles and Niles, 1992), can meet the needs of teachers in their individual contexts: a role that was intended to be fulfilled in South Africa by the curriculum implementers but has not manifested as effective.

Mentors in a study of Feiman-Nemser et al (1992, 2) are described as being required to talk in a very straightforward fashion to teachers without offending them and “describe and demonstrate underlying principles of teaching and learning” (Feiman-Nemser et al, 1992, 4). In this study the mentors underwent a short (30 hour) training course but the authors comment that the nature of the course undertaken implied mentoring to have unproblematic goals, whilst it also avoided issues of diversity or teaching as an intellectual or moral activity (Feiman-Nemser et al, 1992, 6). They warn that procedural orientation of mentor training runs the risk of narrowing thinking about strategies and limiting treatment of issues (15). Whilst the mentor teachers in this study were giving support to new (induction) teachers, they were described as being in a “pattern of isolation, survival, trial-and-error learning”: a pattern not dissimilar to that faced by TMP and township teachers in developing contexts generally and hence the same lessons can be learned in terms of training strategy.

Thus mentoring roles and training strategies for mentoring cannot be rigidly specified. Teachers’ needs are individual-specific and they also change over time as the teachers progress through various stages of development; therefore the mentors’ strategies must simultaneously be modified to echo the changing needs of the teachers. Mentors, charged with the task of meeting individual teachers’ changing needs in the context of an education climate that is itself changing (particularly in the South African context), must be proactive, sensitive, flexible, dedicated, hard-working and display a sense of professionalism. However, for the teacher who becomes a mentor-teacher, the rewards include an influence in education that goes beyond simply an impact on one’s current class to a lifelong impact on other teachers’ lives and classes.
6.3.4 Mentoring themes and core functions of mentors

Most teachers in developing contexts are not sophisticated and do not have the skill or insight to reflect on their practice nor have they previously been exposed to the concept or practice of such self-reflection. Therefore assisting teachers in this task of reflecting on their practice becomes a core function of the mentor, who fills the role of guiding the teacher through contemplating and verbalising prior and present practices and attitudes to the profession, in this way encouraging the teacher to become a reflective practitioner (Fish, 1995, xi) and improving the likelihood of sustainable change.

However, such contemplation has potential to be unsettling to an unskilled teacher and the initial approach of a mentoring model should be to focus on competency-based teacher education (Fish 45, 69) and a technical rational (TR) approach to teaching as being that approach in the developing schools’ context that will show the most immediate impact on numbers of learners with improved marks.

With this technical rational approach in mind, what teaching changes should act as themes for mentoring? Having said that mentoring roles cannot be rigidly specified, this study has nonetheless identified important themes to be planning and preparation; content and conceptual knowledge; classroom practice strategies; assessment strategies and organisational strategies. Three vital threads cut across all of these themes: the requirement for the mentor to both meet individually with each teacher and to observe the teachers in their classrooms, the teachers’ lack of English language proficiency and the need to provide excellent support material for both teachers and learners.

The themes have been addressed in considerable detail in chapters 4 and 5, and are summarised in the schematic diagram on the following page. This diagram indicates the mentoring themes as core functions of the mentors, which are the essential requirements for teacher support in developing contexts as indicated by literature and the teachers themselves.
Mentoring themes and core functions of mentors

**Planning / Preparation**
Year, cycle, topic / lesson
Focus on time management

**Content and conceptual knowledge**
Sound knowledge of current teaching material
Aware of linked content in previous, following grade
Material sequencing logical, systematic

**Organisational strategies**
Timetable issues
HOD duties
Exam/test/assessment organisation
DoE requirements for above

**Assessment strategies**
Understanding terminology and practical requirements of DoE
Incorporating range of assess types
Moderating teachers’ tasks

**Classroom practice strategies and supporting instruments/material**
Learner-centred techniques, practices
Lesson presentation
Homework
Group work
Practicals
Projects, investigations
Use of resources

**Impact on values and attitudes**
Assist teacher to reflect on practice
Focus on learner as centre of educational purpose
Reconceptualisation of pedagogical identity: absolutist to fallibilist
Internalised professional conscience and personal responsibility
Arrows between themes indicate where two themes have impact on each other. Thus for example, year / cycle planning determines the pace of curriculum presentation and allows time for review of previous knowledge as well as presentation of new content; it accommodates for material presentation strategies; it must also facilitate organisational issues (e.g. timetabling, assessment structures). However, each of these items has its own core essentials and dictates to planning: it is evident, from the extent of these links, that a teacher’s task is complex, involving many parameters which all have interplay.

The most fundamental principles in improving teacher effectiveness in developing contexts / schools may be improving their planning and preparation, improving their conceptual knowledge and supplying excellent teacher and learner support material (textbooks for the former and worksheets for the latter). The learner support materials can act as powerful tools to guide classroom activities and assessments; in Rogan’s words: “well-designed, structured worksheets requiring the minimum of apparatus could be key in defining the zone for most of the teachers observed ...” (Rogan, 2006, 17).

Planning and preparation
The first theme, planning and preparation, is critical for teachers and schools in developing contexts in which there is no “sense of urgency” (Jane), teachers do not complete the syllabus and are haphazard in their approach to the curriculum. Teachers in this study (and all other teachers at the TMP schools) had never before worked with planners either for the year, cycle or topic. Mentors must be patient in their assisting the teachers to design appropriate planners, then polite but firm in assisting teachers to work according to their planners, manage their lessons rigorously and control the period time-usage. They should treat teachers with respect but not allow skipping of sections: however, it was the TMP mentors experience that, particularly in the first year of the programme, teachers were constantly behind their scheduled position in the planner and thus extensive re-planning had to be undertaken to ensure that the syllabus would be completed.
In view of the poor mastery of the curriculum by teachers in developing contexts, the theme of content and conceptual knowledge is also critical in its need to be addressed urgently. A teacher with poor knowledge of the material s/he is teaching will present lessons that are illogically and unsystematically structured, compounding the difficulties for learners in mastering the material. Nonetheless, as in the case of Joe, they may claim that their usual practice is to sequence lessons well and build on prior knowledge, as, to the best of their knowledge, they are doing so. In Joe’s case his lesson presentations improved as his content knowledge improved, he gained confidence and showed enthusiasm for integrating new methods into classes, including different introduction techniques and experiments, with the support of the mentor. He and the mentor claim that the mentoring and TMP workshops opened his eyes to the links between the different aspects of teaching (the different “themes” in this study). A repeating identifiable pattern with the teachers in this study was their increased confidence due to improvements in their subject content knowledge, which in turn impacted on many other areas of their work including general classroom practice and material presentation, implementing practicals, projects or investigations, learner interactions and planning. A vital consideration in mentoring the teachers is to make no assumption of a teacher’s understanding of the foundation concepts: the most effective strategy to implement is to work through the material with the teachers from grounding principles. This has the benefit of demonstrating to the teachers the logical sequencing of material and the links to content from the previous grade as prior knowledge, while facilitating an understanding of the need for logical and systematic lesson presentation to learners.

Classroom practice strategies
Teachers in developing contexts were in most cases learners in similar under-performing schools and have suffered from a lack of exposure to excellent classroom practice; their teacher training frequently did little to address these issues and they have few role models evidencing professional practice whom they may emulate. They are surrounded by colleagues of like background, including their HODs, and hence there is no source, within the school or community, of potential assistance. Similarly, due to lack of previous exposure, many of the teachers are unaware of the relevance
of their own subject in their, and the learners’, world and teachers exhibit purist principles in the teaching of their subjects as knowledge to be conveyed. A mentor cannot act entirely as a role model for the teachers: although the mentors may occasionally teach a small section or introduce a new topic as a point of demonstration for the teachers, the mentor is not there to do the teacher’s work for him/her. Thus, the mentor does not teach enough to become a role model for classroom practice, but another core function of the mentors is to address classroom practice strategies, incorporating those delineated in the table.

**Assessment strategies**

A typical phenomenon within developing contexts which creates implementation problems is the fact of the teachers’ imperative to teach in a language which is, at best, their second language but generally their third. This has a negative impact on a number of levels, including their lack of understanding of teacher resources or documents from the DoE. This therefore dictates a further mentoring core function: to assist the teachers in their understanding and interpretation of DoE documents (for example pertaining to curriculum or assessment) and their implementation of the embodied policies. While the DoE holds workshops to address these issues, little follow-up is put in place to ascertain the implementation of the policies.

In terms of the assessment theme for mentoring, mentors assist teachers to understand the concept of different outcomes, the variety of assessment types required and guide their compilation of balanced tests and examinations while moderating to ensure an appropriately high standard. Wallis (2008, 2) holds that a good teacher is one who has an unshakeable belief in children’s capacity to learn and teachers in this study commented on levels able to be achieved by their learners with which they had previously not challenged them. Thus a positive spin-off of TMP support is the teachers’ increased expectations of their learners.

**Supporting instruments / material**

A further impact of the teachers’ lack of efficiency with the language of instruction is that they do not have the language capabilities to compile a task or instrument that the learners will be able to access effectively and they also have little access to references
/ other resources to help in the compilation of such a task. Thus it behoves the
development model to supply support materials that are relevant to the learners’ lives,
thought-provoking and challenging, well-planned and lucidly presented, enabling a
clear understanding of what is required and, where appropriate, embodying OBE
principles. These frequently form the base for classroom activities and are as
motivational to the teachers, particularly in terms of exemplifying the importance of
their learning area to society, as they are to the learners.

Organisational strategies
The final theme for this mentoring theory is that of organisation. Apart from their
required involvement with the school timetable (initially to ensure their individual
teacher meetings are catered for but also to assist the Principal and timetable staff in
constructing the timetable to be compliant with DoE load requirements) mentors’
duties extend to assisting HODs with their roles and facilitating organisation of
school-wide assessments (as previously discussed). Many of these issues may also
fall under the mantle of the project leader. On the teacher level, mentors assist
teachers to locate and organise those resources they have and to build organisational
systems for the material received from the programme in order that the following
year’s programmes operate more smoothly.

The depth and complexity of the issues facing under-qualified, under-resourced
teachers in developing contexts confirm that there are few formats for professional
development programmes currently in practice which have the capacity to support
these teachers and allow them to maximize their potential. Many CPD strategies
address items (or themes) in isolation, ignoring the complex interplay of the themes,
thus leaving the teacher still unskilled in a number of areas and hence not allowing the
teacher to fully realise the potential of knowledge gained by participation in the CPD.

