UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

How student teachers construct and use phronesis to enhance their professional development

by

A. A. James
23399512

Submitted in partial fulfilment of the requirements for the degree

PhD in Curriculum and Instructional Design and Development

Department of Curriculum Studies
University of Pretoria

2009

Supervisor: Professor Johannes Slabbert

Declaration of authorship

I declare that this submission is my own work and that it has been written in my own words. All citations from published or unpublished works have been acknowledged in text and referenced in full.

Signature of student: _____

Date: _____

Abstract

In the present context of South African education many learners may be denied access to the modern world, and from developing as empowered individuals for a world of uncertainty, due to inadequate schooling. The learners' poor results in national and international studies and dysfunctional schools, for example, are clear evidence of inadequate schooling. If we are to improve schooling, and hence, the quality of teaching and learning in South African schools, we need to address the quality of teacher education that student teachers receive as part of their professional development. These improvements in schooling will depend on how student teachers are professionally developed, not to teach, but to facilitate learning. It is on this basis that I explore how student teachers construct and use phronesis to enhance their professional development. Within this question I explore the student teachers' baseline phronesis when they enter the programme and how the student teachers utilise the contribution of the mentor teacher and the specialisation programme to construct and use phronesis to enhance their professional development.

An interpretive, mixed methods, case study participatory action research methodology was used to explore these research questions. The participants in this study were three Postgraduate Certificate in Education Life Sciences student teachers, the specialisation lecturer, mentor teacher and the researcher. The context of this study was in the setting of a radical, innovative teacher education programme at the University of Pretoria, which focused strongly on the construction and use of phronesis. A variety of data collection

instruments, including visual data, personal profile questionnaires and document analysis were used to collect the data. Ethical and research rigour issues were attended to and implemented.

The findings are presented in four case study participatory action research cycles, each having a particular context and purpose. The descriptive data from each of these cycles was analysed to develop responses for the research questions. The finding in response to research question one indicated that the student teachers' beliefs, emotions, desire and vision for the type of facilitator that they wanted to be influenced their perception of a facilitator of learning. Furthermore, their awareness of the challenges and constraints that 'teachers' experienced when teaching in particular contexts did not deter them from becoming facilitators of learning. The mentor teachers' contributions were: direct with regard to providing support in designing learning tasks, resources and assessment feedback. Indirect contributions were in terms of the student teachers developing the need to generate ideas for effective practice and to change their beliefs about the role of a facilitator of learning, and the impact of this role on the learners' work ethic and relationships. The contributions of the specialisation programme were in terms of challenging and changing student teachers' beliefs about the role of a facilitator of learning and the development of learning practice in authentic contexts.

The student teachers constructed and used their phronesis to enhance their professional development. Incorporated in each student teacher's practice theory are their personal and professional transformations on their journey to becoming facilitators of learning.

Acknowledgements

From the beginning of this research there have been so many people who have played a role in how and what I decided to research.

Many thoughts and cherished wishes go to:

my **beloved husband** Gavin and children Lisa, Grant, Ryan and Alex – we know the art of patience and perseverance;
my mother Louise Russon who has always valued the importance of being educated and has never stopped to ask – Are you finished, yet?;
my sisters and brothers - Emily, Sharon, Ursula, Roland and Jeremy and their partners for their love, support and care;
my mother in-law –Jean James, sisters and brother in-law for their love, support and care;
my home assistant for keeping those areas together;
my friends and colleagues for being there as most encouraging, supportive and caring people over this extensive period, especially Dr Michele Stears, Hayley Bentham, Mary-Anne Good, Thelma Rosenberg and Dr Farida Patel;
the large group of editors and critical readers who did such sterling work including Dr L Stears and Dr E Magqwashu;
the Mrs Jeannie Beukes – the administrator at the University of Pretoria for her sterling work and support;
my supervisor – Professor Slabbert for his claim of a doctorate being an academic struggle –it truly was one.

TABLE OF CONTENTS

CHAPTER TWO

LITERATURE REVIEW

CHAPTER THREE

RESEARCH DESIGN

CHAPTER FOUR

CASE STUDY PARTICIPATORY ACTION RESEARCH CYCLE ONE

CHAPTER SEVEN

CASE STUDY PARTICIPATORY ACTION RESEARCH CYCLE FOUR

LIST OF TABLES:

LIST OF FIGURES:

LIST OF DRAWINGS:

APPENDICES in DVD (Attached to inside back cover)

APPENDIX I:

APPENDIX II:

APPENDIX III:

APPENDIX IV:

APPENDIX V:

APPENDIX VI:

COMMENTS: Researcher reflections on completing the thesis

This has been the most challenging, exciting, stimulating and frustrating, depressing experience that I have had over the past few years. At times I questioned why I even bothered to carryon with this research. It was at these times that my inner strength and the excitement of the findings that motivated me further. My family and colleagues also played a major role in motivating me to the point of completion. I cannot deny the enormous impact that my supervisor played on the development and final completion of this research project. During the period I just thought - How the heck did I land up with him? He barely gives advice - a few comments at the top of a chapter ... My big question was - what are these all the comments that he can give?

His statement - This is your research; **your academic struggle** really broke me. I questioned what he meant by this and why did other supervisors work differently going through the students' pages and writing comments on each page?

Words to Supervisor

We met for the first time in February 2003. It was a strange but stimulating one - a time when I did not know much about you so I was wary of this white male with an Afrikaans accent and surname and he was from Pretoria.

The beginning steps - developing the proposal was a very uncertain, insecure period ..... you knew what you were doing when you left me to swim in a floundering manner and almost sank at times. Some comments made were harsh and even callous,

something that I could not accept. The topic and research questions were finally developed and then came the other sections ..... the rationale etc ..

Finally the proposal defence date was upon us .. you were confident and so was I . .it went off very well.

The one question asked by a lecturer during the defence was: Do you not think that your supervisor is expecting too much from you .. .Is this research too big?

At the time I was so excited about starting the research - I said NO QUITE indignantly.

Then came the data collection - the traveling and documenting which you facilitated and supported extensively. Thank you for this - it was difficult for me to manage with work in Durban and collecting data in Pretoria. Your spirit and energy were good and go, go, go.

CHAPTER ONE

ORIENTATING THE RESEARCH

"For the things we have to learn before we can do them, we learn by doing them" (Ross 1980, p. 1).

1.1. Introduction

In 2005, the Department of Education in the Western Cape hosted a two-day conference. The purpose of this conference involved an honest introspection of itself and challenged "those whose professional tasks are the conduct of schooling on a daily basis" (Morrow, 2007, p. 199). Participants in this conference discussed how schooling should be carried forward and reflected critically on what had been achieved (or not achieved) in education since 1994, the period that marked the beginning of democracy in South Africa (Morrow, 2007). Morrow highlighted the following about the conference: "Perhaps the most striking comment made was that from Premier Rasool: 'We come here not to celebrate (our achievements) but to consider whether we should change course …This conference has been called to issue a wake-up call to government" (2007, p. 199). The need for change of course seem to suggest that current policies, for example, lack vision, hope for, and a sense of a better future that many youth in, South Africa, experience (Morrow, 2007). Such a change in course is therefore and should be about ways in which South African youth are schooled – and subsequently how South African teachers should be educated to provide this schooling.

In the context of my study, motivation for changing the course is provided by the results of two major international research studies, namely: the performance of Grade 8 learners in the Trends in International Mathematics and Science Study (TIMMS) of 1995, 1999 and 2003 (Howie, 2001, 2004; Reddy, 2006) and Grade 4 learners' performance in the Progress in International Reading Literacy Study (PIRLS) in 2006 (Mullis, Martin, Kennedy and Foy, 2007), where South African learners had the lowest scores amongst 40 and 50 countries, respectively. Although there might have been criticism against some of the procedures followed in these studies (Dempster & Reddy, 2007; Vithal, 2008), the results remain a serious concern and the concerns regarding this state of affairs seem to be around one primary factor: education quality (Howie, 2004).

1.2. Internal challenges to South African education

The adoption of a plethora of new education policies and legislation by the South African National Department of Education since 1994, heralded in the intended changes in education. These changes were seen as part of the processes designed to bring about *quality* education. Such changes main focus was on addressing the subservient, irrelevant, unrealistic, impersonal education that the majority of learners received under the apartheid rule (Department of Education, 1998). As one of the manifestations of such changes, the new education dispensation policy document explicitly states: "OBE encourages a learner-centered and activity-based approach to education, while high knowledge and skills require the empowerment of those sectors of the population who were previously disempowered by a lack of knowledge and skills" (Department of Education, 2003, p 2-4). Sadly, however,

policies and curriculum statements do not necessarily bring about changes and improvements in education.

In Mr Surty's words during the conference hosted by the Western Cape Department of Education: "transformation has to do …with mindsets and attitudes … [and] how [we] transform institutions so that they can take account of the modern world" (Morrow, 2007, p. 204). He further argued that: "one central purpose of schooling is to enable access to the modern world" (*ibid*). I want to argue in this study, however, that the low performance in literacy of South African learners (Department of Education, 2003), indicate the fact that such access is denied. The fact that "only 1 in 29 Black children entering the school system emerge with matric certificates (Hoffman, 2008, p. 2) which provide them with access to further their education and their training and employment in a poor economy, represents a classical example of the denial of access. If we have the courage to recognise that many of our universities and schools across the political spectrum are "close to a point of breakdown" (Morrow, 2007, p. 184), then we have to also acknowledge that our education system is in "serious trouble" (*ibid*).

As with the poor achievement of South African learners as revealed by international studies referred to earlier, national concerns identify "[P]oor quality teaching [as] the key reason why the education system is failing so many schools" (Paton, 2006, p. 1). Soudien's (2007, p. 188) statement reveals the counterpart (teaching) as the problem when he says that "the impact it [the country] is making on the *quality* of the learning experience of young children is questionable." Morrow (2007, p. 184) concludes by a "widespread conviction that we urgently need to improve the quality of teaching and learning in our schooling system".

1.3. External challenges to South African Education

In addition to the internal collapse of the South African education system, the world community is adding more pressure on authorities to improve the quality in education. These education demands are linked to the rapid changes that the world is undergoing. Given the fact that we have long surpassed the modern world and now live in a post-modern world: "qualitatively different from former worlds" (Barnett, 2004, p. 248), more than before, urgent solutions are needed. Technological advancements represented by such innovations as computers, cell phones, television and satellite phones impose specific demands upon us as these technological advancements have penetrated deep rural areas and made available abundant knowledge to everyone who has access to them. This means the availability of a wealth of information that extends far beyond current school curricula is at our disposal. This accumulation of knowledge furthermore, has increased the complexity of the world that we have come to know. The concern with this form of knowledge, however, is that it carries no tag regarding its validity, reliability and trustworthiness. Further concerns with this knowledge involve the fact that it does not provide any clues about the future. This means we are left with a sense of uncertainty of this unknown future (Barnett, 2004).

Such uncertainties inhibit us from acting "with assuredness" (Barnett, 2004, p. 250) in the world and creates discomfort, anxiety and fear in what Hargreaves (2003, p. 27-35) calls "the age of insecurity." In Drucker's (2000, p. 8) words, "society is totally unprepared for it." Not only is society unprepared for this dramatic change, but the extent of this change compels us to "rethink everything we've ever understood about learning, education, schooling, business, economics and government" (Dryden & Vos, 1999, p. 21). It is within

this context that education needs to focus on developing certain kinds of human qualities. While Barnett (2004) emphasises the qualities of flexibility, courage, humility, thoughtfulness and resilience, Grulke (2000) emphasises the qualities of autonomy, independence, flexibility and self-reliance for empowering individuals in a world of uncertainty. Possessing these qualities is not just a luxury, but a fundamental requirement of the world we are living in and what is subsequently required by learning for an unknown future. These qualities, furthermore, are indications of the learning quality required. Basic numeracy and literacy - skills to be *actually* acquired during progress through the first 4 grades - and functional literacy - to be *actually* acquired during the subsequent 4 years of schooling - are only prerequisites for the possibility of quality education.

Knowledge and skills by themselves, however, cannot prepare individuals for the future. Instead, an acquisition of human qualities is also required. Knowledge and skills which defined and empowered individuals during the Information Age are necessary, yet insufficient because they only provide the entrance ticket to the new playing field of learning (Pink, 2006). According to Pink (2006, p. 3), “who flourishes and who flounders” in this age will be determined by the acquisition of fundamental human qualities that empower moral character. Unfortunately, education practices do not seem to take responsibility for this requirement although the implicit assumption is that this is the responsibility of education. This is despite the fact that today’s education “requires personal development of the highest order” (Alexander & Potter, 2005, p. 178). It is within this context that I argue that our education is in dire need of serious transformation and any such renewal should “start and end with the teacher” (Morrow, 2007, p. 209). Teachers remain the crucial interface between education policy that demand quality education and the execution of this quality (Fullan, 1982). Hargreaves (2003, p. 136) suggests that changes

required from policies (or any other relevant authority for that matter) “should be inherent in teacher professional development.” In addition, the quality of teacher education itself has to emulate the quality education expected from teachers as a trademark of its professional development. The important question to ask in terms of the South African context regarding these issues is:

> What is the pedagogical content knowledge of professional development in current teacher education revealing?

1.4. The flaw of the traditional (conventional) pedagogical content knowledge of teacher education programmes

Different types of experiences have contributed to my development as both a teacher and teacher educator. My role as a Biology teacher in a Secondary School, for three years however, remains the most profound experience in my career. After obtaining a BSc degree, with Biology and Psychology as my majors, and a BSc Honours in Psychology, I decided to teach. This decision was in spite of the fact that I did not have a teaching qualification. Even though I had no teacher education and therefore no pedagogical content knowledge, I was able to teach. My development as a teacher entailed planning for and teaching Biology. This involved practice and having discussions with Biology colleagues (teachers) on how I could teach particular sections of Biology during my lessons. These discussions were a kind of reflection on my practice and not pedagogical in content. Rather, they were experiences of practice. I only acquired pedagogical content knowledge when I was studying for my teaching diploma. This knowledge, however had a minimal influence on my practice. In

fact, my knowledge constructed from practice informed my responses to my teaching diploma assignments. After obtaining a teaching diploma and teaching for many years, I was appointed as a teacher educator at a college of education.

As a teacher educator, I challenged my colleagues on the expectation of student teachers to use a mechanistic 'one size fits all' approach when teaching learners and to learn Secondary school Biology content. But this is not required for future Primary school teachers. The student teachers at the time were frustrated with the teacher education programme. Firstly, they regarded the subject content as "valueless theory" and felt that the knowledge did not match the subject content knowledge that they taught during their teaching practice at schools. Overall, the entire experience was viewed as a waste of time. Secondly, they were frustrated when they found that the pedagogical content knowledge (education theory on how to teach), with all its exciting ideas, could not be applied in the school context (teaching practice) due to the rigid persistence of a dominant traditional knowledge transmission mode of education. It is under these circumstances that student teachers regarded the theory as "worthless" (student teachers', personal communication, September 1998). To illustrate these sentiments, the student teachers' frustrations are expressed in the following comment:

> We try to use the teaching strategies that we learnt at college while teaching at the school. Our teaching attempts have met with not much success and the teachers told us that we would lose all these fancy teaching ideas when we are full-time teachers (Student teachers, personal communication, September 5, 1998).

These comments suggest the failure of implementing theory on the part of students to current education practice. Another student expressed her frustration when she referred to theory that she had learnt:

> Very little of what we learn at the college helps us to cope with the challenges of learner discipline, teaching in under resourced contexts and working with relevant material (Student teachers, personal communication, September 5, 1998).

Clearly, the student teachers experienced immense frustration with transferring the knowledge and skills that they learnt at college to the school context. This evidence raises the theory-practice divide that still plagues teacher education today (Hughes, 2006). This persistence in the theory-practice divide in teacher education is based on the false perception that the knowledge (theory) to be learned sits somewhere, outside of a person, and that it is there for the taking (Slabbert & Hattingh, 2006). The assumption within this thinking is that knowledge can simply be learned or memorised and applied successfully in practice. Recent research (Claxton, 1999; 2000) in cognitive science, neuroscience, artificial science and experimental psychology, however provides evidence that these assumptions are false.

In the global teacher education arena, the traditional aim is to have student teachers learn knowledge constructed by experts (resulting from psychological, sociological, and educational research), and then using this expertise in their practice (Slabbert, 2003). However, this "technical-rationality approach" (Schon, 1983, p. 21) to student teacher education cause "teacher educators to make *a priori* choices about the theory that should be transmitted to student teachers" (Korthagen, 2001c, p. 255, Slabbert, 2003). Unfortunately "research has shown that this approach has very limited effect on practice" (Korthagen,

2001c, p. 255, Hughes, 2006). It instead perpetuates the ever-increasing theory–practice divide that teacher education has been plagued with from its outset. Examples of these plagues include the fact, that firstly, many student teachers did not apply the new theory learnt, they instead, practiced what was happening at the schools (Brouwer, 1989); secondly, there was a lack of success in student teachers developing critical reflective skills (Penny, Harley & Tansy, 1996) and; finally, student teachers were not equipped to address current education needs and classroom environments (Hughes, 2006).

1.5 The search for appropriate professional development

Even though there may be a realisation that the technical rationality model does not resolve the theory practice divide, there seems to be little clarity and/or agreement as to how teachers should be professionally developed to ensure the quality education that is required from them. What is clear is that we need to undergo a paradigm shift in our thinking about education and teacher education (Dryden and Vos, 1999).

In my search for a different teacher education programme, I inadvertently came across what was proposed as a contemporary radically innovative one. This was the one year Post Graduate Certificate in Education (PGCE) of the University of Pretoria. The format in which I was exposed to was through Table 1. It depicts a comparison with the more traditional teacher education programmes with which I could easily identify.

Table 1: A comparison between the more traditional teacher education programme and the radically innovative teacher education programme (PGCE) at the University of Pretoria

ELEMENT	TRADITIONAL	PGCE @ UP: RADICAL INNOVATION
AIM	Systematic learning for knowledge and skills acquisition	Maximizing human potential through facilitating authentic lifelong learning to create a safe, sustainable and prosperous universe for all
Target	Secondary school	All grades R-12: ECD, Foundation, Intermediate, Senior, and FET phases
Content	Pedagogic discipline theory (episteme) Teaching methods	Students construct their own practice theory (phronesis) of and for facilitating learning
Delivery Theory: Model: Mode:	 Behaviourist Transmission Lectures	 Authentic learning (Holistic, Experiential, Reflexive, Radically socio-constructivist, Action, Flexible, Contextual, Situated, Contingent) Transcendence Learningshops
Site % University: % School: Relationship: Purpose:	 80 20 Provides site Teaching Practice	 40 60 Mentor partnership Professional development through: Facilitating learning Reflection Action research
Assessment	Assessment of critique/model lessons Theory tests and exams	Continuous professional development Professional development portfolio defense

This comparison immediately attracted my attention because I am familiar with many of these concepts. I had not observed some of them in a teacher education programme though. I was compelled to satisfy my curiosity because this presentation portrayed a paradigm shift in thinking about education on face value. While I am aware that there is a range of teacher education programmes, I am also aware that there are many differences in their structure and implementation (Darling-Hammond, 2006; Kruss, 2008). Teacher education programmes also differ with regard to the nature and duration of the students' practice and experience in schools: "a capstone experience of student teaching" in some United States

institutions (Leavy, Mc Sorley, Bote, 2007, p. 1218); service-learning activities or school-based or a defined period with reflective practice activities at respective South African universities (Kruss, 2008).

Although this teacher education programme certainly may not be the only one that is featuring these unique concepts, its attractiveness is situated in its explicit emphasis on professional development. In close association with this is the comparison of what in essence constitutes the technical-rationality model. In the traditional (conventional) teacher education programmes it is indicated as pedagogical theory and teaching methods as pedagogical content knowledge (episteme) with which I could easily identify. However, the unique concept of phronesis as the pedagogical content knowledge, with its other closely associated concepts, aroused my curiosity and prompted a preliminary clarification.

1.5.1 Professional development

Education practices at schools presently and in the past reveal that the professionalism expected of teachers is that of being a source of information and knowledge and be able to adopt the teaching methods through which such knowledge could be transmitted (Leavy *et al*, 2007; Morrow, 2007; Bullough & Gitlin, 1994; Zeichner & Tabachnick, 1981). This thinking positions teachers in a professionalism that could be regarded as humanly detached, cognitive in nature and inappropriate in these post-modern times. The professionalism required of teachers is that of a personally engaged holistic nature, where the intellect is still necessary, and the emotional, personal and cognitive development of learners is viewed as primary. Much more fundamentally, professional development has an inherent ethical demand of maintaining the highest possible quality of professional practice. However,

current professional practice seems to be limited to "how to organise *systematic learn*ing" (Morrow, 2007, p. 70). Morrow uses this phrase in a manner that includes learning:

> academic knowledge or traditional 'school knowledge', [and] … also learning anything that takes time and is normally assisted by someone who knows. We might think of learning how to swim, or how to repair a motor car, in addition to learning how to read or to do mathematics (Morrow, 2007, p. 70).

Teacher education programmes with this as their definitive professional function "are inadequate" (Leavy, *et al*, 2007, p. 1218) in preparing student teachers for educating for the 21st century, to acquire the necessary fundamental human qualities indicated before. Hargreaves (2003, p. xi) is clear on this aspect: "…we require a qualitatively different approach to teaching in the 21st century …" not only in what we teach, but especially how we teach. In addition, the kind of pedagogy needed for educating for the 21st century "is much more demanding than that needed to impart routine skills" (Darling-Hammond, 1999, p. 221). The outcomes of this demanding pedagogy characteristically "lie neither in knowledge nor in skills: neither domain can carry a day in a world of uncertainty" (Barnett, 2004, p. 258).

It requires the teacher to adopt teaching methods through which the potential of all learners could be maximised and fully utilised. A teacher could do this through cultivating "practical, creative wisdom" (Slabbert, 2006, p. 1) to live and prosper amidst the uncertainties of real life. For learners to survive this uncertain and unknown future, they need to become problem-solvers and risk-takers in the process of constructing knowledge and teachers need to become facilitators of learning. This is no doubt a daunting task for

teacher education because what these competences should entail could best be described as the demanding challenges of a unique kind of teacher professionalism (Slabbert, 2006).

1.5.2. Phronesis

It is nowadays generally accepted that "people construct their own knowledge on the basis of their experiences" (Korthagen, 2005, p. 108; Van Huizen, Van Oers & Wubbels, 2005; Lombardi, 2007). This therefore leads to a focus on the question: "how one can help students to develop their own knowledge and skills" (Cochran-Smith, 2003, p. 17) and develop this expertise as the dialectic of scholarship and practice (Buchberger, Campas, Kallos & Stephenson, 2000). Hoban (2004) relates this constructivist notion of teacher education to the quality of its professionalism. Thus, an approach to teacher professionalism could focus on student teachers constructing their own knowledge about how to teach through the notion of phronesis which Kessels and Korthagen (2001, p. 27) define as "perceptual knowledge, the practical wisdom based on the perception of a situation". The major paradigm in teaching education is the focus on episteme knowledge. This type of knowledge is distinguished from knowledge as phronesis as follows:

- episteme knowledge is abstract and theoretical, while phronesis is concerned with particulars, concrete situations and theory (Kessels & Korthagen, 2001);
- episteme is linked to conceptual knowledge and phronesis is linked to perceptual knowledge. Conceptual knowledge is essentially governed by principles and theorems (Kessels & Korthagen, 2001) and can be used to explain how student teachers should teach. Perceptual knowledge has an appeal to perception where the student teacher "must be able to perceive and discriminate the relevant details" (Kessels & Korthagen, 2001, p. 25) of a concrete situation (the classroom).

Clearly, the focus on phronesis in teacher education may be a solution to the preparation of student teachers as flexible, individuals who have assuredness of being. But, the challenge that we are faced with – is how could student teachers construct it and utilise it?

1.5.3. Paradigm shift

The challenge of constructing such knowledge requires a paradigm shift that would entail a change in thinking and actions in teacher education – from knowledge as episteme to knowledge as phronesis. This change could see teacher educators losing their hold on making choices about theory and then using these chosen theories to inform student teachers on how to teach. Student teachers at the beginning of the programme would not be given any educational theory on how to facilitate learning. Instead, they would be expected to construct theory from their observation and critique of teachers teaching and their own beliefs about how to facilitate learning. As the programme proceeds, student teachers further construct their theories from the many experiences that they are engaged in, including discussions on educational theories. This theory construction is their own theory about facilitating learning and they construct a phronesis of facilitating learning. The internal and external challenges to education in South Africa can only be addressed effectively if a paradigm shift such as this one is implemented in the education system. For learners to be regarded as successful in the national and international arena and, more importantly, for them to survive the uncertain and unknown future, they need to have the necessary capacities for accessing the post-modern world, to be problem-solvers and risk-takers, and to have developed the human qualities previously discussed. Learners in South Africa could only achieve this if the education system and, ultimately, teachers, provide quality education. This expectation could be possible if teachers are facilitators of learning who

construct a phronesis of facilitating learning – with facilitating learning being identified as distinctively different from teaching (Mohanan, 2005, p. 2; Rooth, 2000, p. 35).

We would have to look to teacher education to fulfil this requirement. Here student teachers would be expected to construct a phronesis of facilitating learning. This experience of constructing a phronesis of facilitating learning would be an all new one for them. A great pitfall with this new paradigm is that since many student teachers would have experienced the old paradigm, this could create resistance to change and acceptance of the new paradigm. A further pitfall is that, in order for the student teachers to construct a phronesis of facilitating learning, they need to be facilitated by teacher educators who understand and can work in this new paradigm.

1.5.4. Construction of Theory

Essentially, for student teachers to be able to construct a phronesis of facilitating learning of school learners, they would need to experience facilitating learning. This construction of theory would have to be a personal activity as each individual's conceptual structures are not the same (Von Glaserfeld, 2001). In addition, student teachers are social beings and, in that sense, could construct a phronesis of facilitating learning collaboratively (Burr, 1995). Since each student teacher is not given a recipe on how to facilitate learning by an external other, he/she is expected to construct it. In constructing a phronesis of facilitating learning, each student teacher is expected to use his/her experiences of teaching and learning and, most importantly, to integrate these with educational theory. The challenge therefore is for us to respond to how student teachers construct this theory.

1.5.5. Authentic learning

Student teachers could construct this theory if they experience authentic learning, which is concerned with experiential, active, professional and contingency learning. The focus of this learning is on student teachers learning in real-life contexts and situations where they are expected to construct a phronesis of facilitating learning in practice. This can only occur if they "use the real world as [their] classroom" (Dryden & Vos, 1999, p. 26) to facilitate learning.

This view is supported on three premises: neuroscientifically, psychologically and practically (Slabbert, 2007). The first premise is that practical know-how (how/practice) and rational knowledge (what/theory) are located in completely different areas of the brain. It is only through direct immersion in authentic experience that practical know-how is developed to construct meaningful rational knowledge, which is specific to particular contexts (Slabbert, 2007; Claxton, 1999). The second premise focuses on the crucial importance of the learning environment to enable the learner to utilise what he/she has constructed to create something new (Slabbert, 2007). If the learning environment is so remote from the real context, then Claxton (1999, p. 209) concludes that, "no transfer will take place". The third premise focuses on the holistic nature of the problems that we experience in real life, which itself is a holistic practice. To solve these problems and thereby achieve our wholeness, we would require the use of human abilities (Slabbert, 2007; Clark, 1997; Flake, 2002).

The challenge in teacher education therefore is to provide authentic learning for all student teachers. However, the decision about what is authentic learning for student teachers and how this authentic learning could be managed is a greater challenge.

1.5.6. Belief system

The provision of authentic learning is a requirement for the student teachers construction of a phronesis of facilitating learning but it does not presuppose that they will do this. A factor that could impede on this process is the student teachers' "own preconceptions about learning and teaching." (Korthagen, 2001b, p. 255). If we, like many researchers (Peterson, Fennema, Carpenter & Loef, 1989; Pajares, 1992; Kagan, 1992, Richardson, 1996; Levy et al, 2007), accept that student teachers' beliefs about teaching and learning can influence how they will teach, then surely student teachers' beliefs about teaching and learning will influence their thinking and actions of facilitating learning. Currently, many South African student teachers, it may be argued, believe that the transmission style of teaching and learning is acceptable, for this probably has been their own experience of education. In order for student teachers to construct their phronesis of facilitating learning, their belief systems would have to be challenged and changed.

De Kock & Slabbert (2003) conducted research on challenging the belief system of student teachers at the University of Pretoria. Student teachers in a PGCE programme were expected to develop a new mental model about how teaching should take place, culminating into a new belief system (Korthagen, 2001). Teaching within this new mental model was viewed as "the facilitation of a process of learning based on the principles of constructivism" (de Kock & Slabbert, 2003, p. 1). Teachers, due to the inception of the new education dispensation in South Africa, were expected to implement changes in their teaching: from teacher-centeredness to learner-centeredness and traditional to constructivist philosophy. Student teachers were expected to observe this changed teaching in schools. Sadly, this was not the case because the new policies and philosophies were not implemented in practice in the way intended (Jansen, 1999; James, 2000). This resulted in a

collision between the student teachers' experiences in schools and the new education approach that they were exposed to in their programme. Because of this, problematic student teachers beliefs' were not changed (de Kock & Slabbert, 2003). The challenge therefore is to consider what actions are required to 'persuade' student teachers to change their beliefs.

1.5.7. Reflective practice

A possible action would be for student teachers to reflect on their experiences and, in the process, become aware of changes in their belief systems. The basis of reflecting is for student teachers to construct meaning (Leavy *et al*, 2007) of their existing beliefs and constructed theories of facilitating learning. In the process of constructing meaning, the student teachers could be "trying to (re)structure an experience, a problem, or existing knowledge or insights." (Kessels & Korthagen, 2001, p. 68). However, this process of reflecting does not take place automatically. The question then is how could student teachers be motivated to reflect and to use these reflections to inform their learning?

1.5.8. Facilitating learning

If we accept that good teaching is concerned with facilitating learning (Lombardi, 2007), then student teachers should facilitate the learning of learners through learning task design and operation, and reflect on the process. In the process of facilitating learning and reflecting, the student teachers could be provided with an opportunity to construct and re-construct their own practice theory.

Each student teacher constructs his/her own phronesis of facilitating learning in authentic contexts. Evidence of this is from a pilot study that I conducted in 2003 on the radically

innovative PGCE programme at the University of Pretoria. The purpose of this study was to examine the underlying assumption that the construction of a phronesis of facilitating learning could take place in practice. I interviewed 3 Life Sciences student teachers whose professional development time comprised 60% at a school facilitating learning and 40% at the university attending specialisation subject sessions. A statement made by one of the student teachers during the interview was: “95% about facilitating learning was obtained at the school during my school-based experience and five percent from the university” (Student teacher, personal communication, September, 2003). All three student teachers concurred with this statement. It has therefore become clear to me that this new teacher education programme is providing the opportunity for phronesis/practice theory to be constructed from practice.

These experiences as a teacher educator led me to question the existing practice of professional development of student teachers. Recognising that the quality of learning is so poor in South Africa and that the world is changing rapidly, the professional development of student teachers should be focused on constructing a phronesis of facilitating learning.

1.6 The research problem

Although it was tempting to consider the evaluation of the programme as a whole, it is the novel concept of phronesis and its related key concepts as a possible alternative to the technical rationality concept of pedagogical content knowledge that became the focus of my interest. In addition, the indication that phronesis has to be constructed by the student teacher proposes a significantly different paradigm. This construction, in turn, represents a

practice theory of and for – not teaching – but facilitating learning. This indicates the existence of a significant difference between teaching and facilitating learning, as mentioned before. Additionally, the focus on learning rather than teaching, as it relates to the explicit aim of education, proposes an emphasis on the development of the highest possible level of learning quality. Finally, and perhaps fundamentally, the construction of phronesis seems to be imbedded in continual professional development. Although the preliminary clarification of these concepts need a more in depth exposition, the accumulative relationship between these concepts prompted my interest in how student teachers construct and use phronesis to enhance their professional development.

1.7 The research questions

The primary research question in this study is: *How do student teachers construct and use phronesis to enhance their professional development?* This research question was explored by addressing the following secondary research questions:

a. What is the student teachers' baseline phronesis when they enter the programme?
b. How do student teachers utilise the contribution of the mentor teacher to construct and use phronesis to enhance their professional development?
c. How do student teachers utilise the contribution of the specialisation programme to construct and use phronesis to enhance their professional development?

1.8. Importance of the research

The findings of this research could be useful to:

a. **Expanding** our knowledge on student teacher professional development. Firstly, on how student teachers' professional development may be enhanced by the particular experiences that they are exposed to during the teacher education programme. Secondly, on the extent, depth and importance of the structure and manner in which a teacher educator engages student teachers in a teacher development programme. Thirdly, on the extent and depth of the role that mentor teachers could/should play in enhancing the student teachers' professional development;

b. **Curriculum development** specialists in teacher education. To inform teacher education curricula on the impact of a particular approach for enhancing teacher professional development, the focus will be on how student teachers' construct and use phronesis in a particular PGCE programme. This could be useful to defining a knowledge base for teaching where phronesis is considered to complement existing theories about teaching (Meijer, 1999). It could also serve a useful purpose in educating new teachers (Bennet & Carrè, 1993; Reynolds, 1989);

c. **Curriculum development** specialists in mentorship for information about the most effective process for maximising the student teachers' construction and use of phronesis;

d. **Policy makers** in teacher education. To inform the development of policies on the structure and implementation of student teacher professional development programmes.

1.9 Plan of the research chapters

The report consists of eight chapters. The purpose of this chapter is to place the study in context by providing some background. As indicated, the rationale for the research study includes personal reasons for wishing to conduct this research based on experience of teacher education as well as upon the importance of this research in the context of global teacher education reform. The research questions provide the framework for this study.

Chapter 2 is organised into a conceptual framework, literature review and a theoretical framework. The literature review focuses on exploring the meaning of phronesis used in this research; research in the field of phronesis and student teacher professional development and constructing and using phronesis for professional development.

As this research will be located in the field of student teacher professional development, the theoretical framework to be used, focuses on the learning and development of student teachers – The Vygotskian perspective on learning and development and sociocultural practice. This theory will be used to inform the research design and how data will be analysed.

Chapter 3 sets out the methodological framework applied in this research. This chapter sets out the selected research design (case study participatory action research) and the chosen methods (interviews – biographic, semi-structured and group; visual media – student teachers' drawings, observations, and document analysis - reflective journals, professional portfolio, concept maps and learning task design documents). Various issues related to the

methodology, such as limitations, research rigour, ethical considerations and limitations will be discussed.

Chapter 4 presents an analytical discussion of the student teachers' construction of a phronesis of and for facilitating learning in the first action research cycle. This cycle will occur during the first three weeks of the programme. The purpose of this cycle will be to explore the student teachers' baseline phronesis and to expose them to an intervention. The student teachers will be expected to explore and construct their personal and professional identity linked to developing as a facilitator of learning and their theory of facilitating learning.

Chapter 5 presents an analytical discussion of the student teachers' construction of a phronesis for facilitating learning in the second action research cycle. Cycle two will occur during weeks four to six of the programme. During this cycle, the student teachers' understanding of a facilitator of learning and facilitating learning in practice will be explored and challenged.

Chapter 6 presents an analytical discussion of the student teachers' construction and use of phronesis to facilitate learning in the third action research cycle. During this cycle, the student teachers' understanding of a facilitator of learning and facilitating learning in practice will be explored and challenged.

Chapter 7 presents an analytical discussion of the student teachers' construction and use of phronesis to facilitate learning and the preparation and presentation of a Professional Portfolio during the fourth action research cycle. During this cycle, the student teachers'

understanding of a facilitator of learning and facilitating learning in practice will be explored and challenged and their Professional Portfolio assessed.

In Chapter 8 the findings from the action research cycles are brought together to explore the student teachers' construction and use of phronesis to enhance their professional development and conclusions are reached in this regard. The implications of this research for student teacher professional development will be discussed in the light of the findings. Suggestions for further research will be made.

In the context and purpose of my study, I choose to sequence the chapters in this way in order to reflect the student teachers' baseline phronesis at the beginning of the professional development programme. I also want to reflect how the student teachers at different phases in their professional development, utilise the contribution of the mentor teacher and the specialisation programme to construct and use phronesis to enhance their professional development.

Chapter 1 focused on stating the problem of the research and the research questions, while Chapter 2 focuses on the research literature linked to the research problem raised and the theoretical underpinnings of the research.

CHAPTER TWO

LITERATURE REVIEW

"There is a need of forming a theory of experiences in order that education may be intelligently conducted upon the basis of experience." John Dewey

2.1. Introduction

The preceding chapter served to orientate the reader to the central issues of this study: the need to improve the quality of learning and teaching in our schooling system; and a possible solution to this need could be in the provision of a student teacher professional development programme that is focused on student teachers' construction and use of phronesis. This suggested solution raises a question of how student teachers construct and use phronesis to enhance their professional development.

As discussed in chapter one, the failure of the Department of Education to provide quality education and ultimately quality learning for all South African youth has led to a situation where education in South Africa is experiencing internal and external challenges. To deal with such challenges, the Department of Education introduced a plethora of policies to provide quality teaching and learning. Such policies, however, are not sufficient to ensure the provision of quality teaching and learning and could not achieve the intended changes in education on their own. The dismal performance of South African youth in national and international studies in numeracy and literacy competence referred to in chapter one and the youths' lack of a vision for the future are just a few examples that illustrate the failure of

these policies. The dilemma for South Africa is that if the youth do not receive quality education, their performance and ability to act with assuredness in this rapidly changing world, which has an uncertain future (Barnett 2004), may be severely compromised.

These issues indicate that it is not the adoption of policy alone that is required to deal with these challenges, but, in Morrow's (2007, p. 184) words, it is also an urgent improvement in the "quality of teaching and learning in our schooling system." However this improvement depends crucially on the collective efforts of individuals who are *au fait* with what it involves and what its "cultural and political significance is" (Morrow, 2007, p. 29).

The most crucial question in this context is: Who are the individuals at the interface between policy implementation and the provision of quality education and learning? Teachers, it seems to me are the individuals who occupy this position and who could possibly fulfill the requirements for providing quality learning. This response is supported by researchers (Hargreaves, 1994; Van Huizen, van Oers & Wubbels, 2005; Morrow, 2007; Samuel, 2008), who argue that teachers play a key role in providing quality learning and the transformation within an education system, for the ultimate success of any schooling system. If we view the provision of quality learning as a teacher's responsibility, then we must explore how teachers and, especially, student teachers, are prepared and developed as professionals to provide such learning.

Student teacher professional development is not an instantaneous, *de novo* process that occurs in a vacuum. Student teachers in student teacher education programmes, it may be argued, have particular paradigms of teaching and learning. Examples of these are presented in chapter 1. The provision of quality learning, however is impossible if student teacher

professional development does not focus on the nature and content of their pedagogic content knowledge that student teachers experience and, more importantly, on exploring and challenging each student teacher's paradigm of teaching and learning. Any changes that student teachers experience in their paradigms of teaching and learning should be rooted in the experiences that the student teachers are exposed to during their professional development (Elbaz, 1983; Richardson, 1989; Elliot, 1991; Korthagen, 2001; van Huizen *et al*, 2005; Zeichner, 2005; Morrow, 2007). There is little clarity, however regarding how student teachers could or should be prepared to ensure their fulfillment of this paradigmatically different and significant role (Zeichner, 2005; Hughes, 2006). It is therefore crucial that we explore how student teachers develop professionally within a particular professional development programme in order to provide a framework for such development.

In relation to these issues, the question to ask is: how are student teachers prepared to provide quality learning for these contexts and post-modern times? A response to this would demand "a critical reflection on the professionalism of teachers" (Van Huizen, *et al*, 2005, p. 267). Reflections on the pedagogic content knowledge and approaches used in traditional teacher professional development have revealed flaws. It is on these bases that I argue in this study that a new approach with different pedagogic content knowledge in student teacher professional development programmes is required for student teachers to acquire the essential human qualities and the understanding of quality learning in the schooling system. This would entail a paradigm shift from knowledge as entirely epistemic to knowledge that is strongly focused on phronesis, on the one hand, and a shift from the assumption that children have to be taught in order to know to one that they have to "be facilitated to develop their unique potential" (Holdstock, 1987, p. 49) on the other hand. Facilitating

learning, in turn, requires the construction of phronesis, the practical wisdom which is acquired when experience of education practice is transformed into dynamic knowledge of, and for, facilitating learning (Slabbert, 2003).

It is within the context of these observations that this chapter firstly explores the meanings of phronesis and related concepts to present clarity and declare the meaning used in this research. Secondly, I move to presenting a critique of research literature in the field of phronesis and student teacher professional development. Thirdly, the chapter discusses major concepts that have been identified in this radically innovative teacher education programme and foregrounds the impact of these on student teacher professional development. Fourthly, and finally, the chapter presents the theoretical framework that I will use to analyse the data – the Vygotskian perspective on learning and development and sociocultural practice as espoused by van Huizen, van Oers and Wubbels (2005).

2.2. Meaning of phronesis and related concepts

Various theorists have used the concept phronesis and have ascribed particular meanings to it. In addition to discussing its original meaning as used by Aristotle, I analyse it in terms of its philosophical basis. It is after these deliberations that I further discuss the meaning of phronesis as ascribed by other theorists (Jonsen & Toulmin, 1988; Kessels & Korthagen, 2001; Halverson & Gomez, 2002). The meaning of the concepts practical knowledge and practical theory are also discussed. The purpose is to clarify their relationship with phronesis. My intention is to lead the reader to the focal concept of this research - phronesis

as practice theory, and serve to position and distinguish practice theory from the other concepts.

2.2.1. The meaning of phronesis

In his *Nichomachean Ethics* (in Ross, 1980) Aristotle distinguishes three kinds of knowledge associated with wisdom: techne, episteme and phronesis. *Techne* refers to the knowledge of making, ranging from the arts of construction to the creation of states of affairs (Dunne, 1993) and as craft-knowledge (Kessels & Korthagen, 2001). For Halverson (2004), it is expressed through routines and procedures. This type of knowledge however, in not the focus of my discussion at this stage because episteme and phronesis are the knowledge types I intend to focus on. Episteme, a concept coined by Plato, refers to purely intellectual forms of knowledge. It is both necessary and universal, and it may be connected to a scientific understanding of knowledge (Kessels & Korthagen, 2001). Episteme can be represented apart from the knower, codified into systems of thought, and leads to reproducible effects under similar circumstances (Kessels & Korthagen, 2001).

Phronesis, also referred to as practical wisdom, was first described by Aristotle in his book the Nichomachean Ethics (in Ross 1980). Ross (1980, p. 1) translates phronesis in the following way:

> For the things we have to learn before we can do them, we learn by doing them, e.g. men become builders by building and lyre players by playing the lyre; so too we become just by doing just acts, temperate by doing temperate acts, brave by doing brave acts (Ross 1980, p. 1).

The emphasis on the individual's action as an essential feature in the learning process. However, this action is focused on the "capacity [of an individual] to act with regard to human good" (Aristotle, *Nich. Eth., Book VI, Book* 1140, p. 25) (in Ross, 1980).

This notion of 'good' is the concept that Aristotle focused on extensively (Roca, 2007). Good is considered the ultimate driving force behind moral action in Aristotelian ethics. Good inspires human inclinations, virtues and, therefore, prudential deliberation because, as Aristotle points out: "The good for man turns out to be activity of soul in accordance with virtue" (*Nicomachean Ethics* I 7, 1098a, p. 15) (in Ross, 1980). Aristotle regarded good as the ultimate end, and the compass that guides the uncertain exercise of judgment. This uncertainty is due to the actions being specific to particular situations and they do not have reproducible effects. Any individual possessing phronesis is to know what is "good for human beings in general and will have the ability to apply such knowledge to particular situations" (*Nicomachean Ethics* VI 5, 1140b, p. 6) (in Ross, 1980). This means that individuals will have a general awareness of right values and should be able to act appropriately in specific instances, including situations where there is no established formula.

The practical wisdom that individuals have may be viewed as harmonizing rather than clashing with the nature of the practical matters which includes interpretation, ambiguity, and indetermination (Roca, 2007). It is within the context of this understanding that an individual's individuality during the process of deciding on an action to take in a particular situation is important. Furthermore, in doing an action, individuals develop the capacity to discern solvable features of a situation. This focus on the good and the solution to the problem suggests a duality of reason and emotion. This duality is evident in Aristotle's work

"it is impossible to be practically wise without being good" (*Nicomachean Ethics* VI 12, 1144a, p. 18) (in Ross, 1980). Finally, the decision-making action is considered by Aristotle as praxis: an action that changes behaviour and develops an individual (Roca, 2007). I turn to a discussion of the meaning of phronesis by other theorists in the next section. .

As part of their work in the field of moral arguments and ethics, Jonsen and Toulmin (1988) used the term 'casuistry' and linked it to phronesis. For them the term deals with the ultimate particular and this is [seen as] the object of perception. They referred to this perception of each individual as an "individual-particularistic-perception" (Jonsen & Toulmin, 1988, p. 66). They highlight the importance of specifics in an individual's experience of perceiving. Kessels and Korthagen (2001) who worked in the field of realistic mathematics teacher education, furthermore, extended the meaning of phronesis to include a particular type of knowledge. According to them, the individual develops knowledge which focuses on the "understanding of specific concrete cases and complex or ambiguous situations" (Kessels & Korthagen, 2001, p. 24). The essential feature for this development of knowledge, however, is that an individual should have appropriate experiences as "particulars only become familiar with experience" (Kessels & Korthagen, 2001, p. 27). It is during this experience that individuals perceive, judge and assess situations, choose the actions to take and become aware of their consequences (Kessels & Korthagen, 2001). Individuals generate a "sort of insight that is altogether different from scientific knowledge (*ibid*, p. 27) as a result of these experiences. Kessels and Korthagen (2001, p. 29) concluded that what a person needs is "perceptual instead of conceptual" knowledge. They view an understanding of particular situations as more important than the understanding of general situations and experiences as an essential component to developing phronesis.

Halverson & Gomez (2002) also viewed experience as essential to the development of a particular type of knowledge. This experience entailed the processes of "judgment, understanding, and insight" (Halverson & Gomez, 2002, p. 21) resulting in appropriate action. According to them, "wisdom, a capacity acquired through experience" assists individuals to ask questions and provides them with the capacity to ask questions, provide intuitive understanding and consequence of actions, to inform possible action (*ibid*). Of significance is the fact that the action decided on should take "account of the particular … [and] how knowledge and experience" are used within particular contexts *(ibid*).

The concept 'phronesis' was used in the business world by, amongst others, Mc Kenna, Rooney and Liesch (2006) and Roca (2007). Mc Kenna *et al* (2006, p. 284) showed how "wise practices can be used effectively by managers in a knowledge economy." Their reason for using the concept was that it is directed to moral (good) outcomes and is rational, with a focus on the contingency nature of knowledge (Mc Kenna *et al*, 2006). Roca (2007) re-conceptualised phronesis so as to emphasise its intuitive and emotional components. According to Roca (2007, p. 206), the emotional components "are often devalued by business ethicists". I argue in this thesis that they need to be included so as to avoid a too intellectual interpretation of Aristotle. This concurs with Roca (2007, p. 206) who concluded that practical wisdom appears to be "an appropriate sense" with which to understand and manage organisations.

In the context of my study, a comparison between episteme (expert, scientific knowledge) and phronesis (individual practical wisdom) will provide additional clarity as depicted in Table 2. This table, however, need not be read as a declaration that there is a divide between scientific knowledge and practical wisdom, nor that practical wisdom is the only one that

has a place in teaching and learning. Instead, my position is that a student teacher, in a student teacher professional development programme, will generate a sort of insight or perception that is different from scientific knowledge. In this context the student will use the rules (scientific knowledge) to further inform, enrich and strengthen their insight or perception. This insight, however, can only be constructed by the student within conditions that allow for extended periods of proper experience. It cannot be transferred or induced through the use of conceptual knowledge. It is on these bases that conceptual knowledge is used as a guide to explore the student teacher's insight or perceptions. The focus of my research thus is on theory with a small t (phronesis) and not on theory with a capital T (conceptual knowledge).

Table 2: Comparison between knowledge as "episteme" and as phronesis (Kessels & Korthagen, 2001, pp. 20-31)

KNOWLEDGE AS EPISTEME	**KNOWLEDGE AS PHRONESIS**
Expert, scientific knowledge (theory)	Individual practical knowledge
Needs scientific understanding	Needs practical wisdom
Knowledge of universal principles	Knowledge of concrete particulars
Locus of certitude: Principles	Locus of certitude: Particulars
Knowledge is conceptual	Knowledge is perceptual
Knowledge is rigid	Knowledge is flexible
The principle (concept) dictates the practice	Uses the practice to discover a guiding rule/principle/procedure/method
Knowledge learned (memorized) and "applied"	Knowledge acquired through enough, appropriate and proper experience (perceiving, assessing, judging, choosing actions, execute them, be confronted with its consequences and learn from them)
Provides principle	Provides holistic insight
Teach the student concepts – avoid will, emotions, etc they disturb	Help the student see – celebrate will, emotions, etc they provide insight

Phronesis is also closely related to what may be called practical knowledge. A discussion on the various meanings of practical knowledge is the focus of the next sections.