Individual teachers have specific needs and practice in unique contexts: these needs
can only be effectively identified and addressed by interfacing with the teachers over
a long period of time at their place of work, both in private meetings and during
classroom observations, while any positive impacts thus brought about can only be
sustained if the teacher support provides a continuous process of monitoring and
feedback. Inherent in the teachers’ development through the programme is their relationship with the mentor: they must believe that effecting the recommended changes will have value for them and their learners, and this bespeaks a relationship of trust and goodwill between the participants. Within such a relationship, and once the teacher sees evidence of his/her improved practice on the learners, the mentor may guide the teacher through contemplation of his/her prior practice and professional theories to facilitate an impact on more personal teacher aspects as values, attitudes and ideologies.

**Impact on values and attitudes**

Whilst mentoring provides considerable opportunity for the teachers to improve their competences, simultaneously the mentor may have an impact on the teachers’ values and attitudes, the final theme of mentoring. The mentor acts as the vehicle to start the teacher on, and guide the teacher in, reflecting on his / her own practice, slowly assimilating reflective practitioner techniques, processes and skills that the teacher may then implement independently after the mentor has moved on, providing potential for sustainability of the change (Fish, 1995, xi). The fact that three of the teachers claimed after their interviews that the actual interview process had been of value to them, and they had themselves gained from it by verbalising their experiences and being forced to think back on their prior practice, indicates the potential value of on-going, trusting personal interactions between a mentor and teacher for the development of the skills of self-reflection. In many other CPD strategies such a focus is omitted, thereby denying the potential for sustained impact.

Many teachers, prior to TMP, held strong views on various topics: for example the attributes of a professional teacher, their understanding of professionalism, their attitude to their learners and the concept of learner-centredness: however, in many of these cases the teachers’ actual practices did not reflect their theorising. This is in contrast to their current teaching practice, subsequent to their involvement with the mentoring model, which evidences more professional and conscionable practices in line with their articulations. This reveals two issues: firstly, a lack of previous exposure to honest reflective contemplation and practice resulted in articulations which probably reflected those commonly held in the staff room but were not
consciously directed to principled teaching approaches. Secondly many of the teachers’ lack of capacity made it difficult for them to effect such responsibility and principled practice, had they even wished to do so. The provision of excellent materials and specific individual support towards becoming skilled, knowledgeable teachers, in conjunction with guided self-reflection, enabled the teachers to clarify their sense of personal responsibility and put into practice the theories and principles they espoused, to evidence their internalised professional conscience.

Rogan and Grayson (2003, 1179) warn that “Professional forces (for change) will not be effective unless a sense of professionalism exists or can be developed” and this is echoed by Lamie (2002, 138) who observes that imposed change will be unsuccessful unless teachers willing to undergo personal change are supported in this endeavour. This research supports Lamie’s (2002, 146-148) observation that attitude change is not a prerequisite to practice change but an initial practice change (instituted due to mentor recommendations) actually subsequently brought about a change in attitude. However, the teacher in this case is made aware, through the mentor, of the potential value of the change (Maree and Fraser, 2004, 31). In this way experienced mentors may assist teachers to use a different lens in thinking about their teaching practices and have some influence in changing the teachers’ perspectives on their learners. Through this mentoring model teachers may be assisted to develop their own theory of professional practice, reflecting their values and beliefs related to teaching (Sweeney, 2003, 109), and be open to professional development, social development and personal development.

6.3.5 Mentoring as a change force

What is the nature of change forces, their impact and subsequent endurances? Rogan et al (2003, 1178, citing Sergiovanni) identify five different change forces: bureaucratic, personality / leadership, market driven, professional and learning community based. I purport that TMP as a mentoring model reflects characteristics of personality / leadership and professional change forces and the interplay of both forces projects the strengths of each. Thus: the former (personality / leadership) implies that it relies predominantly on the vision, drive and interpersonal skills of
strong individuals (project leader and mentors) and the “...change may not endure beyond the tenure of the leader” although changes wrought are substantive. The latter relies “on a sense of professionalism that embraces codes of conduct and standards of teaching and learning” (1178) and changes wrought are more sustainable. It is my contention that a mentoring model, although evidencing the strengths of a personality / leadership change force, is not limited in its sustainability in that, through its impact on teachers’ personal perspectives and values, it also reflects the characteristics of professional change forces, eliciting deep change in teachers’ attitudes, thus sustaining the teaching and learning changes of the personality / leadership model.

Finally, an intimate mentoring relationship facilitates further benefits to teachers on a personal level. Joe held a very strong emotional position before TMP: “before, I had a fear of chemicals...” whilst he now enjoys doing experiments; he also became significantly enabled in that he learned through the programme that he now has the ability to face challenges, achieve success and grow professionally from them. Jane’s attitude is different now from what it was prior to TMP: “… it’s different from before, altogether. Even if there’s a section that I did not enjoy, I do it with passion, with love, so it’s very different.... attitude (change) contributed and understanding the section and having someone that you know will help you if you are encountering problems, so I think that helped a lot.”

In few of the constructs or themes under consideration in this research did all teachers evidence improvement; however, all teachers reflected improvement in some of the constructs. This observation points to a critical issue: the requirement of addressing individual teachers’ needs in their different contexts. It also explains why in-service teacher professional development programmes relying on large-scale cascading models or workshops as their means of knowledge and skills transfer have generally been found to effect “little change in the teaching / learning process” (MacNeil, 2004, 3) due to the lack of acknowledgement of need for individual requirements and follow-up. However, the mentoring model should be supported by courses or workshops (Zhang et al, 2003, 498; Rogan, 2006, 22): see rationale in discussion below.
### 6.3.6 Further considerations for a mentoring model

I propose that the need to recognise individual teacher requirements in differentiated teacher contexts points to a model such as the on-site mentoring model exemplified by TMP. The design of the model is supported in literature and by the evidenced results featured in this research. A programme such as the TMP would be particularly successful under the following conditions:

- **Mathematics and science mentors are supported by a mentor for the English teachers**, since the achievements of the maths and science learners is inextricably linked with their English language proficiency;
- **Each mentor should not have more than six teachers** (if the school roll incorporates seven teaching periods, for example), to ensure he/she meets individually with each teacher during a school day;
- **The mentoring should be supported by courses or workshops which provide opportunity to address issues that pose problems to many teachers as well as opportunity for further professional interaction. The impact and implementation of the new workshop material would be monitored through the normal regular mentor visits to the schools and teachers’ classrooms.**
- **A system of “mentor schools” is put in place to allow directed and focused teacher visits. These play a valuable role in presenting further exposure to teachers of different role models, who embody the recommended mentors’ practices, while observations made at the mentor schools may be considered at guided goal-setting subject department meetings for possible incorporation into the department’s / school’s strategy;**
- **Cooperation and communication exists between the school personnel, mentors and DoE to maximise support offered by the local education District personnel. This could, for example, facilitate that all teachers are given permanent posts, to ensure continuity with the development programme, and allow education department subject and organisational officers to remain informed of the model’s activities at the schools while encouraging acceptance and support from their side;**
- **A project leader facilitates communications with the school management, DoE, mentor schools, other educational institutions and, if necessary, funding**
bodies. S/he manages the project implementation within each school
acknowledging their differing characteristics and requirements; no project of
this nature may have a static point of departure or inflexible agenda and
extensive negotiation and planning must be undertaken with school bodies for
smooth and successful implementation. A vital role of the project leader is to
set short- and long-term goals for teachers, HODs, principals and mentors and
facilitate the process to ensure that the goals are attained.

6.4 Limitations of the study

In this study, the researcher provides own limitations in view of a lack of psychology
training or experience, while the fact that the researcher is the project leader brings
potential problems of subjectivity and positive bias: the teachers may answer the
questionnaires as they believe the researcher wishes it. However, triangulation of the
information received by cross-referencing between questionnaires, interviews,
observations and mentor interviews (incorporating their own teacher observations) is
believed to limit bias and provide for trustworthiness of the data.

The time spent with each teacher was limited to the following: exploratory
corversation (30 minutes); interview (4 to 5 hours); classroom observations
(approximately 3 hours in total); follow-up interview (30 minutes). All data for this
inquiry were gathered at these sessions, except for the teacher questionnaires which
were completed by the participants at their homes.

In this inquiry the data gathering process was based on select few teachers who
experienced successful change with the programme, and therefore the study cannot be
assumed to provide findings that are generalisable to all teachers being mentored: they
are not “accounts of the whole” (Merriam, 1998, 42). Case studies, however, have
their principal strength lying in their descriptive power and are not “intended to
provide a basis for drawing general conclusions about the schooling system” (Bassey,
It has been mooted that case studies may “… provide convincing demonstrations of change” but that “(a)ttributing such changes particular to interventions is highly problematic” (Bassey, 1995, cited by Taylor and Vinjevold, 1999, 75). Thus no definitive list of improved practice behaviours can be compiled for this model which could with certainty be attributed to the model or be used to bring about sustainable change in the practice of all teachers becoming involved with similar models: the nature of teaching throws the teacher into a large diversity of complex situations and interactions with others, individuals and groups.

However, the findings will provide information on what teachers say about mentoring, what mentors say about mentoring and hence may feasibly be used to synthesise a guideline or basic start-point for identifying elements of a CPD programme with potential to effectively and sustainably address issues of teaching at under-resourced schools. One may extract those elements that may have transferability and that can possibly be extended to other settings.

6.5 Significance of the study

This study can offer a significant contribution to the following fields of research in which there is a gap in the knowledge base:

- There are relatively few research papers on INSET in the South African context, specifically a developing context; this study may serve to support the theories put forward in these papers and enrich the knowledge base in the area of teachers with poor academic background who are situated in unsupportive schools. Very little research has been done in schools that are at a very low level of performance, as are the TMP schools, so this research will have value in that it addresses an under-represented group.

- “In recent years, education research in South Africa has tended to focus on policy aspects, where it was inclined towards the normative (what should be). Research of an investigative nature (which models might best embody
particular values) or evaluative nature (which models work best under specific conditions) have been relatively neglected” (Taylor and Vinjevold, 1999, 5). This research has an investigative nature and as such may contribute to a field which is under-researched.

- Literature provides extensive coverage on mentoring new (beginning or induction) teachers and pre-service (student) teachers, but little on mentoring those teachers who have already been in the profession for some years, particularly in schools that are under-resourced and under-achieving. Thus a study providing a window into the practice of mentoring as a professional development strategy for experienced maths and science teachers in historically under-resourced schools has potential to inform where there are existing gaps in such knowledge.

The research findings of this study may be used to inform policy on the transformational process and act as a basis for making recommendations to the DoE or NGOs for the practice strategies of future teacher professional development programmes for in-service training. Certainly, this research can result in a tentative hypothesis for future research.

6.6 Conclusion

This research study considered the effect of individual mentoring on secondary school mathematics and science teachers in developing contexts. It explored the impact of this teacher support model on their professional, personal and social development, as perceived by them and as confirmed by observation, their mentors’ testimonies and other research strategies. Triangulation between the different research approaches served to validate the findings and confirm their trustworthiness.

Using the voices from literature and the teachers and mentors, a model for professional teacher development has been proposed that has potential for both broad and deep sustainable change. This model employs an “inside-out” format (Taylor et al, 2003, 4), in which the strategy focuses on support activities within the school and
may be specifically tailored to the needs of the school and teachers, addressing the individual as essence to improvement within the school context. Such a theoretical model may provide a window into the practice of mentoring as a professional development strategy for experienced maths and science teachers in historically under-resourced schools in developing contexts and has potential to inform where there are existing gaps in such knowledge.

I purport that the model exemplified by TMP exhibits theory that is supported by the literature while its practice, as exemplified by the teachers in this study, has potential to bring about sustainable change in teaching.

Joe was asked: “Are there any aspects of the programme that have been of long term benefit for you?” He responded: “You know, I don’t know what is going to happen tomorrow, but I think the confidence that I’m feeling right now, to me it’s an asset, it will last forever and because of that I will be able to utilise it even if mentors have part ways with me.”
References


TMP Funding Proposal 2007, University of Pretoria, South Africa.


TMP Report 2006, University of Pretoria, South Africa.


APPENDIX 1   TMP matric results & learner numbers applying to study SET

Matric Results

Grade 12 results are frequently used as a reflection of the state of education in a school as a whole, but this vision is limiting: in some schools there is enormous improvement in lower grades which may sometimes be negated as the learners meet particularly weak teachers further up the grades, while in others there appears to be a policy of completely ignoring the lower grades and putting extensive after-hours work into matriculants (who have a poor foundation). However, grade 12 results indicate potential learners for further study in SET fields, a particular TMP focus.

Matric Results at TMP Schools: 2003 to 2006

<table>
<thead>
<tr>
<th>Subject / Year</th>
<th>Entries</th>
<th>Pass %</th>
<th>A B C D Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths HG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>18</td>
<td>67</td>
<td>6</td>
</tr>
<tr>
<td>2004</td>
<td>36</td>
<td>64</td>
<td>6</td>
</tr>
<tr>
<td>2005</td>
<td>30</td>
<td>80</td>
<td>7</td>
</tr>
<tr>
<td>2006</td>
<td>24</td>
<td>92</td>
<td>6</td>
</tr>
<tr>
<td>Maths SG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>269</td>
<td>50</td>
<td>52</td>
</tr>
<tr>
<td>2004</td>
<td>321</td>
<td>40</td>
<td>41</td>
</tr>
<tr>
<td>2005</td>
<td>475</td>
<td>49</td>
<td>74</td>
</tr>
<tr>
<td>2006</td>
<td>281</td>
<td>52</td>
<td>103</td>
</tr>
<tr>
<td>Science HG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>28</td>
<td>71</td>
<td>3</td>
</tr>
<tr>
<td>2004</td>
<td>44</td>
<td>73</td>
<td>13</td>
</tr>
<tr>
<td>2005</td>
<td>35</td>
<td>89</td>
<td>7</td>
</tr>
<tr>
<td>2006</td>
<td>36</td>
<td>94</td>
<td>11</td>
</tr>
<tr>
<td>Science SG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>156</td>
<td>88</td>
<td>38</td>
</tr>
<tr>
<td>2004</td>
<td>188</td>
<td>79</td>
<td>29</td>
</tr>
<tr>
<td>2005</td>
<td>253</td>
<td>89</td>
<td>52</td>
</tr>
<tr>
<td>2006</td>
<td>185</td>
<td>84</td>
<td>32</td>
</tr>
</tbody>
</table>

The main aspects to note are improved HG pass rates (the drop in SG pass rate in the first year possibly reflects the top students having changed to HG study) and increased numbers of A, B, C, D symbols (requirements for potential to further study...
at a tertiary level; however it is argued that the SG learners achieving high symbols should have been studying the subject on the HG, but their teachers would not allow it).

Matriculants applying to study in SET fields

The increase in numbers of applicants to study SET courses at UP from 2002 to 2007 is indicated in the graph alongside. In 2002 there were no applicants for SET fields from these schools, but after TMP introduced some of the motivational programmes from the end of 2003 these numbers increased, although the numbers applying to UP are still very small (due to requirements for maths and science on the higher grade). Note that these stats do not reflect those learners who have chosen to study at other universities other than UP, or other courses at UP.

The increase in numbers of students accepted to TUT from 2003 to 2007 is indicated (2002 stats not available). The green indicates total numbers of accepted students from the TMP schools (i.e. studying all fields) while the red shows those accepted to study in STEM fields (the latter however do not include business fields, and only those B Tech students studying in fields of sciences were included).
It is apparent that the numbers studying at TUT are far higher than those at UP (top graph) and from the start of the TMP programme the numbers of learners motivated to apply to study increased, both for STEM fields and other areas of study.
### APPENDIX 2  Example of Profile of Implementation for science classroom

**Rogan, 2006**

<table>
<thead>
<tr>
<th>Level</th>
<th>Classroom interaction</th>
<th>Science Practical Work</th>
<th>Science in Society</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Teacher:</strong> Presents content in a well organised, correct and well sequenced manner, based on a well designed lesson plan. Provides adequate notes. Uses textbook effectively. Engages learners with questions. <strong>Learners:</strong> Stay attentive and engaged. Respond to and initiate questions.</td>
<td>Teacher uses classroom demonstrations to help develop concepts. Teacher uses specimens found in the local environment to illustrate lessons.</td>
<td>Teacher uses examples and applications from everyday life to illustrate scientific concepts. Learners ask questions about science in the context of everyday life.</td>
<td>Written tests are given that cover the topic adequately. While most questions are of the recall type, some require higher order thinking. Tests are marked and returned promptly.</td>
</tr>
<tr>
<td>2</td>
<td><strong>Teacher:</strong> Textbooks are used along with other resources. Engages learners with questions that encourage in depth thinking. <strong>Learners:</strong> Use additional (to text book) sources of information in compiling notes. Engage in meaningful group work. On own initiative, offer a contribution to the lesson.</td>
<td>Teacher uses demonstrations to promote a limited form of inquiry. Some learners assist in planning and performing the demonstrations. Learners participate in closed (cook-book) practical work. Learners communicate data using graphs and tables.</td>
<td>Teacher bases a lesson (or lessons) on a specific problem or issue faced by the local community. Teacher assists learners to explore the explanations of scientific phenomena by different cultural groups.</td>
<td>Written tests include at least 50% of the questions that require comprehension, application and analysis. Some of the questions are based on practical work.</td>
</tr>
<tr>
<td>3</td>
<td><strong>Teacher:</strong> Probes learners’ prior knowledge. Structures learning activities along “good practice” lines (knowledge is constructed, is relevant, and is based on problem solving techniques.) Introduces learners to the evolving nature of scientific knowledge. <strong>Learners:</strong> Engage in minds-on learning activities. Make own notes on the concepts learned from doing these activities.</td>
<td>Teacher designs practical work in such a way as to encourage learner discovery of information. Learners perform ‘guided discovery’ type practical work in small groups, engaging in hands-on activities. Learners can write a scientific report in which they can justify their conclusions in terms of the data collected.</td>
<td>Learners actively investigate the application of science and technology in their own environment, mainly by means of data gathering methods such as surveys. Examples here might include an audit of energy use or career opportunities that require a scientific background.</td>
<td>Written tests include questions based on seen or unseen ‘guided discovery’ type activities. Assessment is based on more than written tests. Other forms of assessment might include: reports on activities undertaken; creation of charts and improvised apparatus; reports on extra reading assignments.</td>
</tr>
<tr>
<td>4</td>
<td><strong>Learners:</strong> Take major responsibility for their own learning; partake in the planning and assessment of their own learning. Undertake long term and community-based investigations projects. <strong>Teacher:</strong> Facilitates learners as they design and undertake long-term investigations and projects. Assists learners to weigh up the merits of different theories that attempt to explain the same phenomena.</td>
<td>Learners design and do their own ‘open’ investigations. They reflect on the quality of the design and collected data, and make improvements. Learners can interpret data in support of competing theories or explanations.</td>
<td>Learners actively undertake a project in their local community in which they apply science to tackle a specific problem or to meet a specific need. An example might be on growing a new type of crop to increase the income of the community. Learners explore the long term effects of community projects. For example, a project may have a short-term benefit but result in long term detrimental effects.</td>
<td>Performance on open investigations and community-based projects are included in the final assessment. Learners create portfolios to represent their ‘best’ work.</td>
</tr>
</tbody>
</table>
## APPENDIX 3

### Year planner for TMP schools

<table>
<thead>
<tr>
<th></th>
<th>TERM 1</th>
<th>TERM 2</th>
<th>TERM 3</th>
<th>TERM 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>JANUARY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Su</td>
<td>1</td>
<td>2</td>
<td>1 Day 3</td>
<td>Day 4</td>
</tr>
<tr>
<td>Mo</td>
<td></td>
<td>Day 7</td>
<td>Day 6</td>
<td></td>
</tr>
<tr>
<td>Tu</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>We</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Th</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Fr</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sa</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Su</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td><strong>FEBRUARY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mo</td>
<td>3</td>
<td>7</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Tu</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>We</td>
<td>5</td>
<td>9</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Th</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Fr</td>
<td>7</td>
<td>11</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Sa</td>
<td>8</td>
<td>12</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Su</td>
<td>9</td>
<td>13</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td><strong>MARCH</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mo</td>
<td>10</td>
<td>14</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Tu</td>
<td>11</td>
<td>15</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td><strong>APRIL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mo</td>
<td>12</td>
<td>16</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Tu</td>
<td>13</td>
<td>17</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Fr</td>
<td>14</td>
<td>18</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>Su</td>
<td>15</td>
<td>19</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Mo</td>
<td>16</td>
<td>20</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>Tu</td>
<td>17</td>
<td>21</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>We</td>
<td>18</td>
<td>22</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>Th</td>
<td>19</td>
<td>23</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Fr</td>
<td>20</td>
<td>24</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>Sa</td>
<td>21</td>
<td>25</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Su</td>
<td>22</td>
<td>26</td>
<td>22</td>
<td>24</td>
</tr>
<tr>
<td>Mo</td>
<td>23</td>
<td>27</td>
<td>23</td>
<td>25</td>
</tr>
<tr>
<td>Tu</td>
<td>24</td>
<td>28</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>We</td>
<td>25</td>
<td>29</td>
<td>25</td>
<td>27</td>
</tr>
<tr>
<td>Th</td>
<td>26</td>
<td>30</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Fr</td>
<td>27</td>
<td>31</td>
<td>27</td>
<td>29</td>
</tr>
<tr>
<td>Sa</td>
<td>28</td>
<td>30</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>Su</td>
<td>29</td>
<td>31</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>Mo</td>
<td>30</td>
<td>31</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td><strong>MAY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mo</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
</tr>
</tbody>
</table>
**APPENDIX 4   TMP Educator report form**