2.2.2. The meaning of practical knowledge

Just like phronesis practical knowledge also focuses on an individual's action in a real context. According to Nussbaum (1986, p. 314), a person with practical knowledge "inhabit[s] the human world and does not attempt to rise above it". This assertion suggests the importance of knowledge of a particular context and action as dictated by that context.

This knowledge is “for responsiveness and yielding flexibility … [but] could not adequately be captured in general description” (Nussbaum, 1986, p. 304) and it is unconstrained by prior theories of education. Carter (1990) however, locates practical knowledge within the context of teachers’ work. In this context practical knowledge refers to the knowledge that teachers have of “classroom situations and the practical dilemmas” (Carter, 1990, p. 10) that they encounter in carrying out decisive action, in particular settings. Thus, practical knowledge may be viewed as conceptual and particular in nature. It can thus be argued that an exploration and analysis of the teachers’ actions could be used to reveal the conceptual knowledge that underlies the teachers’ actions (Carter, 1990).

Fenstermacher (1994) and Meijer (1999) also situated practical knowledge in teachers’ work. Fenstermacher (1994, p. 58) viewed it as knowledge that “teachers themselves generate” from their experience of teaching and reflecting on these experiences, while Meijer (1999, p. 20) focused on the “cognitions that underlie teachers’ actions.” Meijer (1999, p. 20) also viewed practical knowledge as “personal and tacit” and related to the content, context and reflections on experiences. Both theorists seem to adopt the view that student teachers could use these reflections to learn from them. In the words of Fenstermacher (1994, p. 24), teachers seek solutions from “concrete details rather than from some theoretical domain.” The view that teachers generate knowledge advances the understanding about practical knowledge. This view, however, fails to provide a description of how teachers generate this knowledge. A possible solution to this is suggested by the work of Bigelow (1992) in managerial wisdom. In this work, Bigelow (1992) designed a model of wisdom development representing two types of changes in a person. At one level he views practical knowledge as important for individuals to develop over the short term and, at another level, metacognitive processes as developing higher levels of insight

(Bigelow, 1992). Although the model presents a possibility of how an individual develops wisdom, it also fails to provide a description of how this knowledge is generated.

2.2.3. The meaning of practical theory

The use of practical theory could be a response to this lack of clarity and can essentially be viewed as knowledge that is developed and used to guide practitioners' actions (Brookfield, 1987; Handal & Lauvas, 1987; Duignan &.Macpherson, 1993; Cronen, 2001; Cunliffe, 2002; Barge, 2004). The proviso for this knowledge development is that all practitioners should have the experience of a phenomenon in order for them to be able to assign meaning to it. This meaning is regarded as particular in that it is linked to particular contexts and is used to inform further action within that context. While Brookfield (1987) and Handal and Lauvas (1987) view practical theory as extending the teachers' baseline theory, Duignan and Macpherson (1993) view it as a theory to inform leadership in educational settings. Social theorists, furthermore, have used the term practical theory in a variety of ways. Cunliffe's (2002) usages focus on the "localized description [that] individuals create" and the collective abilities that professionals bring to a situation. These abilities are "informed by a coherent way of going on—the practical theory" (Cronen, 1995, p. 233). Barge (2004, p. 188) also supports and extends this view by stating that "practical theory evolves through its reflexive relationship with practice". The focus on this reflexive relationship is vitally important as a person's practical theory informs their practice and the "consequences of our practice should yield new insights for revising our theories" (Barge, 2004, p. 188). Barge (2004) concludes that these practical theories "are intended to inform patterns of practice that make life better and are judged according to the pragmatic criterion of utility as opposed to an epistemic criterion of truth." (p. 190). The use of the term practical theory and

the meanings given to it as discussed above lead to the development of the meaning for practice theory.

2.2.4. The meaning of practice theory

Practice theory is derived from the Aristotelian use of phronesis with its focus on particulars and the action for common good. Practice theory focuses on particular practice, reflection on the practice, social learning of the practice of learning and the inclusion of existing theories of education (Furlong, 2000; Korthagen, 2005; Slabbert, 2003, 2007). Each student teacher during his/her professional development, for example, is expected to construct his/her own practice theory from all the experiences throughout the programme. According to Slabbert (2003, p. 3), the practice in practice theory focuses on each student teacher's education practice which "relates to transformative learning design and action of facilitating learning in the classroom". In this context, the focus is on what each student teacher does when preparing to facilitate learning and when he/she is actually facilitating learning. Slabbert (2007) views the theory in practice theory as the knowledge constructed during the interaction between theory and practice as the student practices and reflects on the practice. Each individual student teacher therefore, will have his/her own practice theory as it will be constructed from their experiences and continuously enriched by each individual student's practice from reflecting on his or her practice and also the "practices of other facilitators of learning, as well as other already existing theories (research) in education (Slabbert, 2007, p. 22).

Hence, the role of a student teacher is that of a facilitator of learning who "generate[s] knowledge [during] the process of facilitating learning" (Slabbert, 2007, p. 22).What is significant here is the action of the individual in the generation of theory and the context in

which this experience is embedded. The crucial aspect within this context, is that during this process, while the needs of any individual student teacher is met, the students teachers are also challenged to transcend their immediate level of learning continually in order to achieve the highest possible quality of learning they can. This is what facilitating learning has as it's focus (Mohanan, 2005). So in facilitating learning student teachers are constructing their theory of their facilitating learning practice.

2.3. Phronesis and student teacher professional development

It would be amiss to discuss phronesis and student teacher professional development without presenting perspectives on the concept of professional development.

2.3.1. Student teacher professional development

The focus of this section is to contextualise the meaning of being a professional teacher and professional development in teacher education. My purpose is to discuss the particular meaning embraced in this study.

2.3.1.1. Professional teacher

The meaning of the terms professional and professional teacher are politically, socially and culturally influenced, and this is evident in the way theorists assign meaning to them. In Morrow's (2007) terms, for example, a profession has two characteristics: "theoretical nature of professional practice and the ethical dimensions of a profession" (p. 78). Within the South African context, this meaning cuts to the core of the characteristics that professional teachers should possess as many lack appropriate content knowledge,

pedagogic content knowledge and an effective work ethic. Researchers essentially agree that the teacher as a professional should possess "competence in and be committed to the practice of professional teaching" (Morrow, 2007, p. 75); make decisions about teaching and learning for particular learning environments with "confidence and commitment" to teach learners (Samuel, 2008, p. 15); "standard of competence" and also commitment (Van Huizen *et al*, 2005, p. 274).

Teachers may be regarded as members of a profession (Morrow, 2007) whose 'actions' and work are shaped by many different demands made on teachers' work in general (Samuel, 2008; Morrow, 2007; James, 2000) and the internal and external challenges for quality learning (Hoffman, 2008; Soudien, 2007; Morrow, 2007). It is for this reason that a critical view of how student teachers learn and develop as professionals is important. Such learning does not happen as a *de novo* process, nor is it "invented by individuals" (Morrow, 2007, p. 101). Student teacher professional development does not occur in a vacuum and as student teachers are expected to learn and develop in particular educational institutions. These use particular models and methods for them to develop pedagogic content knowledge.

2.3.1.2. Developing a student teacher as a professional

Professional development is "generated" within the institutions and the profession committed to teaching (Morrow, 2007, p. 74). It is a process where student teachers, over an extended period of time, learn and develop within a sociocultural context. This learning and development entails evolving participation in a social practice where the sociocultural context is recognized (Van Huizen *et al*, 2005).

2.3.2. Perspectives on the professional development of student teachers

Research literature (Vonk, 1995; Hargreaves, 1994; Calderhead & Shorrock, 1997; Korthagen, 2001; Morrow, 2007; Samuels, 2008) on how student teachers should be professionally developed, suggest various strategies. The perspective that has dominated such literature for many years is that "learning to teach is a two-step process of knowledge acquisition and application or transfer" (Feiman-Nemser & Remillard, 1996, p. 79; Hughes. 2006; Morrow, 2007). This view infers a mutually exclusive relationship between the teacher educator, the student teacher and the acquisition of knowledge about teaching. The roles of the teacher educator and the student teacher are clearly defined in terms of what content and pedagogic content knowledge will be the focus, who knows best in terms of what must be done when you teach, and how you should teach. The teacher educator is the specialist provider of knowledge and the student teacher applies this knowledge when teaching. This 'one size fits all', theory driven process, where the teacher is expected to perform as a technician (Zeichner, 2005), is currently not suitable as a model for student teacher professional development. One fundamental reason for this position is that it is far removed from the actual experiences that student teachers will have when they are teaching. This view implies that this approach will not even equip them for the challenges of the uncertain future.

Globally, student teacher professional development programmes differ with regard to their content i.e. curriculum components and the allocated time for each component (Villegas-Reimers, 2003; Darling-Hammond, 2006; Kruss, 2008). The debates about whether the professional development programmes should focus exclusively on content or pedagogy, or both, are abundant. In many countries the tendency is to emphasise the teaching of "content in the initial preparation and the pedagogy in the practicum" (Villegas-Reimers, 2003, p.

48). In some African and Latin-American countries the focus is on "content without pedagogy and/or practice" (Villegas-Reimers, 2003, p. 48). In such instances, student teachers do not receive any school-based experience during their professional development. In other parts of the world, furthermore, the professional design is such that there is an increase in the time that the student teachers spend in schools for the practicum period (Villegas-Reimers, 2003). The length of this period varies quite remarkably from country to country: "a capstone experience of student teaching" in some United States institutions (Leavy, Mc Sorley & Bote., 2007, p. 1218); two weeks for Japanese secondary school student teachers; four weeks for New Zealand elementary teachers and Japanese primary teachers, and for a full year in Germany, France, India and Belgium (Villegas-Reimers, 2003); sixteen weeks in a some South African universities and twelve weeks in others. In some countries such as Japan, this practicum experience is coupled with the expectation that novice teachers also complete a further practicum session. The professional development programmes may also differ with regard to their composition and nature: service-learning activities (Callahan & Root, 2003); school-based with minimal university theory (Slabbert, 2003; Korthagen, 2001) and project-based (Vithal, 2008). In these programmes it is evident that a teacher educator is not regarded as the provider and transmitter of knowledge, instead he/she facilitates learning (Stacey, Rice and Langer, 2001). The role of the student teacher therefore is fixed: he/she is actively involved in his/her own professional development as a teacher.

Student teacher professional development occurs in a sociocultural context (Van Huizen, van Oers & Wubbels, 2005; Hughes, 2006; Morrow, 2007; Samuel, 2008) and is influenced by a number of factors (Samuel, 2008; Morrow, 2007; Hughes, 2006). These factors include, amongst others: biographical, contextual, institutional setting and programmatic

forces (Samuel, 2008); conception of teacher's work (Morrow, 2007; Hargreaves, 2003; Fullan, 1982) and conceptions of the places where the teachers will teach e.g. schools (Morrow, 2007; Hargreaves, 2003); the professional requirements (Hughes, 2006); demands for quality learning (Dryden & Vos, 1999; Alexander & Potter, 2005; Soudien, 2007; Morrow, 2007). Knowing this, however, should not detract us from the main proviso that student teachers should be professionally developed to provide learning of the highest quality.

2.3.3. Phronesis and professional development

Research on phronesis and practical knowledge has been the focus of professional development research for several years (Elbaz, 1983; Fenstermacher, 1994; Calderhead, 1996; Korthagen, 2001; de Kock & Slabbert, 2003; Marsh, 2003; van Huizen et al, 2005; Hughes, 2006). This has mainly been on the nature of teachers' practical knowledge (Elbaz, 1983, Connelly and Clandinin, 1990, Schon, 1987, Polanyi, 1967, Anderson, 1987; Brown et al, 1989, Carter, 1990; Fenstermacher, 1994; Meijer, 1999); contents (Van Driel, Verloop & DeVos, 1998); use of practical knowledge to guide teacher's decisions (Calderhead, 1996; Black & Halliwell, 2000), and the types of instruments used to capture and represent this knowledge (Kagan, 1990; Meijer, 1999); teaching reading comprehension in secondary education (Meijer 1999); in mathematics education and realistic teacher education (Korthagen, 2001); and successful instructional leadership (Halverson, 2002). It is within this context that the personal dimension of teacher thinking was explored with a focus on their emotional, moral and aesthetic components (Marsh, 2003, Hargreaves, 2005; Leavy *et al*, 2007). Several researchers (Hargreaves, 1998, 2001; Nias, 1996; van Veen, Sleegers & van de Ven, 2005; O' Connor, 2006) have explored emotions in teaching and teacher's professional lives. Other researchers (Mattson & Harley, 2003; Marsh 2003; Lasky, 2005)

have explored teacher identities in professional development and (Connelly & Clandinin, 1987; Fenstermacher, 1994; Marsh, 2003) focused on teacher's implicit theories and personal knowledge.

The focus on teacher professional development in the research literature has changed from developing research knowledge of the nature of the content and the teaching of this content to the subjective experiences of student teachers (Leavy *et al*, 2007; Hargreaves, 2001; Zeichner, 2005). This research, however, still needs to fully embrace a professionalism focused on enabling people to live and prosper amidst the uncertainties of the future. A different student teacher professional development that focuses on the complexity of facilitating learning (where the facilitator of learning facilitates learning and the learners construct meaning) should be planned and implemented.

Researchers, such as Meijer, Zanting and Verloop (2002) re-directed the field of research on phronesis and practical knowledge to research not just on teachers, but also student teachers. They used student teachers to elicit experienced teachers' practical knowledge (Meijer, Zanting and Verloop, 2002). Research that focused directly on student teachers focused on their development of mental models in a sociocultural context (de Kock & Slabbert, 2003); their use of field work to aid in their process of meaningful reflection and construction of practical knowledge (Perry & Power, 2004); personal learning in a realistic teacher education programme (Korthagen, 2001). Korthagen (2001b, p. 71) concluded that student teachers' professional learning will be "effective when: directed by an internal need", in the learner, rooted in the learner's experiences and the learner's reflection. Carr's (2007) research findings on student teachers implied that the use of phronesis in the student teacher professional development programme was essential for the cultivation of their

character. Research on phronesis and student teacher professional development is minimal and there is a silence on how each student teacher constructs and uses phronesis to enhance their professional development.

Research on phronesis and professional development is, however, not new in the field of education. Halverson (2004) presented a case for the development of wisdom in management development programmes. He (2004) used phronetic narratives to recognize the missing knowledge in the knowledge base of instructional leaders: what its component 'parts' are and how it operates as a form of reasoning and deciding (p. 4). The narratives were used to illustrate how these leaders negotiated problem situations to achieve their outcomes (Halverson, 2004). Korthagen (2001), furthermore, explored phronesis by focusing on realistic teacher education in mathematics. He proposed an approach for teacher professional development that has its roots "in a wish to bridge the gap between theory and practice" (Korthagen, 2001c, p. 254). This approach was based on realistic tenets: concrete practical problems; systematic reflections of student teachers; personal interaction between student teachers and teacher educators; levels of professional learning and a strongly integrated character (Korthagen, 2001). Research on post-graduate student teachers' observations of the reality of change in school classrooms and the impact of this on the development of mental models was conducted by de Kock and Slabbert (2003). This research is further later in this thesis.

2.4. Constructing and using phronesis for professional development

A critique of research literature on student teachers' perceptions of teaching and learning, understanding of their role as facilitators of learning, and their experience of the teacher development process, are necessary to give meaning to how student teachers construct and use phronesis to enhance their professional development. Furthermore, an in-depth and critical inquiry into the literature on student teachers' feelings and emotions during their professional development is imperative because feelings and emotions play an essential role (Hargreaves, 1998, 2001) in professional development.

Research in the construction and use of phronesis in student teacher professional development may be available, but it does not explore how student teachers actually construct and use it. The concepts used in this research focus on a paradigm shift in student teachers' beliefs about teaching and learning; authentic learning and reflective practice.

2.4.1. Paradigmatic shift

An exploration of the paradigm shift in student teachers' beliefs about teaching and learning is linked with the fact that phronesis, as it is conceptualised in this research, is the individually, self constructed practice theory of facilitating learning, as opposed to solely receiving the theory of teaching and learning from a teacher educator.

2.4.1.1. Self constructed practice theory

According to the constructivist theory, student teachers who are educated to become facilitators of learning should be constructors of knowledge (Von Glaserfeld, 1984). This knowledge, according to Von Glaserfeld (1984, p. 37) cannot be transferred and

"communication not a conveyance." It is within this context that student teachers should not passively receive knowledge, either through the senses or by way of communication. They should actively perceive and construct knowledge by interacting with their environment (Heyligen, 1997). This knowledge construction is possible for, the function of cognition is to observe phenomena in the world and to interpret them (Von Glaserfeld, 1995). Piaget (1945, p. 113) explains that this interpretation is due to the understanding of the interaction between the self and the phenomena. It is possible that student teachers could use these interactions to construct models of reality. These models could then serve as a basis for then to interact with their environment. Since conceptual structures in different heads are not the same (Von Glaserfeld, 2001), consensus between different cognitive structures of individuals has to be activated. This is necessary since knowledge is constructed in a social context (Wortham, 2001). It is for this reason that this knowledge construction process is perceived to be radically socio-constructivist.

This view of how knowledge is constructed is linked to the type of learning expected of student teachers. Learning is the construction of meaning which is "unique and specific" (Frankl, 1984, p. 121) and it can be developed by a facilitator of learning. This facilitator of learning is then able to use the meaning developed to do something "creatively new" (Slabbert, 2007, p. 3). This is possible if the facilitator of learning's understanding comes from experience and not explanations. Such an experience can only be facilitated by others (Claxton, 1999, p. 17). In this instance the others refers to teacher educators. The roles of the student teacher and the teacher educator are such that the former constructs meaning in the process of facilitating learning and the latter facilitates this learning. Most significantly, in this process is that the student teachers are expected to take control of, and responsibility for, their learning about facilitating the learning of learners.

2.4.1.2. Facilitating learning

This experience needs to be facilitated by teacher educators who are highly professional facilitator[s] of learning and who are extremely well-educated (Slabbert, 2006). Smith and Blake (2005, p. 3) add further requirements for a student teacher when they say that they should be aware that good 'teaching' "involve(s) a process of facilitating learning" and not a conveyance of knowledge from the teacher to the learner. Slabbert (2007, p. 3) provides the conditions for this facilitation of learning when he says that knowledge and "understanding does not come through explanation, but through experience." In this frame of experience, student teachers are seen as facilitating learning and learners are constructors of meaning (Slabbert, 2007).

a. The role of a facilitator of learning

The label facilitator of learning is used in this research as the most appropriate replacement for teacher or educator. Samuel (2008) reminds us that in the South African context, the label educator was chosen by teachers themselves. This choice was not for educative purposes, but for political reasons, designed "to flatten the levels of hierarchies that characterised the apartheid system" (Samuel, 2008, p. 5). The choice of facilitator of learning as a label in this research is based on a psychosociocultural one. This choice is based on the view that learning is the most fundamental concept in all education. The role of the facilitator of learning in this context is to operationalise learning (Slabbert, 2003), for they are expected to do this.

The concept facilitator of learning, is not a new one (Biehler, 1974). A clear and distinctive meaning of this concept is linked to teaching, instruction, teaching methods or techniques and skills. For Rooth (1995), facilitating learning is "not teaching, not telling, not lecturing,

not preaching, and not directing or guiding" (p. 5). She indicates that it is something distinctively different. A teacher and teaching are concerned with developing learners to know, whereas a facilitator of learning and facilitating learning are concerned with developing learners' "unique potential" (Holdstock, 1987, p. 49) to learn. This qualitative difference is further explored by Alexander and Potter (2005, p. 179) who assert that facilitators of learning are in "the business of making themselves redundant" due to the expectation that the learners take control of, and responsibility for, their learning. Facilitating learning, in that sense, is indeed "new pedagogy" (Alexander & Potter, 2005, p. 179) that ensures quality learning, not only on the level of knowing, but indeed on the highest possible quality level of being fully human.

This shift in focus from teaching to facilitating learning begs a recognition that learning can be recognized to be taking place. Facilitating learning is linked to the concept of phronesis discussed in this thesis. As pointed out, phronesis incorporates the student's personal practice experience. Facilitation enables continuous enhancement of these experiences by each practice, reflection on these and those of other facilitators of learning and the integration of already existing theories (research) in education (Slabbert, 2007). A student teacher's practical experience of facilitating learning is therefore in a continuous process of development and improvement throughout the period of facilitating learning in the classrooms.

In facilitating learning, three purposes must be considered. The first has to do with getting learners involved in experiencing a challenge that would create in them a need to learn through searching for meaning, which is generally referred to as initiating learning. The second focuses on the learning process that learners engage in for them to construct meaning. The third is concerned with maintaining learning by ensuring that the learner remains engaged

with the learning process until the highest possible quality of learning is achieved through them experiencing an enhancement of the meaning constructed.

It is therefore essential that in facilitating learning, the facilitator of learning engages learners in authentic learning experiences. This can only occur if "The real teacher …lets nothing else be learned than – learning" (Armstrong, 1991, p. 48). A critical feature of this 'real teacher' is that he often produces the perception that learners "learn nothing from him" (*ibid*, p. 48). This 'real teacher' will work with the belief that learners have to learn for themselves and that no one can learn for them (Slabbert, 2007).

This learning requires learners to experience learning tasks which may be characterised as "authentic and meaningful real-life experiences" (Van Merrienboer & Paas, 2003, p. 9) designed by the facilitator of learning. These learning tasks should have the features of authenticity, interviewing, articulation and reflection (Van Merrienboer & Paas, 2003) within them. For them to contain these features, these learning tasks have to be designed by student teachers who will have to learn how to do this. These student teachers will be expected to develop an understanding of the features and the principles of designing learning tasks. Designing features of authenticity is linked to tasks that reflect the real world, while interviewing, articulation and reflection focuses on the role of the learner. The role of the learner is one in which they are actively engaged in "learning the ways of knowing of an expert" (Van Merrienboer & Paas, 2003, p. 5). Claxton (1999, p. 307-311) extends this view by stating that "learning to learn (metalearning through metacognition) includes the self-discovery of the tools (algorithms) to solve problems." So, learning focuses on the role of the learner and the type of tasks that need to be given to learners. If learners are given simple tasks with no relevant problem to solve, this would be meaningless in

developing the learners' ability to learn. For a learning task to be meaningful and succeed in developing learners' ability to learn, it would have to have a challenging real-life problem (Van Merrienboer & Paas, 2003). In designing these learning tasks the facilitator of learning needs to consult "curriculum planning documents (official resources); … find the real-life challenge; … design the authentic learning context; … determine the end product outcomes; … design the presentation and … prepare the learning environment" (Slabbert, 2007, p. 7-14). The implication here is that the designing of learning tasks demands that student teachers be knowledgeable, not just in terms of content of the Life Sciences, but also the essential features and principles of a learning task.

Once the learning task has been designed according to the features and principles, the student teacher will then be expected to operate the learning task. This in Slabbert's (2007) view challenges student teachers to use artistic and creative skills. The focus here is on the student teacher's professionalism and uniqueness in creating a learning environment and then initiating learning. Since initiating learning is the only aspect of facilitating learning that can be designed (Slabbert, 2007), a student teacher will need to plan carefully. Herrington, Oliver & Reeves (2002) suggest that it is necessary for the facilitator of learning to create an authentic environment for meaningful learning to be achieved. This environment is then used when learners engage with learning tasks, as it (environment) can "provide [extensive] … meaning to otherwise decontextualised facts and skills, and can enhance the transfer of deep and lifelong learning" (Herrington et al, 2002, p. 4). It is during this phase, the maintaining learning phase, that the learners' actions cannot be planned as they are dependent on what happens during the initiating learning phase (Slabbert, 2007). The Life Sciences student teachers are therefore expected to construct the required knowledge of the essentials and practice of operating a learning task.

b. Facilitating Learning in the Life Sciences

Effective facilitation of learning of learners in the Life Sciences focuses on the facilitator providing space and means for learners to construct knowledge, skills and attitudes in authentic contexts. For this reason, Life Sciences learning tasks may be one of four types (Heathcote, 1991; Wagner, 1999; Slabbert, 2007): (1) focuses on learners operating in *real life*, such as maintaining a door-sized vegetable garden; (2) learners portray characters involved in or associated with particular jobs, for example, operate as researchers presenting their findings at a "scientific" conference; (3) focuses on learners' thinking about and creating the future, for instance, projects about the food that future people will eat and (4) learners to construct and or play games according to rules that they have constructed, such as, games on life processes, environmental issues or any other appropriate content, skill and, attitude and value aspect of this field of study.

Life Sciences, the field that "involves the systematic study of life in the changing natural and human-made environment" (Department of Education, 2003, p. 9) is offered to Grade 10-12 learners. These learners are expected to develop processes of "critical inquiry; reflection and an understanding of concepts and processes and their application in society" (*ibid*) as well as dissect and identify botanical and zoological material; make and identify material on a microscope slide; observe material using a microscope and manipulate laboratory instruments while conducting investigations (Department of Education, 2003). Learners are also expected to design, conduct and present the findings for investigations conducted.

Learners' competence in the science processes is assessed by executing the learning task and this integrates dissections of material in order to assess learners' competence to use a

wide variety of dissecting instruments for a specific purpose. This involves an expectation that student teachers would choose appropriate material to be dissected and activities where learners are expected to use a wide variety of instruments. Learning tasks may integrate the formulation of problems and hypothesis about natural phenomena. Here, learners are being assessed on their competence to make acute, nuanced observations and to identify problems in a natural environment. To achieve this, learners need to be confronted with real natural phenomena as opposed to models, videos and pictures. More specifically, a Life Sciences facilitator of learning needs to be knowledgeable, skilful and creative about the nature of Life Sciences and, the type and nature of the learning tasks, the ways of learning of learners, and the socio-cultural context of learners, when designing learning tasks

c. Developing Perceptual Knowledge

In addition to developing conceptual learning as a result of getting involved in the process of facilitating learning, student teachers develop perceptual knowledge (Kessles & Korthagen, 2001; Slabbert & Hattingh, 2006). These types of knowledge are created as a result of the student teachers facilitating learning in the actual school classrooms and discussing and reflecting on these experiences. They are focused on: intuitive and perceptual aspects and works through imagination to "reveal what is real" (Slabbert & Hattingh, 2006, p. 16) and "concrete particulars" (Kessels & Korthagen, 2001, p. 25) and subjective experiences. The second type of knowledge is "conceptual and logical and draws on the intellect and [constructs] the knowledge" (Slabbert & Hattingh, 2006, p. 16). This would serve as the interplay between the student teacher's theory with a *t* and the educational theories (T) that inform educational practice.

Essential features for the development of perceptual knowledge are real contexts to be "perceived, experiences to be had, persons to be met, plans to be executed, and their consequences to be reflected on (Kessels & Korthagen, 2001, p. 29). The central importance of the student teachers development of perceptual knowledge can be seen in the view that the technical-rationality approach, which focuses on developing conceptual knowledge, only "has a very limited effect on practice" (Korthagen, 2001c, p. 255; Hughes, 2006; Morrow, 2007). This development of perceptual knowledge to improve practice is essential for it "helps the [student] teacher, within the practical situation, to quickly perceive" (Korthagen, 2001c, p. 255) what is appropriate in the particular context and to make decisions and execute suitable actions. The construction of this knowledge requires experience within authentic learning, experiential learning, an explorations of their knowledge, beliefs and interactive cognitions of facilitating learning, facilitating learning, and to reflect in and on the facilitating learning experiences in social learning settings.

2.4.2. Authentic and experiential learning

This section enlightens the reader on the importance of authentic learning for the construction of phronesis. It is for this reason that discussion on the concepts of learning, authentic and experiential learning are presented. These concepts are central to the construction of phronesis.

2.4.2.1. Learning

If we accept that learning "is about change, and it is change" (Zull, 2002, p. xiv), then we need to recognise that it is "a change in understanding and a change in one's relationship to the world" (Barnett, 2004, p. 248). This change could be due to the learning process of interaction, analysis and reinterpretation of new information (Mims, 2003; Brown, Collins

& Duguid, 1989). Learning therefore may be viewed as a "messy process; [as] it is never simply linear or logical" (Abbot, 1999, p. 23). It is a complex, dynamic process. Furthermore, it is an active social and sensory process that occurs effectively in authentic contexts (Van Huizen *et al*, 2005). Lombardi (2007, p. 2) reminds us that it is "learning by doing [action] that is the most effective way to learn." It is in learning, furthermore, that learners increase their capacity to act effectively in the world (Senge, 1990; Mims, 2003; Lombardi, 2007; Slabbert, 2007; Morrow, 2007).

This is possible because during the learning process, people perceive their environment as their "cerebral cortex is engaged in sensing, integrating and motor activity" (Zull, 2002, p. 15) acting and, as a result, deep learning should emerge. Zull further states that "our brain has the capacity to reflect, develop ideas, and take actions continually" (*ibid*, p. 25). This indicates that our brains are active in the learning process: solving real life problems. This means "we are always in the middle of a multitude of learning cycles, getting new sensory information, thinking about different experiences, getting new ideas about their meaning, and testing those ideas" (*ibid*, p. 25) in real contexts. It is during this process that we develop authentic learning.

Such authentic learning and its importance is also provided, among other things, by research in learning. Three principles align authentic learning and learning research to each other. Principle one views learners as looking for connections between new pieces of information and their existing knowledge structures (Lombardi, 2007). Inherent in this principle is the view that if learners cannot make connections i.e. there are no links, then the new knowledge is rejected (Lombardi, 2007). So the assimilation of the unfamiliar will be easier if a learner receives "more encouragement" (Lombardi, 2007, p. 8) and, in the process, they

develop personally and emotionally. This would call for support for student teachers who would be experiencing new, different and challenging experiences to construct knowledge and integrate educational theories for explanations and learning in the process. The second principle focuses on the practice (Lombardi, 2007, p. 8) of airing concepts "repeatedly and regularly … and associated with new settings, activities, and people" for the attachment to be made and to prevent the loss of information. This principle links with the practice of the student teachers facilitating learning, and this leads to a situation where the new experience, with all its complexities and expectations, the student teachers construct new knowledge. This knowledge could be used to change the student teacher's thinking and practice of facilitating learning. The third principle views new information as part of a "learning event and [is] directly linked to the learner's mind with social circumstances" (*ibid*, p. 8). These could be linked to the repeated facilitating learning practices that student teachers will experience and the socio-constructivist and social learning that they will encounter.

2.4.2.2. Authentic learning

This type of learning is concerned with real aspects as the term authentic is defined as "genuine, true, and real" (Webster's Revised Unabridged Dictionary, 1998). Rule (2006) uses the term authentic learning to describe the learning of individuals in real-life contexts and situations. Mims (2003, p. 2) provides a more comprehensive view for he states that students should be "engaged in genuine learning problems" for them to be able to make connections between the material being learned and their previous knowledge. He extends this view further to include an approach to teaching that allows students to discuss and "meaningfully construct concepts and relationships in contexts" (Mims, 2003, p. 2) that are concerned with real-life problems that are relevant to learners. Lombardi's (2007, p. 2) view of authentic learning also captures the real aspect of learning and it provides specifics about

the nature of the problem and the strategies of "role-play exercises, problem-based activities [and] case studies" which are used for effective learning to occur. Authentic learning therefore requires real life problems; active learners, the achievement of an outcome and experiential learning in a real context.

Some scholars (Slabbert & Hattingh, 2006, p. 15) argue that real life problems serve as a "trigger for the use of creative problem-solving skills" and the skills and urgency to search for meaning and appropriate actions to solve the problems. When learners are exposed to these problems they will have to, in Slabberts' (2007) view, develop and display courage and wisdom. This is critically important, as for these problems do not have pre-defined solutions or patterns for solving them (Lombardi, 2007). The challenge for solving these real-life problems should awaken learners' intuition described by Noddings and Shore (1984, p. xiv) as "engagement of the will, involvement of the senses, receptivity, a quest for understanding" and forces between certainty and uncertainty. It is at this point that if an individual makes choices during facilitating learning, these will be based on his/her practical wisdom/phronesis.

Authentic learning, furthermore, incorporates the emotional aspect of learning and student teachers bring their experiences, beliefs, knowledge, neuro-psychological functioning, identities and curiosities to the classroom where "authentic learning provides a means of bridging those elements with classroom learning" (Mims, 2003, p. 2; Hargreaves 2001). According to Mims (2003, p. 2), authentic learning "will increase student motivation". This motivation will enable learners to "persevere despite initial disorientation or frustration, as long as the exercise stimulates what really counts" (Lombardi, 2007, p. 4) in facilitating learning of Life Sciences.

The importance of the context in a student teacher's construction of a phronesis of facilitating learning should not be underestimated. Korthagen (2001c, p. 255) reminds us that one of the main causes for student teachers' "failure to transfer theory to practice are the socializing influences" of the school context. The beliefs and thinking about teaching and learning that student teachers are exposed to, and the support provided by the mentor teacher, represent examples of such influences. Van Huizen *et al* (2005, p. 270) directs this cause to the "contextualized support" offered to student teachers during their construction of phronesis. If this context and support is such that they provide student teachers with space and opportunities to challenge and learn from their facilitating learning practices, this could serve as the springboard for the further construction of the student teacher's phronesis (practice theory). The importance of the self with regard to perception and the development of a student teacher as an authentic being (Barnett, 2004) during his/her construction of phronesis in the particular contexts have a great impact on the practice theory to be constructed, and more specifically, on the intricacies of the theory. Due to student teachers' experiencing facilitation of learning, they could be able to evaluate and use past and present experiences to "plan how to act in the future" (Aspin & Chapman, 1994, p. 17). Such an action by the student teacher is critical, for it contributes in the development of an understanding of the process of facilitating learning.

Authentic learning plays a critical role in a student teacher's construction of phronesis, for this learning enables student teachers to experience activities where the following features are present (Lombardi, 2007, p. 3):

- "*Real-world relevance:* Authentic activities match the real-world tasks of professionals in practice as nearly as possible. …

- *Ill-defined problem:* …students to identify for themselves the tasks and subtasks needed to complete the major task.
- *Sustained investigation:* … tasks to be investigated by students over a sustained period of time …
- *Multiple sources and perspectives:* … students to examine the task from a variety of theoretical and practical perspectives, using a variety of resources, distinguish relevant from irrelevant information n the process.
- *Collaboration:* collaboration integral to the task ….
- *Reflection (metacognition):* … learners to make choices and reflect on their learning, both individually and as a team or community.
- *Integrated assessment:* Assessment is not merely summative… but is woven seamlessly into the major task in a manner that reflects real-world evaluation processes.
- *Polished products:* …culminate in the creation of a whole product…
- *Multiple interpretations and outcomes:* …allow for diverse interpretations and competing solutions. (Lombardi, 2007, pp. 3-4).

Student teachers need to be immersed in authentic learning contexts and not just to be engaging with authentic learning experiences. As a result of this immersion, they develop different kinds of transferable skills of judgment, patience, synthetic ability and flexibility to "generate innovative solutions" (Lombardi, 2007, p. 3) which are necessary for "learning and development" (Van Huizen *et al*, 2005, p. 274). Student teachers immersed in these learning experiences are expected to be active, reflecting people who perceive their contexts and assign meaning to these contexts, ultimately developing perceptual knowledge. Within particular contexts student teachers may have diverse interpretations and competing

solutions where they may be required to make decisions and choices about what to do next (Claxton, 1999). Barnett (2004, p. 259), however, is of the opinion that neither knowledge nor skills will enable student teachers to make appropriate choices and decisions, but "certain kinds of human qualities." He (2004, p. 259) views the human qualities such as "thoughtfulness, humility, resilience, flexibility and courage" as essential for the development of an authentic being.

2.4.2.3. Experiential learning

In order to attain a certain level of experience, the action of the student teacher in authentic learning is critical. This experience could serve as the foundation for an lifelong education process that is based "in the intellectual traditions of social psychology, philosophy, and cognitive psychology" (Kolb, 1984, p. 2). Kolb (1984, p. 18) extends this view further by stating that it is the "philosophical rationale for the primary role of personal experience in experiential learning". This suggests that the actions of individuals are pertinent for an experience to be lived out. Experiential learning, furthermore, focuses on "the process of learning as opposed to the behavioural outcomes" (*ibid*, p. 26; Beaudin & Quick, 1995) and the learner's learning and development is within a sociocultural context (Van Huizen *et al*, 2005).

According to Stenhouse (1979, p. 1), we have "to learn the wisdom that we do not possess". This learning could be possible if student teachers are expected to facilitate learning in authentic learning contexts, and are provided with emotional support. What is crucially important within this endeavour is that the student teacher himself/herself is expected to construct his/her own phronesis (practice theory). The construction of phronesis is the learning or construction of the wisdom of, and the wisdom necessary for, facilitating

learning in practice and this is a never-ending process of improvement. In facilitating learning over an extended period of time student teachers will be designing and operating learning tasks, and this facilitates learning and improvement as part of doing it.

The student teachers' construction of phronesis is concerned with the questions how, why, and more particularly, in what contexts it is constructed. Their experiences of particular contexts are significant for the construction of their phronesis as the nature, depth and duration of this experience and their personal perceptions and identities are intertwined in the process. Student teacher's experiences would be operating on a meta-cognitive level where deep analysis and critique with a focus on what action they could take as facilitators of learning and the justifications and impacts of these are experienced, reflected on, and understood. A possible further essentiality for constructing phronesis is for student teachers to practice (what they do) to inform theory (what they think about what they do), and the constructed practice theory (what they think) informs their practice (what they are doing) (McNiff & Whitehead, 2005). McNiff and Whitehead state that "theory is located in teachers' professional experience" *(ibid*, p.6). This supports the view that theory is inherent in each developing student teacher, and that it is further constructed from experience. The connection between the experience of facilitating learning and the development of expertise in facilitating learning is made in the practice theory that the student teachers construct. It is for this reason that phronesis construction is essentially based on experience, but more particularly on using the theory that is already constructed by the student teachers themselves.

The student teacher's construction and use of phronesis must be experienced in an authentic context over an extended period of time. Studies (Zeichner, 1983; Villegas-Reimers, 2003)

and as valuable and real learning (Amarel & Feiman – Nemser, 1988; Korthagen, 2001; Morrow, 2007) in teacher education report that student teachers view their experience at the schools as the central part of their education What my study wishes to challenge is the commonly held belief that there is a relationship between the "quantity of field experience and the amount of learning" (Doyle, 1997, p. 2; Hughes, 2006) that student teachers experience. Johnston (1994) is of the view that the more classroom experience one has, the more one will learn about teaching. This view is supported by Villegas-Reimers (2003, p. 49) who, after reviewing studies on the effectiveness of the teaching practicum stated that "an increase in the number of hours" that a student teacher spends in the lesson is very valuable. Some researchers (Griffin, 1986; Zeichner, 1990; Hughes, 2006) report however, that the quantity of field experience in a teacher education programme does not necessarily result in teacher learning. They argue that experience may be the best teacher, but only if student teachers use the full range of their experiences as contributors to their learning process. This learning process should be one where the student teacher is active in seeking particular experiences from which to develop and learn, and then to actively process their development and learning from these experiences (Zeichner, 1990).

There is no doubt that fieldwork plays a role in preparing better teachers, but "there is persistent concern that such [fieldwork] experiences do not reach their full potential value" (Bowman & McCormick, 2000, p. 256). Several reasons are suggested for this, among which is limited resources to conduct field work (Goodlad, 1990; Darling Hammond, 1999) and nature of fieldwork (Goodlad, 1994). According to Hughes (2006, p. 115) it is "faculty currency" that is critical to the professional development of student teachers. The challenge is to question and provide the relevance of the faculty work to the real-life experiences that

student teachers will encounter in the schools. It is therefore necessary for student teachers to experience facilitation of learning in real classrooms over an extended period of time.

Senge (2006, p. 23) reminds us that the core learning dilemma is that "we learn best from experience but we never directly experience the consequences of many of our most important decisions." This is where the construction of phronesis expects student teachers to be intimately involved in both the experience of facilitating learning and most importantly, **also** the consequences of their decisions about facilitating learning. In constructing and using phronesis student teachers may integrate these consequences into their phronesis (practice theory) and use it in subsequent experiences. The student teachers' knowledge construction will be possible if they are engaged in activity, reflection and collaboration for these are essential for experiential learning to occur.

2.4.3. Student teachers' beliefs and construction of phronesis

Student teachers' beliefs and construction of phronesis is concerned with their beliefs about teaching and learning and their knowledge, beliefs and interactive cognitions. A discussion on each of these follows in the next section.

2.4.3.1. Student teachers' beliefs about teaching and learning

Teacher educators have become increasingly aware of the fact that preservice teachers on entry to teacher education programmes bring with them a multitude of experiences, assumptions, and beliefs about teaching and learning (Feiman-Nemser & Remillard, 1996; Leavy, Mc Sorley & Bote, 2007). In constructing and using phronesis, student teachers' beliefs about teaching and learning must be elicited, explored, challenged and changed. It is accepted in the research literature, for example, that the beliefs teachers hold strongly influence their perceptions and judgments, which in turn, affect their behaviour in the

classroom (Peterson, Fennema, Carpenter, & Loef, 1989; Pajares, 1992; Richardson, 1996; Bullough and Gitlin, 1995; Leavy *et al*, 2007). What we need to recognise though is that student teachers' beliefs are developed and informed over an extended period of time. These beliefs could be informed by their experience of being taught at school and at tertiary education institution. According to Korthagen (2001b, p. 255), the main cause of the "failure to transfer theory to practice are…student teachers' own preconceptions about learning and teaching." In the context of South Africa, these beliefs would mainly consist of teachers as a source of information and the transmission of knowledge. These beliefs are in contrast to what is expected of teachers - to adopt teaching methods through which the potential of all learners could be maximised and fully utilised (Slabbert, 2006).

Such radical changes in one's belief system will only be feasible if student teachers' beliefs are challenged. It is on these bases that Kagan (1992, p. 85) concludes that teacher beliefs, which he regards as personal knowledge, "lies at the very heart of teaching." It is imperative therefore that this personal knowledge should be changed. Furthermore, a general assertion held by many researchers (Hollingsworth, 1989; Holt- Reynolds, 1992; Resnick, 1987; Richardson, 1996; Leavy *et a*l, 2007) in teacher professional development is that what prospective teachers learn during their preparation is strongly influenced by their existing perspectives and understandings about teaching and leaning. As many student teachers enter their teacher education programme with "preconceptions about teaching and learning that are rooted in their experience as students" (Korthagen, 2001b, p. 69) they must be exposed to different experiences and thinking about what it ought to be. It is for this reason that student teacher professional development should aim to create the interactions between student teacher's new and existing conceptions of teaching and learning (see Duckworth, 1986; Feiman-Nemser & Featherstone, 1992, Richardson, 1996). Korthagen (2001, p. 71)

argues teacher educators will help student teachers in their professional development if they try to understand "the way these students view teaching and learning, and how they have come to construct these views". This view is supported by Bullough and Gitlin (1995) who suggest that these beliefs and preconceptions must first be identified; sources examined and establish legitimacy of them. This should be conducted when the student teachers enter the professional development programme. Leavy *et al* (2007, p. 1230) extend this further in that the student teachers should use these explored beliefs and attitudes to "plot and monitor their own professional growth." This has great implications in this research, for student teachers taking responsibility for their own learning and development is the central tenet.

If we accept that student teachers' preexisting beliefs about teaching and learning are difficult to change not just due to their experiences as learners in school but also from their visits to schools, then the challenge for changing their beliefs is even greater. This challenge is further heightened by the view that the student teachers' belief systems affect perception and strongly influence how they will process information (Pajares, 1992). It is therefore important that any change should be directed at their perceptions about education in general and to teaching and learning in particular. The requirement for student teachers to have substantial experience in practice, from which the (educational) theory is constructed makes it possible. It is during this immersion in experience that student teachers could and should develop the need to change. This need is strengthened by their experience of being faced with the challenges of teaching in real contexts. And it is in facing these challenges that they are forced to make decisions about the actions they need to take. If we accept the assertion that there is a relationship between beliefs and actions, and that these are interactive in nature (Richardson, 1996), then it is in performing the act that the student teachers will start changing their beliefs. This is the reason I argue that beliefs are not fixed but they may be

extended, modified and changed within particular contexts in order for new beliefs to be developed.

The study on the evolution of preservice teachers' beliefs about teaching and learning conducted by Leavy *et al* (2007) illustrates this view. They used metaphors constructed by the student teachers as a tool to gain access to, and promote the development of, student teachers' beliefs through the incorporation of reflective activities of both academic and field-based experiences (Leavy *et al*, 2007). Their research, furthermore, revealed the change in belief that the student teachers had experienced from the metaphors constructed at the beginning and at the end of a semester long micro-teaching course. These changes in beliefs at the beginning and the end of the module are indicated as percentages for the four categories established: [1]behaviourist 49% - 42%; [2]constructivist 24% - 44%; [3]situative 9% - 6% and [4]self-referential 18% - 8% (Leavy *et al*, 2007). Some of the reasons they offer for these changes are: an increase in the student teacher's awareness of the "central role played by the child in the classroom as a result of field based experiences" … "[p]articipants found themselves ill-equipped to deal with the unpredictable and dynamic realism of the classroom" … " did not have the opportunity to draw on experiences of teaching and modifying metaphors" in the case of the self-referential group (Leavy *et al*, 2007, p. 1227-1228). These changes and reasons given for the change in belief indicate the importance for prospective student teachers to experience a revelation and a challenge to their beliefs about teaching and learning, both in their professional identity and their facilitation of learning.

[1] Behaviourist view reflect the belief that the learner is passive recipient; teachers as transmitters of information;
[2] Constructivist view knowledge as actively constructed by the learner,- active agent and the teacher as a facilitator
[3] Situative view learning as situated in the context in which it is constructed. Knowledge is situated, a by-product of the activity, context and culture in which it used
[4] Self-referential view did not refer to learners, classroom teaching and assessment, but were egocentric and focused on what teaching represented for them as individuals. (Leavy, et al, 2007).

When facilitating learning, student teachers are continually challenged to think and to make decisions about the appropriate action to take. This enhances change to their beliefs. But very minimal change, if any, would take place if methods of teaching are taught to beginner educators (Korthagen, 2001c; de Kock & Slabbert, 2003; Leavy, *et al*, 2007). However, when student teachers are faced with, and experience, challenges in facilitating learning, they are forced to question and re-structure their beliefs about teaching (Zeichner, & Tabachnick, 1981; Korthagen, 2001c; Leavy, *et al*, 2007). Research conducted by de Kock & Slabbert (2003. p i) on challenging student teacher's belief system "exposed the illusiveness of change in teaching and learning in the classroom." In their study, student teachers were engaged with learner-centeredness and socio-constructivism in their teacher professional development and they were expected to observe these in the schools where they conducted their observation assignments. Prior to the student teachers being sent out to the schools, they were introduced "in very broad terms to the paradigmatic change envisaged for global future education" (de Kock & Slabbert, 2003, p. 12). The student teachers were expected to adopt a belief system where:

- "recipes and models for good teaching are not available;
- questions seldom have straight answers and;
- little support, opportunity or encouragement can be detected in the existing school culture" (de Kock & Slabbert, 2003, p. 13).

After their observation period in the schools, however, the student teachers' perception of the traditional mental model were re-enforced (de Kock & Slabbert, 2003), for they still taught in traditional ways. Their initial beliefs of teaching were entrenched. Ultimately what the student teachers observed informed their beliefs about teaching and and to change these

beliefs, it is imperative that this "perceived-practice mental model" (de Kock & Slabbert, 2003, p. 20) is replaced with a "belief initiated mental model" *(ibid*, p. 21). Here believing is required "as a prerequisite to seeing the belief coming to fruition" (*ibid*, p. 20). This model according to Ray (1999, p. 3), includes "dependence on inner wisdom and authority rather than on the senses and outer proof." For this to be achieved, student teachers would have to experience a paradigmatic shift in their beliefs, and this experience that could be powerful in promoting such a shift. The disadvantage, however, is how to get the student teachers to have these beliefs as prerequisites to facilitating learning. This disadvantage could be reduced if "student teachers have to be challenged to risk the unknown and create the reality of their newly adopted belief (or perhaps the lack thereof) in practice" (de Kock & Slabbert, 2003, p. 20). It is likely that a new mental model could be constructed if student teachers are exposed, and even encouraged, to engage in many different but appropriate experiences (Korthagen, 2001).

2.4.3.2. Knowledge, beliefs and interactive cognitions

Meijer (1999, p. 22) suggests that a teacher's interactive cognitions are "closely related to a teacher's actual behaviour." This view is supported by other researchers (So, 2006; Schepens, Aelterman & Van Keer, 2007). So (2006), for example, asserts that it is in uncovering a teacher's thinking process that we can get a more holistic view of the complexity of teaching. Schepens *et al* (2007, p. 27) further state that in the field of teacher education, the student teacher's interactive cognitions evolve during their professional development and these can be used as "indicators for learning and professional development". In developing a holistic understanding of student teachers' construction and use of phronesis, we need to explore the interactive cognitions that underlie the student teachers' construction of a phronesis of and for facilitating learning.