**Teacher’s self-assessment**

3. Please rate yourself in terms of the following teaching aspects:

<table>
<thead>
<tr>
<th>Teaching Aspect</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle planning</td>
<td>Not done at all</td>
<td>Done halfheartedly, don’t see the need</td>
<td>Planning done but sometimes struggle to keep up</td>
<td>Planning done according to work schedule and keeping up with it</td>
<td></td>
</tr>
<tr>
<td>Lesson preparation</td>
<td>Go into the classroom unprepared</td>
<td>Quickly reading through the work before the lesson or while the learners are already waiting</td>
<td>Well planned lesson presented without interruption caused by disorganisation</td>
<td>Lesson planned well in advance, where activities run exactly according to plan with all LTSM available</td>
<td></td>
</tr>
<tr>
<td>Subject knowledge</td>
<td>Inadequate for the sections taught</td>
<td>Still have some uncertainties</td>
<td>Good command of the sections taught</td>
<td>Good command of the sections taught with a profound knowledge of the subject matter</td>
<td></td>
</tr>
<tr>
<td>Lesson presentation</td>
<td>Unenthusiastic, disorganised and boring presentation</td>
<td>Presentation teacher centred (chalk &amp; talk)</td>
<td>Good presentation where the teacher uses more than one teaching technique</td>
<td>Inspiring way of teaching which captivates and motivates the learners</td>
<td></td>
</tr>
<tr>
<td>Control of learners’ work</td>
<td>Don’t ever control the learners’ work</td>
<td>Very seldom get round to controlling books</td>
<td>Books are checked regularly with necessary follow up</td>
<td>Have systems in place to make controlling of work easy and less tedious</td>
<td></td>
</tr>
<tr>
<td>Learner discipline</td>
<td>Learners are not being disciplined: latecomers are not reprimanded, high noise levels and learners are allowed to walk in and out as they wish</td>
<td>Learners are sometimes behaved but are still able to manipulate the teacher</td>
<td>Learners are generally well behaved with an occasional spurt of noise, learners asking permission to leave if they need to</td>
<td>The educator manages to maintain good discipline until the end of the lesson</td>
<td></td>
</tr>
<tr>
<td>Learner participation</td>
<td>The learners are passive and show no interest in the lesson and are also not encouraged to participate in the lesson</td>
<td>Educator mostly asks closed-ended questions and learners ask simple questions only</td>
<td>Educator asks thought provoking questions which encourages the learners to answer and participate</td>
<td>Learners are being encouraged to think creatively and to initiate discussions</td>
<td></td>
</tr>
<tr>
<td>Classroom time management</td>
<td>Not enough work is done in one period</td>
<td>To much time is used discussing homework and to few activities leading to new homework are done</td>
<td>The time is used productively to discuss homework, introduce new work and give homework</td>
<td>Productive use of time according to the work schedule (correct pace) — discuss homework, introduce new work and give homework</td>
<td></td>
</tr>
<tr>
<td>Identification of barriers</td>
<td>Not able to identify any barriers</td>
<td>Able to identify the most obvious barriers such as physical disabilities</td>
<td>Able to identify barriers such as learning and physical disabilities, systemic barriers, severe poverty, behavioural problems etc.</td>
<td>Able to also identify deep-rooted problems such as abuse, HIV, gender bias etc.</td>
<td></td>
</tr>
<tr>
<td>Classroom atmosphere</td>
<td>Non-co-operative or tense</td>
<td>Relaxed but idle atmosphere</td>
<td>Relaxed, positive and industrious</td>
<td>Relaxed, positive and industrious, learners feel safe and encouraged to express themselves</td>
<td></td>
</tr>
<tr>
<td>Progress with portfolios</td>
<td>Far behind with portfolio work</td>
<td>Portfolio work done but not marked or checked that all learners have done it</td>
<td>All portfolio work for the term completed by everyone and marked</td>
<td>Portfolio work done and future items planned and ready</td>
<td></td>
</tr>
<tr>
<td>LTSM</td>
<td>LTSM inadequate</td>
<td>Some LTSM available</td>
<td>All necessary LTSM available</td>
<td>Educator has collected extra LTSM to extend what is available</td>
<td></td>
</tr>
</tbody>
</table>
# TEACHER MENTORSHIP PROGRAMME

**Educator Report: Physical Science**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Grade:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## 1. Please list the experiments you have attempted with your learners during the last term.

Please rate the experiments according to the following scale:

1 - Difficult to do;       2 - Easy to perform;     3 - Not worthwhile; 4 - Rewarding

(each experiment may have two codes)

Please comment in the space below and/or describe any problems encountered.

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Code/s</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## 2. Please rate the TMP assistance you have received in the previous term according to the following scale:

1 - The assistance has not met my expectations.
2 - The assistance has been adequate, but not covered the sections I need
3 - The assistance has been good, but I still need more help in certain aspects
4 - The assistance has been excellent, and covering all my problem areas

<table>
<thead>
<tr>
<th>Assistance with aspect</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching methodology/skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classroom interaction with learners</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learner discipline and monitoring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the above responses, please specify what your further needs are:
1. Please list the performance tasks you have attempted with your learners during the last term. Please rate the experiments according to the following scale:
   1 - Difficult to do;  2 - Easy to perform;  3 - Not worthwhile;  4 - Rewarding
   (each task may have two codes)
   Please comment in the space below and/or describe any problems encountered.

<table>
<thead>
<tr>
<th>Performance Task</th>
<th>Code/s</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Please rate the TMP assistance you have received in the previous term according to the following scale:
   1 - The assistance has not met my expectations.
   2 - The assistance has been adequate, but not covered the sections I need
   3 - The assistance has been good, but I still need more help in certain aspects
   4 - The assistance has been excellent, and covering all my problem areas

<table>
<thead>
<tr>
<th>Assistance with aspect</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching methodology/skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classroom interaction with learners</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learner discipline and monitoring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the above responses, please specify what your further needs are:
APPENDIX 5  Teacher questionnaire: General information

TEACHER QUESTIONNAIRE
SECTION A: GENERAL INFORMATION

<table>
<thead>
<tr>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>School:</td>
</tr>
</tbody>
</table>

Personal Details

Please answer each question by drawing a CROSS (X) in the box or write your answer in the space provided

1. How old are you?

<table>
<thead>
<tr>
<th>Under 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 – 29</td>
</tr>
<tr>
<td>30 – 39</td>
</tr>
<tr>
<td>40 – 49</td>
</tr>
<tr>
<td>50 – 59</td>
</tr>
<tr>
<td>60 or more</td>
</tr>
</tbody>
</table>

2. What language do you speak mostly at home?

<table>
<thead>
<tr>
<th>Afrikaans</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
</tr>
<tr>
<td>isiNdebele</td>
</tr>
<tr>
<td>isiXhosa</td>
</tr>
<tr>
<td>isiZulu</td>
</tr>
<tr>
<td>Sepedi</td>
</tr>
<tr>
<td>Sesotho</td>
</tr>
<tr>
<td>Setswana</td>
</tr>
<tr>
<td>Siswati</td>
</tr>
<tr>
<td>Tshivenda</td>
</tr>
<tr>
<td>Xitsonga</td>
</tr>
</tbody>
</table>

3. Teacher’s professional training

Indicate all your professional teaching qualifications:

<table>
<thead>
<tr>
<th>Further Diploma in Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Certificate in Education</td>
</tr>
<tr>
<td>Primary Teaching Certificate (PTC)</td>
</tr>
<tr>
<td>Senior Teaching Certificate (STC)</td>
</tr>
<tr>
<td>3 year College of Education Diploma</td>
</tr>
<tr>
<td>4 year College of Education Diploma</td>
</tr>
<tr>
<td>Technikon Diploma</td>
</tr>
<tr>
<td>Higher Diploma in Education/ Postgraduate Certificate in Education</td>
</tr>
</tbody>
</table>
What is your highest academic qualification in Mathematics?

<table>
<thead>
<tr>
<th>Lower than Grade 12/ Std. 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 12 / Std. 10</td>
</tr>
<tr>
<td>College of Education Diploma</td>
</tr>
<tr>
<td>Year 1</td>
</tr>
<tr>
<td>Year 2</td>
</tr>
<tr>
<td>Year 3</td>
</tr>
<tr>
<td>Year 4</td>
</tr>
<tr>
<td>University</td>
</tr>
<tr>
<td>Year 1</td>
</tr>
<tr>
<td>Year 2</td>
</tr>
<tr>
<td>Year 3</td>
</tr>
<tr>
<td>Honours</td>
</tr>
<tr>
<td>Masters</td>
</tr>
<tr>
<td>Doctorate</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

What is your highest academic qualification in Physics?

<table>
<thead>
<tr>
<th>Lower than Grade 12/ Std. 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 12 / Std. 10</td>
</tr>
<tr>
<td>College of Education Diploma</td>
</tr>
<tr>
<td>Year 1</td>
</tr>
<tr>
<td>Year 2</td>
</tr>
<tr>
<td>Year 3</td>
</tr>
<tr>
<td>Year 4</td>
</tr>
<tr>
<td>University</td>
</tr>
<tr>
<td>Year 1</td>
</tr>
<tr>
<td>Year 2</td>
</tr>
<tr>
<td>Year 3</td>
</tr>
<tr>
<td>Honours</td>
</tr>
<tr>
<td>Masters</td>
</tr>
<tr>
<td>Doctorate</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

What is your highest academic qualification in Chemistry?

<table>
<thead>
<tr>
<th>Lower than Grade 12/ Std. 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 12 / Std. 10</td>
</tr>
<tr>
<td>College of Education Diploma</td>
</tr>
<tr>
<td>Year 1</td>
</tr>
<tr>
<td>Year 2</td>
</tr>
<tr>
<td>Year 3</td>
</tr>
<tr>
<td>Year 4</td>
</tr>
<tr>
<td>University</td>
</tr>
<tr>
<td>Year 1</td>
</tr>
<tr>
<td>Year 2</td>
</tr>
<tr>
<td>Year 3</td>
</tr>
<tr>
<td>Honours</td>
</tr>
<tr>
<td>Masters</td>
</tr>
<tr>
<td>Doctorate</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>
4  Teaching Experience

How many years will you have been teaching by the end of this school year?

<table>
<thead>
<tr>
<th>Teaching</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>In total</td>
<td></td>
</tr>
<tr>
<td>At your current school</td>
<td></td>
</tr>
</tbody>
</table>

For how many years have you taught the following?

<table>
<thead>
<tr>
<th>Teaching</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics at a junior secondary level (Grades 8, 9)</td>
<td></td>
</tr>
<tr>
<td>Mathematics at a senior secondary level (Grades 10, 11 and 12)</td>
<td></td>
</tr>
<tr>
<td>Natural (or general) science</td>
<td></td>
</tr>
<tr>
<td>Physical Science</td>
<td></td>
</tr>
<tr>
<td>Geology (Earth science)</td>
<td></td>
</tr>
<tr>
<td>Geography</td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td></td>
</tr>
<tr>
<td>Biology/Life sciences</td>
<td></td>
</tr>
<tr>
<td>Other subjects (specify)</td>
<td></td>
</tr>
</tbody>
</table>

5  Home

How far from your school do you live?

<table>
<thead>
<tr>
<th></th>
<th>0 – 5km</th>
<th>6 – 20km</th>
<th>21 – 50km</th>
<th>More than 50km</th>
</tr>
</thead>
</table>

6  Language proficiency

In your class, what language do you usually speak when you ask a question to your learners?

- Always English
- Most of the time English
- Sometimes English
- Language I speak at home

When you explain a new (or difficult) topic, what language do you speak?

- Always English
- Most of the time English
- Sometimes English
- Language I speak at home
7 Mentor

What is the nature of the support given to you by your mentor? Place a cross (X) in each appropriate block.

<table>
<thead>
<tr>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly/ cyclic</td>
</tr>
<tr>
<td>Individual meetings</td>
</tr>
<tr>
<td>Visits to classroom</td>
</tr>
<tr>
<td>Supply of teaching and learning support materials</td>
</tr>
<tr>
<td>Discussion of materials</td>
</tr>
<tr>
<td>Within-classroom support of curriculum implementation</td>
</tr>
<tr>
<td>Classroom demonstrations (e.g. team teaching with teacher)</td>
</tr>
<tr>
<td>Telephone conversations</td>
</tr>
<tr>
<td>Other, please specify</td>
</tr>
</tbody>
</table>

8 Instructional leadership

With the leadership of Head of Department / Subject head / Principal, how often are subject meetings held?

<table>
<thead>
<tr>
<th>Before TMP</th>
<th>Present practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td></td>
</tr>
<tr>
<td>Once a year</td>
<td></td>
</tr>
<tr>
<td>Once a term</td>
<td></td>
</tr>
<tr>
<td>Once a month</td>
<td></td>
</tr>
</tbody>
</table>

SECTION B

MATHEMATICS TEACHERS

In this section, I would like to ask you specifically about teaching mathematics. If you teach mathematics in grades 8-12, please complete this section. If you DO NOT teach mathematics, please proceed to Section C and complete the section on science teaching.

9 Which of the following grades do you teach mathematics this year? (Please indicate with a cross (X) all grades that you are teaching mathematics.)

<table>
<thead>
<tr>
<th>Mathematics taught to</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 7</td>
<td></td>
</tr>
<tr>
<td>Grade 8</td>
<td></td>
</tr>
<tr>
<td>Grade 9</td>
<td></td>
</tr>
<tr>
<td>Grade 10</td>
<td></td>
</tr>
<tr>
<td>Grade 11</td>
<td></td>
</tr>
<tr>
<td>Grade 12</td>
<td></td>
</tr>
</tbody>
</table>
10 Language of instruction

In general, how proficient are the learners in your mathematics classes in the language of learning?
(Select one)

<table>
<thead>
<tr>
<th>Language</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Not proficient</td>
<td></td>
</tr>
<tr>
<td>Somewhat proficient</td>
<td></td>
</tr>
<tr>
<td>Proficient</td>
<td></td>
</tr>
</tbody>
</table>

When you explain or introduce a difficult topic in mathematics what language do you use in your mathematics classes?

<table>
<thead>
<tr>
<th>Language</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Home language of learners</td>
<td></td>
</tr>
<tr>
<td>Language of learning some of the time</td>
<td></td>
</tr>
<tr>
<td>Language of learning most of the time</td>
<td></td>
</tr>
<tr>
<td>Language of learning all the time</td>
<td></td>
</tr>
</tbody>
</table>

11 Mathematical Classroom Practice

A list of practices is given below (next page), all of which have merit. The aim of this question is to determine which of these practices you use now / used before you became involved with TMP and how frequently you might use them.

After each statement please place a cross in the blocks corresponding to the correct frequency, for your teaching both before TMP and your present teaching practice.

1 = Never
2 = Once a term
3 = Up to three times a term
4 = Once a week
5 = Every day
<table>
<thead>
<tr>
<th>Practices related to teaching mathematics</th>
<th>Frequency of use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before TMP</strong></td>
<td><strong>Present Practice</strong></td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>a Learners do drill and practice exercises to consolidate the learning of concepts and to master various skills. (E.g. Completing an exercise on multiplication of integers.)</td>
<td></td>
</tr>
<tr>
<td>b Learners follow worked examples demonstrated by the teacher and then do some calculations on their own using the demonstrated example. (E.g. Learners copy an example from the board and then try an exercise from the textbook on their own or in groups.)</td>
<td></td>
</tr>
<tr>
<td>c Learners are given opportunities to negotiate meaning. (E.g. They discuss their understanding of concepts and strategies for solving problems with each other and the teacher.)</td>
<td></td>
</tr>
<tr>
<td>d Learners engage in solving contextual problems related to their lives that require them to interpret a problem and then find a suitable mathematical solution. (E.g. Learners are asked to work out which taxi service is the cheapest given the fares they charge and the distance they want to travel.)</td>
<td></td>
</tr>
<tr>
<td>e Learners engage in solving problems of a purely mathematical nature, which require higher order thinking and application of knowledge. (E.g. Drawing a graph they have not yet been given a specific technique on how to draw (for example a parabola), but have learnt to use the table method to draw straight-line graphs)</td>
<td></td>
</tr>
<tr>
<td>f Learners work together as a group to investigate or solve a mathematical problem. (E.g. A group is given the task of working together to solve a problem that requires them investigating patterns and working through data to make conjectures and find a formula for the pattern.)</td>
<td></td>
</tr>
<tr>
<td>g Learners are shown and required to represent situations in various but equivalent ways. (E.g. Learners represent data using a graph, a table and a formula to represent the same data.)</td>
<td></td>
</tr>
<tr>
<td>h Learners are given opportunities to see the interrelatedness of the mathematics they learn, i.e. how the different outcomes are related and connected. (E.g. In working through geometry problems, learners are encouraged to make use of algebra.)</td>
<td></td>
</tr>
<tr>
<td>i Learners individually do mathematical investigations in class guided by the teacher where necessary. (E.g. Each learner is given a paper containing the mathematical problem (for instance to find the number of prime numbers less than 100) that needs to be investigated and the solution needs to be written up. Learners work independently.)</td>
<td></td>
</tr>
</tbody>
</table>
12 Assessment Strategies

What assessment strategies have you applied and how often? Place a cross (X) in the block, for your teaching both now and previously.

<table>
<thead>
<tr>
<th></th>
<th>Before TMP</th>
<th>Present Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daily</td>
<td>Weekly</td>
</tr>
<tr>
<td>Tests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homework</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assignments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investigations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Examinations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION C

SCIENCE TEACHERS

In this section, we would like to ask you specifically about teaching Natural, Physical Science and / or Biology / Life Sciences. If you teach these subjects in grades 8-12, please complete this section.

9 Teaching Experience

How many years will you have been teaching the following learning areas / subjects at the end of this school year?

<table>
<thead>
<tr>
<th></th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural (or general) science?</td>
<td></td>
</tr>
<tr>
<td>Physical science?</td>
<td></td>
</tr>
<tr>
<td>Geology (Earth science)?</td>
<td></td>
</tr>
<tr>
<td>Geography?</td>
<td></td>
</tr>
<tr>
<td>Agriculture?</td>
<td></td>
</tr>
<tr>
<td>Biology/Life sciences?</td>
<td></td>
</tr>
<tr>
<td>Mathematics education?</td>
<td></td>
</tr>
<tr>
<td>Technology education?</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>
Which of the grades indicated below are you teaching Natural science this year?

<table>
<thead>
<tr>
<th>Natural science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 7</td>
</tr>
<tr>
<td>Grade 8</td>
</tr>
<tr>
<td>Grade 9</td>
</tr>
</tbody>
</table>

For which grades indicated below are you teaching Physical science this year?

<table>
<thead>
<tr>
<th>Physical science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 10</td>
</tr>
<tr>
<td>Grade 11</td>
</tr>
<tr>
<td>Grade 12</td>
</tr>
</tbody>
</table>

10 Language proficiency

In general, how proficient are the learners in your science classes in the language of learning?
(Select one)

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Not proficient</td>
</tr>
<tr>
<td>Somewhat proficient</td>
</tr>
<tr>
<td>Proficient</td>
</tr>
</tbody>
</table>

When you explain or introduce a difficult topic in science what language do you use in your classes?

| Home language of learners | Language of learning some of the time | Language of learning most of the time | Language of learning all the time |

11 Classroom practices

Several lists of practices are given below, all of which have merit. The aim of these questions are to determine firstly which of these practices you used before TMP / use presently, and then how frequently you might use them. Please note that the examples given are not necessarily representative of the subject / learning area that you teach.

After each statement please place a cross in the blocks corresponding to the correct frequency, for your teaching both before TMP and your present teaching practice.