It is generally accepted in the literature that there is a relationship between cognition and behaviour. The relationship accepted is that actions (behaviours) and cognitions (thinking) influence each other (Clark & Petersen, 1986). In the field of teacher education the relationship is that "teachers' cognitions and their classroom behaviour mutually affect each other" (Meijer, 1999, p. 5, 2001). Meijer (1999, p. 20) viewed teacher's practical knowledge as "knowledge and beliefs, on the one hand, and interactive cognition on the other." Teachers' knowledge and beliefs were viewed as "[a] huge body of personal theories, values, factual propositions… [which] are important determinants of a teachers' action" (*ibid*, p. 22). These beliefs do not develop *de novo*. Meijer (1999, p. 22) pertinently suggests that "teachers interpret experiences through the filters of their existing knowledge and beliefs and make sense of classroom practice only through" existing knowledge and belief lenses. Other studies (examples) revealed that: science teachers and general teachers differ in the structural complexity in their thinking process (So, 2006); student teachers' varied more in how they thought than in how they instructed (Kwo, 1994); student teacher' interactive cognitions evolve during their professional development and these are dependent on the situation (placement schools) that student teachers are placed in for their practicum sessions (Schepens *et al*., 2007). Student teachers who were placed in schools where they received guidance and support to reflect upon their experiences "developed more towards a pupil learning and understanding orientation" (Schepens *et a*l., 2007, p. 29) than one that just focussed on themselves and their teaching.

Research (Shavelson, Webb & Burnstein, 1986; Clark & Peterson, 1986; Meijer, 1999) on teachers' interactive cognitions is not new. This research has focused on aspects like the process, content and content related to educational theories. There are also many research reports of the teachers' interactive thoughts which were "concerned with the learner" (Clark

& Peterson, 1986, p. 269). These studies, however, did not provide a clear picture on what was on the "teacher's minds" while he/she was teaching (Meijer, 1999, p. 23). Meijer (1999) declares that without this picture we cannot get a full "understanding of the cognitive aspects of teaching" (p. 23). She suggests that these aspects of teaching could be obtained if we studied student teachers' interactive cognitions by focusing on "their practical knowledge" (Meijer, 1999, p. 23). When teachers are teaching they "activate appropriate and familiar elements from their long-term memory into their working memory" *(ibid,* 1999, p. 25) and they use these to make decisions about their actions when teaching. It is on these basics that changes in the practical knowledge will indicate learning (Meijer, 1999). These changes in practical knowledge and interactive cognitions can also be used to examine the learning and professional development of student teachers and to explore the effects of the quality of teacher education on student teachers' interactive cognitions (Schepens, Aelterman & Van Keer, 2007).

Research investigating the relationship between teachers' cognitions and their behaviour (actions) has experienced difficulty in demonstrating these relationships (Calderhead, 1996). These difficulties were due mainly to behaviour and cognitions being studied separately (Brown *et al*, 1989, Yinger, 1986). It is thus important that teachers' cognitions and actions be investigated while they are teaching (Leinhardt, 1988; Meijer, 2001; Schepens *et al*, 2007), because it is at that time that their thinking and actions are inseparable. Moreover, we need to accept that the student teacher's knowledge, according to Leinhardt (1988, p. 148), is "embedded in the artefacts of a context." This view is shared and extended by Meijer, Beijaard and Verloop, (2001, p. 162) who argue that any similarities and differences in teacher's interactive cognitions could be explained in terms of "the differences in teacher's approaches to students and their approaches to the content of the lesson." This research

paves the way for providing an understanding of how to research the student teachers' cognitions and actions of constructing and using phronesis in the particular contexts that they experienced.

2.4.4. Reflective practice theory

This theory is used to provide the lens to give meaning to the student teachers' reflections, their practice of reflecting, and their learning about how to reflect by reflecting in practice. This learning about how to reflect in practice has an evolving nature resulting in student teachers improving their practice of reflecting.

2.4.4.1. Meaning and use of reflections

Reflective practice is a process that many student teachers have not experienced before. It is therefore necessary for them to develop their reflective practice and to use these to formulate their practice theories. Researchers (Kubler LaBoskey, 1993; Van Manen, 1995; Zeichner & Tabachnick, 2001; Leavy *et al*, 2007) suggest that student teachers' reflections should be analytical, not just descriptive. This is important in that such reflections will impact on influencing the student teachers' professional image. Metaphors, reflective journals, diaries and portfolios have been used by student teachers to record their experiences of constructing a professional identity (Pollard & Tann, 1997; Leavy *et al*, 2007). The information obtained from using these data collection methods reveal and "synthesise" large data sets about teachers' understanding of their professional identity, and this could inform their practice (Calderhead & Robson, 1991). This is the reason for a more detailed discussion of reflective practice is presented in the next section, which focuses on facilitating learning in practice.

Reflective practice is an integral feature of this research is. According to Ferraro (2000, p. 1), “Schon recommended reflective practice” for novice student teachers to make connections between their own practices and those of successful practitioners. An exploration of what reflections are is essential for the development of a different meaning and use for reflective practice. There are different meanings for reflection. Some meanings focus on the process while others focus on the importance of reflections. Descriptive meanings of the process of reflection are about how learners “engage to recapture, notice and re-evaluate” their experience and to develop meaning (Boud, Cohen & Walker, 1993); looking back at an experience to establish the meaning, with a view to planning further action (Kolb, 1984; Raelin, 2000); and how both cognition and feelings are closely interconnected and interactive (Boud et al., 1985). The importance of reflections is viewed by Coghlan & Brannick (2001, p. 31) as a “critical link between the concrete experience, the interpretation and taking new action”, while Day (1993 p. 84) views it as “an essential part of learning.” Each of the meanings is concerned with the actions and/or the development that a student experiences when reflecting on action. What is even more significant is the central role that the student teacher plays in reflecting. Student teachers’ process an awareness of reflecting, and also the process of coming to learn about how to reflect, is crucial for them to reflect effectively. Kessles & Korthagen (2001, p. 68) view reflection as “the mental process of trying to (re)structure” a problem, an experience, knowledge or insights. This reflection can take place after an action (reflection on action) or during an action (reflection in action).

2.4.4.2. Meaning and purpose of reflecting in professional development

Reflections could be used by student teachers to make phronesis visible for both the student teacher and the teacher educator. They may also be viewed as tools student teachers use to

develop their awareness (Leavy *et al*, 2007; Pollard & Tann, 1997) about facilitating learning. This awareness could be due to student teachers developing a "deeper understanding of their own teaching style and ultimately [having] greater effectiveness" (Ferraro, 2000, p. 4) as student teachers. This suggests not only awareness, but definitely construction, use and change that a student teacher may experience from reflecting on their experiences of facilitating learning. Researchers (Schon, 1987; Carr and Kemmis, 1986; Van Manen, 1995; Zeichner & Tabachnick, 2001; Leavy et al, 2007) in the field of reflective practice have focused on how student teachers are encouraged to reflect on their own development as professionals. Such research, however, is not enough for we need to recognise that reflecting may be a private and social constructive process where theory about facilitating learning is informed by practice. If we accept that reflecting on experiences informs the construction and use of phronesis and could shape and accelerate change in self and interested others (Zeichner & Liston, 1996), then we can view reflective practice as a solitary and social constructive process where practice shared during these sessions could inform theory. This can only happen if the student teacher's reflections are critically focused on, and analysed (Zeichner & Liston, 1996), and they are linked to the theories about teaching and learning.

An essential component of constructing phronesis is the reflection that each student teacher is expected to learn 'to do' and also 'do' during their professional development. A new experience (learning) can be seen in the principles of professional learning: "awareness …of one's own learning process is fundamental to the process of becoming" (Korthagen, 2001b, p. 74). This awareness can only be developed if student teachers are reflecting on their own experiences. Such processes are supported by Lebler (2005, p. 43; Claxton, 1999) who insists that "reflections are essential to learning". This importance lies in the fact that in

reflecting the student teacher "examines both the experience as well as his own conceptual framework" (Saddington, 1985, p. 56) and can within this context,"develop new insights" (Wade & Yarborough, 1996, p. 64) that can be used to inform future activities. The reflective stance accepted in this research is viewed as informing practice rather than determining it. During such a process, student teachers are expected to discover and learn for themselves rather than be informed about how to reflect by experts. During the reflection sessions the teacher educator could help the student teachers to use all of their "knowledge and experience to make connections and to draw learnings" (Saddington, 1985, p. 58). This view is supported and extended by Claxton (1999), and Lebler (2005, p. 43) who states that "reflection is a process that will produce greater coherence between knowledge (learning that can be put into words) and know-how (the intuitive ability to do something)". Hence the use of reflective practice is viewed as essential for the construction of a phronesis of, and for, facilitating learning.

2.4.4.3. Research in the field of reflective practice

Research (Hopkins & Antes, 1990) in the use of reflections as reflective practice looks at how student teachers use their reflections to develop their teaching how pre-service teachers develop the skills necessary for reflective teaching and the role of the teacher educator as coach (Ferraro, 2000). The research reviewed in this study includes the benefits of pre-service teachers using action research and engaging in reflective practice (see Schon, 1996; Rearick, 1997; Zeichner & Tabachnick, 2001) and considering one's own experience in applying knowledge to practice (see Schon, 1996). Kettle and Sellars (1996) investigated third year students' reflective writings and interviewed them about their reflective practices. They found that student teachers' use of peer reflective groups encouraged them to challenge existing theories and their own preconceived views of teaching. This would seem

to be a requirement when student teachers reflect on their own experiences and use phronesis during reflection sessions.

The reflective practice of facilitators of learning, within this context, seems to be an essential component to incorporate in this research, both in individual and social settings with a focus on exploring the purpose and nature of the process. Reflection sessions are viewed as essential for student teacher's construction and use of phronesis to enhance both their personal and professional development. According to Korthagen (2001a, p.15), each student teacher "develops his or her own knowledge in a process of reflect[ing] on practical situations." In constructing and using phronesis, private and group reflection, supervision and small group discussion may be essential for the student teachers to share their experiences so that the intricacies and the salient features of these could be critically analysed and challenged.

Moon (1999, p. 52) is of the opinion that reflections have "a role in learning and informing action and in the building of theory to guide practice or action." It is within this context that student teachers could gain experience from "acting and from reflecting upon the action and its consequences" (Handal & Lauvas, 1987, p. 5). Reflection and counselling are viewed as important elements in the professional development of a facilitator of learning because the students are introduced into the world of action, but do not remain there. During counselling (reflection) sessions, a teacher educator could offer assistance to "analyse the social [and] educational processes" (Handal & Lauvas, 1987, p. 5) that a student teacher has experienced. He could do this by helping the "student teachers explore and refine their perceptions" (Nussbaum, 1986, p. 29) and with collaborative reflection between a teacher educator and student teachers and this could lead student teachers developing to advanced

levels of thinking (Hunter and Hatton, 1998). If student teachers' experiences of facilitating learning in the school classrooms are not reflected and elaborated upon, then their learning will be minimal as meanings would not be realized (Van Huizen *et al*, 2007). This could be avoided if, in the reflection sessions, each student teacher's phronesis is explicitly reflected upon and the details of these reflections are shared and explored in a critical, social collaborative manner.

2.4.5. Professional learning, development and assessment

This section focuses on the professional learning and development of student teachers and the assessment thinking and practices undertaken. These are central to the construction of phronesis.

2.4.5.1. Professional learning and development

This different teacher professional development should focus on the professional learning and development of the student teachers. The role of student teachers in the construction and use of phronesis in their professional development is intricately located in their professional learning. Professional learning of student teachers must recognise that "student teachers may have good reasons" (Korthagen, 2001b, p. 71) for the feelings, thoughts, beliefs and the ideals that they hold. They are not ice structures devoid of experiences, feelings, emotions and ideas about what teaching and learning entails. Therefore any teacher professional development programme should start with "the student teachers' views about teaching and learning, and how they come to construct these views" (*ibid*, p. 71).

Professional learning of student teachers, according to Korthagen (2001b, p. 71), is based on the following principles:

1. A teacher's professional learning will be more effective when directed by an internal need in the learner (student teacher);
2. A teacher's professional learning will be more effective when rooted in the learner's own experiences and;
3. A teacher's professional learning will be more effective when the learner reflects in detail on his or her experiences (Korthagen 2001b, p. 71).

It is clear that student professional learning is driven by a need. This need should be understood and 'felt' by each student teacher. But this will not happen if we do not explore the implicit preconceptions that student teachers have about teaching and then to make these explicit by analyzing them (Korthagen, 2001). According to Korthagen (2001b, p. 71), it is "only by such analysis [that student teachers] discover weaknesses in their preconceptions. This, in turn, creates in them the need for further learning which, according to principle 1, is a basic factor for promoting learning." These professional learning principles are linked to student teachers changing their existing preconceptions of teaching and learning to appropriate ones. In a climate of change, however, this could be impossible. It is for this reason that this research should explore the student teachers' construction and use of phronesis in the different contexts – practicum schools.

Teachers' practices strongly influence their professional experience of teaching and learning. This is supported by Villegas-Reimers (2003) and Loucks-Horsely, Hewson, Love & Stiles (1998, p. 32). All these researchers state that much of teachers' "knowledge of teaching is embedded in their practice rather than in codified bodies of knowledge" and the knowledge they have will influence how they teach. Furthermore, the learning processes involves many other aspects not just cognitive ones (Hargreaves, 2001; Marsh, 2003). It is

on these bases that emotions and feelings involved in teaching need to be focused upon as well. Even though professional development, through facilitating learning, reflection and action research (de Kock, 2004), has been researched, a focus on the question of how facilitators of learning construct practical wisdom is essential for both their professional and personal development of not just South African, but all student teachers. In developing student teachers we need to heed Gallego's (2001, p. 312) assertion that: "Dewey argued that personal experiences in schools are critical to the education of teachers, however, he argued that experiences are not necessarily educative". We need therefore to consider the sites (the schools) where the student teachers will facilitate learning, the type of mentor teachers, and the manner and depth of the reflective social discussion sessions. This is crucial if we want these experiences to be educative for the student teachers. We also need to recognise that the professional development of student teachers should focus on their personal **and** professional learning in a reflective and supportive manner. This could enable their construction and use of phronesis in their professional development.

2.4.5.2. Assessment of professional development

Student teachers within a professional development programme participate in many different roles, these include, being supervised and supported by teacher educators and mentor teachers and designers and operators of learning tasks. They therefore could be viewed as "objects of assessment" (Van Huizen *et al*, 2005, p. 280) where this assessment is radically different from formal testing procedures. Here the assessment is viewed as being constructive for the learning and development of student teachers and is focused on the process of learning and development, not the end product. Since the old ways of preparing student teachers are not working, the strategies of assessing their professional development have been changed. New assessment strategies look into effectively connecting learning

theories with teaching practices by synchronizing curricula with real-life classroom situations (Nave, 2000) and specially designed supervised clinical practice experiences (Zeichner, 1992).

Student teachers who facilitate learning in practice can develop if it is done in situated assessments that are constructive (Black & William, 1998; Clarke, Timperley & Hattie, 2003). These assessments could be used to inform the decisions that the student teachers make about the design and the operation of their learning tasks and to also monitor the outcomes of their learners. The purpose of these assessments is in terms of the learning and development that the student teachers experience during their professional development. This leaning and development focuses on the student teachers' demonstrating what they can do when they are not aware of what should be done (Claxton, 2000). In the process of learning, this uncertainty that the student teachers experience serves as the turning point to their personal and professional development. It is at these times that the student teachers will draw on their practical wisdom to inform their decisions and actions.

It is therefore accepted that for student teachers to develop in the facilitation of learning, a continual process of assessment is required. This can be managed through the use of professional development portfolios. Portfolios have been used as a "vehicle to enhance reflective thinking" and it "provides a venue for developing "critical reflection skills" among novice teachers (Yost, Sentner & Forlenz-Bailey, 2000, p. 45). This portfolio represents the entire experience of the student facilitator's learning process of professional development. It provides all the necessary hard evidence that has to convince an examination panel of the quality of professional development through a hard copy portfolio with all the hard evidence, an oral professional development portfolio presentation, and a

final probing interview that determines the student teachers' assessment of their professional development.

2.4.6. Mentoring

The type, nature and role of the mentors in the student teacher's construction of phronesis is critical. Generally the role of a mentor for novice teachers is "so diverse that the skills [required of mentor teachers] need to be equally diverse in order that they can advise on the many aspects needed by the new entrant to teaching" (Moyles, Suschitzky & Chapman, 1998). Halverson & Gomez (2002, p. 6) suggest that learning phronesis has traditionally taken place in "apprenticeships or mentoring arrangements". One of the focuses of this research is on the student teachers' construction and use of phronesis in an exploration-experiencing-mentoring arrangement where teacher educators (at the university site and the school site) and mentors (at practice schools) support the student teachers. This exploration-experiencing-mentoring is not one of modelling practice, but that of providing space where the student teachers can plan, act and reflect, and in so doing, are constructing and using their phronesis (practice theory).

2.4.7. Student teachers - personal and professional identities

In the process of constructing and using phronesis, student teachers' identities are challenged. It is not just any identity that is challenged - it is a personal identity. Personal identities are complex and these are further impacted on when looking at teacher identities (Goodson, 1996). According to Coffey (2001, p. 52) "no longer is the self seen as a fixed, static entity, the self is increasingly viewed as dynamic, fluid, multiple and subject to contestation." Personal identity is constructed by the student teacher during the learning experiences in the professional development programme. If all experiences are learning,

then according to Knowles (1980, p. 50) “learners derive their self-identity from their experience” and they define themselves from the range of experiences that they have. Identities are a means by which we perceive ourselves within our social environment on a relational level with others (Zirkel, 2000). Our identities may be private or public, providing a link to what, how and why we perceive ourselves and present ourselves to the world (Zirkel, 2000; Van Huizen *et al*, 2005). What is equally crucial, however is how we perceive others when developing our identities.

In student teacher professional development we cannot deny the importance of the evolving identity that student teachers experience during their professional development. Bullough (1997, p. 21) contends that “teacher identity – what beginning teachers believe about teaching and learning and self-as-a-teacher – is of vital concern to teacher education: it is the basis for meaning making and decision making…teacher education must begin, then, by exploring the teaching self.” An expose` of the student teacher’s identities is crucial to developing an understanding of their experience of meaning making when constructing and using phronesis.

Beijaard, Meijer & Verloop’s (2004) review of studies on teachers’ professional identity that it fell into three groups - teachers’ professional identity formation, the identification of characteristics of teachers’ professional identity, and the use of teacher’s stories to represent their professional identity. They suggested that research on teachers’ professional identity should focus on the relationship between concepts like ‘identity’ and ‘self’ and the role of the context in the professional identity development. They also suggest that researchers should consider the features of professional in professional identity, and research perspectives other than the cognitive one.

In constructing phronesis, critical features of an individual's personal and professional identity should be developed. The following features are essential to this construction: "self-directed individuals… critical reflectors … and experiential learners" (Brookfield, 1995, p. 2-4). Self-directed individuals should plan and act on the construction of knowledge about teaching and learning by becoming aware, reflecting and re-constructing their perceptions and beliefs of the particular role that they have to play (Brookfield, 1995). Secondly, self-directed individuals construct both cognitive and emotional understanding about the contexts that they experience and they recognise the importance of this understanding for their personal theories (Brookfield, 1995). Thirdly, self-directed individuals are resourceful in their experiences, perceptions, ideas and personal attributes. Furthermore, experience and reflections in action (Schon, 1987) of practical situations in particular contexts could influence a student teacher's personal and professional development and construction of the student teacher's identity as a facilitator of learning.

2.4.8. The Vygotskian perspective on learning and development in a sociocultural context

Different theories have been used to analyse student teacher learning in professional development. The competency based theory (Elam, 1971; Houston, 1974) used a public standard for teaching (performing effectively), while the personality-oriented (Combs, 1982; Fuller, 1970) and the reflective inquiry theories (Schon, 1983; Zeichner & Liston, 1987) focused on the development of the personal and the use of formal procedures (reflecting), respectively. These theories did not address the comprehensive aspects of learning that student teachers experience during their professional development. Furthermore they did not recognise the importance of the context for the learning in professional development.

This choice of theory is based on the feature that it "concentrates on the connections between individual functioning and development *and* the sociocultural practices in which individuals take part" (Van Huizen *et al*, 2005, p. 271). Each student teacher's learning and development as a facilitator of learning cannot be understood if it is viewed as removed from the everyday actions e.g. thinking, facilitating learning actions that the student teacher participates in. Within this theory the student teacher and his/her environment (society) are viewed as "a unified system in which these two elements are joined together in a dialectical relationship" (*ibid*). It also views a student teacher's environment and his/her activity as the most comprehensive and fundamental concept (Van Huizen *et al*, 2005). This suggests that a student teacher's learning and development is to be in the context of the student teacher participating in a sociocultural practice in a variety of activity systems during his/her professional development (van Huizen *et al*, 2005; Wenger, 1998).

In the process of learning and developing, a student teacher develops towards "fuller (more extended, more responsible, and more autonomous) participation" (Van Huizen *et al*, 2005, p. 272) where social functions are internalised and fit in as psychological functions, i.e. meaning is developed. This development requires of the student teacher to experience an environment where an ideal standard of achievement is modelled and where supporting conditions are present. It is in this context that the student teacher will then be successful in achieving the required "ideal form" (*ibid*, 205, p. 274). This form is concerned with "the professional image" of a student teacher serving the values of facilitating learning and the student teacher's "functions and tasks, and the competences that have to be learned to be effective" (*ibid*, 2005, pp. 274-275) in their role as facilitators of learning.

In conducting, his/her activities as a facilitator of learning in the particular contexts, the student teacher's actions not only "serve the maintenance of the activity system, but also its further development" (*ibid*, 2005, p. 272). In conducting these activities the student teacher is learning to be a participant in the teaching world. This involves learning an "action-repertoire in relation to the meanings behind this repertoire" (*ibid*, 2005, p. 272) where each student teacher shares his/her experiences of facilitating learning in a social setting. Each student teacher then reflects on their learning from the social setting and constructs a personal meaning of it for himself/herself (van Huizen *et al*, 2005). This interaction between exploring and developing public (professional image of teaching) meaning may be presented in a way that the student teacher could challenge and clarify his/her personal choice of teaching as a career. In confirming this choice and learning and developing the required identities and trappings of a facilitator of learning, a student teacher also develops a personality that enables him/her to make "committed action choices" (*ibid*, 2005, p. 272).

Another feature of this theory is the "development of a personality [that] runs parallel to the creation of a personal identity" (*ibid*, 2005, p. 272) and there is continuity between the two, not opposition. Finally, student teacher emotional experiences are critical to developing meaning and a personality. The extent to which a student teacher will participate in activities is influenced by his/her emotions, needs and motives. And it is in participating that a student teacher's personality which comprises rational, decisions and emotions are developed further (Van Huizen *et al*, 2005).

The Vygotskian principles have advantages for the purposes of this research in that it fits with constructivist, socio-constructivist, meta-cognition and deep learning, reflective practice, authentic learning, emotional development, the importance of the interplay

between performance and meaning, student teacher's perceptions and competence in teaching in relation to "good teaching" (Van Huizen *et al*, 2005, p. 276). At the same time, there is an awareness of weaknesses – for example it focuses on teaching which in this research is regarded as distinctively different from facilitating learning. The plan therefore will be to focus on the provision of learning, and not just any learning, but quality learning by facilitators of learning. Another weakness is that the provision of support is viewed in a cognitive sense and not in an emotional sense. In this theory, emotion is used to explore the development of identity and personality, but the provision of emotional support is not the focus in the process of the student teachers' professional development. A focus on what emotional guided support student teachers receive will be explored. Furthermore, the theory advocates for the development of student teachers to ideal forms, but it does not recognise the impact of the sociocultural learning on developing these ideal forms. A further weakness of the theory is that student teachers are viewed as apprentices, whereas the focus in this research is on the exploration-experiencing-mentoring arrangement between student teachers and mentor teachers. In exploring student teacher's perceptions there is a gap with regard to how these are challenged and changed if they are found to be inappropriate.

So this focus on the professional development of each student teacher *and* the social practices of facilitating learning in which he/she takes part is crucial to exploring and developing an understanding of how each student teacher constructs and uses phronesis to enhance his/her professional development. It will provide the knowing how and why each student teacher constructs and uses phronesis in the way he/she does.

2.5. Conclusion

Preparing student teachers for the 21st century is challenged by many dynamics of change. To address these dynamics, student teachers should construct phronesis in authentic contexts. Research literature on phronesis/practice theory focused on the meanings used and empirical research conducted in various fields to provide a place and scope for the meaning and process of the construction of phronesis in this research project. The choice of theory provided the foundation and support for this research.

Chapter 3 focuses on the research methodology adopted to research the student teacher's construction and use of phronesis. In the chapter, the decision and explanations for the choice of paradigm, strategy, data collection methods and instruments are clearly presented.

CHAPTER THREE

RESEARCH DESIGN

A decision-making action is considered by Aristotle as praxis: an action that changes behaviour and develops an individual (Roca, 2007)

3.1. Introduction

The exploration of the research question formulated in chapter 1, namely: "how do student teachers construct and use phronesis to enhance their professional development," with its accompanying sub questions, required an appropriate research design. This chapter concerns itself with the discussion of the research design I intend to implement in order to explore issues around the research questions. Since the intellectual puzzle of this research study is not so much to ascertain the content of student teachers' phronesis, but to explore how student teachers actually construct and use phronesis, the choice of research design, in particular, will be interpretive. This choice will further be impacted upon by the requirement to explore each student teacher's practice of facilitating learning in school classrooms. This action of facilitating learning will occur over a period of one year within university settings and school classrooms. It is for this reason that the duration of the research will be for one year. I have also chosen to conduct my research within the interpretivist paradigm, with mixed methods as an approach.

In this chapter, I report on the choice and justification for the particular research contexts, participants, paradigm, approach, strategy, methods and techniques used to collect data in

this research study. However, the limitation of having available only three Postgraduate Certificate in Education (PGCE) Life Sciences student teachers as participants, from whom data about their construction and use of phronesis could be obtained complicated the choice of the research design. I now turn to a detailed descriptive account and critique of the research design employed in this study.

3.2. Research Contexts

Since this research adopts a "naturalistic approach to the world" (Denzin & Lincoln, 2000, p. 3), it will be located in the natural sites within which each student teacher will interact during the construction and use of phronesis. After all, field research involves, as Neuman (1997, p. 348) puts it: "observing ordinary events in natural settings, where the researcher gets inside the meaning system of members". During the PGCE programme the student teachers will experience two types of experiential contexts – the university and school sites. The university-based natural sites will be the Life Sciences class and the science laboratory venues. In these venues, student teachers will be involved in Life Sciences specialisation discussions with regards to exploring their identity of a facilitator of learning, their reflections on the process of development and improvement in their facilitating learning in real classroom contexts, and preparing for their school-based responsibilities. The school based natural sites will be the classrooms and science laboratories where the student teachers will spend approximately 60% of their academic year facilitating learning during their execution of Life Sciences learning tasks.

3.3. Research Participants

Research participants in my study will occupy particular role(s) and the extent of their participation will be influenced by such role(s). Three white students[1], Bernice, Carol and Mack, will be major participants (as indicated in table 3 below) in the research. These will be the only student teachers in this Life Sciences specialisation module during the period of the research and available as research participants. The specialistion lecturer[2], Professor Ned, the researcher, mentor teachers and student teachers' peers will also be participants in this research. Table 3 below indicates the participants' profile, their role(s), and the justifications for these role(s) in the research.

Table 3: The research participants' profile, role(s), including the justifications for these roles.

RESEARCH PARTICIPANTS AND BIOGRAPHY	**ROLE(S) AND JUSTIFICATIONS**
[1]Bernice is a white female of Afrikaans background. She completed a three year Bachelor of Science degree and is a PGCE Life Sciences student teacher	Major participant She will participate in the collection of data and provide the data to be used in this research
[1]Carol is a white female of Afrikaans background. She completed a three year Bachelor of Science degree and is a PGCE Life Sciences student teacher	Major participant She will participate in the collection of data and provide the data to be used in this research
[1]Mack is a white male of English background. He completed a three year Bachelor of Science degree and is a PGCE Life Sciences student teacher	Major participant He will participate in the collection of data and provide the data to be used in this research
[2]Specialisation lecturer (teacher educator) – Professor Ned is a Professor of Science and Science Education in the Faculty of Education. He is a white male of Afrikaans background. He is integrally involved in designing and implementing the innovative teacher development programme for all PGCE students in the Faculty of Education.	He will participate in the collection of data and provide certain data to be used in the research.

[1] Pseudonyms for the three student teachers
[2] Pseudonyms for the specialisation lecturer

He is the coordinator and presenter of the Life Sciences specialisation programme.	
Researcher is a Coloured female of English background. She is a specialisation lecturer in the Faculty of Education in another South African university.	I will collect the data and also play different roles in different stages of the research. My role in the data collection will not be neutral. I am aware of being "the primary instrument in the data collection" (Cresswell, 2003, p. 198) in terms of my presence, the comments and actions that I will make and the changing roles that I will play. I will be a non-participant observer at times and a participant observer at other times.
The mentor teachers – teachers that the student teachers will be assigned to at the school-based sites. Six mentor teachers in total will participate. One for each student teacher for each of the school-based sessions (there will be two sessions).	Minor participants in the research. Each mentor teacher's participation will be in terms of their mentor status of supporting and assessing the student teacher's facilitation of learning at the school-based sites.
Student teachers' peers The student teachers' peers will be PGCE student teachers in the teacher education programme who will also be facilitating learning at the school-based sites. These student teachers will be specialising in another field – not Life Sciences.	Minor participants in the research. Their participation will be in terms of their assessment of the student teacher's facilitation of learning at the school settings.

3.4. Research design

Since my research inquiry relates to how student teachers in the radically innovative teacher education programme constructed and used phronesis to enhance their professional development, the choice of research design will be interpretive. As phronesis in this research will be explored in terms of the student teacher's constructed professional identity, and each one's developing practice of facilitating learning in practice in real classrooms. Over an extended period of time (one year), the most appropriate choice of research design will be interpretive. I will draw on Aristotle's (1941) view that phronesis is inaccessible,

and that Meijer (1999, p. 35) regards its exploration as an "evolving topic" to inform my choice of research design. In relation to this, Halverson (2004, p. 1) pointed out the difficulties of "representing practical knowledge apart from the context of exercise" and that "we are our phronesis in a way that we cannot separate ourselves from our knowledge" (ibid, p. 13). It is mainly for these reasons that the interpretive paradigm will be the paradigm of choice in this study. I will also have to recognise that to gain insight into the student teacher's construction of phronesis; I will need to use particular objective data collection methods concerned with determining personal and emotional development of the student teachers.

3.4.1. Paradigm orientation.

"Paradigms are all-encompassing systems of interrelated practice and thinking that define for researchers the nature of their enquiry along dimensions of ontology, epistemology, and methodology" (Terre Blanche & Durrheim, 2006, p. 6). Table 4 indicates the ontological, epistemological and methodological dimensions within particular paradigms.

Table 4: Paradigms and their ontological, epistemological and methodological dimensions

PARADIGM (PREDOMINANTLY DETERMINED BY EPISTEMOLOGICAL ASSUMPTIONS)	ONTOLOGICAL DIMENSION	EPISTEMOLOGICAL ASSUMPTION	METHODOLOGICAL CONSIDERATION
Positivist	Realist	Positivist	Researcher is an objective detacher observer; Hypothesis testing
Interpretive	Nominalist	Interpretative	Researcher is empathetically and (inter)subjectively immersed in the research; Interpretation
Constructionist	Constructivist	Constructivist	Researcher is suspicious of object of study (political undertones); Discourse analysis

Interpretive research will be used to explore the nature of, and respond to, the question of how student teachers constructed phronesis. Various data collection methods will be used to reveal how the student teachers constructed phronesis. The construction and development of their professional identity and facilitation of learning to construct their practice theory is the outcome.

3.4.2. Research approach/mode of enquiry

A mixed methods approach will be chosen because it is most appropriate for exploring ways in which each student teacher constructs and uses phronesis to enhance their professional development. It is formally defined as “the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study” (Johnson & Onwuegbuzie, 2004, p. 17). Given the fact that

this meaning lacks clarity in terms of developing the end point of the research, I will adopt Teddlie and Tashakkori's (2006, p. 15) meaning of this approach: "the investigator collects and analyses the data, integrates the findings, and draws inferences using both quantitative and qualitative approaches or methods in a single study".

Various researchers embrace the use of mixed methods research and view it as: "important for the development and practice" of research (Myburgh & Poggenpoel, 1995, p. 4); have much to offer and can often be skillfully used together (Miles & Huberman, 1994); "in complement to each other to reflect the truth" (Myburgh & Poggenpoel, 1995, p. 9); it is an "expansive and creative form of research" (Johnson & Onwuegbuzie, 2004, p. 17) and many research questions are "best and most fully answered" when mixed method are employed (*ibid*, p. 18); "produce more complete knowledge necessary to inform theory and practice" (*ibid*, 2004, p. 21). In the context of this research, as the student teachers will be involved as active participants, I use the view by DeVos (1998, p. 416) that research that involves the participants "includes both quantitative and qualitative methodologies" to support the choice of design. All the views expressed above are the bases for my decision to employ a mixed methods approach.

The mixed methods approach consists of "families" (Teddlie & Tashakkori, 2006, p. 16) of research design. The choice of design within the mixed method approach employed in this research will be decided from the typologies of Mixed Method design used by Teddlie and Tashakkori (2006) as presented in Table 5. The mixed methods designs as presented in this table differ with regard to three key criteria and one less important criterion. These, according to Teddlie and Tashakkori (2006, p. 25), are; "(1) the number of methodological

approaches used, (2) number of strands in the research design, (3) type of implementation process and the stage of integration."

Table 5: A typology of research designs featuring Mixed Methods as represented by Teddlie and Tashakkori (2006, p. 15)

THE METHODS-STRANDS MATRIX: A TYPOLOGY OF RESEARCH DESIGNS FEATURING MIXED METHODS		
Design Type	**Monostrand Designs**	**Multistrand designs**
Monomethod Designs	**Cell One** Monomethod Monostrand designs (1) Traditional [3]QUAN design (2) Traditional [4]QUAL design	**Cell Two** Monomethod Multistrand Designs: (1) Concurrent Monomethod a. QUAN + QUAN b. QUAL + QUAL (2) Sequential Monomethod a. QUAN → QUAN b. QUAL → QUAL
Mixed methods Designs	**Cell Three** Quasi-Mixed Mono Strand Designs Monostrand Conversion Design	**Cell Four** A) Mixed Methods Multistrand Designs (1) Concurrent Mixed Designs (2) Sequential Mixed Designs (3) Conversion Mixed Designs (4) Fully Integrated Designs B) Quasi-Mixed Multi-Strand Designs: Designs mixed at the Experiential Stage Only, including the Concurrent Quasi-Mixed Design

[3] QUAN stands for Quantitative
[4] QUAL stands for Qualitative

The mixed methods design that will be chosen for this research will be that found in Cell Three. The designs that fall into this cell have both qualitative and quantitative approaches mixed across the stages of a study. Since this research only has one strand; "a phase of a study that includes three stages: the conceptualization stage, the experiential stage (methodological/analytical), and the inferential stage" (Teddlie and Tashakkori, 2006, p. 16), it is referred to as having a monostrand design. Within this monostrand conversion design, the qualitative approach will be used more frequently than the quantitative approach. It is therefore more dominant than the quantitative approach in my study. The quantitative data that will be collected will be converted to qualitative data during the data analysis stage of this research. There will be integration of both qualitative and quantitative data during the research stage.

Within this mixed methods design both qualitative and quantitative methods will be used to give further and more expressive truths about the student teacher's constructed professional identities and the developing practice of facilitating learning.

As a strategy to use both qualitative and quantitative methods, I use the statements made by various theorists to support the use of qualitative methods. While for Cresswell (2003, p. 181), qualitative methods is "concerned with interactive and humanistic" aspects, Miles and Huberman (1984) feel that it could be used to make sense of social phenomena, and Mouton (2001) insists that it could be used to gain insight and understanding into a phenomenon. Since I am interested in gaining insight into a social phenomenon of student teacher's constructing phronesis, the choice of qualitative methods will suit the research purpose and aims. This research is not just about the researcher gaining insight for it will also focus on the researcher developing a level of detail about how the student teachers constructed and

used phronesis. The researcher will therefore have to be "highly involved in" (Cresswell, 2003, p.181) and (inter) subjectively immersed in the data collection process. Quantitative methods, which are objective, measurable statistical strategies, will be used to enhance the data collected by qualitative methods. Quantitative methods using objective tests with scoring will be used to determine, for example, the Personal profiles of the student teachers.

Qualitative data collection methods will be used to collect qualitative data and for its interpretation. These methods will be used because they involve "documenting real events, recording what people say, observing specific behaviours, studying written documents or examining visual images" (Neuman, 1997, p. 329; Merriam, 1988). I am also aware that qualitative researchers look for "involvement of their participants in data collection and seek to build rapport and credibility with the individuals in the study" (Cresswell, 2003, p. 181). For this reason, the student teachers' participation will be in terms of them designing some research instruments and providing the data to be used in this research. Qualitative methods will also be used to interpret and analyse the data (Cresswell, 2003). This will be done by developing descriptions, categories and themes from the data.

This is possible in the context of my study because qualitative researcher allows the researcher to "systematically reflect on who she or he is in the inquiry and is sensitive to his or her personal biography and how it shapes the study" (Cresswell, 2003, p.182). Throughout the research, I will have to be aware that I am the "primary instrument in the data collection" (*ibid*) and therefore need to recognise and be aware of the impact of my presence, the comments and actions I make and the changing roles/positions I will take as participant and non-participant observer at particular points in the research.

3.4.3. Research strategy

An action research strategy will be chosen, for it is most appropriate for exploring each student teacher's action, critical reflections on his/her practice and the desired changes when facilitating learning practice in realistic classroom contexts.

3.4.3.1. Action Research

The distinguishing features between action research and other research strategies is on the basis of the participant's action in the research. Action research has been defined differently by different scholars. Kemmis and McTaggart (1988, p. 5) define it as "a form of self-reflective enquiry undertaken by participants in educational situations in order to improve the educational practices". Coghlan and Brannick (2001, p. xi) see it as "taking action and creating knowledge or theory about that action". McNiff & Whitehead (2005, p. 4) define it as "a common-sense approach to personal and professional development that enables practitioners everywhere to investigate and evaluate their work and to create their own theories of practice". A central thread in all these definitions, that needs to be noted, is the participants' improvement in practice. This improvement in practice, however, can only be revealed if the action researcher "draw[s] on knowledge of how change and learning take place" (Coghlan & Brannick, 2001, p. 100). This brings into focus the expectation of the student teacher's participation in the research and the use of participatory action research in this research project.

3.4.3.2. Participatory Action Research

Research in participatory action research focuses on its practice in educational settings (Zeichner, 2001), its use by teachers to understand their practice (Kemmis & McTaggart, 1988; Noffke & Zeichner, 1987) and education for social change (Lewis, 2001).

Participatory action research will be used as each student teacher will be involved in an educational setting and "expected to construct knowledge as phronesis (Korthagen, 2001, p. 24) of and for facilitating learning. This construction will only be revealed if I use a strategy where their reflections could be elicited and shared.

As the ideals of participatory action research are reflected in critical thinking and actions such as learning, teaching and research which are all part of the same process (Elliott, 1991; Weiler, 2001), the choice of an appropriate research strategy for exploring the student teacher's construction and use of phronesis to enhance their professional development must be carefully considered. This exploration will expect the participation of the research participants in the research and the involvement of "people as part of a shared inquiry. It is research with rather than research without" (McNiff, 1988, p. 4). The use of the word 'with' is powerful, for it signifies the essence and importance of the participation of the student teachers in the research process. It therefore will involve the student teachers as an "integral part of the design" (Mouton, 2001, p. 150). This integral part of the design is in the "knowledge production" concerned with the role of the subject during data gathering (De Vos, 1998, p. 406). This is the reason I will plan for the student teachers to actively participate in the collection of data by formulating some questions for certain interview sessions. We, together with the student teachers, will be "agents of development and change" (Swantz, 1975, p. 1-4) in the research process.

3.4.3.3. Case study

To realise the objectives of my study, I will use Merriam's (1988, p. 153) view of a case as "a person". I recognise my role and the importance of the research process in collecting data for the case for each of the three student teachers from Denscombe (2003, p. 30-31) who

points out that a case study "focuses on just one instance of the thing that is to be investigated… [and the case] is something that already exists, it is not artificially generated." I will also have to heed the advice given by Cresswell, (2003, p. 15) that I need to use a range of data collection methods "over a sustained period of time." In researching one instance in depth, I will have "far greater opportunity to delve into things in more detail and discover those that might not have become apparent through more superficial research" (Denscombe, 2003, p. 30). In the context of my research, I will use a case study "to explain why certain outcomes may happen more than just find out what these outcomes are" (*ibid*, p. 31). The outcome in this instance will be concerned with ways in which each student teacher constructed his/her phronesis. A further outcome will be to "portray, analyse and interpret the uniqueness" (Cohen, Manion, & Morrison, 2000, p. 79) of the student teachers – how each student used the contribution (specialisation programme and mentor teachers) to construct phronesis in the way they did.

3.4.3.4. Case Study Participatory Action Research

Each student teacher's experience of constructing and using phronesis will be researched as a case. Here their practice of facilitating learning as "practical theorising" (Mc Niff & Whitehead, 2005, p. 6) will be captured and documented in a participatory action research framework. Each case will include each student teacher's reflections, planning, actions, any reflections on the actions and their change and learning (Schein, 1996) from the reflections and interventions experienced. Ultimately, the prime focus of the case studies will be on how each student teacher constructed and used phronesis in their professional development programme.

It is important at this stage to present the central tenets adapted and developed for the use and application, together with the justifications for this research strategy:

Central to this research design is that the student teachers will be in social settings;

In this research these settings will be during the university sessions and the school facilitation of learning sessions;

There should be equitable participation among participants, for this could "enhance [the participants] by enabling the expression of people's [participants] full human potential" (Stringer, 1993, p. 148). During the specialisation sessions I will have to be aware that the student teachers are participating equitably. If this is not the case I will then have to devise ways of encouraging this participation;

Data-driven action research is concerned with "dealing with the research situation and the people in it as they are, as far as possible" (Dick, 2000, p 75). A major feature of this data driven action research will be each student teacher's construction and use of phronesis in the contexts of the university and the school. This will entail researching the student teachers in the natural settings that they encounter during the specialisation sessions and the school-based practicum;

Case studies based on the inquiry into the real experiences for each of the research participants (student teachers) will be recorded. The case studies will be individually reported, and developed from social participative educational settings. The case study participatory action research accounts will be descriptive accounts of each student teacher's thinking (cognition), beliefs, feelings and actions in constructing an identity of a facilitator of learning and his/her continuous process of development and improvement in facilitating learning in classroom contexts. They will ultimately be descriptive accounts of student teachers constructing and using his/her phronesis over a period of a year.

I will use the suggestion made by McNiff, Lomax and Whitehead (2003, p. 7) who state that "central to action research and inclusional methodologies is the recognition of the uniqueness of the other even if the other acts and thinks in ways that are sometimes radically different from oneself." So as a researcher I will need to be aware of each student teacher's uniqueness in their thinking and actions in constructing and using a phronesis of facilitating learning. I will therefore have to be aware of the impact of my beliefs and assumptions on the interpretation of data.

It is a second person research as I will engage with student teachers in the inquiry process (Coghlan & Brannick, 2001). The types of inquiry to be used in this research are: an exploratory experiential praxis and case study inquiry. The exploratory experiential inquiry is a form of inquiry that I will adapt from Schein's (1999) typology of inquiry. This typology includes the exploratory diagnostic inquiry which explores the emotional, reasoning and actions of the participants and the confrontive inquiry where the consultant (specialisation lecturer) will share his own ideas, and challenge the other to think from a new perspective (Schein, 1999). I will link the exploratory experiential inquiry to that of praxis as it is "a human activity which, as it were, joins thought to the world" (Kitching, 1988, p. 29). I will use this inquiry as I need to explore each student teacher's thinking and actions of his/her process of constructing an identity of a facilitator of learning and his/her continuous process of development and improvement in facilitating learning in the school settings. The use of exploratory experiential praxis will offer the opportunity for me to explore the student teacher's interactions and transformation during the professional development programme as it offers the opportunity for student teachers to act and reflect "upon their world in order to transform" (Freire, 1970, p. 66). Praxis is also viewed in a more specific manner where "it is placed at the heart of effective facilitation (Brookfield,

1986, p. 10). According to Brookfield (1986, p. 10) during this process "learners and facilitators are involved in a continual process of activity, reflection upon activity, collaborative analysis of activity, new activity, further reflection and collaborative analysis." As the student teachers will be involved in action and reflecting on these actions, it is through this active dynamic process that their transformation could be revealed.

In this research design the dual nature of the role of the researcher (myself) will be critical to the data collection process. I will have an outsider role and an insider role at particular times during the data collection process. My position as an outsider will be vital to observe and record the authentic, real–life encounters between the specialisation lecturer and the student teachers. These observations and recordings will be used to inform my understanding and interpretation of each student teacher's experiences and reflections and to provide clarity in reporting in this dissertation. My position as an insider will be necessary as according to Tabachnick & Zeichner (1999, p. 311) "action research assumes that an observer participant can infuse an observed event with meanings". My position as a participant observer will also enable my active intervention (Coghlan et al, 2001) where clarity and deep insights into the experiences of the student teachers will be sought. Of particular importance is that the presence and role of the participant observer should be constructive and supportive, not destructive and unsupportive.

3.4.3.5. Case Study Participatory Action Research Cycles

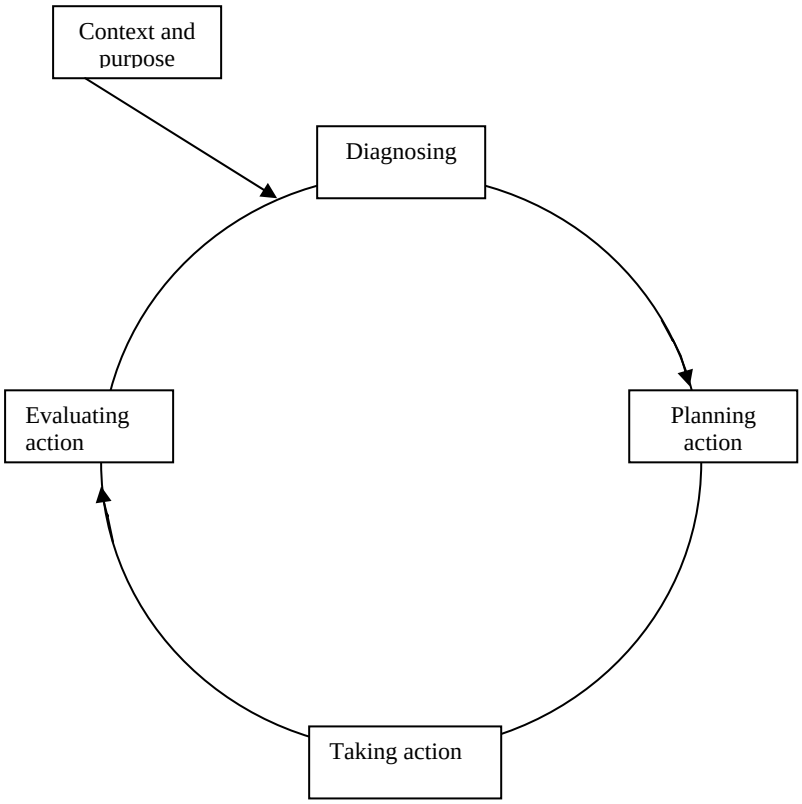
a. Designing the Case Study Participatory Action Research Cycle

Given the fact that my study uses the case study participatory action research strategy to explore how each student teacher constructed and used phronesis to enhance their professional development, focus on the action research cycles to be used will be necessary.

Action research is a cyclical process, with “each cycle of the research affecting subsequent ones” (Zeichner, 2001, p. 274). The action research cycle used by different researchers had different steps. This is evident in the examples of the action research steps used by Corey (1953), Lewin (1973) and, Kemmis and Mc Taggart (1988). Corey (1953) used the following steps: the identification of a problem area; the selection of a specific problem and the planned procedure for addressing the problem, leading to the planned goals; the recording of actions and the accumulation of evidence to determine if the goal was achieved and reflection on the procedures and actions. The steps typical for Lewin (1973) are: planning, taking action and evaluating, while Kemmis & Mc Taggart (1988) used the steps of plan, act, observe and reflect.

The model that I will use for the case study participatory action research cycle in my study will be adapted from Coghlan and Brannick’s (2001) model. The model for their cycle had the following - a context and purpose and the main steps of diagnosing, planning action, taking action and evaluating action (Coghlan & Brannick, 2001). Figure 1 illustrates this.

Figure 1: Coghlan & Brannick's (2001) model

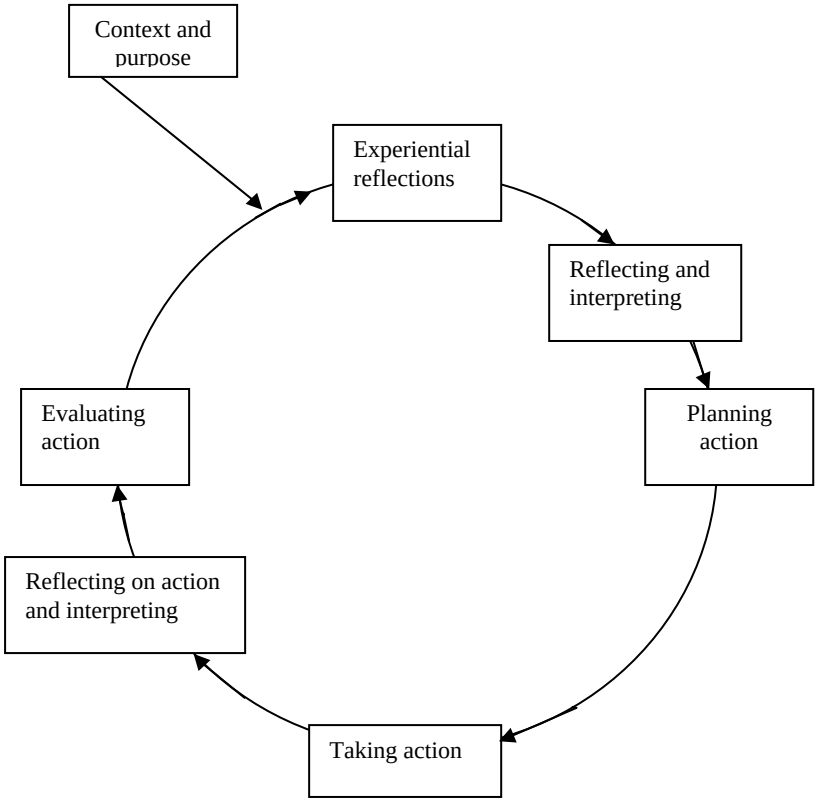


As shown in the figure, Coghlan and Brannick's (2001) model for the action research cycle begins with an understanding of the context and the purpose of the project. They describe the cycle as:

> the diagnosing is naming what the issues are to decide which action will be planned and taken; planning action follows from the analysis of the context and purpose of the project, the framing of the issue and the diagnosis; taking action is when the plans are implemented and evaluating action is concerned with examining the intended and unintended outcomes of the action (Coghlan & Brannick, 2001, p. 17).

Figure 2 presents the model that I have designed and will use for the case study participatory action research cycle.

Figure 2: James model



As figure 2 shows, this model begins with the context and purpose, and then feeds into six steps. The steps included in this model will be: experiential reflections; reflecting and interpreting; planning action; taking action; reflecting on taking action and, interpreting and evaluating action. I will modify Coghlan and Brannick's (2001) first step from a diagnosis step to an experiential reflections step. The rationale for the modification is that the student teachers will be submitted to an experience that they now have to reflect on. I will also insert two more steps in Coghlan and Brannick's (2001) model – a reflecting and interpreting step, and a reflecting on action and interpreting step.

The context and purpose are not steps in the case study participatory action research cycle. Instead, they will be used to contextualise the cycle. The context will describe the duration, the role players and the site of learning (school-based and/or university-based site) and the purpose will outline the rationale and the process for the cycle.

The experiential reflections step will be concerned with each student teacher sharing his/her experiences in a reflective mode, with a focus on their thinking, feelings and actions that they had at the beginning of the cycle (at the particular point in time for the various action research cycles). Each student teacher's reflections will be elicited and shared in a social setting. In this step, each student teacher, when sharing their experiences, will also be reflecting on what had occurred at the time when they had particular experiences. During this process they will also be learning about how to reflect. For this step, I will have to be aware of the fact that the experiential reflections that student teachers will share should include cognitive and affective aspects. I will also take advice from Coghlan *et al* (2001, p. 29), who states that "[a]ttending to experience is the first step to learning."

The reflecting and interpreting step - step two, will be inserted after the experiential reflection step in the model. This step will be inserted because it will be the "critical link between the concrete experience, the interpretation and taking new action" (Coghlan *et al*, 2001, p. 31). During this step each student teacher will be expected to reflect on what each will have shared during the experiential reflection step. These reflections will be crucial to opening up each student teacher's feelings, thinking and action of their shared experiential reflections and the intervention and meaning given to these experiential reflections. Each student teacher's reflections will be opened in such a way that the deep, privately held views, understandings and feelings could be brought to the surface (Raelin, 2000) for them

to critique their own thought processes and attend to their feelings (Coghlan & Brannick, 2001). These reflections and interpretations will be used in step three - the planning action step. They will be used to plan any actions that are decided upon by the participants.

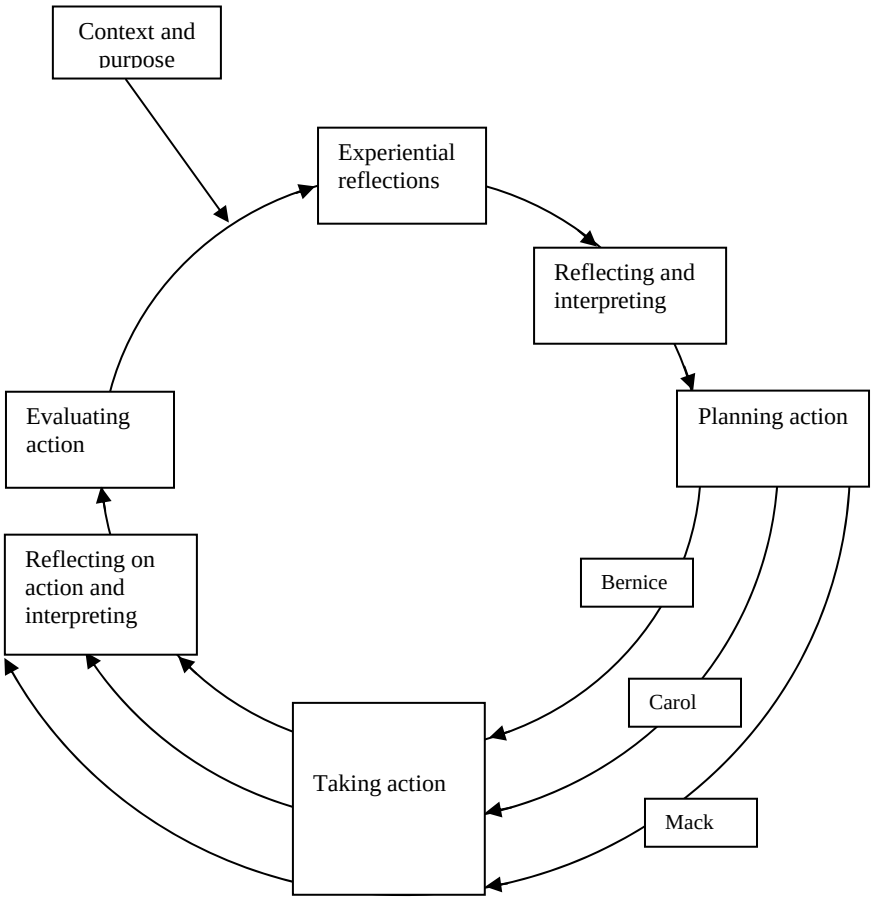
The fourth step in the cycle will be the taking action step. During this step taking action will be concerned with the intervention that the student teachers experience. The focus of this step will be on the learning in action as each student teacher is expected to construct and use his/her phronesis. This construction of phronesis, with its use and further construction and re-construction, is associated with the learning (change) that each student teacher is expected to experience. As change and learning are central to action research, it is important for me to draw on research methods and instruments that will reveal the knowledge of how change and learning will take place (Burke, 1994).

The fifth step will be that of reflecting on action and interpreting step after the taking action step (see Figure 2). Each student teacher's reflections will be elicited according to Mezirow's (1991) categories of reflection. The first category will be concerned with **content** - where the student teachers think about their feelings and understandings about various issues. The second category will be concerned with **process** - where the student teachers will think about the strategies and procedures that were used for them to develop an understanding of their reflections. The third category will be concerned with **premise** - where the student teachers will critique their underlying assumptions and perspectives that they shared and believed in.

During the sixth step, the evaluating action step of the cycle, the outcomes of the action (intervention), will be explored and the focus of the next cycle will be described.

I will follow the six steps as outlined in the section above in the data collection and reporting of data for cycles one and two. In these two cycles I will focus on the student teacher's construction of a professional identity which will be conducted in group settings and reported according to the plan of the cycle. For cycles three and four, even though I will follow the planned steps for data collection, I will present the reporting of data differently. This is because each student teacher will be facilitating learning in practice individually. I will present step 3 (planning action step), step 4 (taking action step) and step 5 (reflecting on action and interpreting step for each individual student teacher (see figure 3 for the plan). I will do this to give greater meaning, continuity and connectedness with the data set for each of the student teachers. Figure 3 represents this process.

Figure 3: James model for cycles 3 and 4 (steps 3, 4 and 5 will be reported for each student teacher



b. The timing and purpose of the four cycles

The PGCE programme has a duration of thirty nine weeks. The cyclical process of this participatory case study action research will consist of four cycles. Each cycle will be planned on the basis of their timing for the purpose to be achieved. The purpose of cycle one will be to establish each student teacher's baseline phronesis and to challenge it. This cycle will be conducted in weeks one, two and three of the programme. The purposes of cycle two will be to establish the student teachers' phronesis – now renamed a practice theory – in the paradigm of facilitating learning in the Life Sciences. A further purpose of this cycle will be to challenge each student teacher's practice theory against the

professional dimensions of facilitating learning in the Life Sciences. This cycle will be conducted during weeks four, five and six. The purposes of cycle three is to establish each student teacher's practice theory regarding his/her preparation to facilitate learning in practice and also to challenge the student teacher's practice theory regarding his/her facilitating learning in practice. This cycle will be conducted during weeks seven and seventeen. The purposes of cycle four will be to establish each student teacher's practice theory regarding his/her preparation to facilitate learning in practice and also to challenge the student teacher's practice theory regarding his/her facilitating learning in practice. A further purpose of cycle four will be to assess each student teacher's practice theory through the presentation of a Professional Portfolio during a Portfolio Defense Presentation. This cycle will be conducted during weeks eighteen and thirty-nine of the professional development programme.

3.4.4. Contextualising a case study participatory action research as the research design for this study

The main role players in this research are the three Life Sciences education student teachers, and they are subsequently the cases. This is in line with the purpose of action research, which is primarily to enable practitioners to improve their practice. Within the context of this research, the action research refers to the student facilitators of learning engaged in a process to improve their facilitating learning practice. The foundation of their facilitating learning practice is embedded in their construction of phronesis – or practical wisdom of and for facilitating learning. Within the context of being educated as facilitators of learning, the student facilitators of learning are the main participants in this endeavour. However, other people, like the teacher educator, mentor teachers, and in this case, the researcher, are also participants. The discussions on Life Sciences Policy documents and

pedagogy, exploration of research and the observation of novice facilitators of learning facilitating learning and experts teaching may also contribute to the construction of phronesis. Such a construction of phronesis constitutes the theory of their practice – subsequently conceptualised as a practice theory.

The practice theory forms the foundation from which they design and operationalise their facilitating learning practice (through learning tasks that the learners have to execute). The experience of facilitating learning in practice itself, as well as all the participants and contributing factors, however are continually challenging the existing practice theory to improve – the foundation of professional development. The practice theory is therefore subjected to a continual process of improvement.

However, the student teachers involved in this research are pre-service student teachers who desire to enter the education profession. In this sense they are at the very beginning of the process of their professional development as novice facilitators of learning. This means, although they themselves are not necessarily initiating the action research process (cycles), and neither are they the creators of required interventions, they nevertheless are actively participating in the action research process. They do this through engaging with the challenges they are confronted with in various ways, which subtly compels them to construct and subsequently continually reconstruct their own individual practice theory. This subsequently could improve their practice theory of and for facilitating learning. It is for this reason that the research is entitled “How student teachers construct and use phronesis to enhance their professional development?”

3.4.5. Data Generation Techniques and Research Instruments

Data generation came from each student teacher's participation and interaction with their shared experiences, interventions experienced and reflections made in social settings during the case study participatory action research. According to Meijer (1999, p. 8), "there is no agreement about which instruments and procedures are most appropriate for making teachers' practical knowledge explicit". The data generation techniques and instruments will be selected and designed to fit both the contexts and the purposes for the complete research project (Cunningham, 1993). A range of methods with their accompanying research instruments will be used to gain rich and thick descriptions (Neuman, 1997) of the individual student teacher's experiences and reflections. A variety of research instruments will be used for triangulation (Neuman, 1997) purposes and to give credibility to the research data and the research project. Table 6 shows the range of instruments used, their purposes, unit of analysis, frequency, and the person involved with generating data.

Table 6: Research instruments used in the research

Instrument	**Purpose**	**Unit of Analysis**	**Frequency**	**Completed by**
Semi-structured interview; visual data – each student teacher's drawing of the role of a facilitator of learning; group interviews; personal profile questionnaires	Elicit the student teachers baseline phronesis	Student teachers in their contexts	1 1 2 (February and October)	Researcher, specialisation lecturer and student teachers
Focus group interview; Specialisation Classroom observation; video and audio recordings; specialisation classroom reflective audio recordings; Practice classroom observation, audio and video recordings; post facilitation of learning semi structured interview; stimulated recall interview; student teacher's professional portfolios with reflective notes; and student teacher's document analysis – learning task designs	Elicit the student teachers' expectations, perceptions and use of the contributions of the specialisation lecturer and mentor teacher in the construction and use of phronesis	Student teachers in their contexts	3	**Re**searcher student teachers and specialisation lecturer
Focus group interview	Match between expected and actual contribution of specialisation programme	Student teachers		Researcher and student teachers

3.4.5.1. Interviews

Neuman (1997, p. 77) suggests that in order to understand structures, "the veil of their surface appearances should be pulled back." This requires interviews with the participants (individual student teachers) so that "the surface reality of ideology" (ibid, p. 77), the student teacher's experiences, can be revealed. Besides revealing the student teacher's experiences, it was recognised that interviews are not simply tools for collecting data (Cunningham 1993). According to Coghlan *et al* (2001, p. 92), "asking someone a question or a series of questions is a data-generating intervention". Furthermore, interviewing in action research focuses "on what the interviewee has to say, rather than confirming any hypothesis that the action researcher might have" (*ibid*). For the purposes of this research, the interviews will be open-ended and will focus on the student teachers' responses. I will use four types of interviews: group; semi-structured; focus group and stimulated recall.

a. Group interviews (Refer to Appendix 1 for the actual questions asked)

Interviews can sometimes "involve the use of more than one informant" (Denscombe, 2003, p. 168). The group interview "tells us that those present during the interview will interact with one another and that the discussion will operate at the level of the group" (*ibid*, p. 168). According to Lewis (1992, p. 413), these interviews "help to reveal consensus views, may generate richer responses by allowing participants to challenge one another's views" and confirm experiences shared.

I am not comfortable with calling these group interviews, for these will be used during the specialisation discussion sessions. I will rather call them group discussion/interviews. I will tape record and video record these interviews.

The disadvantage of using a group interview is that "quieter people's voices may be drowned out" (Denscombe, 2003, p. 168). The specialisation lecturer will be aware that this may happen and he has planned to prompt the student teachers to respond during the interview. According to (*ibid,* p. 168) there is also a gender issue that must be heeded "where men tend to hog the centre stage in group discussions". Another potential disadvantage of group interviews is that "the opinions that are expressed are ones that are perceived to be acceptable" (*ibid*, p. 168). I planned that the role of the specialisation lecturer and the researcher during the group interview would negate this activity.

b. Semi-structured interviews

I will use semi-structured interviews at various times during the research; especially at the beginning of the programme, to elicit each student teacher's decision about wanting to facilitate learning of Life Sciences, their construction of knowledge about designing learning tasks and to explore their thinking and feelings about learning task design. These interviews will also be used to gain insights into each student teacher's expectations, perceived contribution and use of the contributions from the specialisation programme and the mentor teacher towards their construction and use of phronesis in their professional development.

The advantage of using semi-structured interviews will enable student teachers to verbalise their own perception and understanding of their role as a facilitator of learning, what their experiences linked to 'being' a teacher are, the decision to facilitate learning of Life Sciences. Furthermore, each student teacher will be able to verbalise his/her expectations, perception and use of the contribution of the specialisation programme and the mentor teacher in the construction and use of his/her phronesis. Each student teacher will be

expected to present his/her data in his/her own words and language so that the essence of what needs to be said will not be lost. This is why these interviews will be tape recorded.

I had to recognise and plan for the disadvantage of student teachers feeling threatened from disclosing personal information during the interview. This is why I will triangulate the data by using my (researcher's) notes, audio transcripts and each student teacher's professional portfolio.

c. Focus group interviews

I will use focus group interviews to elicit the student teachers' expectations, perceptions and use of the contributions of the specialisation lecturer and mentor teacher in the construction and use of phronesis. I will also use the interview to make a match between the expected and actual contribution of specialisation programme. I will conduct these interviews at various times in the programme. Denscombe (2003, p. 169) states that focus group interviews "place particular value on the interaction within the group as a means of eliciting information". He further states that "the sessions usually revolve around a prompt, a trigger, some stimulus introduced by the moderator" (p. 169), who in this instance was myself. The use of focus group interviews is "a useful way for promoting an empowering, action-oriented form of research (Williams & Katz, 2001, p. 1). This sense of empowerment comes from being valued as experts (Byron, 1995) and from working collaboratively with researchers and interacting with other participants (Gibbs, 1997).

The focus group interviews will be chosen as the student teachers could share their reflections in an open dynamic manner. These reflections will be used to elicit the student teacher's constructed phronesis, to challenge the phronesis constructed and to influence

change on the part of each student teacher's thinking, feelings and actions. I will audio tape and video record these interviews as well.

The advantage of using this type of interview is that student teachers will have the ability to access their own and their colleagues "knowledge and ideas within a given cultural context" (Barbour & Kitzinger, 1998, p. 5). Furthermore, this interviewing strategy fits the Vygotskian learning and development epistemology and ontology in that it "can be used by researchers or participants to facilitate the process of change" (William & Katz, 2001, p. 5) which can then be documented. Furthermore, as I will explore each student teacher's feelings, the focus group interview will be helpful in uncovering dynamic affective aspects which will focus on emotional processes that could influence each student teacher's behaviours (response) to a significant extent.

I will have to heed the problem that a focus group interview could produce less data than a face-to-face interview. I therefore will use creative ways to enable the student teacher's openness to share in a non- threatening context. According to Samuel (2003, p. 261), it is imperative that "a climate of mutual trust, co-operation and confidentiality is established within the group" before embarking on the use of students' sharing of their experiences. I will also heed the problem of people not being "equally articulate and perceptive" (Cresswell, 2003, p. 186). I will negate this by conducting the research over an extended period of time. I will not guarantee, but will be aware that no fellow student teacher will pass insensitive remarks that could damage the psychological well-being of their peer. I will also be ware that different individuals may have different views about how much (if anything at all) they wish to reveal about themselves to outsiders (Harris & Furlong, 1997). As focus group interviews mainly rely on verbal data, the interpretation of the data could be

biased. However, triangulation could be achieved by using my (researcher) field notes, and each student teacher's professional portfolio.

d. Stimulated recall interviews

I will use stimulated recall interviews to explore each student teacher's interactive cognition when they will be facilitating learning during the execution of learning tasks. The facilitation of learning sessions will be audio and videotaped. The videotape will be used to aid the student teachers recall of his or her interactive thoughts at the time of the lesson (Meijer, 1999, p. 37). According to Meijer (1999, p.37), the stimulated recall interview is used for "teachers to explicate their interactive thinking in response to watching the videotape of a lesson that they have just given". Before each interview, I will first prepare the student teachers for the activity by stating: that "the video will be used to stimulate you to remember what you were thinking or what was on your mind when you were facilitating the learners learning of the learning task". I will also tell them that we will "use the video as a tool for you to re-live" (Meijer, 1999, p. 84) the experience. I will tell them that "what we have to be careful about is that the thoughts that you have are not the thoughts that come from watching the video, but are the thoughts that you had during the lesson." I also will tell them that what we are really looking at is the interplay between the short- term memory from watching the video and the long-term memory from what you did in class (Meijer, 1999). I will also tell them that as "the video plays, I want you at points to stop it and say this is what I was thinking; and where I feel that I want to ask something I will stop the video at certain points if I see that you are not doing it" (Meijer, 1999, p. 84). It is at these moments that I will also ask student teachers to describe their thoughts. So, where they feel that they are doing that and when they give me an answer or make a comment, I will ask: is

this from what you have just watched or is it they are linked to the thoughts that they had while teaching (direct thoughts)?

The disadvantage with this type of interview is that student teachers could find it difficult at times to try and work out what they were thinking. To offer them support, I will ensure that they understand the purpose of this data collection instrument clearly before it is administered. Another disadvantage could be student teachers' access to a video-recorder. I will plan for student teachers to access and use the university recorder for interviews.

3.4.5.2. Personal profile questionnaires (See Appendix 1 for copies of the questionnaires).

The student teachers will complete the following questionnaires: a. Neethling Brain Instrument, b. Temperament indicator – David Keirsey (1998) and c. Self Image Evaluation. Professor Ned will plan for each student teacher to complete these questionnaires twice during the course of the year - February and October.

1. The Neethling Brain Instrument is a descriptive, non-judgemental assessment of a person's brain profile with no profile being superior to the other. The instrument identifies the strengths of a person's skills in every quadrant of the brain: R1; R2; R3 and R4. The profile report focuses the specific quadrant scores and makes recommendations based on these scores. Each student teacher's scores for each quadrant will be calculated and plotted on a pie graph. Each student teacher will receive a report with the score, general preferences and teaching preferences that he/she could be linked to.

2. Temperament indicator – David Keirsey

The Keirsey Temperament indicator is a powerful forty question personality instrument that helps individuals discover their personality type. The data from using this indicator gives people insight into themselves, which is useful for choosing a career and also for having knowledge about their self-understanding.

According to Keirsey (1998, p. 2), people may be "sorted into one of four temperament categories. [5]A category is Popular Sanguine (extrovert) who is outgoing and people-oriented. Category B is an Influential Choleric (outwardly forceful) who is outgoing and task-oriented. Category C is a Perfectionist Melancholy (introvert) who is withholding and task-oriented. Category D is Tranquil Phlegmatic (careful) who is withholding and people-oriented.

3. Self Image Evaluation

This is a quantitative measuring instrument which is an evaluation of a person's self image. It has the instruction at the beginning that it is not a test, therefore yields no right or wrong answer and mark the score that correlates with your circumstances. There are twenty five statements and five criteria: 1 – never, no; 2 – seldom; 3 – sometimes; 4 – often; 5 – always, yes. A total is calculated for all the responses to the statements and the rating is determined: 70 – 120 is no self image; 56 - 69 is a dissatisfied self image; 40 – 54 is an average-self image, 30 – 39 is a very good self image and 0 – 29 is an excellent, too good self image.

[5] Refer to addendum of data collection for further details about the questions asked.

3.4.5.3. Visual data

I will use visual data to explore each student teacher's baseline understanding of what the role of a facilitator of learning is and their understanding of facilitating learning. According to Coghlan *et al* (2001, p. 90) "it is not uncommon for action researchers to use story-telling, drama or photography as a core process of their data generation". In this research it will not be the core, but essential to exploring each student teacher's perceptions of a facilitator of learning, his/her identity construction as a facilitator of learning and their understanding of facilitating learning.

Each student teacher will be asked individually to draw how he/she sees himself/herself as a facilitator of learning. These drawings will be used to generate data on how each student teacher sees himself or herself as a facilitator of learning. Each student teacher will also be asked to draw a concept map that represents their understanding of the facilitation of learning. They will draw these concept maps at least three times during the programme: at the beginning (start), midway and at the end. The student teachers will submit these concept maps in their professional portfolio (to be discussed further below).

The advantage of using drawings is that it "may be an unobtrusive method of collecting data, provides an opportunity for participants to directly share their 'reality' and it is creative in that it captures attention visually" (Cresswell, 2003, p. 187). Black and Halliwall's (2000, p. 105) successful use of such "alternative forms of representation cogently demonstrate that it provides an excellent forum for teacher reflection" and that it reveals aspects that are not always easy to verbalise on how teachers make sense of their teaching.

The disadvantages are that it "may be difficult to interpret and the presence of an observer may be disruptive and affect responses' (Cresswell, 2003, p. 187). To overcome this limitation, I will ask the student teachers to interpret the images and the text represented in their particular drawings. The student teachers will share their interpretations and where clarity is required, I will question them about this. This drawing and discussion session will be audio-recorded and later transcribed. Another disadvantage of using drawings is that "the availability of time for the student teacher to do this could be a problem" (*ibid*, p. 187). To tackle this loophole, each student teacher will be asked to draw his/her visual during an arranged university specialised discussion session.

3.4.5.4. Observations

Observations will be essential for me to collect data on each student teacher facilitating learning directly, as this data will serve. This is because the source (researcher and student teacher will observe the video and question and discuss actions) for the stimulated recall interview and it will be used for triangulation purposes. According to Denscombe (2003, p. 192), observation "draws on the direct evidence of the eye to witness events first hand. It is based on the premise that for certain purposes it is best to observe what actually happens."

I will use two types of observation in this research: non-participant and participant observations. During the non participant observations my role will be that of an outsider, while during the participant observations I am an insider. I will be a non-participant observer during the specialisation discussion sessions and some post facilitation of learning sessions at the school-based site. My role as a non-participant will be crucial for me to observe the authenticity and the real–life encounters between the specialisation lecturer and the student teachers. This role will be important for me to observe the student teacher's

facilitation of learning through the execution of learning tasks. I will use these observations to inform my understanding and interpretation of each student teacher's experiences and reflections. I will also audio-tape and video tape the university specialisation discussion sessions, and record researcher field notes and assessment comments on each student teacher's observation schedule.

The data generated from these observations will be used to triangulate with the data from the semi-structured interviews and focus group interviews. When the specialisation lecturer is present during the student teacher facilitation of learning sessions at the school, he will observe the session and record assessment comments on each student teacher's observation schedule. The student teacher facilitation of learning sessions will be audio-taped and video-taped so as to provide rich data on the relationship between the student teacher's actions, beliefs, feelings, the classroom world and their thoughts. The videotapes will be played back during the stimulated recall interview. The observations will also be used to elicit the student teachers' expectations, perceptions, and use of the contributions of the specialisation lecturer/researcher and mentor teacher in their construction and use of phronesis (practice theory). The advantage of being a participant observer is that an in-depth probe into the concerns that the student teachers experienced could be completed. The participant observations will be used as "the researcher has firsthand experience with the participants; researcher can record information as it is revealed and unusual aspects can be noticed during observation (Cresswell, 2003, p. 186). According to Cresswell, (2003, p. 186), "the presence of the researcher in the classroom may be seen as intrusive". In this research, however, the participants and the specialisation lecturer and myself will negotiate and discuss the purpose and rationale for my presence during particular specialisation sessions and practicum sessions at the school.

3.4.5.5. Personal reflective journals

At the beginning of the programme the specialisation lecturer will tell the student teachers to reflect on all the Life Sciences university specialisation sessions and also on the facilitation of learning and post-facilitation of learning sessions at their particular schooling contexts. Samuel (2003) views reflection as a process for enhancing teacher professional development. to this development. In this research I will focus on the student teacher's reflections of the interventions and also their understanding of what a reflection is and the process of how they reflected. From these reflections the structure, tentativeness of ideas, experiences and beliefs in the construction and use of phronesis will be explored. I will use these reflections to gain insight into the construction and use of phronesis in the student teacher's particular contexts.

An advantage in the student teachers using a reflective journal is that it will be a means of consolidating what they had experienced - the contribution of the specialisation and the mentor teacher to their construction and use of phronesis. An important feature of reflective journals that will be critical for the data collection in this research is that it is an "ongoing record of practices and reflections on those practices" (Connelly & Clandinin, 1988, p. 34). The personal experiences of the student teacher's life-world will be recorded by the student teachers themselves. The student teachers will also formulate their evolving experience of constructing phronesis in their own words as much as possible (Meijer, 1999). The reflections that I will work with are those that the student teachers will write in their reflective journals and insert into their professional portfolio. The reflections in the portfolio will be chosen by the student teachers to represent their construction and use of phronesis.

A possible disadvantage of using these reflective journals, however, could be that my "interpretation of [them] could be removed from the actual experience of the student teachers" (Fals Borda, 2001, p. 30). It is for this reason, for example, that when they share their reflections from their journals, during their portfolio defense, and their experiences during the focus group interview, triangulation of the data will be achieved and misinterpretation will be reduced. A further disadvantage to using reflective journals is that it "can be time consuming" (*ibid*) for the person writing the reflections. Another possible disadvantage to using reflective journals is that the fundamental role of language is to be acknowledged and I needed to act on the "ways of reporting to be understandable by the people who will be furnishing the data" (*ibid*).

3.4.5.6. Document Analysis

Each student teacher will compile a professional portfolio during the course of the programme. In this portfolio they are expected to insert their reflections and examples of learning tasks that they had designed and executed (operationalised) during the two practicum sessions at the schools. These reflections and learning tasks chosen by the student teachers are those that represent their construction and use of phronesis during the programme. The student teachers will hand in these portfolios at the end of the year during their portfolio defense. I will scan these portfolios, remove and photocopy all their reflections and learning tasks. I will need to be cautious though in dating and filing this photocopied material in a data file that I will compile for each student teacher. These documents will be analysed using particular methods of data analysis.

The advantage of using documents is that the text in terms of the language and words of the participants will be obtained. These documents will represent data that is thoughtful as

student teachers would have given attention to compiling the information. The documents will serve as written evidence and therefore will save the time and the expense of transcribing. The disadvantage, however, may be that the documents will be incomplete as not all the reflections for each of the interventions will be inserted. I will therefore have to work with the documents that I will have access to.

3.4.6. Data Analysis and Interpretation

In this section the proposed data analysis process and the data analysis instruments are described. I also describe how the researcher will use the conceptual framework concerned with the understanding/meaning of practice theory to analyse the data. The meaning of practice theory focuses on the role of a facilitator of learning and the facilitation learning practice. A description of the data analysis process follows.

3.4.6.1.Data Analysis process

According to Cresswell (2003, p. 190), the data analysis process makes "sense out of text and image data. It involves preparing the data for analysis, conducting different analyses moving deeper and deeper into understanding the data, representing the data, and making interpretations of the larger meaning" I will develop both qualitative, descriptive data and quantitative statistical data from the data collection instruments used. In developing the data I will transcribe all audio and video recordings of the various interviews and observations. These transcriptions will be typed and placed in an electronic form. All the documents for the document analysis (the reflective diaries, researcher field notes and observation notes) will be typed and placed in an electronic form. All the data from the personal profile questionnaires and visual data collection instruments will first have to be interpreted and analysed, before it can be written up in an electronic form (to be described).

The data analysis process will be conducted on two levels. Level one data analysis will be concerned with developing descriptive data from categories deduced from the data. A descriptive case study data analysis tool (Cohen, Manion & Morrison, 2007) will be used to analyse the data for level one. The legitimacy and fitness for purpose of this tool (Cohen, Manion & Morrison, 2007) is observed from the focus on how each student teacher constructed and used phronesis in each of the cycles. The first level data analysis process, therefore, will entail developing a descriptive case study, providing narrative accounts (Cohen, Manion & Morrison, 2007) for each of the student teachers. These cases will then be organised into the steps for each of the cycles - experiential reflections; reflecting and interpreting; planning action; taking action; reflecting on action and interpreting and evaluating action. These case studies will be compiled from deduced categories (previously organised). These categories will be stated in the findings chapters four, five, six and seven.

Descriptive data in cycle one will be organised around a central theme and time frame within the professional development programme. Data to be analysed in this cycle will be concerned with exploring the student teachers' baseline phronesis and their construction of an identity, their knowledge of a learning task and facilitating learning. Data to be analysed in action research cycle two will be concerned with the student teachers' understanding about a facilitator of learning in terms of the role of teacher (now to be called facilitator of learning), role of the learner, facilitating learning (concept maps) and learning task. Data to be analysed in action research cycles three and four will be the student teachers' understanding of a facilitator of learning, and their practice theory regarding their facilitating learning in practice.

Level two data analysis will be concerned with emergent themes that will be induced from the first level of data analysis. This will entail reading the descriptive data for each of the student teachers in each step of the four cycles. Emergent themes will be induced from the data in each step of each cycle and reported as themes in the findings chapters four, five, six and seven.

3.4.6.2. Data analysis techniques:

Visual data (concept maps and student teachers' drawings of a facilitator of learning) and objective data from the profile questionnaires will be interpreted and analysed. All this data will now be analysed using particular data analysis techniques for each of the data sets. A discussion of the various data analyses techniques and justifications for their use follows.

(i) The textual data from the group, focus group and semi-structured interviews, observations, personal reflective journals and document analysis will be analysed according to a deductive process (Lincoln & Guba, 1985; Merriam, 1988; Cresswell, 2003). The deductive process will start by using the questions from the interviews for the categories. The student teacher's responses to these questions (now referred to as categories) will serve as the data for each student teacher. The focus of this data will be to identify each student teacher's understanding of the identity of a facilitator of learning and his/her feelings linked to this identity and his/her facilitating learning in practice. The identity of a facilitator of learning will reflect the roles and images of a teacher that they have and their feelings will be reflected in words that describe how they feel, e.g. happy, excited, frustrated, etc. The student teachers' understanding of facilitating learning in practice, will be reflected in the teaching and learning objects that they will construct, and the processes that they engage in when constructing a phronesis of these two aspects.

(ii) The visual data (student teacher's drawings of how each one sees himself/herself as a facilitator of learning and the student teachers' concept maps of their phronesis of facilitating learning).

After each student teacher has completed his/her drawing, the student teacher and the researcher will decide on the questions to be asked about the visual data. I will then ask him/her questions about the drawing in an attempt to understand his/her understanding of the identity of a facilitator of learning represented in the drawing (Nelson & Wright, 1995). The data from the images drawn will be collapsed with the data from the semi-structured interview that was used to give meaning and depth to the drawing. This data will be read and analysed using the visual data analysis tools in the literature by Leavy, McSorley and Bote (2007). This tool places the image into one of four categories based on the role of the teacher and teaching and learning accessories depicted in the drawing. The four categories are: self-referential (where the teacher only speaks about himself/herself or only has an image of himself/herself in the picture); behaviourist (knowledge is transmitted); constructivist (learners construct knowledge) and situative (knowledge is situated in the context).

I will read the concept maps. I will analyse the concept maps according to the contents in the map, the number of linking branches and the type of linking branches drawn. I will use the information presented by Slabbert (2006) on what is a facilitator in the student teacher's guide to develop an analysis tool to analyse the concept maps. I will identify key features of what is a facilitator of learning from this guide and I will check the concept maps against these features, how they are linked and the types of relationships between these features that

are indicated by these links. I will then present a descriptive account of a student teacher's concept map of his/her phronesis of facilitating learning.

(iii) In analyzing the stimulated recall interviews I will use the guidelines suggested by Meijer (1999) where I will work with each student teacher's responses that indicate that they are linked to long term memory. Student teacher responses that start with words like when and I think that, will be included in the data.

(iv) In analysing the student teachers' reflections I will use different analysis methods depending on the type of reflection and step of the cycle that these reflections are in. The reflections that will be shared after the experiential reflections step will be placed into the reflecting and interpreting step. These reflections will be analysed by me identifying and using reflection factors that could give depth and meaning to what was done by for example the specialisation lecturer or the student teachers for them (the student teachers) to construct and use phronesis. These reflection factors and their interpretations (Coghlan & Brannick, 2001) will therefore be set up by me using the student teachers' reflections to inquire into how each student teacher constructed and used phronesis.

The reflections that the student teachers shared in reflecting on action and interpreting step five will be analysed according to Mezirow's (1991) levels of analysis - by looking at the content (what), the process (how) and the premise (why) to make meaning (Wang & King, 2006) of each of the student teacher's constructed phronesis.

(v) The Personal Profile Questionnaires - the Neethling Brain Instrument, the Temperament indicator and the Self Image Evaluation (SIE) scores will be interpreted using the particular information for each of the tests. These scores will tallied and recorded.

- The student teachers' scores for the Neethling Brain Instrument will be tallied and matched to particular categories that are already decided in the instrument. The categories are: 50 very low preference; 50 – 64 low preference; 65 – 79 average preference; 80 – 94 very high preference and 95+ very high preference. An individual's profile should always be evaluated in categories and not according to exact scores.
- The Temperament for each student teacher will be deduced from scoring the options (characteristics for the four temperament types) and counting the total for each temperament type: How many options matched with A (Popular Sanguine), B (Influential Choleric), C (Perfectionist Melancholy) or D (Tranquil Phlegmatic).
- The Self Image Evaluation was scored for each student teacher. Each student teacher was then placed into one of the five categories based on their score: 70 – 120 is no self image; 56 - 69 is a dissatisfied self image; 40 – 54 is an average-self image, 30 – 39 is a very good self image and 0 – 29 is an excellent, too good self image.

3.4.7. Rigour in the research

According to Neuman (1997, p. 508), the "foundation for interpretation rests on triangulated empirical materials that are trustworthy." Trustworthiness will be established by using Guba's model of trustworthiness as found in Lincoln and Guba (1985, p. 235) of qualitative research. The four criteria for trustworthiness - credibility, transferability, dependability and confirmability, their criteria and their applications in this research are presented in Table 7.

Table 7: Rigour in the research

STRATEGY	CRITERIA	APPLICATION
Credibility	• Prolonged field experience and observation	I (researcher) will spend time with student teachers to gain their confidence, make video recordings of classroom observations and play them back; field notes by researcher, literature review by researcher; data analysis by researcher; researcher to describe the findings.
	• Triangulation	Use journal entries, focus group interviews and classroom observation and co-coder.
	• Peer group discussion	Researcher, practitioner and student teachers to discuss findings
	• Reference adequacy	Copies of anonymous transcriptions of interviews and field notes will be attached to the research
	• Member checking	Findings of research will be submitted and discussed with participants
Transferability	• Dense description	Complete control of methodology, including verbatim quotes from the interviews
Dependability	• Triangulation	Use journal entries, focus group interviews and classroom observation and co-coder.
	• Dense description of research method	Research methodology will be fully described
	• Reference adequacy	Copies of anonymous transcriptions of interviews and field notes will be attached to the research
	• Peer group examination	Research protocol will be discussed with independent education researchers Researcher, practitioner and student

	• Peer group discussion • Consistency	teachers will discuss findings Research process and the action research cycles to be followed – experiential reflections, reflection, planning, action, taking action, reflecting on action and evaluation are outlined
Confirmability	• Conformability audit • Triangulation • Peer group discussion	Internal audit of data: • Raw data from interview, tapes • Process notes • Material relating to intentions and dispositions Use journal entries, focus group interviews and classroom observation and co-coder. Researcher, practitioner and student teachers discuss findings

3.4.8. Limitations

In undertaking this research project, I am aware of the limitations that could be present. I have recognised these and have planned on how to reduce their negative effects in this research. These are outlined in this section.

- While the study may be able to identify some of the constructs of each of the student teacher's construction and use of phronesis, the limitations of this research study could be that the sample is limited because it will involve only three Life Sciences PGCE students who are classified as white in South Africa. These will be the only student teachers in this Life Sciences specialisation module during the period of the

research and available as research participants. Due to the apartheid history, South African schools and schooling contexts are linked to racial groupings. There is unfortunately a relationship between the schooling contexts and support that a black student teacher could experience as opposed to that for a white student teacher. This relationship is recognised and planned for in the teacher education programme. The programme is designed in a way that any student teacher will not be exposed to only "bad" role models (mentor teachers). The programme has been especially designed to expose student teachers for 8 weeks to a challenging school environment (multicultural, with difficult circumstances e.g. large class teaching and learner discipline) and another 8 weeks to another experience (well managed and functional teaching and learning environment).

- Since only three Life Sciences PGCE student teachers will participate in this research, this research will be regarded as a small-scale study which does not aim to generalize its findings. However, it has the potential to make a contribution to theory building. It seeks an intense focus on the complexities of learning about facilitating learning and social life as it is related to the subjective experiences common to the actors on the site, particularly with regard to their facilitating learning in practice and the importance of this authentic experience in their development of a professional identity of a facilitator of learning. It further aims to determine how student teachers experience the contributions of the various players in the particular contexts. As I will use a mixed methods approach with a dominant qualitative focus I am aware that qualitative research is "often conducted on a small sample, which limits the possibilities of making generalizations about the topic under investigation

(Meijer, 1999, p. 35). It is for this reason that I decided on a protracted period of research – a year with a range of data collection methods and field-based research.

- The student teachers' lack of understanding of their role, the role of the specialist lecturer (teacher educator) and the researcher in the research could also be a limitation. During the research orientation meeting the roles of all participants will be discussed and clarified. It is possible that with the use of a participatory action research strategy, the research could fail because of a lack of understanding by researchers of what the student teachers perceive their role to be (De Vos, 1998). This will be attended to throughout the research where the researcher will elicit these perceptions, discuss them and provide clarity where necessary.

- A larger number of extended, long-term observations would be ideal, but it is not possible given the limits of time and resources and the distance from the research site. I live and work in Durban (approximately 536 km away from Pretoria), so it is necessary for me to travel from Durban to Pretoria at pre-arranged times to collect data. If at any time I experience a crises and I cannot attend a pre-arranged session, data collection will not stop as the student teachers will still be recording their reflections and completing their professional portfolio. If I am absent from any planned observation sessions, these will be video-taped and all the documents and videos for these sessions will be handed to me and we will discuss what occurred during the session.

- I am aware that my presence during the Life Sciences specialisation and classroom (school) sessions and the use of a video camera to videotape each student teacher

facilitating learning in the classroom could also be a limitation. Student teachers could feel uncomfortable with a video-camera directed/facing them while they are facilitating learning. We will have to workshop this and have trial sessions of videotaping the student teachers. I will also have to use a variety of data collection methods and triangulate the data in an attempt to tackle this limitation. Also, as I will be videoing the student teachers over an extended period, would like to see them more relaxed while they are being videotaped.

- Interviewer bias which can be related to personal characteristics of the interviewer (researcher) such as affiliation, gender, race (Neuman, 1997). This could limit the student teachers' participation. It is thus necessary to be conscious at all times that I am a Coloured woman who is also a specialisation lecturer, researching three white student teachers, one male and two female. I must be aware that we and the data collection will not be prejudiced by any perceptions that we may have of other racial groupings. I will raise popular perceptions that racial groups have of one another that I am aware of and I will ask the student teachers to share their perceptions. These will be discussed in open discussion sessions. I have had experience of doing this with multicultural and multiracial student groups that I work with at my institution. I must also be aware that my biases about effective teaching and learning strategies should not impact negatively on student teachers in such a way that they feel undermined. Interviewer bias could also be linked to the fact that I am the main instrument for the collection and analysis of data. To minimize the effect of this limitation I will use a variety of data collection methods over an extended period of time.

- I need to be aware that the phenomenon of social desirability of participants could be played out in such a way that the 'real' aspects of the experiential reflections and the subsequent reflections in the participatory case study action research may not be the student teacher's experiences. The use of a range of data collection methods and triangulation of the data and the methods will reduce this limitation.

- I need to be aware of the impact/influence of the use of particular data collection instruments to collect and record the data. In many instances the use of the instrument and other instruments will override any limitations that the use of a particular instrument may have.

3.4.9. Ethical issues

This research is part of a larger project that is funded by the National Research Foundation (NRF). Any findings reported in this research are not the opinion and ideas of the NRF but those of the researcher.

Permission for the research was granted by the University of Pretoria, Faculty of Education ethics committee. The following will be prepared and presented for the ethical clearance: defense of the proposal the research proposal and student teacher's consent forms. Permission will not be sought from the Department of Education for this research project but, it was sought for the overall innovation project that this research was a part of.

Participation of the student teachers was voluntary. No coercion was used to convince students to participate in the research. Student teachers willingly and freely read and signed the consent forms. A template of the consent form given to students is present in the appendix (see appendix for a copy of the consent form).

Confidentiality and privacy of the student teachers was ensured. The following measures will be used:

- Pseudonyms or non-direct titles will be used for all individuals mentioned in this thesis.
- Summaries of interviews, specialization discussion session and reflection transcripts rather than full transcripts will be provided in the participatory case study records in an effort to protect the privacy of the individuals.
- At the completion of the research the transcripts will be returned to the bin.

I will be conscious of each student teacher's perception of me as a researcher and as a teacher educator from another faculty of education. If student teachers ask me questions about my experience with teacher education and the extent of my experience, it is crucial that I answer these questions as honestly as possible. These are all ethical issues as my credibility as a researcher and a teacher educator will be crucial for me to give the student teachers respect, participation and open sharing of concerns and challenges that they will experience during the research.

3.5. Conclusion

In this chapter, the selected research design, participatory case study action research offers a new and refined approach to explore and document the construction and use of phronesis for each of the three student teacher participants. Furthermore, the research period which will extend for one year is crucial for providing a space to explore how each student teacher constructed and used phronesis during this time frame.

The Case Study Participatory Action Research Cycle is adapted and re-designed from that of Coghlan and Brannick's (2001) model. My model provides a framework for the sequencing, analyses and presentation of the data. The six steps in the model of experiential reflections, reflecting and interpreting, planning action, taking action, reflecting on action and interpreting, and evaluating action will be essential to provide a holistic and comprehensive account of how each student teacher constructed and used phronesis. The choice of a mixed methods research approach will give depth and richness to the student teachers' case studies within the cycles of the four phases. The range of research methods and data collection instruments that will be used and the amount of data to be collected will be essential for the rigour of the research.

The following four chapters focus on the findings. Chapter four focuses on the first cycle. Chapter five focuses on the second cycle. Chapter six focuses on the third cycle. Chapter seven focuses on the fourth and last cycle.

CHAPTER FOUR

CASE STUDY PARTICIPATORY ACTION RESEARCH CYCLE ONE

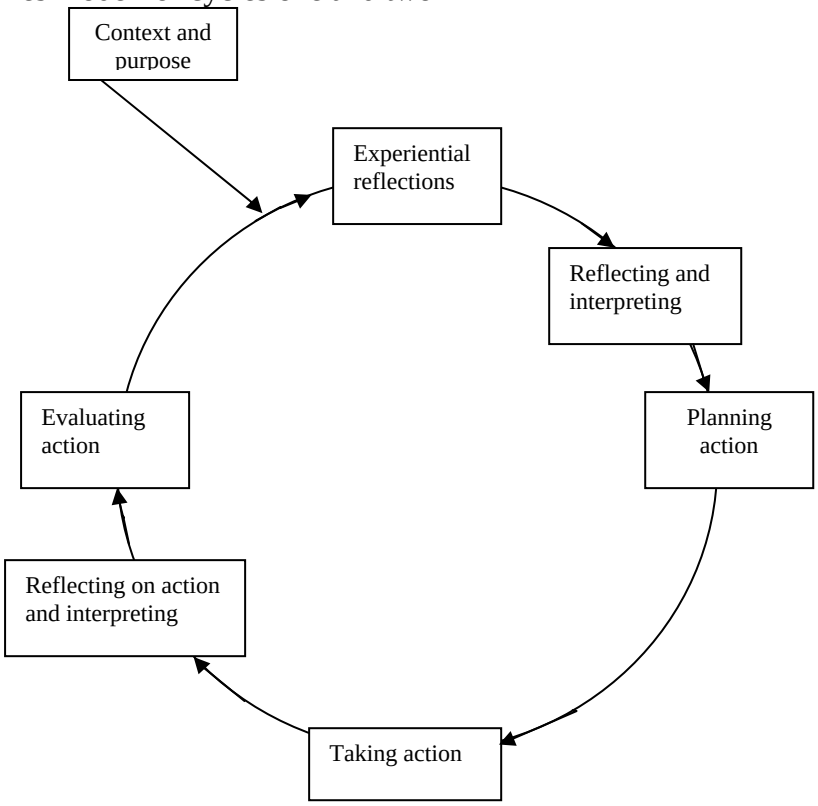
4.1. Introduction

The purpose of this chapter if three fold: first it hopes to present the sequence of this cycle in relation to the other three cycles, observed in Table 8 (see shaded area). Second it presents the case study participatory action research cycle model used as observed in Figure 2. Finally it describes the data analysis process and presents the analysed second level data in the form of themes for each of the steps in the cycle and conclusions are reached.

Table 8: Sequence of cycles

Action research cycle one	Action Research cycle two	Action Research cycle three	Action Research cycle four
Weeks one, two and three	Weeks four, five and six	Weeks seven to seventeen	Weeks eighteen to thirty-nine

Figure 2: James model for cycles one and two



4.2. Context and purpose

4.2.1. Context

This cycle occurred during weeks one, two and three of the professional development programme. The contexts for this cycle were a school, the university and a nature reserve. The participants in this cycle were the student teachers and the specialisation lecturer.