1 = Never
2 = Once a term
3 = Up to three times a term
4 = Once a week
5 = Every day
<table>
<thead>
<tr>
<th>Practices related to doing Science</th>
<th>Frequency of use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before TMP</td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>a Learners ask the kind of question that results in you showing them something. (E.g. What would happen if you used ammonia instead of vinegar?)</td>
<td></td>
</tr>
<tr>
<td>b Learners plan the method of their own experiments with your help. (E.g. Plan an experiment to test the effect of acid on different materials.)</td>
<td></td>
</tr>
<tr>
<td>c Teacher performs a demonstration, but with learner participation. (E.g. Teacher shows learners various static electricity demonstrations.)</td>
<td></td>
</tr>
<tr>
<td>d Learners perform practical work in groups with the help of a worksheet using apparatus given to them. They carry out the instructions on the worksheet correctly. (E.g. follow worksheet instructions to dissect a flower.)</td>
<td></td>
</tr>
<tr>
<td>e Learners perform practical work in groups following a procedure they have designed themselves, and using the apparatus they decide they need. They collect data systematically and accurately. (E.g. investigate factors that lead to different rates of plant growth.)</td>
<td></td>
</tr>
<tr>
<td>f Learners use information from demonstrations to explain observations and to construct their own graphs and tables where appropriate.</td>
<td></td>
</tr>
<tr>
<td>g Learners can answer all questions on a worksheet where they have performed practical work and can relate these answers to the focus question of the investigation.</td>
<td></td>
</tr>
<tr>
<td>h Learners seek patterns and trends in their data and present these in scientific reports that justify their conclusions in terms of the data collected. (E.g. look for trends in weather patterns over a period of time.)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Practices related to constructing science knowledge</th>
<th>Frequency of use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before TMP</td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>a Learners receive written assignments where they have to name and describe the appearance and characteristics of objects, materials or organisms in their own words. (E.g. name and describe ten plants in the school garden.)</td>
<td></td>
</tr>
<tr>
<td>b Learners receive written assignments where they recall or apply theories, models or processes in their own words. (E.g. use the kinetic theory to explain what happens when ice melts.)</td>
<td></td>
</tr>
<tr>
<td>c Learners are given tasks in which they use a variety of systems to classify both familiar and unfamiliar objects. (E.g. classify the pictures of trees into groups and explain why you have chosen these groups.)</td>
<td></td>
</tr>
<tr>
<td>d Learners are given worksheets, which require them to translate Information from one form to another. (E.g. from tables to graphs, or text to diagrams.)</td>
<td></td>
</tr>
</tbody>
</table>
Learners are given tasks that require them to **make predictions** from data that is provided. (E.g. given data from 1990 to 2000 on the numbers of predators and of prey in the Moretele Game Reserve, predict the numbers for 2001, 2002 and 2003.)

Learners are given tasks which require them to **identify relationships** between variables and hypothesize about possible future relationships. (E.g. a car accelerates away from a stop sign. Given the following data on its distance from the sign for the next 20 seconds, what is the relationship between time and velocity?)

Learners are given a **problem to solve** in a familiar situation. (E.g. how would you clean water from the dam to make it drinkable?)

Learners are given tasks in which they use their knowledge in different topics to **solve problems that are unfamiliar**. (E.g. based on what you know about mosquitoes and about malaria, design a one-year program to eradicate malaria in the Lebombo district.)

Learners are given tasks which require them to **access information**. They have to use the school library, local community library, internet and other resources to find an answer to a question (E.g. find out the numbers and trends in the cattle population of the Mpuluzi district for the past 20 years.)

<table>
<thead>
<tr>
<th>Practices related to science, society and the environment</th>
<th>Frequency of use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before TMP</strong></td>
<td><strong>Present Practice</strong></td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>a Learners <strong>describe</strong> in writing how different local cultures have <strong>used scientific principles</strong> and technological products for specific purposes. (E.g. describe how the different cultural groups make beer.)</td>
<td></td>
</tr>
<tr>
<td>b Learners <strong>describe</strong> and <strong>comment</strong> on in writing different <strong>explanations</strong> offered by science and indigenous knowledge systems. (E.g. describe different explanations for lightning and comment on these explanations.)</td>
<td></td>
</tr>
<tr>
<td>c Learners do tasks in which they <strong>identify positive and negative effects</strong> of science and/or technology. (E.g. Read about and summarise the pros and cons of growing genetically modified crops or human cloning.)</td>
<td></td>
</tr>
<tr>
<td>d Learners do a project in which they <strong>make decisions or judgments</strong> about the use of natural resources and the impact on the environment. (E.g. women in the village need fire-wood. However, the trees are rapidly disappearing. What should be done?)</td>
<td></td>
</tr>
</tbody>
</table>
Practices related to science, society and the environment

<table>
<thead>
<tr>
<th></th>
<th>Before TMP</th>
<th>Present Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>e</td>
<td>Learners do a project in which they <strong>suggest</strong> how V93 technology can be made accessible to those people who are presently excluded. (E.g. Read about different ways in which electricity can be generated, and then propose a plan to provide electricity to a remote rural school.)</td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>Learners <strong>describe</strong> in writing how resources that they are familiar with impact on their daily lives. (E.g. Work out how much water is used for different purposes)</td>
<td></td>
</tr>
<tr>
<td>g</td>
<td>Learners <strong>describe and comment</strong> on ethical issues related to the practice of science. (E.g. write an article for your local newspaper in which you argue for both sides of the following statement, “People with HIV/AIDS should be forced to disclose their status.”)</td>
<td></td>
</tr>
</tbody>
</table>

**12 Assessment Strategies**

*What assessment strategies have you applied and how often? Place a cross (X) in the block, for your teaching both now and previously.*

<table>
<thead>
<tr>
<th></th>
<th>Before TMP</th>
<th>Present Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Tests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homework</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assignments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investigations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Examinations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical work assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 6  Teacher questionnaire: Self-perception of competence

(NB Grade 8 Science example provided only)

Teacher’s self-perception of competence in the teaching of his/her particular learning area

The following questions try to assess whether or not there has been any change in your teaching in a number of different classroom aspects, specifically since the Teacher Mentorship Programme started at your school. Please place a cross (X) in the block denoting the option you select. Use the following rating scales:

1 - I believe my teaching practice has got worse in this aspect
2 - My teaching practice has not changed in this aspect
3 – My teaching practice may have improved in this aspect, but not very noticeably to myself or my learners.
4 – My teaching practice has improved somewhat in this aspect
5 – I believe my teaching practice has improved significantly in this aspect.

<table>
<thead>
<tr>
<th>Item / Aspect of teaching for assessment of competence</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Issues: Grade 8 Science</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matter and material: The particle model of matter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matter and material: Properties and classification of matter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matter and material: Density of substances</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matter and material: Mixtures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matter and material: Oxygen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matter and material: Hydrogen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matter and material: Carbon dioxide</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life and Living: Ecosystems, energy flow in ecosystems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life and Living: Adaptations of animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life and Living: Adaptations of plants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life and Living: Biodiversity in South Africa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life and Living: Healthy living</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life and Living: Digestion and absorption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life and Living: Diseases of the reproductive system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy and change: Electricity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy and change: Forces</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planet Earth and Beyond: The solar system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planet Earth and Beyond: Climate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planet Earth and Beyond: Structure of the earth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item / Aspect of teaching for assessment of competence</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Investigations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtaining evidence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discovery and conclusions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Practicals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conducting practical / experimental work in class</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Learner questioning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On facts and/or descriptions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On ideas and/or explanations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encouraging learners to question</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Planning and organisation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creating a lesson plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creating a cycle plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creating a year-planner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controlling your teacher’s files</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building up resource files</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Classroom practice</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementing OBE methodology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handling classroom discipline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controlling / monitoring learners’ homework</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making lessons learner-centred</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifying learners’ misconceptions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developing new knowledge from previous knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sequencing lesson content systematically and logically</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structuring a section of work to achieve a desired outcome</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementing effective and meaningful group work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accurately assessing learners’ skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting an assessment task of correct balance and standard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX 7  Teacher interview reference document

INTERVIEW QUESTIONS

1  You, the teacher, and your beliefs and experience before TMP came to your school.

   a. When you were at school, what was your opinion of the teaching profession?
   b. Why did you decide to become a teacher?
   c. What did you think was the most important part of a teacher’s job?

   d. Reflecting on your prior teaching practice:
      Please tell me the following about yourself and your teaching practice before you met the TMP programme:
      i. Were you confident of your content knowledge?
      ii. How did you interact with the learners in class? Did you ask questions? Encourage them to ask questions?
      iii. Describe what you believed “being well prepared for a lesson” meant. Were you well prepared for your lessons?
      iv. Describe to me how you would generally start a lesson.
      v. Did you refer to textbooks as a resource to help you?
      vi. When the learners had textbooks in the class, how did you try to use these in your lessons?
      vii. Please will you describe to me how you generally structured your lessons?
      viii. How much homework did you give the learners, on average? How did you monitor the learners’ homework?
      ix. What were your general expectations of your learners? For example, did you expect them to work or not, pass or not, succeed or not?
      x. Did you finish the syllabus?
      xi. Did you generally find your learners attentive and engaged in your lessons? Can you give an explanation for why this was the case?
      xii. Did you have discipline problems with your learners? What was the reason for this?
xiii. Please describe how you assessed your learners in terms of the techniques you used. Comment on the standard you set for your learner assessments. On what basis did you judge this standard?

xiv. Was your organisation (e.g. resource files, minutes of meetings, cycle planners) efficient?

xv. To what extent did you provide notes for the learners, and under what circumstances did you provide these? Did you design and write your own notes? If so, was it easy to design them for a particular outcome?

xvi. What was your pedagogical belief about your teaching subject? I.e. of what importance did you believe it was to your learners? How did you believe it could help them?

xvii. Did your learners take responsibility for their own learning?

xviii. Each year, did you build on the previous year’s systems, learned experiences and collected resources and did teaching become easier for you from year to year?

xix. What did you do when faced with a section of the syllabus that you did not understand?

xx. In what year did you first have to implement OBE methodology? Please talk about your first experiences of OBE, in terms of how you were able to implement it in your classes. What were your feelings and opinion of OBE methodology then?

xxi. Did you consult with your HOD or other colleagues for assistance or support?

xxii. Did you use group work in your classes? Under what circumstances, and how did you structure these activities? Was it effective and meaningful group work?

xxiii. How did you make the lessons “learner-centred”?

xxiv. What demands did you make of your learners, e.g. in terms of punctuality for class, homework complete, tasks handed in?

xxv. What did you understand to be required as preparation for a lesson, for teaching? Describe how and when you did your preparation for the next days’ lessons.

xxvi. Did you do projects with your learners? What merits did you see in learners doing project-work?

xxvii. If you are a science teacher: how often did you do practical work in your classes, and how were these practical classes conducted?
xxviii. Did you do demonstrations? How did you involve your learners in practical work?

xxix. Did you see any benefits of open investigations, compared with closed experiments / practical work?

xxx. Describe the working relationship that you had with the other members of your subject department.

xxxi. Did you alert your learners to the relevance of science/maths in society? If so, how did you achieve this? If not, why not?

xxxii. What was your attitude to your learners: did you take any ownership of their final achievements, or feel any accountability to the learners for their future careers? If so, how did this determine the way in which you taught the learners?

xxxiii. Did you at any stage desire to develop yourself as a teacher or change your teaching practice in any way? What did you identify to be your professional development needs? What approach did you take to address those needs or make that practice change?

xxxiv. What was your main priority in teaching in those days?