4.2.2. Purpose of cycle one

The Main purpose of cycle one involves two dimensions. Firstly, to establish the student teachers' baseline phronesis and, secondly, to challenge the student teachers' baseline phronesis. The first dimension concerned itself with revealing what is already there with regard to being a Biology teacher. This was accomplished by the specialisation lecturer

challenging student teachers to reveal their baseline phronesis of a Biology (Life Sciences) teacher through answering the central question: What do you see as your role as a Biology (Life Sciences) teacher? Answers to this question were explored for a better understanding of the student teachers' phronesis construction. This occurred during the specialisation discussion sessions at the university.

b) The second dimension concerned itself with four issues: first, the challenges of current education practice in schools. In terms of this issue, student teachers were sent out to observe current education in practice, in different schools for a few days. On their return to the university, they were challenged to reflect on their experiences. Secondly, the student teachers were given opportunities to be confronted by another face of education. This involved putting student teachers into an unfamiliar location (Hammanskraal) outside the university for a week immediately after the observation. In Hammanskraal they were confronted by an unfamiliar challenge as they had to engage in a paradigm shift from teaching to learning through various experiences. Thirdly, during the same week they spent in Hammanskraal, student teachers were challenged to engage in the process of introspection by constructing a personal profile. This involved completing personal profile questionnaires and completing an identity description, answering the question: "Who am I"? The purpose of this exercise was to recognise personal strengths and weaknesses that may have impacted on each student teacher's professional development. Fourthly, the final Hammanskraal week challenge was concerned with student teachers engaging in a first formal construction of phronesis as a result of all their experiences during the entire cycle. This first construction of their own phronesis is ***now called a practice theory*** of, and for, facilitating learning. This practice theory construction should then be utilised to design a learning task.

4.3. Step 1: Experiential reflections

During the first week of the programme the specialisation lecturer interviewed the student teachers to elicit each student teacher's baseline "phronesis" (practice theory) of the role of a teacher. The specialisation lecturer asked each student teacher to respond to the following questions: what he/she saw as his/her role as a Biology/Life Sciences teacher or educator; the general concerns that they will have of their role as a Life Sciences teacher; their emotions about teaching, from their experiences of being taught and/or teaching themselves; their concerns about getting into the classroom to teach; the expectations of the programme for their development of how to be able to be an educator in the Life Sciences; what they think they lacked in order to be able to 'teach' at the school; the single most important thing that they want to achieve in the programme and what their meaning of a best presenter is. The student teachers' responses represented the descriptive data. A detailed report of the descriptive data collection process, the data analysis process and the descriptive data are presented in appendix 1, section II – cycle one in the DVD. The analysis process of the descriptive data and the emergent themes are presented in 4.3.1. and 4.3.2. respectively.

4.3.1. Data analysis process

The descriptive data was further analysed by developing themes from the data. These themes were developed from reading the descriptive data and establishing the relationships that were present in the categories. For example, categories that focused on the approach to teaching Biology were placed into the theme approaches to teaching and categories indicating concerns/constraints that the student teachers believed would impact on their teaching were placed in the theme of concerns and constraints. The themes constructed from

the categories are presented in 4.2 below. These themes represented the student teachers' baseline phronesis.

4.3.2. Themes

4.3.2.1. Developing appreciation in learners and student teachers' feelings

Bernice, Carol and Mack believed that appreciation is what all learners should have and that the development of appreciation in learners was dependent on the learning experience that they are exposed to. These study participants further all believed that appreciation has to be developed in the learners, for it is not something that learners just possess. Mack saw that it was his role as the teacher to do this, which is indicated by his comment: "we need to bring that love and appreciation of nature to the children" and Bernice and Carol described their teacher role in terms of what they expected of learners for them to develop this appreciation. Bernice believed that learners had to "see, it and feel it", implying the importance of a concrete experience for learning. Carol took it further and stated that learners can only appreciate something if "they love and know about and understand and believe it". For her our own experience is important" It can be seen that the student teachers' perceptions were similar with regard to the importance of developing appreciation in learners. What was significant is that none of the student teachers focused specifically on the importance of content knowledge for learners to learn. Mack was the only one who alluded to content knowledge when he stated that the learners had "a lot of learning words" when they learnt Biology.

Bernice and Mack expressed strong emotions for the subject. Bernice stated that she had experienced "passion for the subject". Mack expressed that he "always had a passion for nature" and it was this passion that he wanted to develop in learners. Carol also expressed

strong emotions in that in her words it, her passion "borrel (bubbles) in me". Her emotions though were concerned with supporting the learners in learning the subject.

4.3.2.2. Approach to teaching Biology is that the theory and practical is worked on together

Bernice, Carol and Mack believed that the best situation (approach) when teaching Life Sciences (Biology) is in Bernice's words "if you work with theory and practice together." Carol though thought that learning Biology "if it is just theory or just practical you will not help anyone" And as Mack stated that a teacher could bore learners "with practicals". This could be linked to teachers expecting learners to conduct practicals for the sake of keeping the learners busy and where relevant, appropriate knowledge and skills are not constructed and developed. Mack believed that when Biology practicals are linked to learners' thought processes, learners could develop appreciation for the subject. This raises the importance of teachers using practicals to challenge learners to construct knowledge and develop skills and not just to follow a recipe (practical instructions) where they verify statements and processes previously given or discussed in class. This thinking is in line with constructivist principles of learning (Von Glaserfeld, 1984) and in line with a professional level of thinking. The study participants were also aware of the importance of social group learning in that Bernice believed that "children can observe the colour changes with their chommie[1]". For Carol, Bernice and Mack this appreciation could come if the learners have concrete experiences where there is no transmission of knowledge (Smith & Blake, 2005) and they have direct experiences (Slabbert, 2007).

[1] Chommie is an Afrikaans colloquial word that means friend.

4.3.2.3. Concerns about teaching – teacher constraints and student teachers' concerns and actions

The student teachers were aware that the Life Sciences (Biology) teachers in the schools experienced constraints when teaching Biology. The student teachers though did not accept that they would experience constraints in that they shared the actions that they could carry out in their role as a teacher. Since Bernice recognised that teachers experienced a lack of time and resources when teaching Life Sciences, she saw her role as making "time for the children to have a bit of a practical experience". Carol only recognised teacher time as a constraint and she suggested that she would "make time to do them (practicals)." Even though Mack recognised the teacher constraint as a curriculum one in that they (the teachers) did not have an "option as to what theoretical work they can teach" (they had to teach what was in the syllabus), he did suggest that teachers could include practical work when teaching the theory. While he recognised the constraint as a curriculum one he also assessed the teacher's understanding of the nature of Biology. These student teachers were positive and pro-active in terms of what they as teachers could do to enhance the teaching and learning context for learners. They did not show any apathy or frustrations towards the constraints that teachers' experienced.

Even though all the student teachers expressed concern about their role in the classroom, they differed with regard to the focus of their concern. Bernice, for example, was concerned with the learners. She stated "how will I get them (learners) interested and what will happen if I do not get anything out of them"? Carol, on the otherhand, was concerned with the type of teacher –learner relationship. Contrary to the first two participants, Mack was concerned with himself as a teacher. He stated "I may not be able to really portray my passion adequately to the learners."

4.3.2.4. Student teachers' expectations of the module

While Bernice and Carol's expectations were focused on their actions in relation to the learners, Mack's were focused on his own development. As Bernice wanted to learn how she could get "a reaction out of the children", Carol and Mack expressed their expectations in terms of their desire. For Carol, this desire was in terms of how to teach the children and how to be "the best teacher". For Mack how to teach Life Sciences differently, by moving away from the traditional way where the "traditional teacher only transmitted knowledge to learners". Clearly Mack wanted to be the "best teacher" for his learners and expected to develop "more than just the facts" as he could find out the facts himself. Student teachers, furthermore, expressed uncertainty about what they expected from the module. They were uncertain, for example, about whether they were going to, in Bernice's words: "learn more about the subject or will we learn about how to teach the subject?" Mack on the other hand, was certain that he expected to develop "more than just the facts" as he could find out the facts himself.

4.3.2.5. Student teachers' vision of a Life Sciences teacher

The three student teachers had a vision of the best Life Sciences teacher that they wanted to be. Bernice did not want to "be boring as a boring teacher cannot get the learners to learn". Carol wanted to be the "best teacher", but did not want to be the teacher that others expected her to be. She wanted to do and decide on what she needed to do for her self. Carol's thinking is further clarified when she points out that: "you have to develop your own style and method" and be "prepared to try new things and use new things" to develop into the best teacher. Mack expressed his vision to be a passionate teacher that makes the work fun and always great, not this boring thing" and an individual who finds "out what works for him."

Bernice, Carol and Mack's vision of the type of teacher they wanted to become was influenced by their personal experiences of being taught during their schooling years and their experiences of teaching in various contexts such as youth club and Saturday school. Mack's perception was also influenced/informed by his school peers' experiences of being taught Biology. His teacher, for example, used traditional methods to teach Biology and his peers hated the subject.

4.4. Step 2: Reflecting and interpreting

During this step the specialisation lecturer prompted the student teachers to reflect by asking them questions about what they had shared in the experiential reflections step. The rationale for the data analysis was informed by the view that specialisation lecturers can help student teachers in their professional development if they try to understand the "way these students view teaching and learning, and how they have come to construct these views" (Korthagen (2001, p. 71). It is for this reason that I identified and used factors that could give depth and meaning into how each student teacher constructed phronesis (Coghlan & Brannick, 2001). A detailed report of the data collection process, the data analysis process for the descriptive data and the descriptive data are presented in the appendix 1, section II – cycle one.

4.4.1. Data analysis process

The descriptive data was further analysed. The factors identified were induced from the data and the theoretical framework was used to inform these.

4.4.2. Factors:

4.4.2.1. The multi-dimensional role of the specialisation lecturer

The specialisation lecturer played multiple roles during these sessions so that he could elicit the student teachers' baseline phronesis in order for them to become aware of, and to realise what, their perceptions and beliefs about teaching and learning were. The specialist lecturer was fully aware that the beliefs that teachers held strongly influence their perceptions and judgments (Pajares, 1992; Feiman-Nemser & Remillard, 1996; Leavy, Mc Sorley & Bote, 2007). It is for these reasons that he asked the questions that he did in a group setting. This action by the specialisation lecturer was vital, for the student teachers' learning will be minimal if meanings are not realised (Van Huizen, van Oers & Wubbels, 2005). It is in reflecting on experiences that the construction of new knowledge could shape and accelerate change in self and interested others (Zeichner & Liston, 1996).

The specialisation lecturer, furthermore, was aware that each student teacher's construction of phronesis would be strongly influenced by his/her existing perspectives and understanding of teaching and learning. This thinking is reflected upon in the literature by Hollingsworth (1989); Holt- Reynolds (1992); Richardson (1996) and Leavy, Mc Sorley and Bote, (2007).

The multiple roles are evidenced by him stimulating the student teachers to participate in the discussion group interview by using a *questioning strategy. This involved encouraging* the student teachers to dig deep and to explore their feelings by asking: "you say you have passion. How do you know that you have passion?" He also *inspired* them to use their past experiences to try and respond to their own questions He, in other words, *motivated and encouraged* all the student teachers to participate in the discussion.

4.4.2.2. Student teachers' participation

Since each student teacher's perceptions and beliefs had to be elicited and discussed it was imperative that each student teacher had to respond to each question. It was therefore important that the structure of the discussion interview was such that each student teacher was given the opportunity to share their views in a relaxed and open manner. This relaxed atmosphere was created by the specialisation lecturer as the student teachers joked and laughed with one another and the specialisation lecturer. This relaxed atmosphere was important for the student teachers to feel comfortable to participate and share in the discussion.

4.4.2.3. Role of a teacher now referred to as a facilitator of learning

The student teachers had images of the type of teacher they wanted to be. According to the Vygotskian perspective, the action of exploring a student teacher's image of teaching is important for the "development of a professional identity" (Van Huizen *et a*l, 2005, p. 275). This image of teaching that the student teachers have should be made both "publicly and personally meaningful" (*ibid*) for the student teacher through "guided participation" (*ibid*, p. 275). Van Huizen *et al* (2005, p. 275) are of the opinion that it is these images that underlie and direct the "acquisition and further development of professional knowledge and skills."

Bernice, Carol and Mack had assigned personal and public meanings to their personal image as teachers. Bernice saw, for example saw her role as being "passionate and interesting" and "unique and interesting". Carol, furthermore, saw her role in an affective (passion bubbling in her), individual personal manner and she wanted to be herself. Interestingly, Mack was aware of his strengths and weaknesses, but doubted himself and his ability to portray adequately his passion.

Even though Bernice wanted to use teaching and learning strategies that exposed learners to concrete experiences, but what is surprising is that she saw herself as a transmitter of knowledge. There clearly is a disjuncture between Bernice's beliefs about her professional identity with regard to her role as teacher and the role of learners. Carol's professional aspects focused on her development into the best teacher who could provide learners with opportunities to use their personal experiences. She thought these were important for learning. Even though she was aware that learners must experience concrete things, she still viewed learners as dependent on the teacher. A significant professional aspect is that Carol was open to change as she wanted to try new things out for herself. Mack saw himself in terms of performance attributes - teaching and learning strategies and the goals for teaching learners. He was aware that: the teacher had to set the scene for learner encounters of the importance of context (scene) and that learners all had their own ways of responding to different things.

4.5. Step 3: Planning Action

This step is concerned with actions planned by the participants. Since this is the first cycle at the beginning of the year Professor Ned (specialisation lecturer) planned the intervention (action) activities. The purpose of this intervention was to challenge the student teachers to change their existing preconceptions of teaching and learning. This intervention comprised two types: intervention one and intervention two. Intervention one was during week two of the programme with a focus on each student teacher observing two local Life Sciences teachers teaching in their respective schools. Intervention two was during week three of the programme with a focus on each student teacher participating in a five day workshop whose

theme was 'What is an educator really?' This workshop was conducted at a remote destination from the university campus at a Nature Reserve called Hammanskraal.

4.6. Step 4: Taking Action

This step focused on the actions that the student teachers were engaged in. The student teachers observed two local Life Sciences teachers teaching in their respective schools and they participated in the five day workshop. During this workshop each student teacher was expected to become aware of their personal identity as understanding this makes one more effective (De Kock & Slabbert, 2000). At the workshop they participated in a session called 'Who am I', where they completed Personal Profile Questionnaires: Neethling Personal Skills Instrument, Temperament Inventory and a Self Image Evaluation. Each student teacher was also expected to individually design a learning task and construct a concept map of his/her understanding of facilitating learning (practice theory). This was done to elicit each student teacher's baseline "phronesis". The data collected were the student teacher's reflections, questionnaire results, concept maps and designed learning tasks. The descriptive data, which represented the cases for each of the student teachers is presented in the appendix 1, section II – cycle one in the DVD. The analysis process of the descriptive data and the emergent themes are presented in 4.6.1. and 4.6.2. respectively.

4.6.1. Data Analysis process

Themes were induced from the relationships between the categories used for the descriptive data. The categories present in the descriptive data were education practice in schools (observation of teachers teaching at a local school), paradigm shift (teaching to facilitating

learning) which involved a workshop on what is an educator really? personal-professional relationship (personal profile questionnaires and an identity description - Who am I?) and construction of phronesis - practice theory (learning task design and a concept map on the student teacher's practice theory of facilitating learning).

4.6.2. Themes

4.6.2.1. Student teachers were aware of teacher constraints but were motivated to teach

Bernice rated her experience as a "good experience". She described her observation in terms of her previous personal experiences and her personal aspirations of being a teacher. She stated that this experience "made her more determined to teach." Carol, on the otherhand, described her observation in terms of the constraints that teachers had in that they "did not have time to teach." Mack described his observation in terms of his personal aspirations. The experience got him "to really feel motivated to go out and teach."

4.6.2.2. Paradigm shift – teaching to facilitating learning

Bernice stated that as a result of the paradigm shift experience, she was "now doubled as positive as I was when I first joined the programme to teach." This experience, it seems to me, was a re-assurance for her about becoming a teacher. Carol did not know what to expect from the Hammanskraal experience and thought that it would be useless for her as she already "knew what a teacher was and what I wanted to achieve with my learners." She expressed her irritation: "so how can they tell me what a teacher should be?" She, however, expressed surprise about the experience when she said that "it took one day to show me that maybe I didn't have everything figured out and that my idea of education was challenged." Carol's beliefs about her role as a teacher before Hammanskraal were to convey and explain information to her learners, but after the experience she stated that "the role of an educator

was conveyed in a totally new and different way to me." Her ideas of what education was and the kind of teacher she wanted to be "were shattered." She expressed her feeling by stating that she "felt lost and confused and yes, I was very skeptical!" She felt skeptical about the new paradigm of facilitating learning. Mack, on the otherhand, stated that his experience at Hammanskraal "was a challenging one" in that he was confronted by many different things, including the knowledge that learners "differ according to their intelligences and they must be treated differently."

4.6.2.3. Personal – Professional Relationship

This exploration of relationship is evident from the profile questionnaire data analysed for the three student teachers. Both Bernice and Mack function as right-brained persons who, according to the Neethling Brain Instrument, searches for alternatives, prefer the big picture and not the detail, are comfortable with chaos, fantasy, surprise and association, are restless and become bored quickly. This result is borne out by how she describes herself as a "spontaneous and confident person" who is "adventurous and love challenges". Mack describes himself as a "holist by nature and it is important for me to see the bigger picture rather than the isolated facts. I like to know how things are connected rather than the exact detail". He also described himself as a person who does not pay attention to things that do not seem to work in practice. Bernice and Mack's teaching preferences were determined as R1 trainers/teachers who usually give a holistic view of the lesson and prefer to link it (lesson) to other subjects, point out how it applies to the real world, encourage spontaneous participation and create opportunities to experiment. This links to Mack's description of himself as "pretty good at leading people through a task. However where I do have problems is in the planning of tasks." Bernice's score for the Temperament Test indicates that she is a Popular Sanguine (extrovert) person who is outgoing and people-oriented and

this is partly supported by her description of herself as “always friendly, positive and cheerful” and “lively and always busy. Bernice viewed herself as a person who is “impossible to really know me as I am an introvert”. Mack’s score for the Temperament Inventory indicates that he is a Popular Sanguine (extrovert) person who is outgoing and people-oriented, but sees himself as “an intro-extrovert … enjoy(s) being sociable”. Bernice’s score for the Self-Image test (50) indicates that she has an average self image. These scores support the identity description that she gives of herself as a “bit of a ‘nervous Nelly’ and frighten easily” and “I am sometimes stubborn and I am strong-willed”. Mack’s score for the Self Image test of 59 indicates that he has a dissatisfied self image. A possible reason for this is that he has “a fairly good self image of myself and sometimes I feel that I am seriously lacking in self confidence and tend to doubt myself a lot.” He also sometimes felt that he relies “too much on the approval of others and too little on my own approval.”

Carol functions as a left-brained person who, for example, seeks accuracy, works for precision, critical correctness – not to make mistakes, organization and promptness. This is borne out by how she describes herself: “I like to plan and organize to make sure everything happens according to schedule. I am responsible, strong willed.” Carol’s teaching preferences were determined as an L1 and L2 trainer/teacher. This teacher usually plans formal lessons, uses textbooks or other teaching materials, and has the following characteristics: the lesson content is usually well-planned and presented in a sequential order. Thoroughness is very important and untidy and incomplete work is not tolerated. This can be an authoritative trainer who likes to be in control of the situation at all times. This, furthermore, can be explained by how Carol describes herself: “I will make up my own mind about what must happen or what must be done and then do it.” This trainer could resist new teaching methods in that, in Carol’s words, she does not “like changes in my

life." This trainer could tend to be inflexible with regard to change within the system. In the case of Carol, for example, she "can be critical and negative, especially in frustrating situations" which could be the changes that she is expected to undergo in the programme. Carol's score for the Temperament Inventory indicates that she is a Perfectionistic Melancholy (introvert) who is withholding and task-oriented. These are supported by the extracts from her story about herself: "I will not shy away from my responsibilities and will stand up for my beliefs and values," and "I am very shy and an introvert" and "I won't easily show my true feelings to people". But she can be "easily disappointed if my expectations are not met". Carol's score for the Self Image test of 71 indicates that she has no self image and does not have fixed ideas about her image in terms of who she really is. She expressed uncertainty with regard to what she expects of herself and other people in that she "sometimes expect too much of people and of myself" and she saw herself as "not very creative (my spring is definitely hidden deeply away)".

4.6.2.4. Feelings, developing meaning, Construction of phronesis (practice theory)

In exploring her construction of her practice theory Bernice stated that she designed a learning task that she "felt proud of [and it] … did not seem very difficult". She included learning task features, but for some features like outcomes and assessment criteria, she inserted her own content. She included learner organization - children working in two large groups and then in groups of 4. She was aware though that her "perception of a good learning task was obviously a bit skewed", but she used it to illustrate her development. Bernice understood facilitating learning to be "the facilitator giving the learners tasks to do and expecting learners to complete the tasks on their own. The facilitator does not provide any answers."

Even though Carol thought that this was a “huge challenge” and felt a “bit lost and confused at the time”, she did design a learning task. Her learning task included features like competencies acquired, relationship, meta-cognition, co-operative learning, feedback learning outcomes and assessment standards. She viewed this experience of designing a learning task as “a momentous moment in my development as a facilitator of learning.” Carol understood facilitating learning as “preparing the child for knowledge”. Carol’s concept map focused extensively on the characteristics of a facilitator of learning. She was aware of the link between assessment and outcomes, and that learners need to be challenged but that they require time to achieve the appropriate outcomes. The concept map was represented in a flow chart where one term was linked in a linear manner to another and only three linking terms were used. Mack’s learning task design had the essential features of: outcomes, assessment and a meta-learning, including group work for learners. Mack had a basic understanding of facilitating learning. He used four basic concepts and did not illustrate many relationships amongst the concepts. Mack thought that facilitating learning was an action (path) that had a particular sequence that had to be followed.

4.7. Step 5: Reflections on taking action and interpreting

This data was collected from the student teacher’s reflective journals and the specialisation discussions sessions. Each student teacher’s reflections of the school observation and the workshop at Hammanskraal were elicited according to Mezirow’s (1991) categories of reflection. These are concerned with each student teacher sharing his/her feelings and understandings about his/her role as a facilitator of learning; to develop an understanding of his/her reflections and critique the underlying assumptions and perspectives that each

shared and believed in and presented as cases. This served as the descriptive data. A detailed report of the data collection process, the data analysis process for the descriptive data and the descriptive data are presented in appendix 1, section II – cycle one in the DVD. The analysis process of the descriptive data and the emergent themes are presented in 4.7.1. and 4.7.2. respectively.

4.7.1. Data analysis process

The descriptive data was read and the emergent themes were induced from the data. These themes are presented and discussed below over the next few pages.

4.7.2. Themes

4.7.2.1. Role of a teacher now referred to as a facilitator of learning

The student teachers' reflections indicated a meaning of a facilitator of learning that had personal and professional perspectives (Van Huizen *et al*, 2005). The student teachers' personal perspectives can be seen in the following student teachers' reflections. Bernice's reflections indicated the thoughts and feelings that she had about teaching when she stated that "standing there and hearing the teacher say this class is impossible" made her more determined to "start teaching, to prove them wrong." She was so motivated by this observation of the teacher teaching that the "feeling of I can do it, I sommer[2] want to start so that I can see if I can do it" were intense. Since Carol had explored her personal profile she was aware of the importance of "knowing your strong and weak points and making a concerted effort to improve them can only lead to development and growth personally and professionally." Mack also expressed a similar thought in that he had "started thinking more about myself" and he thought that this was a "very important thing that you have to really

[2] Sommer is an Afrikaans word that means just.

know more about yourself first" to be a facilitator of learning. He became aware that "to be a facilitator I need to be different." What was very important is that Mack was fully aware that he had to change "his self-confidence", "to believe in himself and believe that he had the potential to make a difference in this world and in the students' lives." He was aware of the actions that he needed to take to make the changes for example "he needed to read what other people had to say about effective communication" and "it was only through practice that this could improve and therefore he would have to force himself to communicate effectively."

The professional perspectives of the student teachers can be seen in the reflections. Carol's understanding that a teacher was "someone who explains, transfers and promotes the potential of a learner" was changed to learners "construct their own meaning and it is his/her responsibility and that they must reach their maximum potential with the help of a teacher". Mack reflected on what was expected of him as a teacher when he wrote, "I now realise that the challenge of my future profession does not lie in the content matter but rather in the individual student. He also came to realise that "education is not about the transfer of knowledge from the teacher to the student" but it is the "construction of meaningful knowledge by the student for the student". This belief about knowledge construction is supported in the literature by Von Glaserfeld (1984). Mack realised that a "teacher is therefore only a facilitator in the process and not the source of the process or the information." This view supports what is found in the literature by Kessles and Korthagen (2001).

4.7.2.2. Designing learning tasks and constructing concept maps revealed understanding

Each of the student teachers assigned a professional meaning to their performance (Van Huizen *et al*, 2005). Bernice reflected on the structure of her learning task and she described it as being "organised as one long story and this gives the impression of a rough draft, rather than a professional learning task." She became aware that her perception of a learning task was "slightly skewed" when she checked her learning task against the required format, which was in the module information pack. Bernice's understanding of a learning task included the basic features and she filled in her own outcomes and assessment standards. She did not refer to the policy documents to complete the section on outcomes and assessment standards though. Due to the experience of developing a learning task, Carol's personal meaning was that "it is hard to imagine that there really was a time that I didn't know what a LTD (Learning Task Design), LTP (Learning Task Presentation), LTE (Learning Task Execution) and LTF (Learning Task Feedback) were." Other evidence of her challenges to learning was when she had to design a concept map, something that was "a foreign concept" and it "was difficult to put your views on paper about education in this new manner." She became aware that her concept map indicated that "I did not understand the new concept introduced to us. I couldn't figure out where the concept was supposed to fit in."

4.7.2.3. Strategies used to assign meaning, learn from emotional experience and to develop a professional identity

a. Personal profiles questionnaires

Bernice reflected on the questionnaires where she said that the Temperament test did not describe her in that she saw herself as "an introvert", even though she was friendly. Carol thought that the "test confirmed the type of person that she is."

b. A paragraph – who am I

Carol's reflections focused on the question of why she had to write about herself. Carol expressed that she "could not understand why I should write about myself and what does this have to do with teaching", but she "got to know myself better. I never thought about what I want to achieve as a teacher other than teaching."

c. Reflections

Carol thought that the reflections that she had to write at the end of a day/session "meant something to her development as a facilitator." Even though these reflections were descriptive written, she expressed the feelings that she had the knowledge that she had gained and also what she still needed to learn and think further about.

d. Observing a teacher teaching

Each of the student teachers shared their experiences of observing their mentor teacher teaching and the effect of this experience on their construction of phronesis. This experience served to motivate Bernice to teach and it clarified for Mack what he needed to change to be a facilitator of learning.

4.8. Step 6: Evaluating Action

This step focused on evaluating the action (intervention) of this cycle and on what feeds into the next cycle. In evaluating the action I read each student teacher's baseline phronesis (practice theory) of the role of a teacher as written in step 1. I then compared these responses to those that the student teachers presented in step 4 and 5. These reflections included the learning task design, the role of the facilitator of learning and learners. I then analysed and assessed the intervention on the basis of each student teacher's reflections about their constructed phronesis of facilitating learning. A detailed report of the data collection, descriptive data analysis process and the descriptive data are presented in the appendix 1, section II – cycle one. The analysis process of the descriptive data and the emergent themes are presented in 4.8.1. and 4.8.2. respectively.

4.8.1. Data Analysis

The emergent themes were induced from the data. These themes are presented below.

4.8.2. Themes

4.8.2.1. Development of personal and professional identity

While Bernice's initial personal attributes focused on her feelings of the type of teacher she wanted to be, after the intervention it still focused on feelings but with regard to her wanting to start (facilitating learning) so that "I can see if I can do it". Carol's initial personal attributes focused on feelings of herself (passion bubbling in her) and after the intervention they focused on her developing herself as "knowing your strong and weak points and making a concerted effort to improve them" was important to her. Mack's attributes initially focused on his competence to teach and then they moved to him "thinking more about

myself" as he realised that it was a "very important thing that you have to really know more about yourself first" to be a facilitator of learning. He did become aware of the need to change especially with regard to his "self-confidence" and to "to believe in himself. What was significant is that he was also aware of the actions that he needed to take to make the necessary changes.

With regard to the professional identity Bernice, viewed herself as a transmitter of knowledge, even though she was aware that learners should construct their own knowledge. Before the intervention Carol's understanding was that a teacher was "someone who explains, transfers and promotes the potential of a learner" and after the intervention it was changed to learners "construct their own meaning and it is his/her responsibility and that they must reach their maximum potential with the help of a teacher". Mack initially saw himself in terms of professional aspects of teaching and learning strategies and the goals for teaching learners. After the intervention he realised that "the challenge of my future profession does not lie in the content matter but rather in the individual student." He also came to realise that "education is not about the transfer of knowledge from the teacher to the student" but it is the "construction of meaningful knowledge by the student for the student"

4.8.2.2. Assigning a professional and personal meaning to teaching performance

In assigning a professional meaning, Bernice used her learning task as the indicator for her development of her practice theory. It was only when she reflected on the structure of her learning task that she realised that her perception of a learning task was "slightly skewed". In Carol's case, even though her understanding of a learning task was developing, she did not understand the concept of practice theory. She became aware of this when constructing

her concept map and she stated that “I did not understand the new concept introduced to us. I couldn’t figure out where the concept was supposed to fit in.” Mack had experienced difficulties with designing a learning task and his beliefs about facilitating learning. These difficulties were linked to the challenge that he set for himself to “improve and diversify the learning tasks for the students in order that they may construct meaningful knowledge.

In assigning a personal meaning to teaching performance, Carol’s reflections focused on the intense feelings and thinking that she experienced as her ideas about education and teachers were shattered and she felt lost, confused and skeptical. She thought that she would have to do it herself in order for her to believe that it works.

4.8.2.3. Strategies used to assign meaning and to develop a professional identity

On reflecting on the use of the Personal profile questionnaire, Bernice thought that the Temperament test did not describe her accurately as it rated her as an extrovert when she saw herself as “an introvert” even though she was friendly. Carol, on the contrary, thought that the “test confirmed the type of person that she is.”

When Carol reflected on the activity where she was expected to write about, ‘Who I am’ she expressed that she “could not understand why I should write about myself and what does this have to do with teaching” but she “got to know myself better. I never thought about what I want to achieve as a teacher other than teaching.”

Carol thought that the reflections that she had to write at the end of a day/session “meant something to her development as a facilitator.” Even though these reflections were

descriptively written, she expressed the feelings that she had, the knowledge that she had gained and also what she still needed to learn and think further about.

4.8.2.4. Role of the specialisation discussions sessions and the participation of student teachers

The spaces that the student teachers were given and the activities that the student teachers were expected to complete during the specialisation discussion sessions are important for their personal and professional development.

4.9. Conclusion

Analysis of the student teachers' baseline phronesis and their constructed phronesis produced a number of themes about the construction of phronesis. These themes describe the dimensions of how the student teachers constructed phronesis and the strategies that were used to support the student teachers in this construction. Evidence was presented to support the themes developed about how student teachers constructed phronesis. The personal and professional development of student teachers is important for their construction of phronesis.

The evidence for how the student teachers constructed phronesis is described in this chapter. In the next chapter the analysis of how the student teachers constructed and used phronesis in cycle two will be presented.

CHAPTER FIVE

CASE STUDY PARTICIPATORY ACTION RESEARCH CYCLE TWO

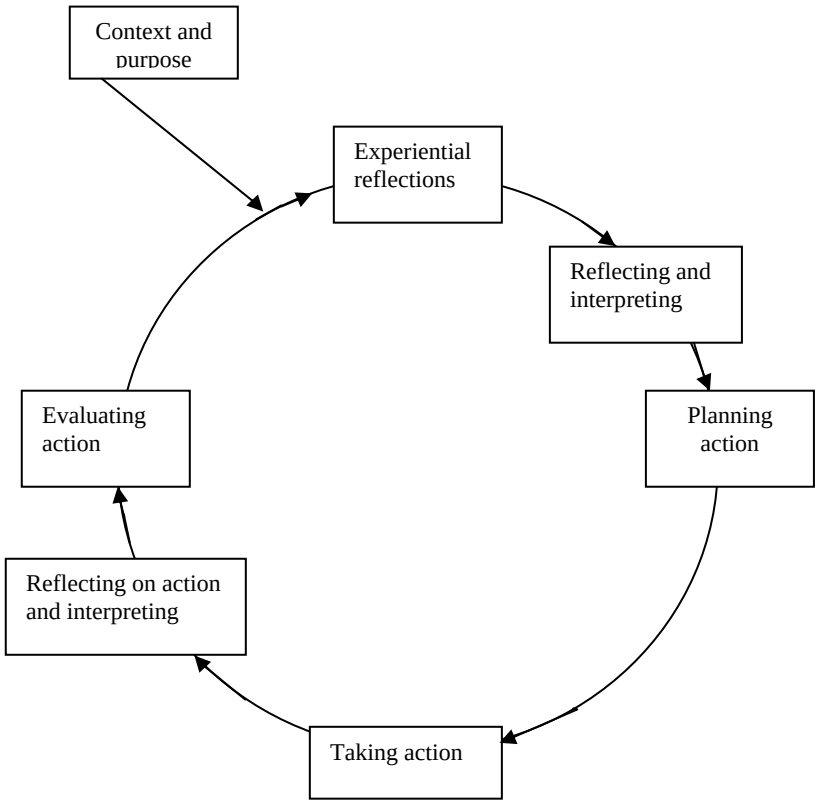
5.1. Introduction

The purpose of this chapter if three fold: first it hopes to present the sequence of this cycle in relation to the other three cycles, observed in Table 8 (see shaded area). Second it presents the case study participatory action research cycle model used, as observed in Figure 2. Finally it describes the data analysis process and presents the analysed second level data in the form of themes for each of the steps in the cycle and conclusions are reached.

Table 8: Sequence of cycles

Action research cycle one	Action Research cycle two	Action Research cycle three	Action Research cycle four
Weeks one, two and three	Weeks four, five and six	Weeks seven to seventeen	Weeks eighteen to thirty-nine

Figure 2: James model for cycles one and two



5.2. Context and purpose

5.2.1. Context

Cycle two occurred during the fourth, fifth and sixth week of the programme. The context for this cycle was the university. The participants in this cycle were the student teachers, the specialisation lecturer and the researcher.

5.2.2. The main purpose of cycle two

The main purpose of cycle two is divided into two dimensions. Firstly, it was designed to establish and challenge the students teacher's phronesis - now renamed a practice theory, and secondly to challenge the student teacher's practice theory against the professional dimensions of facilitating learning in the Life Sciences. In terms of the first dimension, the purpose had to do with ascertaining each student teacher's commitment to facilitating

learning in the Life Sciences as a worthwhile pursuit. To achieve this, the teacher educator had to ask student teachers to answer the question: Why do you want to facilitate learning in the Life Sciences? The other aspect under the first dimension had to do with the researcher challenging each student teacher's already constructed practice theory through a question already posed in the first cycle. The response required in this cycle is a visual presentation as an answer to the question: What is your perception of your role as facilitator of learning at this point in time? Answers to this question are also to be explored for a better understanding of the student teachers practice theory construction.

To achieve the purpose of the second dimension, the researcher had the challenge to ascertain the validity and viability of student teachers' practice theory regarding the nature and structure of the Life Sciences. To achieve this, the teacher educator had to ask several questions after the students had studied three documents: The Study Guide of Facilitating Learning in the Natural Sciences and Technology, Biology Education - A Reader, and The National Curriculum Statement for The Life Sciences Grades 10-12. Answers to these questions were explored for better understanding of the student teachers' practice theory construction.

5.3. Step 1: Experiential reflections

During a semi-structured interview each student teacher was asked to share their reasons why they decided to become Life Sciences student teachers and to draw how each saw himself/herself as a Life Sciences facilitator of learning. Each student teacher was then interviewed and asked to interpret the drawing. This was done as the beliefs that the student teachers have about their role as facilitators of learning will influence their

perceptions and judgments, which in turn, will affect their behaviour in the classroom (Peterson, *et al*, 1989; Pajares, 1992). A detailed report of the descriptive data collection process, the data analysis process and the descriptive data are presented in the appendix 1 section II – cycle two in the DVD. The analysis process of the descriptive data and the emergent themes are presented in 5.3.1. and 5.3.2. respectively.

5.3.1. Data analysis process

This descriptive data consisted of a short story where the student teachers shared their reasons for wanting to become Life Sciences student teachers, drawings of how each saw his/her role as a facilitator of learning. These stories were read and then relationships between the categories were made and themes developed from this. The drawings and the stories were used to reveal the student teachers' perceptions of teaching and learning. Leavy, Mc Sorley & Bote's (2007) data analysis tool was used to classify the student teachers' into particular categories of teaching and learning based on their perceptions and beliefs about teaching and learning.

5.3.2. Themes

5.3.2.1. Reasons (decision) for becoming a Life Sciences student teacher

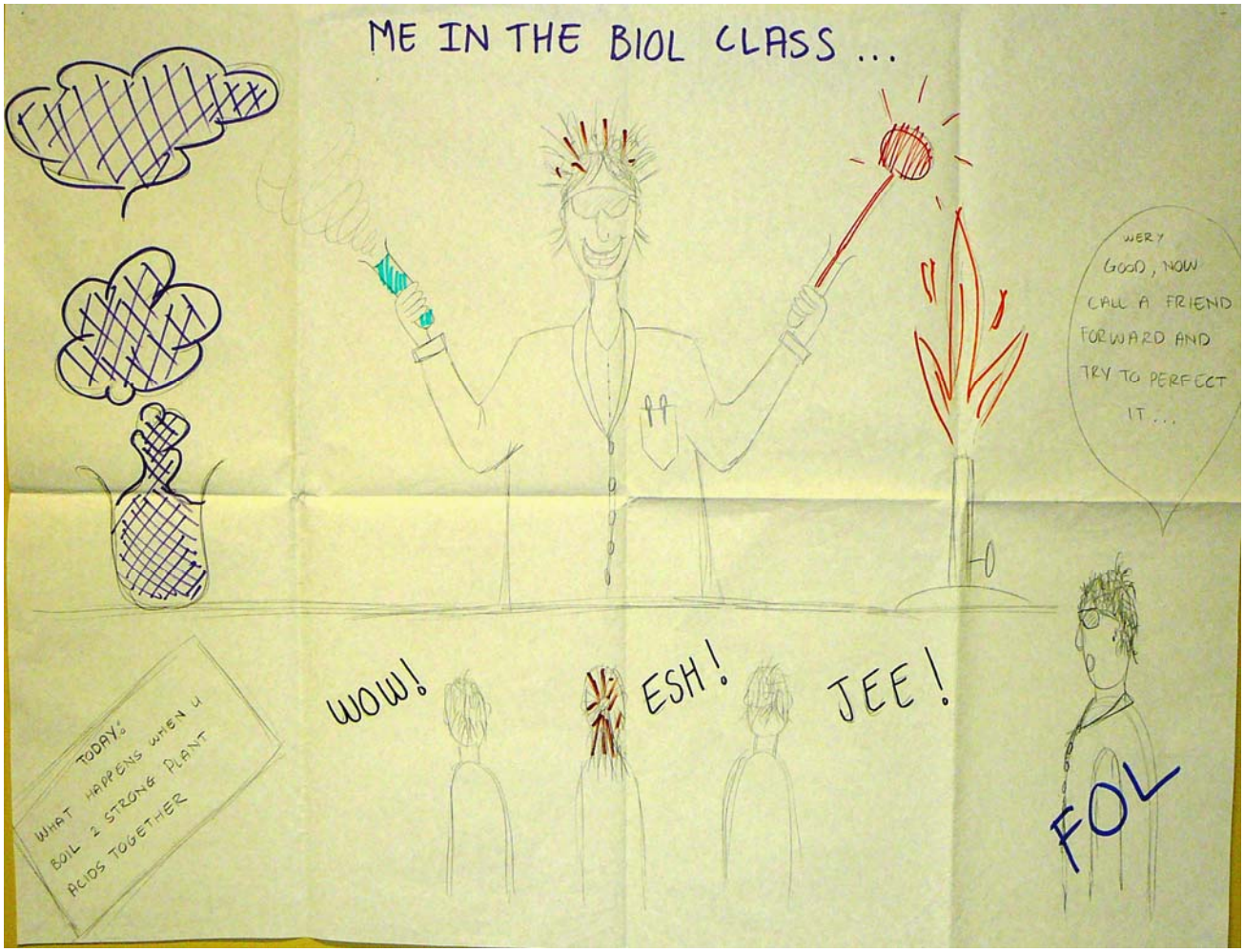
Bernice's decision for becoming a Life Sciences student teacher was influenced by different factors. First, she came from a family of teachers: her "grandfather was a professor of Mathematics and my mom went into the Mathematics world." Bernice's experience of being taught by an amazing Physiology lecturer had a major impact on her decision to choose to be a teacher in that the kind of work she "explained to us made me excited to go into teaching." Bernice realised from teaching horse riding to small children that "the small kids are fun" to teach. She then decided that "the idea of working with children in the way that you can express your subject but you can also make a difference in

childrens' lives". Hence, the area for her to go into "was teaching for me." Carol's thinking about teaching, on the contrary, was influenced by a childhood wish of wanting to work with people. She stated that "as a little girl teaching was there … I always thought I would not mind becoming a teacher and I thought that I would enjoy it". This thinking was formalised as a decision when she taught at Saturday school where she "started to think I can do this for life and this is where my passion started for teaching." She stated that "the Saturday school was the 'spuit op die kop' (the nail on the head) – that was it for me." This experience revealed to her that she "was a patient person" that could teach. Mack's decision to teach was influenced by his interest in teaching and his passion for nature. Mack's decision to teach started off at "church where I have led youth groups for a long time" and also that he had "always been interested in teaching people things." Mack also stated that he had grown up on a farm and has "always enjoyed nature – have a great passion to conserve it". Mack concluded that "children hold nature's future in their hands … I can help them to see the beauty of nature." He stated therefore that the "only way to teach my students about the enjoyment of nature was through Biology/Life Sciences."

5.3.2.2. Student teachers' views of themselves as facilitators of learning

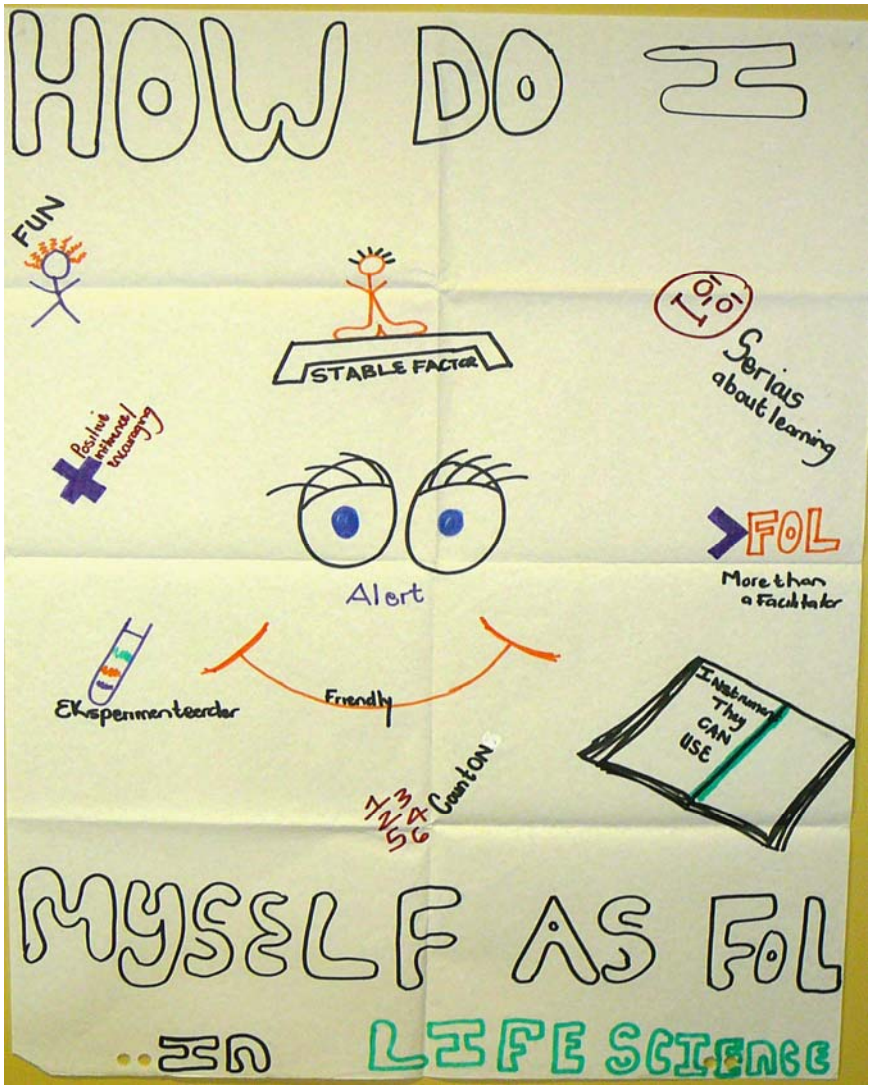
Bernice saw herself as a supportive person who guided the learners by "walking through the class and watching them as they try things out [and] assessing what they are doing" and monitoring time. She thought that a facilitator of learning should give positive comments to learners and not say that something is wrong. For her, this "could suppress their [learners'] confidence." Her supportive role is further evidenced by the fact that a facilitator of learning should say to learners "no it's fine, but just try it again or try until you get it right." She concluded by stating that "I am all for practical work, so they are doing the hands on experiment". Bernice explained that she put herself on the side as she was "observing the learner demonstration with the other learners. Based on the analysis of her drawing Bernice

was placed into the constructivist and learning situative category as developed by Leary et al (2007). This was because her learners were actively involved during the lesson and the learning was taking place in the laboratory.



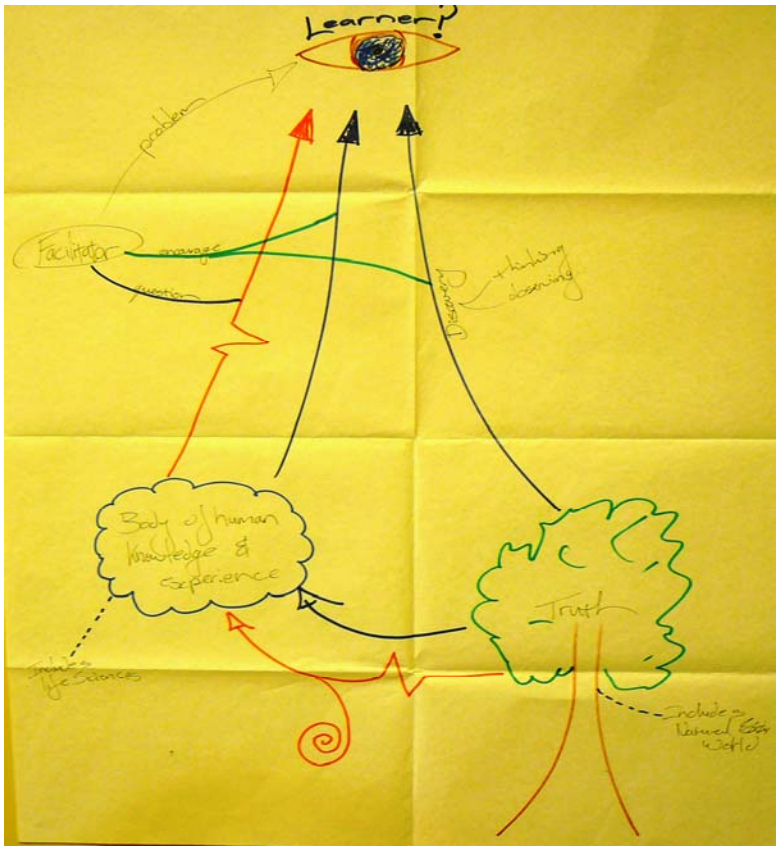
Drawing 1: Bernice's view of herself as a facilitator of learning

Carol described herself as a friendly and alert person who provided fun but was "a stable factor in the classroom". Carol thought that she would get "more out of the children by not being their friend but by being friendly." She also saw herself as providing "motivational aspects for the learners, being a positive influence, encouraging and someone that they could confide in." She did say though that she was "especially serious about the learning, making sure that they understand and that they have what they need". Carol's role captured a number of different aspects that she thought were important for her to do for the learners' learning process to be enhanced. Carol on analysis of her drawing was placed into the self-referential category because she refers to herself and all the activities that she will be involved in with minimal reference to learners.



Drawing 2: Carol's view of herself as a facilitator of learning

Mack viewed himself as a facilitator of learning whose role was to check and correct, and motivate the learners. He was interested in checking the "knowledge that learners have as I do not want them getting incorrect truth." He also viewed it as "crucial in the learning process in that he had to establish inquiring minds in learners and make them realise that what they believe in, is not the truth." He was aware of his role when he stated that "you as a facilitator intend or try to get them to answer the questions, therefore they have to observe things and in doing this they have to acquire things in order to solve problems." He also stated that to get the learners to start thinking about something "they need someone who can encourage them when they are on the right track or when they are establishing the truth coming out and question them if you see something wrong". Mack used the eye (in his drawing) to symbolise the learner. The reason he gave for this was that "I think cause that is what symbolically you want to do, to open their eyes to the world around them." Mack on analysis of his drawing was placed into the behaviourist category. This is because it is focused on what he is going to do with learners.



Drawing 3: Mack's view of himself as a facilitator of learning

5.3.2.3. Student teachers' views of learners and learning

Bernice used the words "wow, is it, geeh", in her drawing to show that "the class is actually amazed. They are not sitting looking out the window or something; they are amazed at what their friend is doing." She explained that the children sitting and watching "would want to go up front and try it themselves." Bernice stated that the learners were "doing this experiment, they are learning." Bernice explained that she wanted the children in her class to "learn through experimentation - not just with test-tube experimentation but even in their theory." The reasons that she gave for this were that "learners are afraid of the whole, afraid of exploring and afraid of practical work … [and] Biology is a practical thing." She wanted the learners to have "fun [while experimenting and] to have confidence, to try things, to try new things, because when you have confidence to try things, then you also have confidence to pose questions to yourself and also to your facilitator of learning." Carol viewed her learners as individuals who would be "serious about learning and fun would be an important element of this learning." Mack on the other hand believed that the learners can experience the world by using their senses to answer questions that they have or to solve the problem given to them by the facilitator of learning. In order to do this, the learners have to acquire knowledge. Through the questioning and through giving them a problem, placing a problem in front of them, this gets the learners to question." He represented this questioning action of the learner by a question mark

5.4. Step 2. Reflecting and interpreting

This step focused on the data captured from the group discussion interviews during the reflection specialisation discussion sessions. The data was analysed to give meaning to the student teachers' construction of a practice theory. The data focused on the student

teacher's perceptions of a facilitator of learning. Responses that indicated each student teacher's perceptions of a facilitator of learning and self identity were selected. Also responses that reflected the actions that enhanced the student teacher's professional development were selected. These responses were presented as interpretations and linked to questions called factors. These responses were selected as the importance of the self with regard to perception and the development of a student teacher as an authentic being (Barnett, 2004). Since the consensus between different cognitive structures of individuals has to be activated the session was held in a group setting (Wortham, 2001). A detailed report of the data collection process, the data analysis process for the descriptive data and the descriptive data are presented in the appendix 1, section II – cycle two in the DVD. The analysis process of the descriptive data and the emergent themes are presented in 5.4.1. and 5.4.2. respectively.

5.4.1. Data analysis process

The descriptive data was further analysed. The factors identified were induced from the data and the theoretical framework was used to inform these.

5.4.2. Themes

5.4.2.1. The specialisation discussion sessions provided the spaces for the student teachers to construct their phronesis.

It was during these sessions that the student teachers were asked to share a visual of how they saw themselves as facilitator of learning and their reasons (decisions) for their choice of a teaching profession. During this time their phronesis was further explored and it was during this exploration that they became aware of the roles of the facilitator of learning in terms of their personal and public dimensions.

According to the Vygotskian perspective, this principle is used to shape the process of professional development in which personal ideas and motives can find valid public expression (Van Huizen *et al*, 2005, p. 275). The student teachers are given an "exploratory space" (*ibid*) to make and follow up personal choices for teaching.

Bernice's choice for teaching was based on historical connections such as being taught by an amazing Physiology lecturer and her interest in teaching children. Carol's, on the other hand, was based on her interest in children and her amazing experience of teaching Saturday school. Finally, Mack's choice was based on his interest in teaching people things and his passion to conserve nature.

5.4.2.2. Strategies to reveal and challenge student teachers' beliefs

The understanding of the development of a facilitator of learning is based on both personal and professional aspects. Personally meaningful images of teaching for Bernice were that she saw herself as a person who did various things for learners. Mack, on the other hand, due to his strong Christian belief saw himself as the person with the truth.

In terms of Bernice's case, the professionally meaningful images of a facilitator of learning were revealed. She wanted to provide learners with a fun learning context and the confidence and encouragement that learners required. Her perception of her role as a facilitator of learning, however, was challenged. This is evidenced from the statement that she made: "I thought that it would be me doing the experiment" (comment about the main person in the picture). She changed the statement and said that it was a learner doing the experiment. The internal conflict that Bernice experienced was an indication of the fact that she was going through a change process in her thinking about the role of a facilitator of learning. She was also establishing reasons/underlying assumptions about her role as a

facilitator of learning and how children learn. Carol's professional image revealed the multiple roles that she wanted to play as a facilitator of learning. She saw herself as friendly, alert, a stable factor in the school life experience of the learners and more than a facilitator of learning. This is because she saw herself as serious about learning and understanding. She still wanted to provide fun for the children. Carol also saw her role as including motivational aspects for the learners where she could be a positive influence and encouraging to the learners. Her view of herself as a facilitator of learning was in a broad educational sense with regard to her developing her knowledge about the curriculum and curriculum change. She used a play of words such as can and not must, when she was describing what she would do as a facilitator of learning. This illustrated her awareness of the social aspects of a facilitator of learning and the power relationship between 'teachers' and learners. This power relationship was supported by Carol not wanting to be seen as having all the power in the facilitator of learning - learner relationship. This thinking lends itself to the behaviour necessary for an effective facilitator of learning. Mack was focused on developing the truth in learners as he "wanted to encourage the learners to achieve the truth." This truth is viewed as the content of the subject.

5.4.2.3. Learning from emotional experiences

Each student teacher experienced various emotions: from exploring reasons for wanting to teach and also the roles of a facilitator of learning. Bernice stated that sharing her story was a "nice experience." Carol, on the other hand, felt "challenged" by the drawing activity as she struggled to think up things to represent it outwards for it to be seen. Mack, on the contrary, stated that he felt good about sharing his story as what he saw in it was his passion for teaching and for really helping other people.

5.5. Step 3: Planning Action

This step was concerned with planning for the elicitation and exploration of the student teachers' interpretation and perception of the Nature and Structure of Life Sciences and the South African schools implementation policy for Life Sciences (Grades 10 – 12). The specialisation lecturer gave each student teacher documents: The Study Guide of Facilitating Learning in the Natural Sciences and Technology, Biology Education – A Reader, and the National Curriculum Statement for the Life Sciences Grades 10 - 12readings – Biology Teaching – an information manual by Schwab; Natural Science and Technology Booklet and the National Curriculum Statement - Life Sciences Policy document. The students were given a few days to read and interpret the content in these documents with a view to constructing their knowledge about these particulars aspects of Life Sciences.

5.6. Step 4: Taking Action

The action step focused on four specialisation discussion sessions that took place in weeks five and six, before the student teachers went out to the schools for their school-based experience. These sessions, were facilitated by Professor Ned (specialisation lecturer). He prompted student teachers to participate and asked them questions about their interpretation and perception of the readings. He asked the student teachers a number of questions. The questions were about he difference between Biology (Life Sciences) teaching and the discipline of Biology; the importance of Biology and why learners should learn Biology, how learners develop Biological knowledge, establishing a relationship with learners and the characteristics of a good facilitator of learning. The responses to these questions served as the descriptive data, cases for each of the student teachers. A detailed report of the data collection process, the data analysis process and the descriptive data are presented in the appendix 1, section II – cycle two in the DVD. The analysis process of the descriptive data and the emergent themes are presented in 5.6.1. and 5.6.2. respectively.

5.6.1. Data analysis

The descriptive data was read and then emergent themes were developed from the relationships between the categories.

5.6.2. Themes

5.6.2.1. Understanding of the nature and structure of Life Sciences

The student teachers had developed a basic understanding that Life Sciences consists of two parts: process skills (syntactical) and content (substantive). They nevertheless differed with regard to their level of understanding and the nature of their understanding. While

Bernice stated, for example, that there is a "difference between Life Sciences teaching and the Life Sciences that we did at school." She was aware that Life Sciences as a discipline had particular characteristics and could be distinguished into theory and practical components. Carol stated that the Science subject, Life Sciences must relate to the Life Sciences discipline in that "they were the same." She was aware that the nature and structure of Life Sciences was changing all the time. According to Carol, "in learning Life Sciences there are practical and theory parts that must be worked with." Carol had the view that a fact is "acquired through learning." According to her, "through practicals you learn theory and there is substantive knowledge that will not change for example, these are my lungs", as this is a fact. Mack stated, "there is a difference between Life Sciences teaching and the Life Sciences that we did at school". This means, unlike the other two participants, Mack was aware that the nature of Life Sciences is such that it was changing, but "a child must be taught facts". He thought that children obtain knowledge via/through developing and using process skills.

5.6.2.2. Understanding the syntactical and substantive structure of Life Sciences provides a platform for decisions about how to facilitate learning

Bernice stated that as a facilitator of learning we need to ask "what is the Life Sciences that we need to teach to make them (the learners) aware of it." She expressed that "if you have the nature and structure of Life Sciences then as a facilitator of learning it gives you the platform from which you can work things out". She concluded that "this makes the teaching of Life Sciences more understandable." Carol stated that as a facilitator of learning she needed "learners to develop better syntactical structure (developing process skills)." She was aware that she could do this by asking questions of "how can learners' thinking skills be developed?" She knew that if she wanted learners to take responsibility for their own learning she still had to ensure that learning took place. Mack, as a facilitator of learning, believed that to get

learners to learn Life Sciences he would have to establish (develop) their process skills in order for them to obtain facts. Furthermore, he believed that for learners to learn Life Sciences they needed to be "taught respect for nature." He was aware of what was required for this to be achieved in stating that children could not be told "to respect nature if they do not know anything about the object (nature)." He said, "children come to have respect for things that they can see". Mack was also aware that when children "observe through the senses you need to use cognitive skills". He was aware that in learning Life Sciences learners must be able to apply the theory. His view was that "when learners construct meaning they can do whatever they can, they can create new things to use in new situations." Mack decided that as a facilitator of learning he would have to be "engaged with construction of meaning and to maximize the potential of the learners."

5.7. Step 5: Reflections on taking action and interpreting

Each student teacher's reflections of the specialisation sessions that focused on the structure and nature of Biology were elicited according to Mezirow's (1991) categories of reflection. I asked questions about the content (what) of the student teacher's reflections, the process (how) of making these reflections and the premise (why) the particular reflections were made to give meaning to Bertha, Carol and Mack's reflections. A detailed report of the data collection process, the data analysis process and the descriptive data is presented in the appendix 1, section II – cycle two in the DVD). The analysis process of the descriptive data and the emergent themes are presented in 5.7.1. and 5.7.2. respectively.

5.7.1. Data analysis

The descriptive data was read and then emergent themes were developed from the relationships between the categories.

5.7.2. Themes

5.7.2.1. Syntactical and substantive meanings were developed, not Life Sciences content

Due to their experiences the student teachers constructed their theory about the importance of understanding the syntactical and substantive nature of Life Sciences. According to Van Huizen *et al* (2005, p. 280) this theory that the student teachers constructed provided them with "frames for their inquiry into the meaning of educational situations and of their own role". Bernice had compared facilitating Life Sciences to the Life Sciences that she did at school. In doing so she was then able to understand the "difference between syntactical and substantive". Carol reflected that they (the student teachers) had "not done Life Sciences really but just the syntactical and substantive structures." And she thought that "(s)o jah, I think that is a good beginning for us to understand that it (Life Sciences) is one thing" it does not consist of two separate parts.

5.7.2.2. Beliefs about facilitating Life Sciences (the role of a facilitator of learning)

Bernice stated that her idea of the role of a facilitator of learning "is not really the idea that I had. I had a different experience at school. We never did any practical at school or work in the laboratory." Bernice's schooling experience was such that she learnt Life Sciences in the transmission style where content from the textbook was the primary focus. Mack reflected that he had "learnt a lot about the theory behind the Life Sciences". An example of the theory that he learnt was "things to use directly in the classroom … what we are teaching, the nature of it". Mack was in the process of experiencing change in his beliefs

about facilitating Life Sciences. Even though he was aware that what can be used in the classroom could influence his practice, he was anxious about the actual action of facilitating learning. This is evident from the question that he asked, “how will I facilitate learning” in the classroom. This is a clear indication that the technical – rationality approach (Schon, 1983) was not used to inform his practice. Mack thought that he had “progressed over these sessions (specialisation sessions) but he still expressed uncertainty about “where we are going from here. I am wondering about the end point in terms of my progress.”

5.7.2.3. The role of the specialisation discussion sessions (the interactive situations).

During the session the specialisation lecturer asked a number of questions that the student teachers had to think about. Some questions asked were: What do they say in the syntactical structure - about basic competencies? Could you observe without syntactical structure? He also made clarifying statements like: substantive nature is changing through the syntactical, and the syntactical structure does not change. He was aware of the importance of relaxing the student teachers during these sessions as he enquired after their comfort. Mack reflected that he had developed a good understanding of the words syntactical and substantive from “preparing for the specialisation session by reading the documents provided” and “it was not just reading the document that enabled this understanding; it was my active participation in the session that was of intense importance.” Bernice had participated during the sessions by her responding to questions asked by the specialisation lecturer and listening to the responses given by her colleagues. Carol also participated during the sessions but indicated that her participation was restricted in that she would have felt “more free to communicate if this was just a chat session”. Even though Carol expressed that she experienced discomfort during the

sessions, she did value these sessions as they made it "clearer [what reflections are] and she got a clearer understanding" of how to make them. Mack and Bernice expressed a similar thought. Bernice thought that because of her participation in it, she realised the importance of social learning.

Another feature of these sessions that promoted learning and development of the student teachers was that they knew in Bernice's words that they could "ask Professor (specialisation lecturer) something. So, yes I did know that I can ask questions". They also knew though that they would not get a response to their questions as the specialisation lecturer wanted them to think about the questions they asked and to respond to their own questions. The initial power relationship between Professor Ned and the student teachers evident in the first cycle during these discussion sessions was now more relaxed. This is evident from an interaction during the discussions where the specialisation lecturer (Professor Ned) stopped Bernice from asking a question by stating, "already done." Bernice was not happy with this incident and she had the confidence to raise it, discuss it and confront him about it.

5.7.2.4. Influence of emotion

Carol reflected on her feelings that she had when she was exposed to "the idea that the content was the most important and now we know the principles – [this] [1]Maak my deurmekaar." The reasons that she gave for this feeling was because "I had the idea that the content was important now the science processes are" and she was now going to have to "rethink what you are going to do in the classroom – that is the whole paradigm thing." This indicated that Carol was experiencing a personal challenge and change in her thinking

[1] Makes me confused

about facilitating learning in Life Sciences. Even though she felt good about learning the new knowledge on the nature and structure of Life Sciences she was also very confused with it. This links with Pajares (1992) where teachers' belief systems affect perception and strongly influence how they will process information She was expressing problems with processing this knowledge as it was too different from what she had experienced in her past experiences of being taught. Mack felt uncertain about how to facilitate learning as he was only given basic ideas on how to teach. His uncertainty was linked to the new knowledge that an individual due to his/her own experiences and the input of education theory, constructs and uses his/her practical wisdom when developing as a facilitator of learning. Mack's uncertainty was linked to who he is as a person and of what will be expected of him to facilitate learning in the classroom. Mack as an individual lacked self-confidence, and his Neethling Brain Instrument analysis indicated that he prefers the big picture not the detail. This absence of the big picture impacted negatively on his feelings about facilitating learning.

5.7.2.5. The meaning and value of reflecting

Bernice developed a meaning for reflections which she viewed as "writing down what you have learnt." Her reflections could be used to assess her progress, even though they only focused on the content, that is, cognitive knowledge that she had learnt. Bernice was still in the process of developing an understanding of what reflections are and also the skill of reflecting. Her reflections were at an academic, and not personal, level. Carol's understanding of reflections was different to Bernice's. She understood them to be "kind of what you did and what you learnt about it, how you feel about it." She characterised reflections as "you see yourself in what you have written? In the feeling thing you can see yourself". Carol understood that writing personal reflections was about sharing the feelings

that she experienced, not just the knowledge that she had gained. She also understood reflections to be used as an indicator of "who you are as a person." Mack understood reflections to be "it is going over all the important things that you think has been discussed and how you sort of assimilate that in your own life." He was aware furthermore, that reflecting was important for his learning. He did state that as a result of his reflecting, he now "definitely [thought] there is value in it." For Mack, "after doing it (reflecting)" he realised that reflecting is "actually thinking deeply about what we had done in the session". At this stage his reflections were still about important things, but focused on what was reflected on, the process of reflecting and the value of reflecting for his professional development.

5.8. Step 6: Evaluating Action

The evaluation stage focused on the analysis and evaluation of the intervention for this cycle and the issues that fed into the next cycle.

5.8.1. Data analysis

The descriptive data was read and then emergent themes were developed from the relationships between the categories.

5.8.2. Themes

5.8.2.1. Each activity in the cycle was essential for self-constructed practice theories.

The construction of each practice theory entailed the dynamic exploration and challenge to their developing identities of a facilitator of learning, both at personal and professional

levels. This exploration and development was evident from the issues raised during this cycle and their responses to these issues. Korthagen (2001c, p. 255) reminds us that these explorations of "student teachers' preconceptions" about facilitating learning are necessary if we want the student teachers to construct their own practice theories. Bernice, Carol and Mack's experiences of the action step challenged their current beliefs of facilitating learning and reflecting, their emotions, and their expectations of the professional development programme. The importance of a Life Sciences facilitator of learning integrating process skills and content for learners to construct the appropriate knowledge was a new experience for all three student teachers. The old belief that teaching was concerned with transferring content to learners was definitely being challenged. But, with this challenge came the question of according to Mack "how are we going to go about it?" So, this new experience brought further concerns and challenges for the student teachers with regard to what would be expected of them in their role as facilitators of learning.

The student teachers were aware that they had to focus and plan for the role of learners as active participants in the process of learning. This clearly is in line with the principles of experiential and authentic learning. This belief of a learner as playing an active role in learning was far removed from their own experiences of learning. This 'shakening' of beliefs further made the student teachers feel uncomfortable and in Carol's words: "deurmekaar". This is evident in the literature where according to (Abbot, 1999, p. 23) learning is a "messy process" But without this messiness, emotional and cognitive uncertainty, learning may not have been possible for the student teachers. This messy nature of learning is also intertwined with emotions, reflections and expectations. It is essential that we recognise and integrate the emotional, cognitive (Kolb & Fry, 1975, Leavy *et al*, 2007) and perceptual experiences of the student teachers for them to learn. We

also need to encourage student teachers to actively reflect on their experiences as awareness of their own learning (Korthagen, 2001b) was important for their construction of phronesis. As student teachers were only told to reflect with no template or guide as to what to reflect on and how to structure their reflections they experienced the process as an intensely personal one. This personal nature came from the depth of emotions and thoughts shared in these reflections. But, this process of reflecting does not take place automatically and it is for this reason that student teachers were asked to record their reflections and then to share them during the reflection sessions which were structured into the professional development programme.

5.8.2.2. The elicitation of student teachers' expectations about aspects of the programme needs to be conducted.

In as much as Carol stated that "we have not learnt any Life Sciences yet" as she expected to be taught Life Sciences in the programme, these expectations if left unattended could develop into concerns and these could impact on the process of learning. Negative emotions are normally associated with concerns and these could impact negatively on the construction of phronesis.

Bernice, Carol and Mack were each constructing their own practice theories of facilitating learning. These theories were influenced by the nature of who they were as people. But the challenge to their current beliefs of facilitating learning and reflecting, the emotions that they experienced, and their expectations of the professional development programme served to re-assert and also re-establish their identities of facilitators of learning. These identities were different now to what they were when they started off at the beginning of this cycle.

5.9. Conclusion

Analysis of how the student teachers' constructed a practice theory of facilitating learning during cycle two was presented. The themes developed described how the student teachers' practice theory was established and challenged during this cycle. The student teachers' reasons for wanting to teach and their perceptions and beliefs about facilitating learning were revealed. The reflecting and interpreting step revealed the importance of the strategies used to enhance the student teachers' construction of phronesis. The taking action step revealed how the student teachers' practice theory was challenged, against the professional dimensions of facilitating learning in the Life Sciences, and constructed in this process. The reflections on taking action and interpreting step revealed the importance of the strategies used to enable the student teachers to construct a practice theory. The evaluating action step revealed the critical aspects required for the student teachers to construct phronesis: the student teacher's experience of each activity in the cycle and the need to elicit the student teachers' expectations about aspects of the programme. Evidence was presented to support the themes developed in all the steps.

The evidence for how the student teachers constructed phronesis is described in this chapter. In the next chapter the analysis of how the student teachers constructed phronesis in cycle three will be presented.

CHAPTER SIX

CASE STUDY PARTICIPATORY ACTION RESEARCH CYCLE THREE

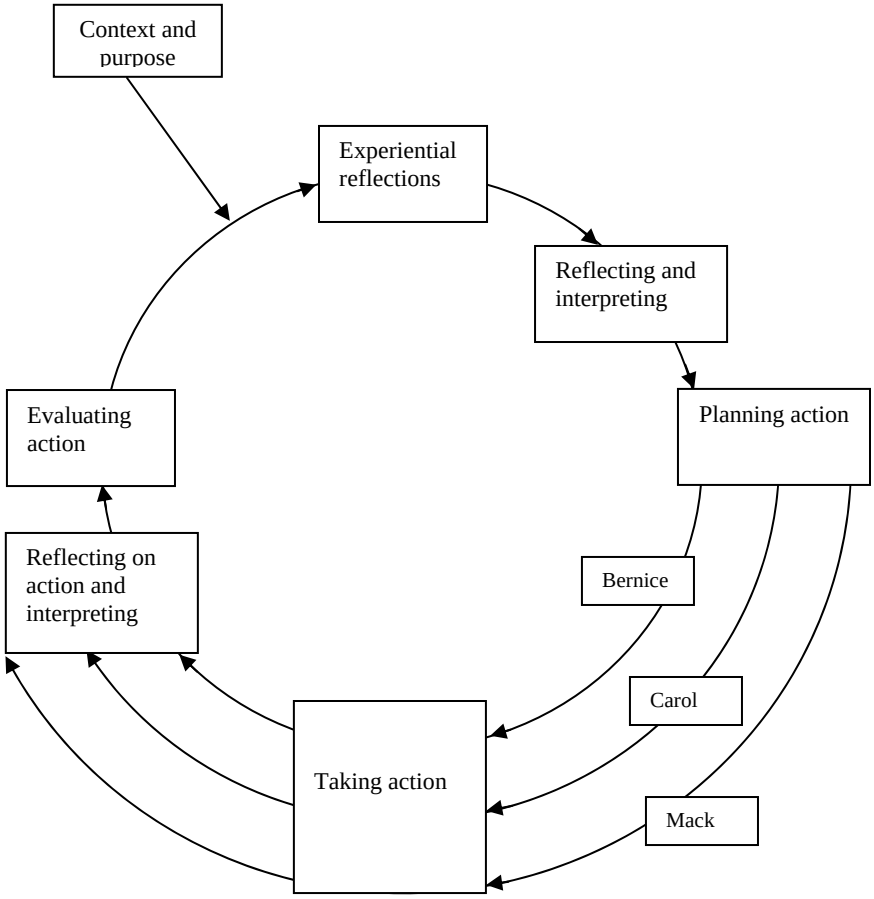
6.1. Introduction

The purpose of this chapter if three fold: first it hopes to present the sequence of this cycle in relation to the other three cycles, observed in Table 8 (see shaded area). Second it presents the case study participatory action research cycle model used as observed in Figure 3. Finally it describes the data analysis process and presents the analysed second level data in the form of themes for each of the steps in the cycle and conclusions are reached.

Table 8: Sequence of cycles

Action research cycle one	Action Research cycle two	Action Research cycle three	Action Research cycle four
Weeks one, two and three	Weeks four, five and six	Weeks seven to seventeen	Weeks eighteen to thirty-nine

Figure 3: James model for cycles three and four



6.2. Context and purpose

6.2.1. Context

The contexts for this cycle were the school to which each student teacher was assigned, on the one hand, and the university site on the other. The research participants in this cycle were the student teachers, the specialisation lecturer, the mentor teacher, the student teacher's peers, and the researcher herself.

6.2.2. Purpose of cycle three:

The purpose of this cycle was for two dimensions. The first concerned with establishing the student teacher's practice theory regarding their *preparation* to facilitate learning in practice and the second was to challenge the student's practice theory regarding their

facilitating learning in practice during an extended (8 week) school based learning period. In terms of the first purpose, the initial strategy for its fulfillment involved the utilization of student teachers' practice theory as assessment tool for observing mentor teachers teaching and themselves tutoring learners at a placement school. This exercise involved reflecting on and sharing their experiences. Another strategy involved establishing their constructed meaning of a practice theory through the teacher educator asking the corresponding appropriate question. A further strategy involved establishing the student teacher's perception of the relationship between a practice theory and designing learning tasks by the teacher educator asking the corresponding question. The answers to the questions were also explored for better understanding of their practice theory construction.

To achieve the second purpose, student teachers had to design learning tasks and operate these learning tasks. These Learning tasks then had to be assessed by the students, their peers, the mentor teacher, the specialization lecturer, and the researcher. The student teachers were then expected to reflect on and share their experiences regarding the above

6.3. Step 1: Experiential reflections

Descriptive data was developed from the categories concerned with Bernice, Carol and Mack's experiences of tutoring the learners at the placement school, their observation of the mentor teacher teaching, their meaning of practice theory, and their constructed phronesis about designing learning tasks. A detailed report of the data collection process, the data analysis process and the descriptive data is presented in appendix 1, section II – cycle three in the DVD). The analysis process of the descriptive data and the emergent themes are presented in 6.3.1. and 6.3.2. respectively.

6.3.1. Data analysis

The descriptive data was read and then emergent themes were developed from the relationships between the categories.

6.3.2. Themes

6.3.2.1 Teacher action critique generated ideas for effective practice

Student teachers were given opportunities to "explore and appropriate the meanings of the interactions and roles that they participated in" Van Huizen *et al* (2005, p. 279) to facilitate the construction of meaning of their practice theory. Bernice's assessment of the teacher was that she (the teacher) was "just feeding the learners with stuff". Bernice was at this stage aware that the learners had to construct knowledge for themselves and that this teaching method was not developing learners. This is why she wanted "to give the learners some interesting things to do not just the transparencies" that the teacher expected her to put on the OHP for the learners to copy. Mack had observed that his teacher made use of group work where there were homogenous groupings with "groups of all boys, all girls, all Blacks, all whites". Even though the teacher shared the reason for this grouping, all learners "live in different areas and when they are given a project then it is difficult for them to meet to complete the project", Mack felt uncomfortable with this grouping. He decided that he would do it differently and he planned a strategy to give learners time at school to work together. Carol was based at a dual medium school where she observing her mentor teacher teaching in Afrikaans and English. Carol observed that the teacher mentor wasted a lot of time talking in the different languages. Even though Carol is Afrikaans speaking she decided that when she is facilitating learning she would "speak in English only and I will get the learners to work it (Afrikaans) out" This is because much of the time was wasted in class owing to the use of different languages.

6.3.2.2. Trialing, personality and reward

Bernice's constructed meaning of practice theory was "you need to be in the situation and try different things until you found something that really works." She further illustrated her meaning by stating "the Bushmen were not told to sit and then the instructions on how to go hunting was told to them. They had to learn how to hunt through experience. Mack viewed practice theory as people trying "things differently". He also thought that practice theory was concerned with what the student teachers had learnt during the discussion sessions (the theory) and "how you put it into practice." Carol viewed practice theory as linked to who the person is and "what you would like to happen." As she did not want learners to do badly, she suggested that she would "reward them" if they experienced the activity.

6.3.2.3. Learner enjoyment, learning and relevance

Bernice's choice of activities in the learning task was influenced by her beliefs that if learners "enjoyed it [an activity] then they would learn more, if the learners were interested then the learning task would have meaning for them and if it (the learning task) is relevant then they will enjoy it". Carol also believed that learners had to experience "enjoyment and learning", different types of activities and the learners' views of learning must be considered. She supported this perception of enjoyment and learning with her own experience when she said, "if I enjoyed an activity I will learn more and I will remember more and I will remember less if something is boring." Carol believed that the expectation of "substantial justification from learners is what made a learning task different and challenging." Mack also believed that learner enjoyment and learning was important in that "enjoyment makes a person want to learn as it is an intrinsic thing." His thinking was that "learning becomes intrinsic automatically because if they [the learners] are enjoying

it, it [the learning] comes by itself" and that "the learners' enjoyment during the process of learning lay in what they achieved at the end by learning."

Bernice believed that when designing practicals for learning tasks she had to consider the preparation of specimens, how to conduct the practical, "how to dissect the heart" and to "record what she did because if something went wrong I will be able to re-do what I did". Mack's understanding of constructing a learning task was that there are questions that need to be focused on like "what are you trying to achieve in the activity, are the activities in the learning task relevant and enjoyable?" Mack was aware that when he gave the learners an experiment linked to the learning tasks he would have to ask them to "describe the process that they used and to substantiate their findings."

6.4. Step 2. Reflecting and interpreting

The descriptive data described the role of the specialisation lecturer in the discussion group sessions, each student teacher's understanding of the case study participatory action research process, the student teachers' participation in the discussion sessions, feelings and understanding about his/her construction of learning task knowledge, reflections of their school-based experience, practice with reflecting and their understanding of phronesis/practice theory was read. A detailed report of the data collection process, the data analysis process and the descriptive data is presented in appendix 1, section II – cycle three in the DVD). The analysis process of the descriptive data and the emergent themes are presented in 6.4.1. and 6.4.2. respectively.

6.4.1. Data analysis

The descriptive data was read and then emergent themes were developed from the relationships between the categories.

6.4.2. Themes

6.4.2.1. Challenged, supported and facilitated

The role of the specialisation lecturer (teacher educator) in the discussion-group sessions was critical and constructive for the student teachers to elicit and challenge their beliefs about the role of a facilitator of learning and the understanding of their facilitation of learning practice. The importance of this role of guided support for trainee teachers to develop a professional identity "as embedded in the sociocultural practice" (van Huizen, *et al*, 2005, p. 281) by the specialist lecturer during the specialisation discussion sessions is evident in the following: he initiated *the discussion, prompted the students to participate* in the discussion by stating, "you have come from the schools, are there any things that you want to share and any questions that you want to ask?" He also challenged and supported the student teachers to think about their own beliefs about how they would facilitate learning – "it is good that you can … ask the questions like the one that you asked, this is what this teacher is doing but what will I do?" He also used the experiences that the student teachers shared during the specialisation discussion session to facilitate the student teachers' construction of further knowledge about facilitating learning (Brown, Collins & Duguid, 1989). During the session he did not provide the student teachers with answers instead he got them to question their own responses further. He then used these responses to discuss guidelines for facilitating learning and he also integrated education theory to further challenge the student teachers on their construction of their practice theory. He also elicited the student teachers' feelings of sharing their ideas (Hargreaves, 1998) in the group setting. These experiences that the student teachers participated in were important

for their construction of their practice theory and they were expected to construct and co-construct (Von Glaserfeld, 1995) ideas and actions for facilitating learning.

6.4.2.2. Anyone could pitch in

Each student teacher's participation was evident from what Bernice said "anyone could pitch in". Each student teacher participated openly and freely and shared his/her experiences and opinions. They were provided with discursive spaces for them to share their experiences in a safe, constructive manner. These participation actions were oriented towards the leaning and development of the student teacher as reflected in Van Huizen *et al*'s (2005) theory. In this instance these spaces were structured sessions, which were conducted at regular, ongoing periods at the university site.

6.4.2.3. Feelings and possible actions

Bernice, Carol and Mack's reflections indicated the feelings that they had experienced and the reasons for these. Bernice experienced "fun" and she "felt good". The reasons for these feelings were that she was responsible for the class as her mentor teacher was not in the classroom and the learners gave her positive feedback about the way she explained and that they enjoyed the class. Carol expressed mixed feelings about the experience. She felt fear and boredom while sitting in the classroom observing the teacher. The feeling of fear was attributed to her observation the learners' behaviour in that they "did not listen to her [the mentor teacher] it was chaos in her class most of the time", "the classes that I was to take are the two most difficult classes". Even though Carol was expected to observe and record her observations, her feeling of boredom stemmed from the fact that the teacher did very little with the learners. Carol wanted at that time to get up and facilitate learning as her perception of learners and learning was that there had to be "enjoyment and learning" (see descriptive data cycle 3, step 1) and she was not observing this. Mack stated that he

had **"**enjoyed my time at the school – it was lekker[1]." But he also experienced boredom as "I was just sitting and observing." Mack, furthermore, did not feel challenged by the action of recording observations during this week. Although he did value sitting behind a desk and observing, his urge to facilitate learning was very strong and he wanted to be the person facilitating learning.

Each student teacher used the observations to make decisions about the role that they would play as facilitators of learning in the particular classrooms that they were to be based in. Bernice described her role as "explaining the stuff to them (the learners)". Carol's reflection indicated her role of how she was going to manage the learner discipline when she stated that "I think that they (the learners) are not that bad it is just that she (the teacher) does not handle them very well. I will be the opposite. I will be very strict."

6.4.2.4. Constructing and assessing a meaning for practice theory

Carol understood practice theory in terms of her own practice theory which she saw as a "kind of just theory at this point". Mack stated that practice theory meant **"**forming your theory from your practice". He understood that "through your experience in the classroom you are able to build on your theory". Bernice's understanding was that "the only way you can get something like practical wisdom is by experience." She thought that when some lecturers tell you "this happened to me that is worth more than plain theory." She said that she could then relate these happenings to her own experiences and "think yah I saw that." Bernice was assigning meaning on a personal level for the construction of practice theory. This phenomenon is described in the literature by Van Huizen *et al* (2005). Mack also understood practice theory as what you know "about yourself and how you interact with other people." This indicates the importance of a student teacher's personality in the

[1] Lekker is an Afrikaans word that means nice.

construction of meaning involving valuation where meaning was integrated into the personality (Van Huizen *et al*, 2005).

6.4.2.5. Learning and feelings from operating a learning task

The student teachers' reflections of their action of initiating learning of their learning tasks indicated the learning and the feelings that they had experienced during the process. This experience of initiating learning was important for the student teachers to assess their competence of facilitating learning and to make decisions about what they needed to focus on for improvement. It was during this time that the student teachers could explore and construct the meanings of these interactions and roles (Van Huizen et al, 2005) and use these to make decisions about the development aspects that required attention and re-planning.

Bernice thought that it was **"**fun and I felt fine doing it" and that this experience led her to believe that "if I stood in front of a class I will not worry". She developed further knowledge and skills about how to design a learning task when she stated that "I had designed too many different things" for them to do and she realised that she had "confused the problem with the organisational aspects of what the learners need to do." Carol had developed the competence to assess her own presentation when she said "I do not think that mine or anyone else's presentation was gripping enough or stimulating." She was aware that she had given necessary organisational instructions to the learners about what "they needed to do about the activity". It was only after she had reflected on the problem that she had posed, did she realise that she had not planned for giving the children "enough information for them to understand how to go into action." Mack was aware of the changes that he needed to make to his presentation. He reflected on the problem that he had posed, and he stated that "it does not encompass everything … it is important that [it] has clarity."

He decided that he would have to work on formulating the problem and to "think further about it … [to] "make sure that the learners understand what I said."

6.4.2.6. Collegial support of practice

The student teachers' reflections about collegial support indicated the feelings that they experienced when sharing sections of their learning tasks during the discussion sessions. Even though Bernice, Carol and Mack stated that they **"**felt good" they expressed different reasons for this feeling. Bernice and Carol's reasons focused on their understanding of how to do it (facilitate learning). Bernice only appreciated the comments if they "made sense" to her and she could "see herself doing it". Carol only appreciated the comments when "she could see that she would be able to do that (whatever was suggested)". Mack's reason was to "see how other people think."

Step 3: Planning action, step 4: Taking action and step 5: Reflecting on action and interpreting

Step 3, 4 and 5 for each of the student teachers are presented in this section. Steps 3 was concerned with the student teachers planning (designing) their learning tasks and their professional portfolio. The descriptive data collected focused on the how the student teachers planned (designed) their learning tasks and also on how they designed their professional portfolio and planned for their portfolio defense. Step 4 was concerned with the student teachers taking action in terms of operating learning tasks from week eleven to seventeen (seven weeks). During this time, the student teachers participated in specialisation sessions at the university. They also presented their professional development portfolios during week thirty nine of the programme. The descriptive data collected for step 4 focused on the operation and assessment of the student teachers' learning tasks, the nature and content of the specialisation session, and the nature and

content of the professional portfolio and the portfolio defense. Essentially, descriptive data collected during the specialisation sessions focused on the student teachers' observations, assessments and suggestions made on how to improve the recorded learning tasks operated by Bernice and Mack. Step 5 was concerned with the student teachers' reflections on the taking actions step. The descriptive data collected focused on the student teachers' construction of a meaning for practice theory and the role of a facilitator of learning, construction and use of the theory of facilitating learning practice, the contribution of the mentor teacher towards the student teachers' construction of practice theory and the contribution of the specialisation programme towards the student teachers' construction of practice theory?

A detailed report of the data collection process, the data analysis process and the descriptive data for each of the steps 3, 4 and 5 are presented in appendix 1, section II – cycle three in the DVD. The descriptive data was further analysed for emergent themes. The themes are presented in 6.4. for Bernice, 6.5 for Carol and 6.6 for Mack over the next few pages:

6.5. Bernice

6.5.1. Planning action

6.5.1.1. Relevance, interest and challenge for learners informed the designing of the learning task

Bernice understood that in designing a problem she had to consider the relevance and interest of it to learners and the authentic nature of it, in that it could in her words be "something that could really happen". It was for this reason that she used a problem that

was linked to a learner's uncle who has a blood circulation disease. She justified her choice of problem as "the use of this context made it more of a real life problem." Bernice stated that a problem that she experienced was with "how to get them (the learners) started properly." According to her the challenge therefore was for her to "design something that would get them" started quickly.

6.5.2. Taking action

6.5.2.1. Operating a learning task entailed knowledge of approaches, action and development of features

Bernice had incorporated both substantive and syntactical aspects of facilitating learning in operating her learning tasks. She was aware of the importance for her to use particular approaches to facilitate learning effectively e.g. her method of grouping was based on her rationale that the use of heterogeneous grouping in class was effective for facilitating learning. It was evident from the type of problem that Bernice presented to the learners in the second learning task that she understood and could implement a relevant real-life problem that was interesting for learners. She was competent now in incorporating and managing the co-operative learning aspects and the use of resources efficiently. Bernice initially developed and implemented a learning task that had the basic requirements. From her experience of designing and implementing learning tasks Bernice now focused on refining the finer details or aspects of the learning task e.g. the structure and type of real-life problem, her management of time and resources. This sequential development could be regarded as levels of difficulty linked to practice. With greater practice, higher levels of difficulty could be achieved.

6.5.2.2. Assessment of the learning task for self-awareness and constructive support

Bernice as a result of operating and assessing her own learning task became aware of her strong points and weak points of operating a learning task. She used this information to identify how she could develop in terms of providing greater attention with problem clarification, more interesting learner activities for the learners to have greater involvement, her time management was "inefficient" as it allowed for distraction so it needed to be efficient and more-focused and she needed to get learners to work out solutions themselves. Bernice had developed in operating her learning tasks with respect to learner involvement as the "total group of learners were involved, highly interested, motivated, took responsibility for their own learning".

Assessment of the learning task by different assessors is essential for constructive development in that the assessors provided constructive support. This support comprised of suggestions to improve the operation of the learning task and also comments about the student teacher's strong and weak points in operating the learning task. Comments like you are "enthusiastic and you have a good interaction with the learners" could serve to motivate Bernice.

6.5.3. Reflecting on action and interpreting

The reflections that Bernice shared on a social and personal level were essential for her construction of her practice theory. In reflecting Bernice had to elicit her beliefs, thoughts, perceptions and feelings about being a facilitator of learning and her experience of facilitating learning in her professional portfolio and during the specialisation discussion sessions.

6.5.3.1. A facilitator of learning should focus on use of their personality and learner actions

Bernice was aware that her role in this context, where learners were used to being fed (see cycle 3, step 1 – 6.2.1) had to be one where she was taking them out of "their usual way of getting notes." She described her role as "I am not giving them notes, I just ask questions." Bernice was not transferring information to the learners; instead she was challenging them to think. As a result of the role that she played and the role that she expected of the learners, they according to her "are becoming to realise that I will not give them any answers and that they have to think," and they in her words were "now able to explain things on their own." Bernice stated that she wanted to be "relaxed and herself with the learners [and she wanted to] … laugh with them." She concluded from observing many teachers teaching that they "are totally stuck up and boring". She could not understand why teachers in her words "did not have an open experience" with the learners. For Bernice a teacher's personality was important and the teacher should share this with the learners by being themselves. Because Bernice wanted to prove that she could work with the learners (see cycle 1, step 5 in the descriptive data) she purposively chose to work with "the two naughtiest classes" and she evaluated her role as "I got more out of them (the learners) than the other teachers." This belief of the importance of personality is evident in the literature where according to Van Huizen *et al* (2005, p. 273) it is "an integrative system".

6.5.3.2. Learning from practice, assessment, reflections and feelings

Bernice stated that she had learnt from the operation, assessment and reflections of her first learning task operation and from various aspects that she had experienced. She provided the following as evidence of her learning "with the second learning task I made a big difference. I did research and I checked the stuff before I started." She also stated that

she “now checked the learners’ work when they were doing co-operative learning to make sure that they are on the right track.” This development of personal meanings through being engaged in social practices is one of the principles of learning and development in the literature by Van Huizen et al (2005).

Initially, Bernice felt worried that she was not going to feel as excited with facilitating learning for seven weeks, “as she felt when she spent the week (one week) at the school”. These feelings changed due to the learners’ positive response to the learning task operation in that “they (the learners) are quite excited … and now I am excited again.” Some feelings served as highlights for Bernice in that she was surprised by the learners’ performance during the operation of the learning task as they “were so good” and “they come with interesting stuff that I did not make provision for”. Bernice had also experienced feelings linked to her self –enjoyment when she stated that she “had fun and I enjoyed it." Bernice’s feelings were internally and externally motivated.

6.5.3.3. The type of contribution and support

Bernice thought that the mentor teacher made a huge contribution to her construction of her practice theory. She stated that the mentor teacher supported her in that she “answers every little question,” and helps with the “planning of learning tasks”. Bernice thought that since the mentor teacher “knows what the university expects” she was very helpful.

6.5.3.4. Sharing and discussing authentic experiences, administration stuff and quality

Bernice viewed the sharing and discussion of her peers’ authentic experiences and the challenges that the specialist lecturer raised as very meaningful. Bernice stated that she had listened to Carol describing the trouble that she had, had in her class and to the advice that was given by Professor Ned when he stated that “if you do not get co- operation, do not

work" and she used this to operate her own learning task. She stated that she also used the experiences from the peer teaching on campus (cycle 2, step 2). Bernice concluded that "she did get help for Professor Ned" in that "he mainly helped with administration stuff not really with content and context stuff". She stated this because she expected to learn and be told about how to teach learners, she expected Professor Ned to tell her all this. Bernice stated that it contributed to her being able to "assess the quality of maintaining learning by looking at whether the learners are active; their discipline is managed and if she could organise them into groups."

6.6. Carol

6.6.1. Planning action

6.6.1.1. Feelings of stress and pressure and learners' bafflement informed the designing of the learning tasks

Carol's learning tasks had the required features as depicted in the module documents for the Life Sciences PGCE student teacher. Carols experience of designing the learning task is linked to feelings that she experienced. Since this was the first learning task to be operated in a classroom that Carol has designed, and she had experienced so many different emotions during the period, she said that it was "hard to describe how I felt when I was busy preparing" it. She did eventually state that she had experienced "so much pressure and stress … [and she was] unsure" about how to design the learning task. These mixed emotions and thoughts that she experienced, indicated the intensity of this first experience for her. Furthermore, since she is an L1 and L2 trainer/teacher who in her words "like[s] to plan and organize to make sure everything happens according to schedule" (see cycle 4, step 4 - 4.5.3.), this explains the intensity of her feelings if things

are not done properly. These reactions that Carol experienced can also be explained in terms of her self-image where she does not have a fixed self-image and she is a type of person who is negative especially in frustrating situations (see cycle 1, step 4 - 4.5.3.). Carol was developing in her competence to plan learning tasks and she felt more relaxed about this. Towards the end of the practicum session the learning tasks that Carol had planned, had a relevant and challenging problem statement, the learners had to work with different levels of difficulty and a variety of activities to try to solve the problem. Carol was also aware while designing the learning task that the learners had never done learning tasks in their lives before and besides being "quite baffled with this new concept … [they were not used to] doing something". She experienced great discomfort with this knowledge as she understood that she would have to think about and plan for a learning task where learners were active and they were learning.

6.6.2. Taking action

6.6.2.1. Self-challenging feelings, feelings linked to the learners' performance, beliefs, context and time

Carol felt intense emotions about operating a learning task as she was "uncertain about managing the learning task" and being the type of person she is "critical and negative especially in frustrating situations" (see cycle 1, step 4 - 4.5.3.), this resulted in her feeling great discomfort. It was during these critical moments before operating the learning task that Carol's "feelings and beliefs about the new paradigm were being challenged". This challenge happened at a time when her skeptical beliefs about this new paradigm was "soaring and I was sure that it would never work". But even though she felt uncomfortable and her beliefs were skeptical, and she is the type of trainer who could resist new teaching methods, she made a surprising comment that the "whole experience was not necessarily a negative experience, and I did grow from this." This could be due to the fact that Carol had

persevered in her action of planning and operating the learning tasks and she observed that she could achieve this. This phenomenon is reflected in the literature where Richardson (1996) asserts that there is a relationship between beliefs and actions, and that these are interactive in nature. It is then in performing the act that the student teachers will start changing their beliefs. Since Carol's vision of achievement as a facilitator of learning focused on good learner performance and she did not want learners to do badly, she expressed her feeling of operating the learning task in terms of learners' performance when she stated "learners were not excited at all" and "I expected more of them". A further example is evident in the excitement that she experienced when "two learner groups … found stuff that they did not need to know about, which was outside the curriculum". Carol's use of learner performance as an indicator of learning is reflected in the literature as an indicator of quality learning and teaching by Morrow (2007) and as an interplay between performance and meaning as asserted by Van Huizen *et al* (2005).

From operating the learning task, Carol realised that she needed to understand more Life Sciences content knowledge for her to be able to "challenge" the learners and "ask them questions". She was aware that she did not specialise in Life Sciences in her undergraduate years and therefore does not have knowledge of all the Life Sciences content areas planned for learners in the Life Sciences curriculum documents. Carol also realised that "time is a challenge" especially when working with particular teaching approaches e.g. learner group presentations.

6.6.2.2. Assessment of the learning task for self-awareness and constructive support

Carol as a result of operating and assessing her own learning task became aware of her strong points and weak points in operating a learning task. She used this information to identify how she could develop in terms of the following: clarity of problem, instructions,

meta-learning, time and learner management. She identified the specifics with regard to each aspect that she needed to improve: the problem posed as clear, but it "lacked relevance, challenge and urgency," the learner involvement was assessed as "at times a few shows an interest" and her time management as "allows distraction and the focus is on individual needs". She was aware that for her to improve she would have to develop her management skills in the class, to be stricter, to create a better learning environment and to get the learners to listen.

The assessment by Carol's peer, the mentor teacher and the researcher served to be constructive for her development and learning. Her peer only commented on strong points and she described the learning task as "outstanding [since] you had the attention of even the naughty children in the class and everyone participated" while the mentor teacher and the researcher indicated strong and weak points and also offered advice as evidence by "(t)he idea of the group presentations was excellent … You need to focus on managing the time and the dynamics of the group presentation (researcher assessment).

6.6.3. Step 5: Reflecting on action and interpreting

The reflections that Carol shared on a social and personal level were essential for her construction of her practice theory. In reflecting Carol had to elicit her beliefs, thoughts, perceptions and feelings about being a facilitator of learning and her experience of facilitating learning in her professional portfolio and during the specialisation discussion sessions.

6.6.3.1. Critical incident, practice, experience and vision informed the meaning of the role of a facilitator of learning

Carol constructed her understanding of the role of a facilitator of learning from a critical incident (the conflict she experienced with a learner in her class) and from facilitating learning through the execution of learning tasks herself, her own experience of being taught and her vision for a facilitator of learning. The conflict situation that Carol had experienced with a learner, challenged her to think and act differently when she said "I showed the learners that I am serious about 'teaching' and discipline in our classes and that I was not going to back down." As a result of this situation she stated that even though "I was very shocked with this situation [conflict] …I know that next time I am equipped to handle it the right way." She felt that she "grew in confidence … I feel more self-assured in handling difficult situations." The importance of the development of the professional identity as "embedded in the sociocultural practice in which she was a participant" (Van Huizen *et a*l, 2005, p. 281-282) was evident in Carol's learning and development.