2 Your general school experiences (your work environment)

a. Do the personnel of this school have a shared sense of direction?

b. What would you say is the single most important focus of this school?

c. Do the school’s implemented strategies serve this focus?

d. Does the staff feel valued in your school?

e. Is there a spirit of openness and trust amongst the staff?

f. Do the teachers and management value open discussion and diversity of opinion?

g. Does the management empower staff to make decisions?

h. Is school management and administration open to change?

i. Do all the school structures and fellow teachers support individual teacher initiative?

j. If staff takes the initiative in implementing new methods or approaches, are they rewarded / commended for this and supported by other staff members?

k. Do your colleagues on the staff support a teacher who may evidence a desire to learn?

l. Is effectiveness of the school’s teaching programmes regularly monitored?
m. Does the staff reflect on, discuss and critically examine their current practices?

n. Do your fellow teachers actively seek information or resources that can improve their work?

o. Does your staff engage in on-going professional development? If so, is this of their own volition or because they are under instruction?

p. Is professional development closely tied to real school issues?

q. Does your school make use of external professional advisers, e.g. facilitators, IDSOs, and is this an effective, useful resource? If so, in what way; if not, what is the reason for that?

3 Your experience of TMP.

a. Before the TMP came to your school, what did you think mentoring was?

b. What was your expectation of having a mentor, before the programme started? In what ways did this mentoring programme meet your initial expectations?

c. In what ways did this mentoring programme not meet your initial expectations?

3.1 The mentors:

a. What do you believe the role of the mentors is?

b. What would you like the role of mentors to be, if in any way different from your previous answer?

c. Describe your relationship with your mentor. How does the nature of this relationship impact on your changes in teaching practice?

d. Does your mentor and the process of mentoring address your needs sufficiently for what you believe to be your requirements?

e. Having the mentors at the school must have caused some problems for you and/or the school or other teachers. Please tell me what these problems were / are.

f. Please comment on the resource materials supplied to you by the mentor.

g. How has the mentor changed the way you thought about teaching as a profession, and any aspects of that profession, if at all?
3.2 The programme:

There are several aspects to the TMP which involve teachers: the individual mentoring, the workshops, the mentor school visits. The following questions will be referring to these.

a. Did you understand at the start what the objectives of the teacher mentorship programme were?
b. What do you think, at this stage, that the objectives of TMP were/are?
c. Please talk generally about the part/s of the programme that you find useful (of the individual mentoring, the workshops, the mentor school visits, the freeze period) and what you enjoyed most about having access to TMP.
d. Please talk generally about the part/s of the programme (of the individual mentoring, the workshops, the mentor school visits, the freeze period) that you find not useful.
e. What did you find out about yourself during the course of your involvement with this programme?
f. Are there any aspects of the programme that have been of long term benefit to you? Please explain.

4 Your teaching during the third year of the programme:

a. What is your opinion presently of the teaching profession in general? Are you happy to be in teaching?
b. In what ways, both negative and positive, do you believe your teaching experience and practice is different in 2006 from that about three or four years ago, if at all?
c. Did your association with the mentor play any role in these changes? If so, please give details.
d. In your approach to your teaching, do you approach the teaching of the younger learners differently from that of the seniors?
e. What do you think is the most important part of a teacher’s job?
f. How much time do you spend preparing (your lessons, marking, homework etc) out of school hours?
g. What resources do you use to help you in your preparation for lessons?
h. Do you believe that there is less pressure (or almost no pressure) on teachers of the lower grades and only the matric teachers should be pressurised? What gives you this indication?

i. Do you find any difference in the amount of period time used effectively now, compared with 3 years ago?

j. Is there any difference in the way you work with your colleagues compared with several years ago?

k. Describe the nature of your classes this year, referring to learner interaction, the amount of time you spend teaching per period, the amount of homework you give the learners, how you check the homework, etc.

l. To what do you attribute any changes from these issues some years ago?

m. What do you believe is the role of an HOD?

n. What would you like your Principal to understand about your role as a teacher in his school? What role do you believe your school Principal should play in your professional life?

o. Please tell me the following about yourself and your present teaching practice. In each case, if there has been any change from your previous practice, to what do you attribute that change? (E.g. changed conditions at the school or in the department or the presence of TMP).

i. Are you confident of your content knowledge?

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

iii. Are you well prepared for your lessons? What preparation do you do, and when do it?

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

v. How do you monitor the learners’ homework?

vi. When the learners have textbooks in the class, how do you try to use these in your lessons?

vii. Please will you describe to me what principles you use to generally structure your activities and lessons?

viii. Do you generally finish the syllabus?

ix. Do you have discipline problems with your learners? What is the reason for this?

x. Do you use the school’s discipline systems to help you with disciplining learners? Does the school have such support systems?
xi. What is your pedagogical belief about your teaching subject? I.e. of what importance do you believe it is to your learners? How do you believe it could help them?

xii. Please describe how you assess your learners in terms of the techniques you use. Comment on the standard you set for your learner assessments. On what basis do you judge this standard?

xiii. Do you teach all sections of the syllabus?

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

xv. To what extent did you provide notes for the learners, and under what circumstances did you provide these? Please comment on any LSM you have received from TMP.

xvi. Is your organisation (e.g. resource files, minutes of meetings, cycle planners) efficient?

xvii. Do your learners take responsibility for their own learning? Please give some details in this regard.

xviii. Please talk about how you implement OBE strategies in your classes now. Is there any difference from before? How, and to what do you attribute this difference? What are your feelings and opinion about OBE methodology presently?

xix. How do you make lessons “learner-centred”?

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

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

xxii. What demands do you make of your learners, e.g. in terms of punctuality for class, homework complete, tasks handed in?

xxiii. Describe how and when you do your preparation for the next days’ lessons.

xxiv. If you are a science teacher: how often do you do practical work in your classes, and how are these practical classes conducted?

xxv. When do you do demonstrations? Do you involve your learners in these? How?

xxvi. What are the benefits of open investigations, compared with closed experiments / practical work?

xxvii. What kind of projects do you involve your learners in? What merits do you see in learners doing project-work?
xxviii. What do you do when faced with a section of the syllabus that you do not understand?

xxix. Describe the working relationship that you have with the other members of your subject department.

xxx. What are your general expectations of your learners?

xxxi. What is your attitude to persons in authority over you, e.g. the Head of Department and Principal? Do you work amicably with them?

xxxii. Do you take any ownership of the learners’ final achievements or feel any accountability to the learners for their future careers? If so, how does this determine the way in which you teach the learners?

xxxiii. Do you desire to develop yourself as a teacher or change your teaching practice in any way?

xxxiv. Did you alert your learners to the relevance of science in society? If so, how did you achieve this? If not, why not?

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

xxxvi. What are the two most important aspects of teaching, in your eyes?

xxxvii. What drives you most as a teacher? What is your priority?
### OBSERVATION DOCUMENT

**SCIENCE TEACHERS: Grade 8 & 9**

<table>
<thead>
<tr>
<th>Teacher Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade being observed</td>
<td></td>
</tr>
<tr>
<td>Time and date</td>
<td></td>
</tr>
<tr>
<td>Lesson topic</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aspect of teaching for observation</th>
<th>Comment / observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning work</td>
<td></td>
</tr>
<tr>
<td>Obtaining evidence</td>
<td></td>
</tr>
<tr>
<td>Discovery and conclusions</td>
<td></td>
</tr>
<tr>
<td>Conducting practical / experimental work in class</td>
<td></td>
</tr>
<tr>
<td>On facts and/or descriptions</td>
<td></td>
</tr>
<tr>
<td>On ideas and/or explanations</td>
<td></td>
</tr>
<tr>
<td>Encouraging learners to question</td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Creating a lesson plan</td>
<td></td>
</tr>
<tr>
<td>Creating a cycle plan</td>
<td></td>
</tr>
<tr>
<td>Creating a year-planner</td>
<td></td>
</tr>
<tr>
<td>Controlling your teacher’s files</td>
<td></td>
</tr>
<tr>
<td>Building up resource files</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Classroom practice</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementing OBE methodology</td>
<td></td>
</tr>
<tr>
<td>Handling classroom discipline</td>
<td></td>
</tr>
<tr>
<td>Controlling / monitoring learners’ homework</td>
<td></td>
</tr>
<tr>
<td>Making lessons learner-centred</td>
<td></td>
</tr>
<tr>
<td>Identifying learners’ misconceptions</td>
<td></td>
</tr>
<tr>
<td>Developing new knowledge from previous knowledge</td>
<td></td>
</tr>
<tr>
<td>Sequencing lesson content systematically and logically</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Structuring a section of work to achieve a desired outcome</td>
<td></td>
</tr>
<tr>
<td>Implementing effective and meaningful group work</td>
<td></td>
</tr>
<tr>
<td>Accurately assessing learners’ skills</td>
<td></td>
</tr>
<tr>
<td>Setting an assessment task of correct balance and standard</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Practices related to doing Science</th>
<th>Frequency / comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learners ask the kind of question that results in you showing them something. <em>(E.g. What would happen if you used ammonia instead of vinegar?)</em></td>
<td></td>
</tr>
<tr>
<td>Learners plan the method of their own experiments with your help. <em>(E.g. Plan an experiment to test the effect of acid on different materials.)</em></td>
<td></td>
</tr>
<tr>
<td>Teacher performs a demonstration, but with learner participation. <em>(E.g. Teacher shows learners various static electricity demonstrations.)</em></td>
<td></td>
</tr>
<tr>
<td>Learners perform practical work in groups with the help of a worksheet using apparatus given to them. They carry out the instructions on the worksheet correctly. <em>(E.g. follow worksheet instructions to dissect a flower.)</em></td>
<td></td>
</tr>
<tr>
<td>Learners perform practical work in groups following a procedure they have designed themselves, and using the apparatus they decide they need. They collect data systematically and accurately. <em>(E.g. investigate factors that lead to different rates of plant growth.)</em></td>
<td></td>
</tr>
<tr>
<td>Learners use information from demonstrations to explain observations and to construct their own graphs and tables where appropriate.</td>
<td></td>
</tr>
<tr>
<td>Learners can answer all questions on a worksheet where they have performed practical work and can relate these answers to the focus question of the investigation.</td>
<td></td>
</tr>
<tr>
<td>Learners seek patterns and trends in their data and present these in scientific reports that justify their conclusions in terms of the data collected. <em>(E.g. look for trends in weather patterns over a period of time.)</em></td>
<td></td>
</tr>
<tr>
<td>Practices related to constructing science knowledge</td>
<td>Frequency / comment</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Learners receive written assignments where they have to <strong>name and describe</strong> the appearance and characteristics of objects, materials or organisms in their own words. <em>(E.g. name and describe ten plants in the school garden.)</em></td>
<td></td>
</tr>
<tr>
<td>Learners receive written assignments where they <strong>recall or apply theories</strong>, models or processes in their own words. <em>(E.g. use the kinetic theory to explain what happens when ice melts.)</em></td>
<td></td>
</tr>
<tr>
<td>Learners are given tasks in which they use a variety of systems to <strong>classify</strong> both familiar and unfamiliar objects. <em>(E.g. classify the pictures of trees into groups and explain why you have chosen these groups.)</em></td>
<td></td>
</tr>
<tr>
<td>Learners are given worksheets, which require them to <strong>translate Information</strong> from one form to another. <em>(E.g. from tables to graphs, or text to diagrams.)</em></td>
<td></td>
</tr>
<tr>
<td>Learners are given tasks that require them to <strong>make predictions</strong> from data that is provided. <em>(E.g. given data from 1990 to 2000 on the numbers of predators and of prey in the Moretele Game Reserve, predict the numbers for 2001, 2002 and 2003.)</em></td>
<td></td>
</tr>
<tr>
<td>Learners are given tasks which require them to <strong>identify relationships</strong> between variables and hypothesize about possible future relationships. <em>(E.g. a car accelerates away from a stop sign. Given the following data on its distance from the sign for the next 20 seconds, what is the relationship between time and velocity?)</em></td>
<td></td>
</tr>
<tr>
<td>Learners are given a <strong>problem to solve</strong> in a familiar situation. <em>(E.g. how would you clean water from the dam to make it drinkable?)</em></td>
<td></td>
</tr>
<tr>
<td>Learners are given tasks in which they use their knowledge in different topics to <strong>solve problems that are unfamiliar</strong>. <em>(E.g. based on what you know about mosquitoes and about malaria, design a one-year program to eradicate malaria in the Lebombo district.)</em></td>
<td></td>
</tr>
<tr>
<td>Learners are given tasks which require them to use various methods to <strong>access information</strong>. They have to use the school library, local community library, internet and other resources to find an answer to a question <em>(E.g. find out the numbers and trends in the cattle population of the Molumzi district for the past 20 years.)</em></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Practices related to science, society and the environment</th>
<th>Frequency / comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learners <strong>describe</strong> in writing how different local cultures have used <strong>scientific principles</strong> and technological products for specific purposes. <em>(E.g. describe how the different cultural groups make beer.)</em></td>
<td></td>
</tr>
<tr>
<td>Learners <strong>describe and comment</strong> on in writing different <strong>explanations</strong> offered by science and indigenous knowledge systems. <em>(E.g. describe different explanations for lightning and comment on these explanations.)</em></td>
<td></td>
</tr>
<tr>
<td>Learners do tasks in which they <strong>identify positive and negative effects</strong> of science and/or technology. <em>(E.g. Read about and summarise the pros and cons of growing genetically modified crops or human cloning.)</em></td>
<td></td>
</tr>
<tr>
<td>Learners do a project in which they <strong>make decisions or judgments</strong> about the use of natural resources and the impact on the environment.</td>
<td></td>
</tr>
</tbody>
</table>
(E.g. women in the village need fire-wood. However, the trees are rapidly disappearing. What should be done?)