After facilitating her first learning experience Carol wrote, "this was the first really momentous moment in my development as a facilitator of learning. My first baby steps in the right direction." This indicated her growth. It was while facilitating learning at the school that Carol became aware that she wanted to be a mixture of the following: "to know my subject; the children to enjoy, and I do not want to be boring; for it to be fun, but not too much fun because it gets out of hand." She understood her role as "I have to set the tone in the classroom".

Her perception was also informed by her experiences as a learner at school where the teachers displayed varied personalities and effective teaching competence. She stated that "many teachers were horrible. My mathematics teacher was a real teacher; he explained

well but was horrible to children." Even though he was horrible she thought he was "the greatest math's teacher." Another great teacher "Afrikaans teacher was totally different - she was cool." Her Biology teacher was also great because "you could ask him anything and he knew everything but the class was so boring."

Carol's perception of a facilitator of learning was: "A fun, cool teacher who was not boring but set the tone, who did not teach all the time, who knew everything and explained well, and was a motivating force in the children's lives." This perception was essentially similar to what she stated in cycle 2, step 1 – 4.2. This facilitation of learning at the school extended and affirmed her perception (Kolb, 1984; Kagan, 1984, Leavy, 2007) of the role of a facilitator of learning.

6.6.3.2. Learning from practice, observing learners and personal experience.

Carol was aware that she had to make changes when operating a learning task. She was aware of what she needed to improve and she said "for my next school I will be stricter from the beginning rather than try to be relaxed." She also evaluated the use of group work when she said "I do not think group work, works." She had made this decision on the basis of observing the learners. She stated that learners "do not like it. Learners think: I do the work and I get this mark. Someone in my group does not do work and they get the same mark." Carol thought that co-operative learning had its uses but it had problems as the learners "do not like presentations and they do not listen to their classmates." She was aware of this from her own experience when she said that "at university I do not listen to my classmates when they are presenting".

6.6.3.3. Attitude to learners, practice and quality of impact of a mentor teacher

Carol was assigning meaning at a micro-level in the interactive situations (Van Huizen *et a*l, 2005) where the meanings were implicit. Carol assessed the teacher mentor as a person who "really thinks about her children even though her discipline is not the best." When Carol observed the mentor teacher teaching, she questioned and challenged her own competence about what she did and what she was capable of in facilitating learning when she said "maybe I didn't research all the learners in my class and maybe they did not construct their own meaning about everything." Carol though did conclude that "I know for sure that the learners in my class achieved more than those that were sitting and listening in this (mentor teacher's) class. Carol stated that when she observed the mentor teacher teaching she "was very bored and stared at the information on the transparency that she (mentor teacher) was busy explaining." It was whilst experiencing this and observing the learners in the classroom that she "suddenly realized that there were maybe two learners in the class that were listening to the teacher in front". At this point she felt the internal need as described by Korthagen (2001) in the literature, for her to change. She stated that this was "the day that I had the AHA feeling for the first time." It was at this point that her beliefs about the new paradigm were moving to an acceptance level as she "realized that this new paradigm in education is not absurd as I thought." This move from a personal to a professional exploration was essential for Carol's self-realisation for the paradigmatic change in beliefs.

Carol stated that even though the mentor teacher "really does help with problems" in terms of resources etc. that Carol required for facilitating learning, she did not "expect that much" from the mentor teacher. She thought that the mentor teacher could "not influence my practice theory in a positive way". The reasons Carol gave for this were that the mentor teacher "teaches like a teacher, she stands and talks [and] … she teaches different

from what we expect" and she "did not know what I did wrong, or how I could improve" when the mentor teacher assessed her learning experience. Carol stated that it seemed as if the mentor teacher did "not know anything about what we [student teachers] are doing." Carol then concluded that she did "not think her [mentor teacher's] practice theory and ours is similar."

6.6.3.4. Syllabus, advice and the content of the sessions

Carol stated that the specialisation session "did more like help with the syllabus (Life Sciences policy document) the stuff we did not know about." She also shared that the sessions impacted on how she facilitated learning in that when she "I explained to learners what they had to do, but I was also aware that Professor Ned had told us that we should not explain any theory to them, they must read the instructions and interpret them". Carol stated that what she experienced in the programme "was not what we expected at all, but it was not useless because we use some of it and it helps to develop overall." She evaluated the programme as "developed us as teachers and not as biology teachers". Carol stated this as she was not learning Biology content (what she expected to do). Carol evaluated two specialisation sessions - "the one on substantive and syntactical" and "the theory and practice one" as the ones that made a huge contribution: towards her construction of her practice theory.

6.7. Mack

6.7.1. Planning action

6.7.1.1. Feelings of uncertainty and a lack of decent learning tasks

Mack's learning tasks had the required features as depicted in the module documents for the Life Sciences PGCE student teacher. Mack's experience of designing the learning task is linked to his feelings about the learning task. Mack felt nervous about the planning of a learning task as he did not know in his words "what exactly I am going to facilitate and how I am going to go about it", and also if it was "going to be effective." These feelings were increased by the fact that he had not planned all the required learning tasks for this practicum period. Furthermore, Mack was looking for lesson plans that he could use, instead of designing them, but he could not "find decent ones " and he had to now design them.

6.7.2. Taking action

6.7.2.1. Diverse feelings and a learner incident influenced the operation of a learning task

Mack expressed anxiety as "things went wrong" and he was "frustrated" because his organization of the learner activity "took so long", longer than planned for the session. Mack had tried taking risks by using new and different approaches e.g. "co-operative learning with the learners at the beginning of the practicum but he had "found it tricky." He attributed this feeling to "the uncertainty of a new experience". Mack also expressed feelings of enjoyment for operating the learning task. This feeling was due to the learners' responses in that they "seemed to be enthusiastic about what they were doing, they were not talking or bored, they were getting involved.

Mack was aware that he had to consider learners' needs while facilitating learning. This awareness was developed from a critical incidence that he had experienced with a learner who he had counselled (spoke to him about his work). This learner experienced "struggles with work" and after the counselling he was "keen to start." Mack's action was self-rewarded in an emotional way (Hargreaves, 1998) as he "felt nice talking to him." This action alluded to the larger action that Mack thought was essential when facilitating learning in that it was "important to get the learners to learn and be enthusiastic about learning".

6.7.2.2. Assessment of the learning task for self-awareness and constructive support

Mack as a result of operating and assessing his own learning task became aware of his strong points and weak points in operating a learning task. He used this information to identify how he could develop in terms of the following: co-operative learner, learner discipline. The assessment of the learning task by different assessors was essential for constructive development in that the assessors provided constructive support. Mack's peer, the specialist lecturer and the researcher also identified strong and weak points of the learning task operation and made many suggestions.

6.7.3. Step 5: Reflecting on action and interpreting

The reflections that Mack shared on a social and personal level were essential for his construction of his practice theory. In reflecting Mack had to elicit his beliefs, thoughts, perceptions and feelings about being a facilitator of learning and his experience of facilitating learning in his professional portfolio and during the specialisation discussion sessions.

6.7.3.1. Emotional and identity formation

Mack experienced mixed emotions when he said "I am enjoying it. I am stressed at the moment … I am a bit worried". Mack had these mixed feelings due to the time demands that he felt as a facilitator of learning when he said "I do not know if I will get everything done" [work programme for the term]. Mack also experienced feelings of amazement of himself - facilitating learning when he said "I never knew that I could be like this – facilitating learning." Mack also perceived his role as a facilitator of learning in a professional developmental one when he said "it was enjoyable … the fact that you see yourself going somewhere, you see that you are developing."

6.7.3.2. Learning from practice, learner aspects and facilitator of learning positioning

When Mack implemented teaching approaches he used his understanding of the effects of these for quality learning for learners. The evidence of this was when he used group presentations and he let the groups decide how they were to present their project reports. The reason that he gave for this was that he wanted the learners to be "creative in their presentation" [as] … too many guidelines would have limited them." He became aware, after observing the learner groups working, of what he could have done to make the facilitation of learning more effective. He stated that he "could have given definite guidelines for the brainstorming. This would have been more helpful and constructive for the learners." He was aware that when working with groups this is "where the whole meta-learning comes in, where you work first with the individual – once they have established what they know and have something, then you work with the group". Mack was aware that learners are constructors of meaning when he said "[the learners] construct the best understanding of the topic by putting ideas together, using the resources that they have." Mack also developed an awareness of the importance of his spatial position in the classroom in relation to that of the learners. This is indicated by in his words, "I noticed

that when you stand in a spot, half the class is not focused or is going wild [and] … I have a tendency to stand next to the OHP and some learners don't get involved and I tend to ignore them." He became aware that "more interaction happens when I am not standing behind a desk or the OHP." He shared how he was using his practice theory when he said "lately, I have been trying to move to the centre of the class." He stated that "no one told me this, it comes with practice."

6.7.3.3. Expectations and benefits

Mack had expectations of what the mentor teacher should do. One particular expectation was that the mentor teacher should be present in the classroom with him throughout the practicum period. But this did not happen and even though Mack at first was upset by this, this was he realised a good thing for him as "I was given space to learn about things by myself". In a way the absence of the mentor teacher was support of an indirect nature for Mack. The direct support that was provided by the mentor teacher was in terms of discussing and illustrating how to integrate the policy requirements, resources and guidelines for teaching and assessing particular sections and providing constructive assessment for the learning operation. Mack found this beneficial because the mentor teacher was very supportive and she indicated clearly in the learning task assessment what his weak and strong points were and she gave useful suggestions. Mack decided that it was to his benefit if the mentor teacher "was sort of critical of us".

6.7.3.4. Ideas, guidance, assessment, reflection and life factors

During the specialisation sessions ideas about facilitating learning were discussed in the light of the student teachers' beliefs and practices of facilitating learning. Mack stated that he used all the things about how to design a learning task and how to facilitate learning as opposed to teaching that he got from the discussion sessions. Mack stated that "I am

constantly growing on ideas from the specialisation programme." The specialisation lecturer according to Mack gave "good guidance with regard to the learning task presentations that we did". He described how he constructed his practice theory of assessment criteria for assessing a learning task when the specialisation lecturer suggested that "to maintain learning you need to ask the learners questions so that you can improve the quality of their learning; bring in a criterion like, are they talking to each other about it". Besides the advice given by the specialisation lecturer Mack developed awareness of what particular aspects of his facilitating learning practice he could improve on, from observing a video of himself facilitating learning and assessing his practice. Mack assessed himself as "you can improve". He was aware, for example that his time management, initiating learning instructions and managing learner discipline could be improved on. Mack thought that reflecting was important for his development, as it was during these reflection specialisation discussion sessions that the specialisation lecturer and the student teachers "reflected on what we had done and on how we could improve them to make them more effective." Mack thought that the discussions during the specialisation sessions were constructive and the student teachers were challenged to think about their personal and professional identity and personality. He stated that they had "work(ed) on how we can better the factors in our lives and shape them to our personality."

6.8. Step 6: Evaluating Action

The descriptive data in this step was concerned with evaluating the impact of the various strategies and actions on the student teachers' construction of their practice theory. The student teachers' responses for step 2 were compared with their responses for step 5. A detailed report of the data collection, descriptive data analysis process and the descriptive

data are presented in appendix 1, section II – cycle three in the DVD). The analysis process of the descriptive data and the emergent themes are presented in 6.8.1. and 6.8.2. respectively.

6.8.1. Data Analysis

The descriptive data was read and emergent themes were developed from the data.

6.8.2. Themes

6.8.2.1. Appropriate strategies for learners to develop knowledge

From their observation and assessment of Life Sciences teachers teaching, the student teachers all focused on what they could do with the learners for effective facilitation. They, for example, constructed perceptual knowledge about the use of appropriate strategies to enable the learners to construct knowledge for themselves and on how they (the student teachers) could maximize teaching time. In exploring their meaning of a practice theory, it was evident that they viewed practice (action of facilitating learning) as a central tenet of a practice theory. They thought that this practice theory was linked to a person's beliefs about facilitating learning. At this stage of the programme, they were for the first time designing a section of a learning task. They thought that in designing a learning task they would have to use their practice theory, which they did do. They also used their beliefs about how learners learn to develop the learning task and they realised the importance of having an understanding of pedagogic content knowledge when developing learning tasks. The preparation to facilitate learning activities that the student teachers experienced served to support their construction and use of their practice theory.

6.8.2.2. Reflecting

The beliefs that Bernice, Carol and Mack had were enhanced by their reflections (Korthagen, 2001c; Wade & Yarborough, 1996). It was through reflecting that each of the

student teachers could share their beliefs and experiences (practice) of facilitating learning. During the process of reflecting the student teachers were also constructing knowledge about how and when to reflect. Carol shared that she "did not know what to do, I just guessed". The student teachers used the knowledge that they constructed form the action of reflecting on how they reflected (the process of reflecting) for their practice theory. In this enabling, reflective learning process each student teacher was learning how to reflect and also how to facilitate learning.

The student teachers experienced the reflective learning process in solitary and social settings (Zeichner & Liston, 1996) outside of the specialisation sessions. The reflections shared during the social setting served to inform their understanding of: who I am as a person (identity), what is my role of, and professional identity of being a Facilitator of Learning? The student teachers experienced relief from intense negative emotions and they engaged in an essential construction of self-confidence, during these social settings. This value of togetherness in frustration for learning alludes to the social learning that was essentially necessary for each student teacher's construction of a practice theory (Claxton, 1999; Lebler, 2005). This value of togetherness in frustration for learning prompted the student teachers to organise meetings outside of the specialisation meeting times. These meetings gave the student teachers space to share and value themselves as individuals, Facilitators of Learning and provide co-operative support. Even though in Carol's words the meetings were "not very constructive as it was just a moaning session" they were critical for the student teachers to develop as persons. It was during these meetings that they "spoke about our frustrations and the difficulties that we were experiencing". These reflections were analytical, not descriptive (Zeichner & Tabachnick, 2001; Leavy, 2007). So, during these meetings the student teachers were crucial co-constructors and co-operative support for one another. These social settings where togetherness in frustration

for learning transpired, were essential for the student teachers' construction of a practice theory of, and for, facilitating learning.

6.8.2.3. The construction of a practice theory comprised both cognitive and perceptual knowledge

The student teachers experienced challenges to the construction of their practice theory. These challenges were in terms of the learning task design, operation and assessment. According to Bernice, she constructed her practice theory from "her operationalisation [of learning tasks], assessment and reflections" and "learnt from the learners' response". Carol constructed her practice theory from "the experience at the schools" (Amarel & Feiman – Nemser, 1988) and Mack from his "experiences of facilitating learning". The student teachers' practice theories were not transmitted from a teacher educator to the student teachers (Von Glaserfeld, 1984; Korthagen, 2001). They were self constructed from individual and also social settings (Wortham, 2001; Van Huizen et al, 2005).and they were further developed by the integration of education theory. The common denominator for the self-construction of practice theory was for each student teacher to facilitate learning in an actual classroom.

The practice theories of all three student teachers focused on themselves (each student teacher) on what they could do to facilitate learning. While Bernice's and Mack's theory focused on organisational aspects in an unemotional manner, Carol's theory focused on her actions of interacting with learners, in an emotional manner. One of Mack's organisational aspects focused on his spatial position in the classroom in relation to the learners. He was aware that the distance between him and the learners impacted negatively on how he could manage discipline and also keep the learner's attention (Saunders, 1992).

Korthagen (2001) reminds us that practice improves due to the perceptual knowledge that is constructed.

Bernice, Carol and Mack's feelings about facilitating learning impacted on their construction of their practice theory. This impact of emotions on learning is stated in the literature by Hargreaves (1998). Feelings of uncertainty as expressed by Mack were linked to "what exactly I am going to facilitate and how I am going to go about it (facilitate the learning tasks)". The student teachers' feelings that they experienced were also linked to how learners responded "they are quite excited about what the surprise is and now I am excited" (Bernice) and in Carol's words "I was disappointed, I expected more of them [from the learners]. The student teacher's feelings were in waves of despair and elation.

The student teacher's feelings impacted on their beliefs about teaching and learning. This relationship is discussed in the literature by Korthagen (2001b). This was evident from comparing the statements that they made after facilitating learning of their first and their last learning task for the first school-based session. Bernice was concerned with "how to get them [learners] started properly." She then believed and acted on what she needed to do as the "learners just started the work". Mack's beliefs about group work were challenged in that he did not understand how to get them participating in the group. His belief about what to do was perceived when the learners in their groups "were brainstorming". Carol's beliefs were that the "skepticism … about this new paradigm was soaring and I was sure that it would never work". She then realised that "this new paradigm in education is not absurd as I thought." These beliefs depended on the student teachers using inner wisdom and authority as suggested by Ray (1999). Bernice, Carol and Mack's beliefs played a crucial role in promoting their paradigmatic shift (Slabbert, 2007). But this shift was possible **ONLY** due to the student teachers being placed in new,

challenging situations where they risked these new unknown practices and created the reality of their belief. This type of shift has been described in the literature by de Kock and Slabbert (2003). In these encounters with practice the student teachers adopted the "belief initiated mental model" which is described by de Kock and Slabbert (2003) in the literature chapter.

6.8.2.4. Mentor teachers varied in their contribution to the student teacher's construction of their practice theory.

Even though Bernice was happy with her mentor's support she only used her (the mentor teacher's) learning task design ideas and her disciplinary measures. Carol was "confused" by her mentor's assessment of her learning task operation and thought that her practice theory was not influenced by her (mentor teacher). What Carol did perceive though is that her mentor cared for the learners and had her own practice theory. Mack experienced a revelation that the absence of the mentor from the classroom gave him "space to learn about things by myself". But he had used the support and guidelines that she had provided. Even though she was "sort of critical" of his lessons he valued her constructive suggestions and the spirit in which it was done.

6.8.2.5. During the specialisation sessions

This contribution was in terms of the syntactical aspects as expressed by Bernice "administration stuff, not really with content and context stuff." This programme was not in accordance with Mack's expectation of learning about "how to teach sections of Biology" and Carol's "what we got was not what we expected at all". Even though Bernice perceived it as not having "contributed a lot … as it was not practical" to implement she did learn how to assess her practice of facilitating learning. Carol on the otherhand perceived it as "not useless because we use some of it and it helps to develop overall."

Carol had also internalised (Korthagen, 2001) her experiences of the specialisation discussions as she was aware that she should "not explain any theory to them [the learners], they must read the instructions and interpret them". She also realised that she needed to know more about particular content areas and she took the necessary action "go and learn more" to achieve this. This focus on taking responsibility for her own construction of her practice theory was essential for Carol's perception of herself as an effective facilitator of learning. Mack attributed his construction of his practice theory to the theory and action that was shared during the sessions about facilitating learning. He came to realise what changes he had to make for him to facilitate learning effectively. He valued the contribution and focus of the specialisation programme in focusing on "how we can better the factors in our lives and shape them to our personality." And most importantly he was aware of his gains "I am constantly growing on ideas".

A significant development during this cycle is that the student teachers reflected on their experience of collegial support that operated outside of the specialisation sessions, only among the three student teachers. Overall, the reflections that the students made were essential for them to think deeply about their constructed meaning of their practice theory and to challenge this meaning.

Each student teacher actively participated in the interventions and constructed their particular practice theory. They were experiencing a transformation in their feelings, beliefs and practice of facilitating learning. These transformations impacted on the student teachers' construction and use of belief-initiated mental models (de Kock & Slabbert, 2003).

6.9. Conclusion

Analysis of the student teachers' practice theory regarding their preparation to facilitate learning in practice and regarding their facilitating learning in practice produced a number of themes. These themes describe the dimensions of how the student teachers constructed their practice theory and how they used the contribution of the mentor teacher and the specialization programme to enhance their construction of their practice theory. Evidence was presented to support the themes developed. In the next chapter the analysis of how the student teachers used and further constructed their practice theory in cycle four will be presented.

CHAPTER SEVEN

CASE STUDY PARTICIPATORY ACTION RESEARCH CYCLE FOUR

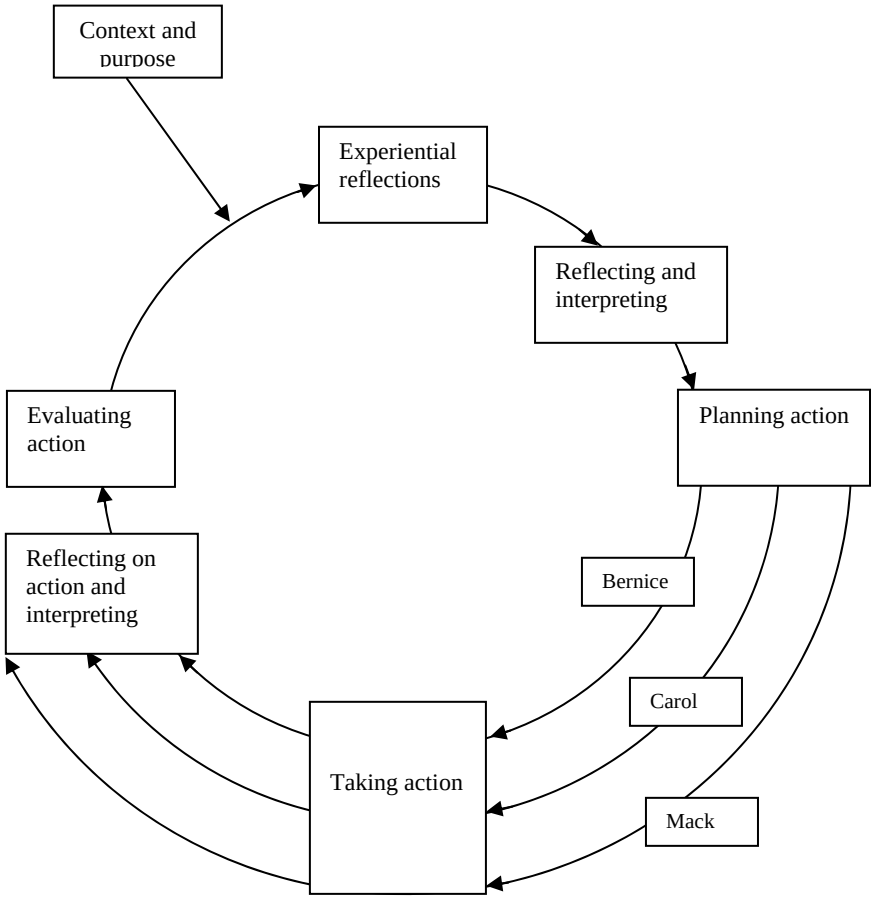
7.1. Introduction

The purpose of this chapter if three fold: first it hopes to present the sequence of this cycle in relation to the other three cycles, observed in Table 8 (see shaded area). Second, it presents the case study participatory action research cycle model used as observed in Figure 3. Finally it describes the data analysis process and presents the analysed second level data in the form of themes for each of the steps in the cycle and conclusions are reached.

Table 8: Sequence of cycles

Action research cycle one	Action Research cycle two	Action Research cycle three	Action Research cycle four
Weeks one, two and three	Weeks four, five and six	Weeks seven to seventeen	Week twenty to thirty-nine

Figure 3: James model for cycles three and four.



7.2. Context and purpose

7.2.1. Context

The contexts for this cycle were the school that each student teacher was assigned to and the university site. The student teachers spent eight weeks at the school. They observed their assigned mentor teacher teaching and they started preparing the learning tasks for facilitating learning during the first week. They then facilitated learning for seven weeks. During this cycle the student teachers attended specialisation sessions at the university. The participants in this cycle were the student teachers, the specialisation lecturer, teacher mentor, the student teachers' peers and the researcher.

7.2.2. Purpose of cycle four

Three dimensions underpinned the purpose of cycle four. These dimensions were, first, to challenge each student teacher's practice theory regarding his/her *preparation* to facilitate learning in practice. Second to challenge each student teacher's practice theory regarding their facilitating learning in practice during an extended school based learning period (seven weeks) and, third to assess each student teacher's practice theory through the presentation of a Professional Portfolio during a Portfolio Defense session at the end of the programme. In terms of the first dimension, student teachers were encouraged to utilise their practice theory as an assessment tool for observing mentor teacher teaching at a placement school and reflecting on and sharing their experiences as the outcome. The other aspect involved challenging each student teacher's constructed meaning of practice theory through the analysis of the learners' level (standard of work and the context of the school. It was also important that each student teacher was challenged to assess his/her progress with regard to facilitating learning in practice. The answers to the questions were also explored for a better understanding of their practice theory construction.

With regard to the second dimension, student teachers were challenged about their
Learning task design by the student teachers, Learning task operation by the student teachers, Learning task assessment by the student teachers, their peers, the teacher mentor, the specialisation lecturer, and the researcher and, participation in specialisation sessions. The student teachers were expected to reflect on and share their experiences regarding the above.

The third dimension, as already explained, focused on the end of the programme.

7.3. Step 1: Experiential reflections

Bernice, Carol and Mack's experiences of tutoring learners at the placement school, their observation of the mentor teacher teaching, their meaning of practice theory, and their constructed practice theory of designing learning tasks were elicited during the university specialisation sessions. These student teachers' elicitations (responses) represented the descriptive data. A detailed report of the data collection process, the data analysis process and the descriptive data are presented in appendix 1, section II – cycle four in the DVD. The analysis process of the descriptive data and the emergent themes are presented in 7.3.1. and 7.3.2 respectively.

7.3.1. Data analysis process

The descriptive data was further analysed for emergent themes. The descriptive data was read and relationships that were present in the data between the categories previously deduced, were established. The themes are presented in 7.3.2.

7.3.2. Themes

7.3.2.1. Features of effective teachers

The student teachers compared the first and second mentor teacher's teaching. In making these comparisons they challenged and extended their constructed meaning of the role of an effective facilitator of learning. This is supported by Bernice describing her second mentor teacher as different from her first one in terms of her teaching approach, her management of discipline and she decided that these were having a negative impact in terms of "spoiling the learners". A further example of this re-construction can be seen in Mack's case where he characterised an effective teacher in terms of how she managed her

time. This is evidenced from the statement that he made where he stated that the teacher was “brilliant; she must be one of the best mentors”. The student teachers could also make judgements about the mentor teacher’s competence with regard to her teaching abilities to teach. Carol judged her mentor teacher as having “old ideas of teaching”.

7.3.2.2. Learner work and teacher expectations generated ideas for effective practice

Bernice stated that the learners at her second school were used to people going down to their level, and “they are fed everything because the teachers think that they are not capable”. Carol evaluated the standard of work at the school as “low.” The reason that she gave for her evaluation was that the learners “did not want to do much work … but this was due to the teacher, who only gave them a little work.” The student teachers were aware that in Mack’s words if more is expected of the kids “they perform.” He also associated the learners’ performance to the type of school and the ethos of teaching and learning that was present at the school. The student teachers made decisions about how they were going to work with the learners and why they were going to do this. Bernice decided that she was going to get the learners to do extra work, but in order to do this she would have to “boost the learners’ confidence” to get them to want to participate and perform. Carol, on the otherhand, facilitated learning during this week and she realised from this experience that she expected too much from the learners and that in order for her to construct an understanding about the performance level of learners in grade 10 it “would have to come from experience and a talk to my mentor”.

7.3.2.3. Comparison reveals progress, weaknesses and betterment

The student teachers had developed an awareness of their progress by comparing their first experience of facilitating learning with this second experience. Bernice thought that her

progress at the beginning of this second session was already better compared to the first session when she "felt like she was nowhere." She gave an example of her progress now as "the assessment is much better because my first assessment stuff was kind of don't know how to, where to". The student teachers were aware of their weak points in facilitating learning during the first session and they made decisions about how they could improve on these weak points. This awareness was in the case of Carol and Bernice enhanced by the fact that they were doing the same learning task that they did in the first school (Zeichner, 1990). For Bernice, she knew what was expected of her and she could "see how the facilitation of learning could happen better" (Claxton, 2000). in facilitating learning in this learning task.

7.4. Step 2: Reflecting and interpreting

Each student teacher reflected on what he/she shared during the experiential reflection step. As these reflections were crucial to opening up each student teacher's feelings, thinking and action of their shared experiential reflections and the intervention and meaning given to these experiential reflections I identified reflection factors (questions) and interpretations (responses) from the data. The reflection factors in this step were on the role of the specialisation lecturer in the specialisation sessions, the participation of the student teachers in the specialisation sessions and on the student teachers' reflections on the utilisation of their practice theory as an assessment tool for observing mentor teachers teaching at a placement school. These student teachers' reflections (responses) represented the descriptive data. A detailed report of the data collection process, the data analysis process and the descriptive data are presented in appendix 1, section II – cycle four in the

DVD. The analysis process of the descriptive data and the emergent themes are presented in 7.4.1. and 7.4.2 respectively.

7.4.1. Data analysis process

The descriptive data was further analysed for emergent themes. The descriptive data was read and relationships that were present in the data between the categories previously deduced, were established. The themes are presented in 7.4.2.

7.4.2. Themes

7.4.2.1. Challenges, sharing and decisions about facilitating learning

Professor Ned provided the context for the session and he asked the students to share their reflections with respect to their experience at the placement school. As the student teachers shared their reflections he challenged them to dig deeper and to share at a meta-cognitive level what and why they had the particular concrete experiences at the placement school. He challenged them to use their constructed practice theory to give meaning to the concrete experiences that they had experienced at the placement school. He also expected them to make decisions about how they would facilitate learning in the particular placement school contexts that they had experienced. Since this interaction between the specialisation lecturer and the student teachers was later in the year he did not have to prompt the student teachers to share their reflections and he did not *project a power* relationship.

7.4.2.2. Relaxed and comfortable with sharing experiences

All the student teachers participated as each was expected by the specialisation lecturer to share their reflections of their concrete experiences at the placement school. All three

students were relaxed and comfortable with sharing their thoughts, actions and feelings that they had experienced. A sense of safety and trust had developed amongst them and also with Professor Ned. This safety and trust relationship is coupled with the fact that the student teachers were developing in confidence and knowledge about what they expected of themselves and the positive feedback that they received from their own actions.

7.4.2.3. Teacher critique generated awareness of practice theory and ineffective practice

As the student teachers used their practice theory to assess the teachers' teaching they became more aware of the nature and content of their own practice theory. They viewed this experience as a good learning experience. The student teachers were comfortable with assessing the mentor teacher's teaching. They were pleased with the action of being able to assess the lesson and project their role in facilitating learning as much more than what the teachers were doing in the classroom. The student teachers were unhappy and frustrated with observing how the teachers taught as they did not challenge the learners instead they were in Bernice's words "spoiling the learners."

Step 3: Planning action, step 4: Taking action and step 5: Reflecting on action and interpreting

Step 3, 4 and 5 for each of the student teachers are presented in this section. Steps 3 was concerned with the student teachers planning (designing) their learning tasks and their professional portfolio. The descriptive data collected focused on the how the student teachers planned (designed) their learning tasks and also on how they designed their professional portfolio and planned for their portfolio defense. Step 4 was concerned with

the student teachers taking action in terms of operating learning tasks from week twenty three to twenty nine (seven weeks). During this time, the student teachers participated in specialisation sessions at the university. They also presented their professional development portfolios during week thirty nine of the programme. The descriptive data collected for step 4 focused on the operation and assessment of the student teachers' learning tasks, the nature and content of the specialisation session, and the nature and content of the professional portfolio and the portfolio defense. Essentially, descriptive data collected during the specialisation sessions focused on the student teachers' observations, assessments and suggestions made on how to improve the recorded learning tasks operated by Bernice and Mack. The descriptive data also focused on the short paragraph on who am I (an identity description) and the Personal profile questionnaires: Neethling Brain Instrument, Temperament indicator and the Self Image Evaluation for each student teacher. The descriptive data for the professional portfolio and the portfolio defense focused on the selected work done by each student teacher, which could be used to represent his/her development from the beginning to the end of the programme and to compile this in a portfolio – Professional Portfolio. In short, each student teacher had to select work that represented his/her professional competence. These selected pieces of work were to be supported by substantial and meaningful reflections from each student teacher. Step 5 was concerned with the student teachers' reflections on the taking actions step. The descriptive data collected focused on the student teachers' construction of a meaning for practice theory and the role of a facilitator of learning, construction and use of the theory of facilitating learning practice, the contribution of the mentor teacher towards the student teachers' construction of practice theory and the contribution of the specialisation programme towards the student teachers' construction of practice theory?

A detailed report of the data collection process, the data analysis process and the descriptive data for each of the steps 3, 4 and 5 are presented in appendix 1, section II – cycle four in the DVD. The descriptive data was further analysed for emergent themes. The descriptive data was read and relationships that were present in the data between the categories previously deduced, were established. The themes are presented in 7.4. for Bernice, 7.5 for Carol and 7.6 for Mack over the next few pages:

7.5. Bernice

7.5.1. Planning action

7.5.1.1. Relevance and interest for learners

Bernice was aware that the learning task should be relevant and interesting for the learners. In planning a learning task on blood circulation she was aware that she needed to focus on a relevant, challenging problem associated with the transmission of HIV during blood transfusions. She therefore planned the problem and asked the following question: How will you ensure that you get uncontaminated blood?

7.5.1.2. Planning the Professional portfolio was linked to her development as an equestrian rider

Since Bernice is an equestrian rider, she planned a portfolio that reflected her love for horses. She had compared her development as a facilitator of learning to her development as an equestrian rider. This is evidenced in the metaphors that she used in her portfolio. She used the metaphor of Man meets horse to represent her initial experiences of the PGCE, the metaphor of mount up to represent her development as a facilitator of learning

during the PGCE, the metaphor of Upgrade to represent her final outcome as a facilitator of learning.

7.5.2. Taking action

7.5.2.1. Revealed competence as a facilitator of learning

Bernice was competent in initiating the learning task problem and managing the learners' response to it. She had incorporated co-operative learning strategies in that each learner worked individually and then in a group setting. She operated as an effective facilitator of learning in that she patiently interacted with the learners and she convinced them to work on their own ideas and she moved from group to group asking questions and providing support to the learners.

7.5.2.2. Assessment of the learning task for self-awareness and constructive support

Bernice became aware of her strong points and weak points of operating a learning task from the learning task self-assessment activity that she completed. She used this information to identify and act on her weak points during the operation of her learning task. This self-assessment of the components of the learning task was essential for a student teacher to develop awareness with regard to the weak and strong points to facilitating learning in practice. It is also essential that this assessment includes suggestions and recommendations for improvement. This is evidenced in the researchers' assessment where the learner group session was rated as good and advise was given on how she could effectively manage her time and group outputs.

7.5.2.3. Observation of self practice revealed weaknesses

The nature and structure of the specialisation session enhanced Bernice's construction of her practice theory. Since Bernice had to observe and assess a video of her facilitating learning and her colleague facilitating learning, she realised that she (as a facilitator of learning) needed to work with accurate information and that she could distract learners while initiating learning, if she carried out certain behaviours.

7.5.2.4. Exploration of the personal – professional relationship reveals the type of facilitator of learning and personal characteristics

Bernice was aware of her own identity in that she described herself as an introvert who has a "stable sense of self worth, self–confidence and spontaneity" and believes that "the more I have to do, the more I am able to do!" Bernice's score for the Temperament indicator conflicts to an extent with her judgment about the type of person she is. While she views herself as an introvert and admits to hiding this by her other qualities, the indicator assessed her as an Influential Choleric (outwardly forceful) person who is outgoing and task-oriented. The Self-Image Evaluation (58) indicated that she has a dissatisfied self image. This could be due to the professional pressures, the expectations and changes that she is experiencing. Bernice functions as a R1 person who has a strong L1 preference as well. This is evident from her scores on the Neethling Brain Instrument (L1:80; L2:70; R1:85; R2:65). The personal characteristics that Bernice has, for example, preferring the big picture not the detail, searches for alternatives, becomes bored quickly, and who is comfortable with chaos, fantasy, surprise, association are borne out in the type of teacher that she is described as – an R1 trainer/teacher (facilitator of learning). This type of teacher (facilitator of learning) usually gives a holistic view of the lesson and prefers to

link it to other subjects and point out how it applies to the real world, encourages spontaneous participation and includes a fun element in parts of the lesson.

7.5.2.5. Presenting the Portfolio at the Portfolio Defense revealed and confirmed her development

During her presentation Bernice stated that "the most amazing thing for me that I learnt is that I can facilitate learners and a traditional lesson is so incredibly boring." She saw her role as that of a facilitator of learning when she is at a school. She did not see her role as a teacher where "I go out next year saying to the learners that they must take out a book and write this in your book." She saw her learners as not been bored and "they will learn so much more."

Bernice described the construction of her practice theory at the beginning of the programme as "where you get theory in a book" and later during the second school based education as "I started thinking that developing practice theory is not so difficult." She was of the belief that "practice theory without a foundation" could not be constructed. She thought that the interventions that she had experienced during the programme were crucial for her construction of her practice theory when she stated that "you cannot leave someone to do something totally on their own". She did express that she had experienced frustration during the programme. This frustration was related to the schools in that "in the schools we do not see the things that we learn about at university, we do not see it at all at the school." She expressed her gains from the programme "personally, from the PGCE I have learnt to work with different people with different personalities."

7.5.3. Reflecting on action and interpreting

The reflections that Bernice shared on a social and personal level were essential for her construction of her practice theory of facilitating learning in practice. In reflecting Bernice had to elicit her beliefs, thoughts, perceptions and feelings about being a facilitator of learning and her experience of facilitating learning. .

7.5.3.1. Learner responses, awareness of learning task design and personal characteristics

Different factors during the learning task operation influenced Bernice's construction of a meaning for practice theory and the role of a facilitator of learning. Bernice felt pleased about the learner responses during the learning task that she operated in that "all the learners, except the two in the front, were working, even the ones that never work … the meta-learning went well." She was also pleased with her choice of problem as it concerns all of us and "the learners realised it was a real life problem" and they were aware of it in their lives. Bernice believed that "patience is a very important characteristic of a good facilitator of learning." She said that "I enjoy teaching and I love the kids …and I got them to do different things."

7.5.3.2. Learning from practice, challenges and feelings

Bernice was aware of what still challenged her when she stated that "I do not believe that I have perfected the problem statement, learning task design or learning task presentation." She was aware that by her practice of facilitating learning she would improve. She used a metaphor to describe this learning "after four years of show horse riding, I still fall off now and then! One is never too old to learn and experience comes with time." Bernice was aware that her feelings about her choice of problem for the operation of the learning task

stemmed from the fact that as a facilitator of learning she could "use real world problems that the learners could relate to."

Bernice had expressed that a challenge in designing the learning task was thinking about ideas on what to do. The intensity of this challenge is observed from the fact that she grappled with it for some time and then "the idea to do this came to me when I was in bed just last night (the day before she was going to facilitate learning). Even though she had planned the learning task she was not pleased with what she had planned, hence the ongoing thought planning. Bernice though did not feel challenged by operating the learning task, since she realised that she had taken into account her knowledge of facilitating learning and she had "attempted to meet all the requirements of a good learning task presentation (LTP) as specified in the Study Manual for Facilitating Learning (Slabbert, 2004, p. 16)." Bernice did feel challenged though that she had not made any "allowance for meta-cognition." She was aware of what she needed to do but did not put it into practice as evidenced by "this is the conflict with my practice theory. I did however; rectify this in the next learning task that I have designed."

7.5.3.3. Awareness of negative features of practice led to decisions about facilitating learning

Bernice had expressed that she had not learnt much from her mentor in that she (the mentor teacher) "was not good with the learners and I learnt how not to behave with the learners." Since Bernice labelled her mentor teacher as a "monster with the learners" and she felt that it was "punishment for me to sit in the class and observe her yelling at the learners". Bernice decided and she knew that she was going to act differently with the learners.

7.5.3.4. Support, participation and idea sharing

In reflecting on the contribution of the specialisation programme towards her construction of her practice theory, Bernice expressed that "the comments the professor made were very helpful. The ideas that he gave me were very good." Bernice was aware that her "role as a specialist facilitator of Biology" was enhanced by her participation in the specialist sessions. She enjoyed the interaction and exchange of ideas that took place during the specialisation in that she stated "one of us would throw ideas and another would get ideas".

7.6. Carol

7.6.1. Planning action

7.6.1.1. Experience of designing and practice of operating learning tasks

Carol's learning tasks on Mammalian tissue and the Human skeletal system, Human blood circulatory system. had the required features as depicted in the module documents for the Life Sciences PGCE student teacher. Carol's designing the learning tasks during this facilitating learning session was influenced by her previous planning and practice of designing and operating a learning task. As Carol was to facilitate the same learning task that she had designed and operated at her previous school, she was aware of the features of the learning task that required modifications and she could act on this.

7.6.1.2. Planning the Portfolio to show professional and personal development

Carol stated that she had planned the portfolio "to show my professional development as a facilitator of learning during this year" and to reflect "her creative development." She

stated that in her professional portfolio she had "included all the items and evidence of things that had made an impact on her professional development as a facilitator of learning." She also shared that "my personal development contributed to my professional development and I included this as well in my professional portfolio." Evidence of this is the following quote from her professional portfolio:

> *During the year I encountered a variety of experiences and situations….I gave my first baby steps as a facilitator of learning in my first SBEP1 and could handle myself with confidence in my second school based education programme (Carol, portfolio, 2004).*

7.6.2. Taking action

7.6.2.1. Affirmation and expectations

At this point in time Carol had planned and operated learning tasks and she did not feel threatened by this task. She was aware that in operating the learning tasks she had to work with the expectations of the new paradigm.

7.6.2.2. Assessment of the learning task for self-awareness and constructive support

Carol as a result of operating and assessing her own learning tasks became aware of what she did, for her to assess the learning task operation as "it went well". She was also aware of her strong points, for example, she used a real life context problem that had adhered to the problem design criteria and had used meta-learning where learners planned, monitored and assessed their own individual learning. Her weak points that she was aware of was that she needed to "work with the meta-learning questions" in formulating them in a more challenging and appropriate manner.

The assessment by Carol's peer, the mentor teacher and the researcher served to be constructive for her development and learning. Her peer assessment was supportive and filled with praise for her excellence in facilitating learning. The mentor teacher and specialisation lecturer's assessment indicated a final assessment and complimentary and advice statements, for example, "enjoyed the learning task presentation immensely" by the mentor teacher and "look at how you can improve the instructions" and "the individual work – meta-learning" by the specialisation lecturer.

7.6.2.3. Observation of colleagues facilitating learning led to a realisation of effective practice

The nature and structure of the specialisation session enhanced Carol's construction of her practice theory. Since Carol had to observe and assess a video of her colleagues facilitating learning, she observed that the learners during the initiating learning phase of the learning task operation were "noisy in the beginning and it got worse". This made her realise that during this phase learners should be quiet and listening to the instructions (organisational aspects) of the learning task. This consideration for student teachers to plan the initiating learning phase when operating a learning task carefully is supported by Slabbert (2007), since this phase is the only one that can be designed.

7.6.2.4. Exploration of the personal – professional identity revealed the personal and professional development of student teachers

Carol was aware of her personal and professional development from the beginning of the programme to this point in the programme. At the beginning she was a "shy, introverted person" who doubted if she could stand confidently, with authority in front of a class and now even though she was still shy and introverted she had developed her self-image and

was a confident professional facilitator of learning. She concluded that this development was "through experience". Carol, in going through this experience, also became aware that she could be a creative person and she could, with effort, hard work and time come up with ideas for facilitating learning in practice. As a result of this awareness, she decided that when she planned a learning task she would make a "conscience decision to look at the positive aspects of what she had done" and in doing so this would then have a positive impact on her personal development – she would be able to handle negativity and stress. This thinking was important for her development as her score for the Self-Image Evaluation (63) indicated that she had a dissatisfied self image.

Carol's scores on the Neethling Personal Skills Instrument were L1:81; L2:77; R1:72; R2:70. Carol was analysed as the type of person and 'teacher' that sought accuracy, works for precision, critical correctness – not to make mistakes, is goal oriented, and facts and rational information are of fundamental importance. Carol was also analysed as an authoritative trainer who likes to be in control of the situation at all times. Carol's score for the Temperament Indicator indicates that she is a Perfectionistic Melancholy (introvert) who is withholding and task-oriented. These two objective tests foregrounded Carol's personality as a person who was a perfectionist and needed to be in control. As Carol was not entirely in control of facilitating learning and she had experienced stress and negativity, she developed a dissatisfied self-image.

7.6.2.5. Presenting the Portfolio at the Portfolio Defense revealed her experiences that led to her development

Carol in presenting her portfolio described the developments that she had experienced in that at the beginning of the year she "started off as a teacher and at the end of the year I

was a facilitator of learning." She also shared her most memorable learning moments during the year which was when she had "the experience in my mentor teacher's classroom where I had the "aha" feeling and the learning task on levers where I wanted to see if it would work and it did." She described her practice theory at the beginning of the year as "it was just a theory but later I constructed my own meaning about these aspects." She thought that the discussions and explanations during the specialisation and her own actions were crucial to her constructing her own theory when she said "I decided to stand up/wake up." She also said that reflections helped her construct her practice theory as she "could see what works and what does not work." Other factors that had the greatest impact on her development was "meta-learning, everything linked to learning; my experience at the second school [which] was a diverse environment". Carol said that all these experiences "opened my eyes." Carol concluded that she had "experienced three years in one [the one year of PGCE, as] there was so much that I had to take heed of" and learn. She declared that if she had not done this PGCE programme "I would not have changed my understanding of what a teacher is and I would have been a teacher." She described the feelings that she had experienced during the programme as "I had all ups and downs, it is hard work and you experience feelings of being satisfied and unsatisfied. At the end you feel satisfied." Carol stated that she had "come a long way, it was definitely not a waste of my time and it does not stop here." She described her experience as a "huge stepping stone to the rest of my life." She also described the impact that this programme had on her personal development as "personally I have developed - I was very afraid, I was a terrible person and I do not want to be this type of person. Now I have become a stronger person, I have grown up in the class."

7.6.3. Step 5: Reflecting on action and interpreting

7.6.3.1. Observations of practice and context versus self-awareness and improvement

Carol's meaning of the role of a facilitator of learning was constructed from her experiences at the school. From her experiences she concluded that the teacher role was "boring and not just for me …I can see that the learners are not listening and I am feeling frustrated." Carol thought that she "became more professional as a facilitator" during this school-based period. The reasons that she gave for these were "because of the setting, the high standards and pressure that the school and the parents place on the learners … I became more confident in my abilities as a facilitator of learning". Carol was aware that her role as a facilitator of learning was made easier by the type of person she was – her organisational and planning skills were quite good. She believed that as a facilitator of learning you could always "improve on any part of your repertoire".

7.6.3.2. Self- learning from practice, assessment and reflections

Carol thought that she constructed her theory of facilitating learning when she started "with a learning task design… firstly plan everything and then go and operationalise your learning task." She realised that "you learn through practice theory and if you do not get your practice theory you will have a problem facilitating learning." She stated that when she took a learning task that she had used in the first school-based session and she improved on it and then presented it to the learners during the second school-based session, her "meta-learning was improved tremendously (I think it was the best meta-learning of all my learning tasks)." Carol concluded that her "practice theory has had an impact on the way I design and operationalise my learning tasks" and as a result she could plan quickly and she could also think about changes to make more quickly. She was aware that before she had constructed her practice theory she "needed the exact structure" of the

learning task in order for her to start facilitating learning. She believed that the "experience that you get in the classroom" was important for her construction of her practice theory. Carol realised and believed that it was not just from her own 'acting' but also from "comparing learning tasks and ideas with your fellow students" and "getting criticism and any assessment" which are valuable resources for the construction of her practice theory. She said that when she "read through the learners' assessment of me I gained a lot of knowledge of myself as facilitator." She thought that "every facilitator must be evaluated by his of her learners. It keeps you on your toes and informed about the standard and quality of facilitating learning".

7.6.3.3. Awareness of the quality of the impact and challenge of practice

Carol had constructed an awareness of the type of work that the learners were capable of doing. She said that her mentor teacher wanted her to "explain the work to the learners" not to get them to do it themselves. She thought that he did not contribute to her construction of "phronesis" as he "told me that I gave the learners too much to do and moved too fast with the learners" In reflecting and analysing his comment Carol thought that "I might move too fast but I saw what the learners are capable of if they really work." She said that he also "expected me to teach the section [on the heart] first using a transparency and then give them tasks." She decided not to do what he told her to do. Instead she "decided to do it [the lesson] in groups [learner]". She concluded that the "learners learnt more now rather than if I had worked with the transparency."

7.6.3.4. The contribution of the specialisation programme towards her construction of her practice theory evaluation for learning

Carol stated that "the specialised module contributed to my development in that my organisation is better." She said that "every session you do different things and you learn." She said that "critique helps from the specialisation lecturer, it helped a lot."

She thought that if she "did not get the explanations and discussions about the stuff, I would not have developed my own theory."

7.7. Mack

7.7.1. Planning action

Mack had planned a learning task on the Blood circulatory system for Grade 10 learners. This learning task had the required features as depicted in the module documents for the Life Sciences PGCE student teacher.