Learners do a project in which they **suggest** how V93 technology can be made accessible to those people who are presently excluded. (E.g. Read about different ways in which electricity can be generated, and then propose a plan to provide electricity to a remote rural school.)

Learners **describe** in writing how resources that they are familiar with impact on their daily lives. (E.g. Work out how much water is used for different purposes)

Learners **describe and comment** on ethical issues related to the practice of science. (E.g. write an article for your local newspaper in which you argue for both sides of the following statement, "People with HIV/AIDS should be forced to disclose their status.")

### Assessment Strategies

<table>
<thead>
<tr>
<th></th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Per term</th>
<th>Yearly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homework</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Projects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assignments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investigations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Examinations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical work assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLASSROOM INTERACTION</td>
<td>SCIENCE PRACTICAL WORK</td>
<td>SCIENCE IN SOCIETY</td>
<td>ASSESSMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------</td>
<td>--------------------</td>
<td>------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Lesson plan (well-designed for good content presentation)</td>
<td>• Uses classroom demonstrations to help develop concepts</td>
<td>• Uses examples and applications from everyday life to illustrate scientific concepts</td>
<td>• Written tests; cover topic adequately.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Probes learners’ prior knowledge</td>
<td>• Uses specimens from local environment to illustrate lessons</td>
<td>• Bases lessons on specific problems / issues faced by local community</td>
<td>• Most questions recall, but some require higher order thinking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Presentation of content (well-organised, correct, well-sequenced)</td>
<td>• Uses demonstrations to promote limited form of inquiry</td>
<td>• Involves learners in demonstration</td>
<td>• Mark and return tests promptly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Provision of adequate appropriate notes</td>
<td>• Involves learners in demonstration</td>
<td>• Designs practical work in such a way to encourage learner discovery of information</td>
<td>• Written tests include 50% of questions requiring comprehension, application, and analysis. Some questions based on practical work.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Use of textbook effective</td>
<td>• Provides opportunity for open investigations as well as closed experiments / practical work</td>
<td>• Assists learners to explore explanations of phenomena by different cultural groups</td>
<td>• Written tests include seen or unseen “guided discovery” activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Engages learners with questions</td>
<td>• Assists learners to understand and weigh up merits of different theories for same phenomenon</td>
<td>• Performance on open investigations and community-based projects included in final assessment</td>
<td>• Assessment based on more than written tests (e.g. reports on activities or extra reading assignments, creation of charts and improvised apparatus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEARNERS</td>
<td>Assisting in planning and performing demonstration</td>
<td>Ask questions about science in everyday life</td>
<td>Learners create portfolios to represent their “best” work.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------------------------------</td>
<td>---------------------------------------------</td>
<td>--------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• attentive and engaged</td>
<td>• Participate in closed practical work (as per “cookbook”)</td>
<td>• Ask questions about science in everyday life</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• respond to questions</td>
<td>• Communicate data using graphs and tables</td>
<td>• Investigate application of science and technology in own environment (e.g. surveys)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• initiate questions</td>
<td>• Perform “guided discovery type” practical work in small groups, engaging in hands-on activities</td>
<td>• Undertake project in local community where apply science to tackle specific problem or meet a need.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• use different materials effectively to compile notes</td>
<td>• Can write a scientific report in which they justify conclusions in terms of data collected</td>
<td>• Explore long-term effects of community projects (e.g. comparing short-term effect with long-term detrimental effect)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• become involved in meaningful group work</td>
<td>• Design and do own “open” investigations</td>
<td>• Learners create portfolios to represent their “best” work.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• on their own initiative, offer a contribution to the lesson</td>
<td>• Reflect on quality of design and collected data, and make improvements</td>
<td>• Learners create portfolios to represent their “best” work.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• engage in minds-on learning activities</td>
<td>• Can interpret data in support of competing theories or explanations</td>
<td>• Learners create portfolios to represent their “best” work.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• take responsibility for their own learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• undertake long-term and community-based investigation projects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**APPENDIX 9  Ethics clearance**

<table>
<thead>
<tr>
<th>CLEARANCE CERTIFICATE</th>
<th>CLEARANCE NUMBER :</th>
<th>CS06/07/01</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEGREE AND PROJECT</strong></td>
<td>M.Ed Curriculum Studies</td>
<td>An evaluation of a professional teacher mentoring programme targeting secondary science and mathematics teachers.</td>
</tr>
<tr>
<td><strong>INVESTIGATOR(S)</strong></td>
<td>Norma Irene Fricke - 25387074</td>
<td></td>
</tr>
<tr>
<td><strong>DEPARTMENT</strong></td>
<td>Curriculum Studies</td>
<td></td>
</tr>
<tr>
<td><strong>DATE CONSIDERED</strong></td>
<td>1 July 2006</td>
<td></td>
</tr>
<tr>
<td><strong>DECISION OF THE COMMITTEE</strong></td>
<td>APPROVED</td>
<td></td>
</tr>
</tbody>
</table>

This ethical clearance is valid for 2 years and may be renewed upon application.

<table>
<thead>
<tr>
<th>CHAIRPERSON OF ETHICS COMMITTEE</th>
<th>Dr S Human-Vogel</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE</td>
<td>24 October 2007</td>
</tr>
</tbody>
</table>

This ethical clearance certificate is issued subject to the following conditions:

1. A signed personal declaration of responsibility
2. If the research question changes significantly so as to alter the nature of the study, a new application for ethical clearance must be submitted
3. It remains the applicant's responsibility to ensure that all the necessary forms for permission and informed consent are kept for future queries.

Please quote the clearance number in all enquiries.
The Project Manager: TMP
University of Pretoria

FACSIMILE: 012 348 2842

Dear Irene

REQUEST TO INTERVIEW EDUCATORS FOR RESEARCH PURPOSES

Permission is herewith granted for you to interview educators from the TMP schools and do class visits as part of your MSc studies.

Please make the necessary arrangements with the school principals and educators.

Interruptions should be minimized and interviews should not take place during teaching time.

Yours sincerely

TS MAKOFANE
DISTRICT DIRECTOR
Dear ……………………………………………

Thank you very much for allowing me to use your teaching as a case study in my evaluation of TMP for my M Ed. I will try to minimise the trouble it causes you! I assure you that in all reports / dissertations / references to the teachers in my texts there will be no teacher names given, or any other way of identifying that teacher.

I have enclosed two copies of a letter from me to you, giving you details of the research process. I have signed both copies, and would ask you to sign them, if you are happy with the information given and you are content to go on. I will collect the single page from you at another stage.

Also enclosed is a questionnaire for you to complete; I will phone you in the week of 21 August to arrange to get this back from you, and set up an interview time. If you have any queries about the questionnaire or any questions in it, please phone me!

Please note the following about the questionnaire:

- Please complete all questions in Section A. Note that in Q8 two answers are required: one for each column (before TMP and present practice).
- Note that section B is for maths teachers and section C for science teachers.
- Questions 11 and 12 in section B both involve comparison of your classroom practice before TMP (slightly shaded) and presently, therefore each question requires that you give a rating (1 to 5) twice. Please remember that all of these classroom practices have merit in certain circumstances, and also remember that the research is not looking only for an increase in the frequency of practice subsequent to TMP: if a certain practice is being employed by you less than before, this information is of great value.

Thank you for participating in this process. I believe and hope that the information that I receive from you, and the observations that I make, will inform us further on how mentoring can best take place. This information may then be used by us, should we have another TMP from 2007, or by others who become involved in teacher development using a mentoring model.

Yours sincerely,

Irene Fricke
082 5705162