7.7.1.1. Influenced by the practice of designing and operating a learning task

Mack had planned learning tasks for the first school-based session and he was aware that the learning tasks should have particular features. He planned his learning tasks in such a way that the context, including the resources, class organization; cooperative learning groups, assessment – methods, tools and techniques were clearly outlined and integrated. As he had constructed the knowledge and skills of assessment strategies, he planned learning task where individual, group and peer assessment rubrics were included.

7.7.1.2. Planning the Portfolio for the Portfolio Presentation Defense

Mack stated that in developing the portfolio this "helped him to focus on consolidating what he had done over the year, helping him to focus where he had developed, how he developed, and looked at what the learners produced. In his portfolio Mack planned to insert evidence of his understanding of what he learnt and what he needed to change with regard to facilitating learning. He came to realise that "there is a very big challenge for me to be firmly grounded in my knowledge of the subject before I can facilitate" learning and "how important the LTP (Learning task presentation) is and how important it is to follow the guidelines for successful LTP."

7.7.2. Taking action

7.7.2.1. Learner responses and time

Mack was aware from operating the learning task that the learners in his class were very capable and they could respond to the challenges that he had set for them. This response informed his thinking about the competence of learners in different school contexts. Even though Mack was pleased with the learners' responses he was frustrated by his inability to complete the sections on time. He thought that he needed to manage his time more efficiently.

7.7.2.2. Self-realisation and constructive development

As a result of assessing his own learning task, Mack was aware of what he could have done differently in operationalising his learning task for it to be rated as excellent. He was aware that his major weaknesses were "non-verbal communication, discipline and consolidation", his minor weaknesses were "use of media, learner action and learning

quality". He was also aware that his good performance was "verbal communication and the competence to use a demonstration method in class.

Assessment of the learning task by different assessors is essential for constructive development in that the assessors provided constructive support. While his peer commented on, for example, his good management of assessment and groupwork and the effective use of worksheets she questioned his effective use of time. She did state though that she was "very impressed … of excellent performance of outstanding quality." Mack's mentor teacher and specialisation lecturer also identified strong and weak points of the learning task operation and they both assessed the learning task as excellent. The specialisation lecturer exclaimed that he was "amazed at what he (beginner facilitator of learning) got out of the learners – excellent work on his part."

7.7.2.3. Specialisation sessions served for further construction of practice theory

The nature and structure of the specialisation session enhanced Mack's construction of his practice theory. When Mack observed a video of himself and his colleague facilitating learning, he became aware that he needed to work on the organisational features of using group inputs to maximise learners' learning and that he (facilitator of learning) could be the cause of the learner's distraction with resulting chaotic learner behaviour. He also became aware that it was important for him to have a certainty about Biological facts and that he had to use accurate Biological knowledge when facilitating learning.

7.7.2.4. Personal and professional development

Mack was aware that his thinking and actions were influenced by his Christian beliefs and also by his current attitudes and point of view. Mack's score for the Temperament

Inventory indicates that he is a Popular Sanguine (extrovert) who is outgoing and people-oriented. Mack's scores on his Neethling Personal Skills Instrument were L1:81, L2:72, R1:79, R2:68. According to these scores, Mack has a high preference for a L1 and average skill strength for L2, R1 and R2. Mack is functioning more as a left-brained person. He used his analysis of his character to explain, assess and decide on appropriate action for him to be an effective facilitator of learning. His awareness, for example, that he is a "holist by nature, it is therefore important for me to be able to see the bigger picture rather than the isolated facts" informed his belief about how the learners' appreciation for Biology could be developed if they understand the details of Biology. He decided that he would have to "gain a stronger content knowledge about Biology". Mack was also aware of his scoring of his self-image and his progress in this regard. Even though his score for the Self Image Evaluation of 61 indicated that he has a dissatisfied self image, he stated that "I have a fairly good self image**;…**I saw that my self-confidence definitely improved as time went by and I became more comfortable in the interactions with the learners, which is a very comforting thought."

7.7.2.5. Presenting the Portfolio at the Portfolio Defense revealed challenges and developments

Mack was aware that the purpose of presenting the portfolio was to "show that I have developed in all seven roles of an educator as described in the norms and standards of Educators (2000)". Even though Mack had presented his learning tasks he still felt challenged by "what I needed to do to lead to clarifying aspects for learners and what learners really need to know, why they need to do the work and the urgency to do it." Mack was aware though that he had "experienced a lot of development" and what he needed to change when operating a learning task. Mack's critical eureka Learning task [on

Anaemia] had set him on the path to becoming "better and more interesting to learners [as] … everyone knew exactly what they were to do."

Even though Mack had knowledge of constructivism, the information about facilitating learning in the student teachers' workbook made no sense to him. He said that the only time that he came to grips with facilitating learning was "by getting into practice" and "the reflections that I did". He stated that in evaluating his reflective practice "I do think that I did not reflect enough and now I see the importance of reflection, especially critically [reflecting]."

He concluded that in the PGCE programme "I have learnt to be a facilitator of learning rather than just a teacher teaching." What he meant by this was that he was not going to "just hand out notes, regurgitate notes" as he was going to create "circumstances where learners are engaged in developing meaning of actual content, developing personally in content, how to make it real to them and for them to use it". He was aware that he still needed to work towards getting the learners to "maximise potential, but I think this is not the be all and the end all." He thought this way because he believed that as a facilitator of learning you are faced with and experience so many emotions and these are "a central aspect to facilitate learning." He described his own emotions of despondency and despair when he tried to facilitate learning "and encourage learners to complete the activity and achieve what you want them to achieve and the learners are not convinced." Mack believed that a law for facilitators of learning is that they had to "have love … [and] the way in which you encourage and support" a learner is important. Mack declared that (a) he had "reached the end of the year and I have so much that I can develop on; I am a lifelong

learner," and (b) that his personal progress "got me out of my comfort zone and I am not dependent."

7.7.3. Step 5: Reflecting on action and interpreting

7.7.3.1. Emotional, personal-professional dimensions

During his development of the role of a facilitator of learning he experienced different emotions. He felt "greatly encouraged" when he became aware of what (the outcomes) that he could expect from learners. Mack also felt confused and frustrated with himself and the changes that he was expected to make. He said "I originally intended to do [teach]. I thought, maybe it is just; I do not know how to go about the whole problem based facilitation. I don't know how I could have got them thinking about it more." Mack was aware that he needed to make his lessons problem-based and he said that "maybe I do not know how to yet." His lack of knowledge about how to work with problem-based lessons could be due to his own beliefs about working with them as evidenced by his comment "I feel that problem based lessons take a lot longer than just normal teaching. So I feel I would have got a lot more content … in this lesson if I had just been teaching." He was not comfortable and stable with his belief and what was expected of him when facilitating learning. This discomfort and instability with his belief and the expectations of what is required from a student teacher in the programme was evidenced by him saying "I mean, the process part [the development and use of process skills] is there, but I also feel that the content part is important. And maybe there is a place for …ROTE learning, whatever you want to call it."

Mack felt strongly that the role of a facilitator of learning is also to work with content and not just skills when he said "when the learners were observing the external structure of a

leaf, maybe they are observing, maybe they are getting all these skills but where is the content?" He was aware that when the learners were recording their observations that this "is content" but that "there is also a lot of content that I wanted them to get done in that one lesson". He was aware that if he stood up "and lectured it, they would not have got the skills they did in this period and they would not have probed into the whole thing as much, but they would have got the content." He thought that as a facilitator of learning he had to have a way where he did not "split the two (content and skills) but there should be a way in which, there is a way I am sure, in which more content can be done."

7.7.3.2. Self-learning from practice

Mack constructed his practice theory of facilitating learning from the many experiences that he had during this second school-based session. Examples of this constructed practice theory are presented. From his experience of facilitating learning Mack stated that he did not know "what was expected of us [me] in the curriculum… we [I] discovered this at schools." He stated that he had "learnt a lot about, day-to-day 'teaching' and working with people in a school … like having notes prepared on time so they can be photocopied for your class, having tests done in advance" at the school. He also learnt a lot "about how to and what the importance of one [learning] task is, and how to make that a real life sort of learning task that is going to be relevant to the learners and to be able to give them positive influence in their own lives." As a result of facilitating learning he was aware that he had "not been managing my time properly". He was aware of the action that he needed to take to organise his time "so, if I just keep day to day up to date with that stuff, it makes it easier." Mack was also aware that his "practice theory informed my relationship with the learners … and my character and my beliefs influence[d] my relationship with the learners." He thought that "when you sort of operationalising a task or anything in the

class, you need to, to a certain extent, have a formal relationship with your learners." He described this formal relationship as "they [the learners] need to respect you and when you need to say something they need to listen to you" and this he thought would influence the way he treated them. From his experience of standing up in front of the classroom, he realised "somehow that you need to enforce the structure into the class. Otherwise, you will not just get anywhere with your groups [learners]."

Mack was aware that the context of the school played a role in his construction of his practice theory. He said that "I also learnt a lot of obtaining information and where to find resources to use, and what resources I can use." Mack's was also aware that "as a facilitator one of my important roles is to assess. I say important because I feel that this can quite frankly make or break a learner." He understood that "good assessment rubrics – peer, group and individual can be used to assess learners" and that learners should be "presented with the criteria with which they will be assessed before they execute the learning task."

Since Mack wanted the learners to develop the truth, he felt that he should be working more with the content so that he could reach "each of the learners "in his class. He did not want the learners to think "different things about the content" so he wanted to teach it to them.

7.7.3.3. Encouraging, open classroom, ideas and decisions

Mack described his mentor teacher as "[1]lekker" because she was "encouraging and she opened her classroom up …she really allowed me to do what I liked… and she gave me

[1] Lekker is an Afrikaans word that means nice in English

ideas of where to get resources for the sections that I was facilitating." Even though he thought that the mentor teacher could have given him a more structured list of what "needs to be covered" in Biology for the term, he reflected that it was a "good thing that I had to work it out myself. I could see how long it takes to work out each section." He also stated that he had "used a lot of what she showed me" and "she left it open for me to use or not use what she showed me – if I wanted to use it, I did, if not that was okay."

7.7.3.4. Encouragement and paradigms

Mack thought that he had not received much support from the specialisation lecturer. Mack thought that Professor Ned had "very rigid views on the whole thing [facilitating learning], if you not doing it like that then it is wrong." Mack felt strongly that Professor Ned had not recognised and encouraged him with what he had done, "I understand that it is crucial to get constructive criticism - find out what you did badly in the lesson and I think it is also just as crucial, the opposite of doing that, to find out what you were doing right". In short Mack thought that Professor Ned was not doing what he expected and had told the student teachers to do, "one of his points of facilitating learning is to encourage your students." Mack was very unhappy about the relationship and the expectations from Professor Ned, hence the claim to "not much" support. Mack did admit though that "Professor did clarify a number of things for me, which I think was needed." Mack felt strongly that "you are not going to get any learning done if the student is not going to like what they are doing." Mack felt strongly that "the approach that he [Professor Ned] has to the paradigm that he wants us to work in is not very focused on the content." Because Mack thought that "content still plays a part in education. … I am not sure where that is and I sort of wanted help there [with working with content and process skills]". Mack was disappointed that Professor Ned told him that "I am working in the totally wrong paradigm

and that I must change my thinking to a new paradigm." Mack was really grappling not so much with the amount of content in a lesson but with the move from a transmission style of teaching to a transformative style of facilitating learning.

7.8. Step 6: Evaluating Action

In evaluating the action I read each student teacher's case with regard to the observation of the teacher mentor at the second school, understanding of the level (standard) of work for learners and the context of the school, and understanding of his/her progress I then compared these responses to those that the student teachers presented in step 4 and 5. I then analysed and assessed the intervention on the basis of each student teacher's reflections about their construction and use of his/her practice theory of facilitating learning and for facilitating learning. The analyses and evaluation of the intervention is presented below.

This step focused on evaluating the action (intervention) of this cycle. Since this is the last cycle the section what feeds into the next cycle is not included.

The student teachers' construction and use of their practice theory during this cycle is evaluated on

a. their response to the challenge to their practice theory during the observation week at the school;
b. their response to the challenge to their practice theory during the school-based learning period and
c. each student teacher's practice theory through the presentation of a Professional Portfolio during a Portfolio Defense session at the end of the programme.

7.8.1. Themes

7.8.1.1. Learners should be challenged and it is the role of a facilitator of learning to do this

The experiential reflections that the student teachers shared at the beginning of this cycle revealed their perception of teaching and learning and the role of a facilitator of learning. Bernice, Carol and Mack's perception of teaching and learning was that learners should be challenged and it was the role of the teacher (facilitator of learning) to challenge the learners. Bernice, Carol and Mack thought that learners do very little because the teachers "only gave them a little work" (Carol) and "expect too little from the learners" (Mack) as they perceive the learners as "not capable" (Bernice). Their perception was that facilitators of learning should demand and expect more from learners. Mack had first-hand experience of this at his second school. He realised that there was a different work ethic at this school where "a lot is expected of the kids and therefore they perform." Carol and Bernice on the other hand were aware that teaching and learning across different school contexts were such that learners were "fed everything" (Bernice). Overall, the student teachers believed that learners could and should do more during the learning process given the support and opportunity to do so by the 'teachers'.

From their immersed concrete experiences the student teachers could project the role that they would play in the classroom. Bernice described how she would need to boost the "learners' confidence" to get them to work while Mack thought that what a 'teacher' expected of learners "could never be too high but you had to be careful not to go over the heads of learners". Carol, as a result of working with the learners and the learning tasks, was aware that she expected too much from the learners. She said that her understanding about what to expect from learners "would have to come from experience and a talk to my

mentor". The student teachers were developing as critical thinkers by being engaged in an active process of reflective analysis and projected action.

7.8.1.2. Reflecting reveals improvement, develops knowledge and skill of reflecting

The student teachers were expected to work at a metacognitive level when reflecting on their progress at the beginning of the second school-based learning period. They did this when they specifically identified and described where, what and how they had improved and what they needed to improve on. Mack realised that "there is still a lot that I can improve on", while Bernice thought that her progress in assessment was "much better because my first assessment stuff was kind of don't know how to, where to". Carol was aware that her organisation skills were better than before and she also knew how to improve them. Carol during the first school-based learning period had seen the consequences of her organisational skills. Her perception therefore about what she could do to "see how the facilitation of learning could happen better" informed her practice of what she was going to do. Mack as a result of reflecting on his learning experience was aware that he "felt a lot of stress due to his slow pace" and these feelings served to support his knowledge construction. Mack was aware that he had more to learn.

The requirement for student teachers to reflect on their learning was a crucial eye-opening experience for them. Their reflections now focused on descriptions of what they had experienced and more significantly on the intense emotions that they had experienced. These reflections also focused on a constructive component where each student teacher had a vision for what they could change and how this would impact on the learners' learning experience. Bernice's reflection on her learning task was "As I engaged with this learning task I was able to distinguish quite effectively between meta-cognition and

thereafter co-operative learning. … Successful management of meta-cognition followed by co-operative learning ensures the acquisition of appropriate life skills".

7.8.1.3. Student teachers' construction of practice theory

Bernice Carol and Mack designed learning tasks according to the learning task requirements as suggested by their PGCE Guide. It was the challenge and demands of designing the learning tasks and not just the experience of doing this that impacted on the student teachers' construction of their practice theory. Planning these learning tasks demanded effort as described by Bernice "to read up on the topic and prepare carefully" and then the "thinking and initiating ideas". Bernice and Mack experienced challenges with generating ideas for the learning task (activities) while Carol's challenge was with designing "meta-learning questions." Mack particularly experienced challenges with designing practical investigation activities due to his intense belief that content (lots of it) must be worked with in a lesson. Bernice described her designing as "you start thinking when I plan it this way will this get learners to work with it, will it interest so and so, the clever ones as well." Bernice, Carol and Mack experienced challenges with insufficient time to design the learning tasks especially when you have last minute great ideas as in Bernice's case. These are the challenges that the student teachers shared, which are not necessarily the full complement of challenges that they experienced when they designed the learning tasks. Carol had realised and believed that the positive impacts on how she designed her learning tasks came from her own 'acting', "comparing learning tasks and ideas with your fellow students" and also from using her "practice theory". The student teachers' understanding of a learning task is in Mack's words: "a real life sort of learning task that is going to be relevant to the learners and to be able to give them positive influence in their own lives". They were also aware that the challenges, role, social

interaction, effort, and attitude that they experienced and responded to, were essential for the way in which they designed the learning task.

Bernice's use of meta-cognitive questions in operationalising her learning task resulted in positive outcomes - the learners enjoyed it and were actively participating, she gained confidence, constructed knowledge and developed skills to manage co-operative learning. Carol's positive outcomes when she presented a learning task that she re-designed – the meta-learning was the best, learners enjoyed it and she was relaxed and confident. Mack's positive outcome was a "total mind set change of the outcomes that I can expect from the learners", his enjoyment of interacting with the learners and his awareness of his development. Mack though was uncomfortable and dissatisfied with his use of problem-based learning in that he wanted to use rote learning where the learners and him could work with more content.

The assessment of the leaning tasks by the student teacher himself/herself, their peers, teacher mentor, specialist lecturer and researcher where possible served to validate assessment comments and provide constructive criticism and suggestions for the student teachers to use. This is evident in the following where in assessing herself Carol stated that she needed to "work with the meta-learning questions" and Mack was aware that his major weaknesses were "non-verbal communication, discipline and consolidation".

Carol realised and believed that it was not just from her own 'acting' but also from getting "criticism and any assessment" especially from "the learners' assessment of me I gained a lot of knowledge of myself as facilitator." She also thought that "every facilitator must be evaluated by his of her learners. It keeps you on your toes and informed about the standard

and quality of facilitating learning". Learner assessment was viewed as valuable and should be included in the assessment of the student teachers' facilitation of learning.

7.8.1.4. Mentor teachers varied in their contribution to the student teachers' construction of their practice theory

While Bernice and Carol stated that their mentor teachers had not supported them they had different reasons for stating this. Bernice thought that her mentor teacher provided support in the form of direct positive feedback and indirect positive learning, in that Bernice "learnt how not to behave with the learners". Carol's mentor teacher expected her to 'teach'. She also had indirect positive learning in that she challenged his suggestion to teach by facilitating and using group work with in her words the "learners learnt more". Mack had a different experience with his teacher mentor. She was supportive and encouraging.

7.8.1.5. During the specialisation sessions

The student teachers, in a social setting, constructed their practice theory by questioning their practice, identifying their problem areas and deciding on the action that they could take to facilitate learning effectively. Bernice came to realise her weaknesses with facilitating learning on her own and in communication with the group. As Carol was experiencing problems with meta-learning questions she used this opportunity to ask "what is the best way to ask questions". Mack became aware of his weaknesses with facilitating learning and what he could do to overcome them. This freedom to critically analyse and share ideas that could enhance the facilitation of learning, during the viewing of the student teachers' videos is a necessary requirement for these sessions.

The specialisation sessions were in Bernice's such that "one of us would throw ideas and another would get ideas". This idea sharing was a necessary springboard for the students to further construct their practice theory or phronesis of facilitating learning and engendering feelings of support and enjoyment. The nature and design of these specialisation sessions was commented on by Carol when she said "every session you do different things and you learn." What is significant is that these different things were linked to the different features of facilitating learning that the student teachers had experienced. "You learn" are powerful words used for these sessions especially since the discussions were not pre-arranged, not developed from theory but they stemmed from the student teachers' reflections of their concrete experiences in the authentic learning contexts (school) and were integrated with teaching and learning theory. Both Bernice and Carol stated that Professor was very helpful in terms of ideas for Bernice and critique for Carol. But, since Mack was experiencing differences with Professor Ned and he felt uncomfortable with this experience he stated that these specialisation sessions did not contribute to his development but he later said that Professor Ned "did clarify a number of things for me, which I think was needed." The support that student teachers expect is not necessarily the support that will be provided. As this programme is focused on maximizing and fully utilizing human potential the student teachers are challenged even "forced" to make the jump as it was in Mack's case from a transmission to a transformative style of facilitating learning.

The setting and the context of the specialisation sessions was crucial to challenging the student teachers' practice theory and to further construct it to one that was aligned with transformative approaches to facilitating learning. The social interactions and individual introspection with dynamic learning were critical to the student teachers transformation in

their personal and professional identity, their role as facilitators of learning and their practice theories. Critically important during these sessions is the character and professionalism of the teacher educator. He definitely played a major role in the student teachers' transformation. He is acutely aware of what it means to facilitate learning for the student teachers to maximise and fully utilise their human potential.

7.8.1.6. Portfolio Defense

This session was a time for the student teachers to reflect on their years experience and to celebrate their development. Their professional development is described in the following sentences. Bernice said "the most amazing thing for me that I learnt is that I can facilitate learners". Carol stated "started off as a teacher and at the end of the year I was a facilitator of learning." Mack stated "I have learnt to be a facilitator of learning rather than just a teacher teaching." For the student teacher to be able to say that they are facilitators of learning started with the beliefs and actions that they had and seeing the consequences of these beliefs in action. Also, assuming the identity of a facilitator of learning was critical for the student teachers to understand and assume the role of a facilitator of learning. Carol referred to herself as a facilitator of learning, while Bernice and Mack referred to being able to facilitate learners. This identity declaration instilled the being of that identity in the person.

The programme also challenged the student teachers to develop personally. Bernice who did not "trust people easily … [and who] would rather be alone than amongst other people" learnt to "work with different people with different personalities." Carol stated that she had developed her "self-image immensely" and she "gained the confidence"

And she concluded that “now I have become a stronger person, I have grown up in the class.” She had identified her weakness as a scared person that she did not now “want to be”. Mack saw himself as out of his “comfort zone and I am not dependent.

7.9 Conclusion

Analysis of the student teachers’ practice theory regarding their preparation to facilitate learning in practice and regarding their facilitating learning in practice produced a number of themes. These themes describe the dimensions of how the student teachers constructed their practice theory and how they used the contribution of the mentor teacher and the specialization programme to enhance their construction of their practice theory. Evidence was presented to support the themes developed. In the next chapter the conclusions and discussion, recommendations and suggestions for further research will be presented.

CHAPTER EIGHT

SYNTHESIS, THESIS, IMPLICATIONS, RECOMMENDATIONS AND CONCLUSION

8.1. Introduction

In the preceding chapters a challenge and a possible solution to the following question was presented. The question posed: What should the focus of the pedagogic content knowledge in teacher education be, to improve the quality of teaching and learning in our schools, develop learners to become problem-solvers and risk-takers, in the process of constructing knowledge, and educate them for an unknown and uncertain future? A teacher education focused on phronesis is suggested as a solution for it could prepare student teachers to be flexible individuals who have assuredness of being, are competent and committed professionals. These professionals could be the ones to improve the quality of teaching and learning, and prepare learners for an unknown future. I am aware of various teacher education programmes that develop student teachers professionally; however, in my study I worked with a contemporary, radically innovative one year Post Graduate Certificate in Education (PGCE), based at the University of Pretoria. I use the findings presented in the preceding chapters, to reveal how student teachers constructed and used phronesis (practice theory) to enhance their professional development. This construction of a practice theory of, and for not teaching, but facilitating learning, proposes a new paradigm for student teacher professional development.

In the present context of South African education, the improvement in schooling will depend on how student teachers are professionally developed, not to teach, but to facilitate learning. Due to inadequate schooling, many learners may be denied access to the modern world, and from developing as empowered individuals for a world of uncertainty. Poor results in literacy and dysfunctional schools, for example, are clear evidence inadequate schooling. A prime reason, discussed in chapters one and two, for this, is the poor quality of teaching and the impact that this has had on the quality of learning that learners experience. The implementation of policy initiatives by the Departments of Education, to address this issue, has proved unsuccessful. It has not brought about change and improvement in the quality of schooling. Evidence of this, is in the poor learner performance in both international and national studies, presented and discussed in chapter one. An improvement in schooling can only be made possible, once there is visible improvement, in the quality of teaching and learning in schools. Furthermore, if we are to improve the quality of teaching and learning in South African schools, we need to address the quality of teacher education that student teachers receive as part of their professional development. It is on this basis that I present an argument for focusing on the professional development of student teachers as facilitators of learning where they construct and use a phronesis of, and for, facilitating learning.

The provision of such knowledge to facilitate quality education is possible if teacher education focuses on changing the student teachers' paradigms of thinking and action about education. The age-old "technical-rationality approach" (Schon, 1983, p. 21) to teacher education, where teacher educators make simplistic choices of educational theories to be transmitted to student teachers who then have to apply these in practice, is

a reason for the lack of improvements in the quality of teaching and learning. These improvements could be effected, if in student teacher professional development there is a shift from the assumption that children have to be taught in order to know, to one that they have to "be facilitated to develop their unique potential" (Holdstock, 1987, p. 49). This focuses ultimately, on a shift from the teacher who transmits knowledge, to a facilitator of learning who facilitates learning. Facilitating learning, as previously stated, requires the construction of phronesis.

Aristotle (350 BCE) used the term phronesis to focus on an individual knowing what is "good for human beings in general and will have the ability to apply such knowledge to particular situations" (*Nichomachean Ethics*, VI 5, 1140B. p. 6) (in Ross, 1980). This meaning incorporates the action that an individual undertakes and the decisions made to solve a problem in a particular situation. This focus on the good and the capacity to solve problems suggest a duality of reason and emotion. It is through the action of solving a problem furthermore, that changes to behaviour and development of individuals takes place (Roca, 2007).

As chapters four, five, six and seven show these changes are observed in this research in the student teachers' development as professionals. The term phronesis, for example, is replaced in chapter four by the term practice theory. As shown in chapter two, practice theory is derived from the Aristotelian use of phronesis with its focus on particulars and the action for common good. It focuses on particular practice, reflection on such practice, social learning of the practice of learning, and the inclusion of existing theories of education (Korthagen, 2005, Slabbert, 2007). During the professional development programme, each student teacher was expected to construct their own

practice theory. In this context, the role of the student teacher is that of a facilitator of learning who "generate[s] knowledge [during] the process of facilitating learning (Slabbert, 2007, p. 22). This represents a practice theory of, and for not teaching, but facilitating learning.

It is thus for this reason that the primary research question in this study is: *how do student teachers construct and use phronesis to enhance their professional development?* This research question was explored in chapters four, five, six and seven by addressing the sub-questions: (a) what is the student teachers' baseline phronesis when they enter the programme? (b) how do student teachers utilise the contribution of the mentor teacher to construct and use their phronesis to enhance their professional development? (c) how do student teachers utilise the contribution of the specialisation programme to construct and use phronesis to enhance their professional development?

With regard to these questions, the findings were presented in four case study participatory action research cycles. The findings in cycle one, as discussed in chapter four, for example, were concerned with student teachers' baseline phronesis of the role of a Biology teacher[1] and their responses to the challenges of their baseline phronesis. The findings in cycle two, as discussed in chapter five, were concerned with establishing the student teachers' phronesis (practice theory), in the paradigm of facilitating learning in the Life Sciences and the challenge to each student teacher's practice theory against the professional dimensions of facilitating learning in the Life Sciences. The findings of cycle three and four, as discussed in chapters six and seven, are concerned with establishing each student teacher's practice theory regarding their

[1] The term teacher is used when discussing data from cycle one of the study. This term is later replaced by facilitator of learning in cycles two, three and four.

preparation to facilitate learning in practice and facilitating learning in practice. Further findings have to do with the assessment of each student teacher's practice theory through the presentation of a Professional Portfolio during a Portfolio Defense Presentation.

In this chapter, the findings from the action research cycles are brought together to provide the synthesis, for this study. The thesis for this study is drawn from the synthesis of the data. Furthermore, the implications of this study for student teacher professional development are discussed and suggestions for further research are made. Finally, a conclusion is presented.

8.2. Discussion

The themes that emerged from each action research cycle, as discussed in chapters four, five, six and seven were matched within and across the cycles to respond to the research questions outlined on the previous page. These responses are concerned with the student teachers' baseline phronesis, how they utilised the contribution of the mentor teacher, and the specialisation programme to construct and use phronesis to enhance their professional development. The responses are presented in this section.

8.2.1. Student teachers' baseline phronesis

Exploring student teachers' experiences, assumptions, and beliefs about teaching and learning on entry to the teacher education programme is supported in the literature by,

amongst others, Feiman-Nemser and Remillard (1996), and Leavy, Mc Sorley and Bote (2007). In this study, an exploration of the student teachers' baseline phronesis revealed their perceptions, beliefs and emotions about teaching and learning Life Sciences, their reasons for wanting to teach, their expectations of the teacher professional development module, their concerns about teacher constraints and the possible actions that they could carry out, and their visions for the type of Life Sciences teacher they wanted to become.

8.2.1.1. Developing learners' appreciation

The student teachers' perceptions and beliefs about their role in teaching and learning Life Sciences focused on "developing appreciation in learners." They believed that learners did not possess appreciation and that it therefore had to be developed in them. It was for this reason that they believed the best situation when teaching Life Sciences is for teachers to work with the theory and practical aspects together. Bernice gave an example of what the student teachers could do to develop appreciation in learners. She thought that the learners could be given concrete structures to interact with so that they could "see, it and feel it" (Rooth, 1995). But, in order for the learners to develop appreciation, they would have to in Carol's words: "love and know about and understand and believe" in what they were learning. The student teachers were aware that developing appreciation in learners is not a simple process as it involves the use of concrete objects, developing learners' understanding and beliefs about Life Sciences phenomena. This development required the use of practical investigations by teachers when 'teaching' Life Sciences.

8.2.1.2. Emotions inform commitment and perceptions of the role of a 'teacher' (facilitator of learning)

The student teachers' perceptions of the role of a Life Sciences teacher focused also on their emotion of "passion". Bernice and Mack expressed this feeling of passion for the subject, while for Carol this feeling "borrel(s)" in her. Even though the student teachers' basis for their "passion" differed, its use was concerned with developing learners. For example, Mack "had a passion for nature" which he wanted to develop in the learners and Carol wanted to use the passion that she had to support the learners in their learning. The emotions that the student teachers expressed revealed the relationship between their commitment and perception of their roles as teachers. Within this frame, personal motivation and development (Van Huizen *et al*, 2005) are related to the roles of the student teachers during the initial phase of their professional development as a facilitator of learning.

8.2.1.3. Desire to teach and the experience of teaching

The student teachers' collective reasons for wanting to teach were historical connections, a desire to teach, being taught by excellent teachers, interests in children and people, and an experience of teaching. The common reasons given were a desire to teach, as expressed in Carols' words: "I always thought that I would not mind becoming a teacher" and, the experience of teaching children. These reasons served to boost the student teachers' personal motivation and development for facilitating learning. The student teachers' experience of teaching children served to reveal features of teaching that they enjoyed. This was observed in Bernice's case where she thought that, "small kids are fun" to teach. In Carol's case this experience served to formalise her desire to teach. And in Carol's words: it was the "spuit op die kop" (nail on the head).

The "aspiration and commitment" (Van Huizen *et al*, 2005, p. 276) to teaching was fuelled by the student teachers' emotions and experiences of teaching. This trend of thinking is evident in the principle of learning and developing from emotional experiences in the Vygotskian theory (Van Huizen *et al*, 2005). The theory though, lacks an explanation for the nature of the teaching experience and the impact of this experience on the student teachers' commitment and aspirations for teaching, and perceptions of their role as teachers.

8.2.1.4. Vision for and of the type of teacher (facilitator of learning)

The student teachers' vision for the type of Life Sciences teacher that they wanted to be was influenced by their personal experiences of being taught during their schooling and tertiary years of education and their own experience of teaching. These visions were linked to the expectations that the student teachers had of the teacher professional development module, their concerns about teacher constraints and the possible actions that they could carry out within particular contexts. For example, Mack was aware that his school peers had hated Biology due to the teacher using traditional methods to teach the subject. His vision therefore, was to be a teacher who made the "work fun" and not boring, so that he could develop appreciation in the learners. Even though he expressed uncertainty about what he was going to learn in the professional development programme, he still expected to learn how to teach Biology "differently", from the transmission style of teaching. Bernice and Carol were also concerned with developing their competence to teach. The student teachers, especially in the case of Carol and Mack wanted to develop their "own style and method" to find "out what works" for them. This willingness to learn with a focus on the action and the self-assessment of this

action is an important criterion in any learning process (Senge, 1990; Mims, 2003; Lombardi, 2007).

8.2.1.5. Awareness of relationship between teacher role and context

The student teachers' baseline phronesis was concerned with their awareness of the relationship between the role of a teacher and the teaching context. The student teachers were aware of specifically, the challenges and constraints that teachers experienced when teaching in particular contexts. This awareness did not serve to frustrate or deter them from becoming teachers. Instead, the student teachers used this awareness in a constructive manner. They did this by deciding on the possible actions that they could carry out, if they were the ones teaching. They also exhibited positive and pro-active thinking. This thinking was crucially important for their emotional development in these initial stages of their professional development (Zeichner, & Tabachnick, 1981; Leavy, *et al*, 2007). The student teachers exhibited their emotions and commitment to learning and developing as future facilitators of learning. They developed a self-awareness of their personal and professional development and this served to strengthen their commitment to becoming a teacher.

8.2.1.6. Rough draft, highly skewed learning task

The student teachers were introduced to learning tasks during the Hammanskraal experience. At this time they were aware that their learning tasks were in Bernice's words: "slightly skewed". This becoming aware was important for their construction of a practice theory of facilitation of learning practice. The understanding and skill of designing learning tasks is crucially important for initiating learning in learners, where they are actively involved in and about the requirements for designing a learning task

(Van Merrienboer & Paas, 2003). It is important therefore that student teachers are knowledgeable about the essential features and principles of a learning task and not just the content of Life Sciences. The student teachers were being challenged to think deeper about learning and teaching in the process off designing the learning tasks. From their experience of developing learning tasks the student teachers were assigning a professional and personal meaning to teaching performance. This aspect is important in the student teachers' construction of phronesis. This learning and development of student teachers is a principle in the Vygotskian theory of learning and development for teacher education.

8.2.1.7. Personal and professional attributes

The student teachers' vision for the type of facilitator they wanted to become was related to their personal and professional development. Bernice wanted to become a Life Sciences teacher who was interesting and passionate. Carol and Mack waned to be the "best teacher" for the learners and they were aware that that needed to develop, to become this type of 'teacher'. Mack and Carol also expressed their emotions and the need to develop a professional identity (Leavy *et al*, 2007). These visions reflected competence criteria, commitment to facilitating learning, emotional and contextual aspects that the student teachers were aware of.

These student teacher visions are linked to the principles of "orientation toward ideal forms" and "learning from emotional experiences" (Van Huizen *et al*, 2005, p. 274-275). The contextual aspect though, features in the "assigning meaning" (Van Huizen *et al*, 2005, p. 275) principle. Clearly, the Vygotskian principles for learning and development are not discrete entities. Instead, they are cross-connected and intertwined.

In constructing a vision for type of teacher, student teachers are moving between the principles, mentioned above, in a 'back-and-forth' fashion. I describe this as a cross-connected manner. Furthermore, within each principle there are many features that are intertwined. For example, "ideal forms" (Van Huizen *et al*, 2005, p. 274) are not constant, independent of individuals' personality, emotion, meaning development, and context. They are changeable, dependent on personality, emotion, understanding and internal and external motivational forces (Coffey, 2001). This suggests that all these are intertwined and interconnected. The theory does not focus on the forms in this way. In fact, what it does suggest is that there is "continuity between the development of a personal and a professional identity" (Van Huizen *et al*, 2005, p. 273).

In summary, the student teachers' baseline phronesis was concerned with cross-connected and intertwined emotional, social, psychological (motivational), perceptual and cognitive features. Their baseline phronesis was concerned with developing learners' appreciation by using integrated practical and theoretical Life Sciences activities. It was also concerned with the interconnections between their desire to teach, the practice of teaching and how these influenced their commitment to teaching. All three student teachers' baseline phronesis incorporated both professional and personal aspects, which informed and enhanced each other.

8.2.2. Contribution of the mentor teacher

The contribution of the mentor teachers to the student teachers' construction and use of phronesis was explored in cycles one, two, three and four. The integrated themes that developed from these cycles are presented below.

8.2.2.1. Developing an internal need – personal to professional

The contribution of the mentor teacher was evident in cycle one, step 4 where the student teachers observed a mentor teacher teaching Life Sciences during their school observation period. This experience evoked emotions in the student teachers, challenged them to think about their role as a teacher (now called a facilitator of learning), and the further action they could carry out if they were effective facilitators of learning. Bernice, on hearing the mentor teacher say that the class was "impossible" felt more determined to "start teaching, to prove them wrong" and she also wanted to in her words: "see if I can do it". Mack also felt "motivated to go out and teach." Carol focused on the context and the constraints that the mentor teacher experienced. These thoughts, feelings and actions are evidence of the student teachers developing an internal need which will direct their effective professional learning (Korthagen, 2001b). A further example of a student teacher developing an internal need is when Carol was observing her mentor teaching and she "suddenly realised that there were maybe two learners in the class that were listening to the teacher in front". She described this experience as "I had the AHA feeling for the first time." It was at this point that her beliefs about the new paradigm were moving to an acceptance level as she "realised that this new paradigm in education is not absurd as I thought." This type of thinking and acting is described in the literature as that which could possibly lead the student teachers to developing a need for change and learning (Zull, 2002).

The mentor teacher indirectly contributed to the student teachers' construction of this need and provided the context for the student teachers' experiential learning (Zeichner, 1990). In essence, the mentor teacher indirectly contributed to the personal and professional development of the student teachers. This connection between the development of a personal and professional identity is evident in the theory framing and supporting this study, in terms of the development of a professional identity that "underlies and directs" (Van Huizen *et al*, 2005, p. 275) the development of professional knowledge and skills. What is clear from the student evidence in cycle one is that their personal aspects override their professional as the focus is on them and how they need to develop as individuals and as professional; it is not an outward projection of rating their development against a list of criteria for an effective teacher (facilitator of learning).

8.2.2.2. Thinking and action for effective practice and developing criteria for effective teaching (facilitating learning practice)

The claim that mentor teachers indirectly contributed to the student teachers' professional learning is supported and extended by the evidence from cycles three and four. In cycle three, step 1, the purpose of the student teachers critiquing the mentor teachers' teaching served to generate ideas for effective practice for the student teachers. Bernice had assessed her mentor teacher in the class as performing a "feeding the learners with stuff" role. At this stage in her professional development Bernice was aware that the learners had to construct knowledge for themselves and that the teaching methods employed by the mentor teacher were not developing learners. When Carol observed the mentor teacher teaching, she questioned and challenged her own competence about what she did and what she was capable of in facilitating learning.

Carol though did conclude that “I know for sure that the learners in my class achieved more than those that were sitting and listening in her mentor teacher’s class. Bernice, Carol and Mack had assessed the learning experiences of learners and they decided that they needed to make it an enjoyable one for the learners.

In cycle four the student teachers extended their constructed meaning of the role of an effective facilitator of learning. This was informed from observing and comparing the teaching competence of the first and second school-based mentor teachers. The student teachers constructed a list that they could use to rate a teacher as effective and in this way they were constructing and challenging their practice theory of facilitating learning. Bernice constructed and used the criteria of teaching approach and management of discipline, and Mack used the criterion of time management. Bernice used these criteria to make judgements about the mentor teacher’s impact on the learners and in Bernice’s words: she was “spoiling the learners”.

8.2.2.3. Teacher- learner relationships

The mentor teacher also made contributions to the student teachers’ understanding of teacher-learner relationships and the work ethic of learners within particular contexts. Since Carol in her baseline phronesis was concerned with the type of relationship that she needed to have with her learners, she observed that even though her mentor teacher did not know how to discipline the learners, she cared for them. The mentor teachers’ lack of disciplining the learners served to challenge Carol’s thinking about learners’ behaviour and her ideas about how she could discipline them. Carol viewed the learners as “not that bad” and she decided that she would have to handle them “opposite” to how the teacher handles them. She stated that she “will be very strict.”

Bernice thought that a teacher's personality was important when interacting with the learners while teaching. She observed that many teachers "did not have an open experience" with the learners, due to them being "totally stuck up and boring". She decided that she would be "relaxed and herself with the learners". This necessity for a student teacher being himself/herself when teaching, challenges the thinking that he/she develops to an externally developed "ideal form" (Van Huizen *et al*, 2005) for 'teachers'. The personal (private) features that a student teacher constructs for a facilitator of learning are the "ideal form" (Van Huizen *et al*, 2005) for that student teacher. This ideal image is not static; it is evolving and linked to the personality, meaning development and experiences of the student teachers. Bernice was constructing her image of facilitator of learning from the way she perceived herself in relation to others (Zirkel, 2000). But, her teacher identity construction was initiated by her observation, judgements and decisions about who and what type of facilitator she wanted to become. Bernice's experience of observing her mentor teacher teaching, highlighted for her the importance of being "a person who is [and she wanted to] … laugh with them [learners]."

8.2.2.4. Teacher work, learner work and context

The student teachers constructed knowledge about the varying levels of work that mentor teachers gave to learners and their perceptions of learner work. From observing different teachers teaching in different contexts, the student teachers evaluated the level of class work and teacher work and drew relationships between them. They observed and concluded that the level of learners' class work was in some cases determined and established by teachers. They concluded that some teachers gave the learners "a little work" and therefore, the learners did "not want to do much work". They further

concluded that some teachers “fed everything” to the learners because they thought that the learners were “not capable”. They were aware that in Mack’s words: if more is expected of the kids “they perform.”

The student teachers also constructed knowledge of the relationship between teacher work ethic and context. Mack during his second practicum session realised that there was a different work ethic at the school, where “a lot is expected of the kids and therefore they perform.” These observations and conclusions challenged the student teachers to think about their own actions with regard to learner work, facilitator of learning work and context. Bernice, in her context decided that she would have to “boost the learners’ confidence” to get them to want to participate and perform.

8.2.2.5. Feelings, thinking and challenging teacher work and action decisions

The student teachers expressed different feelings about their observations of the mentor teachers teaching. Bernice experienced “fun” and she “felt good” because the mentor teacher was not in the classroom and she was responsible. Carol and Mack did not assume any responsibility in the classroom; they were expected to observe the mentor teacher teaching and to record these observations. They expressed feelings of boredom as there was not much for them to observe and record. This was due to the minimal amount and intensity of work that the teachers presented. In this context, Carol and Mack did not feel challenged and they did not want to only observe. In fact, they were eager to facilitate learning. Carol also expressed feelings of fear. These feelings stemmed from the observation of learners (that she was to facilitate learning with for seven weeks), not listening to the mentor teacher and the “chaos” that took place in the

classroom. Carol used her feeling of fear in a constructive manner, in that she planned and decided on how she could possibly interact with the learners.

8.2.2.6. Support, expectations and self-awareness

The student teachers rated the mentor teachers' support according to particular criteria. Bernice thought that the mentor teacher made a huge contribution to her construction of her practice theory in that she "answers every little question," and supported her "planning of learning tasks". Bernice concluded that this was possible as the mentor teacher had completed the same professional development programme that she was completing. The student teachers' constructed knowledge about the type of support that the mentor teachers could provide and the impact of this support on their construction of phronesis. This is evidenced in Carol's case where her mentor teacher mainly supported her with resource problems. She concluded that even though her mentor teacher had a supportive nature and she felt relaxed with her, her mentor teacher could not impact on her practice theory as she "teaches like a teacher". Mack thought that his mentor teacher was "sort of critical" of his lessons but he valued her constructive suggestions and the spirit in which it was done.

The student teachers had expectations of the mentor teachers' support. When Mack expected his mentor teacher to be present in the classroom and this did not transpire, he realised that this was to his benefit. The absence of the teacher from the classroom gave him "space to learn about things" on his own.

8.2.3. Contribution of the specialisation programme

The contribution of the specialisation programme to the student teachers' construction and use of phronesis was explored in cycles one, two, three and four. The integrated themes that developed from these cycles are presented below.

8.2.3.1. Eliciting, meaning–making and challenging beliefs

The specialisation lecturer played multiple roles during the specialisation sessions. These roles were critical, supportive (van Huizen, *et al*, 2005) and constructive (Claxton, 1999) in enabling student teachers to construct phronesis. Initially in the programme, he elicited the student teachers' baseline phronesis, for them to be aware of their perceptions and beliefs about teaching and learning. This development of awareness was not an instant once-off process for the student teachers. They were engaged in many different awareness creating moments facilitated by the specialisation educator (Stacey, Rice and Langer, 2001). This role of the specialisation lecturer was crucial for facilitating the meaning making (Van Huizen *et al*, 2005) and the construction of knowledge by the student teachers (Von Glaserfeld, 1984). The specialisation lecturer challenged the student teachers' about their perceptions of teaching and learning and this according to Korthagen (2001) is a necessary requirement in any student teacher professional development programme. Furthermore, the role of the specialization lecturer was one where he provided guided support (Van Huizen *et al,* 2005). The principle of guided support is stated in the Vygotskian theory of learning and development but it does not provide an ontological base for role of the teacher educator. It was crucial for the specialisation lecturer to use multiple perspectives, when examining the student teachers' understanding, in order to distinguish relevant from irrelevant information, when constructing phronesis.

8.2.3.2. Exploring feelings and providing support

The specialization lecturer also expected the student teachers to share their feelings about their experiences of designing and operating learning tasks, why they wanted to become teachers and how they felt about wanting to teach even after they observed teachers in action at the schools. The depth of the challenge to their feelings can be seen in the question that he asked in one of the sessions: when he said “you say you have passion, how do you know that you have passion?”

The student teachers expressed feelings with regard to the activities that they did, their intense inner turmoils, awareness of their progress, interactions with one another and with the specialisation lecturer. The student teachers experienced feelings of despair and elation at different times in the programme. Carol in her words: “felt lost, confused and skeptical”, when a new experience was given to her. In many instances Carol was the student teacher who experienced the various activities etc., more intensely than the others. Her ‘high’ and ‘low’ feelings were indicative of her challenges and her learning and development that she was experiencing. Mack also experienced intense feelings during the programme linked to the nature of support that he had received from the specialisation lecturer. He felt that he had partially achieved certain requirements of the module and was not being recognised for this. A possible explanation for this is that the student teachers and specialisation lecturer did not having a clear connection between the expectations, understandings and the ‘action to word’ that the lecturer displayed and what the student teachers expected to observe from him. Evidently, an aspect of modelling is expected from student teachers. They, especially in Mack’s case wanted to observe the specialisation lecturer “practicing what he advised” about facilitating learning, with them.

The student teachers recognised and appreciated the support that was provided during the specialisation sessions. They were aware, for example, that clarity about the new paradigm was given and they constructed knowledge about the role of a facilitator of learning and facilitation of learning practice during these sessions. Even though Mack at one time in the programme was very unhappy with the specialisation lecturer, he acknowledged the support provided by him. He described this contribution as informing his understanding of designing and operating learning tasks. An example that he gave was when Professor Ned gave advice about learner work ethic in that as a facilitator of learning he needed to "state the urgency about it, it needs to be done now" (Slabbert, 2007).

8.2.3.3. Content, process and participation

The student teachers experienced these sessions as constructing and co-constructing knowledge about facilitating learning and facilitating learning in practice. It was during these sessions that they constructed knowledge about, for example, syntactical and substantive aspects of Life Sciences and became aware that these sessions did not contribute to developing their understanding about the content of Biology. At the beginning of the programme the students were uncertain about what they were going to be taught, and they began to realise that the focus was going to be on Life Sciences facilitation of learning, not the content. The focus of the specialization sessions were such that they enhanced the student teachers' construction of phronesis .They provided a platform for the student teachers to make decisions about how to facilitate learning

The specialisation lecturer used the student teachers' experiences of facilitating learning and their understanding of a facilitator of learning to facilitate the student teachers' construction of further knowledge about facilitating learning (Brown, Collins &

Duguid, 1989). During the sessions he challenged them to think about their understandings in relation to what they observed and originally though about facilitating learning. He also integrated this with the learning of Life Sciences from constructivist theoretical learning principles (Von Glaserfeld, 2001) as depicted in various documents that the student teachers were expected to work with, for example, the Life Sciences Policy document and the study guide that focused on facilitating learning, discussed in cycle two. He did not provide the student teachers with answers instead he got them to question their own responses further. The integration of their constructed knowledge, with theories of learning was crucial for the student teachers' construction of phronesis.

The student teachers' participation during the specialisation sessions served to enhance their understanding of facilitation of learning. This enhancement was made possible by the actions of the student teachers themselves in that in Mack's words: "it was my active participation in the session that was of intense importance." The nature of the student teachers' participation varied in that Carol did not feel free to communicate. She expected the sessions to be "a chat session". Even though Carol felt restricted it was a 'perceived rule' that all the student teachers were expected to participate. The rule was evident in the questioning and probing action style used by the specialisation lecturer.
The restriction to participate was a personal one that Carol felt. The preparation for, and the participation of, the student teachers during the specialisation sessions was an important action for them to construct their practice theory.

8.2.3.4. Assigning meaning and identity construction

Student teachers' professional identity was revealed and meaning was assigned to the facilitation of learning through the use of stories, professional portfolios, reflections, drawings, discussions and observing videos of colleagues and themselves facilitating learning. These strategies revealed the personal and professional aspects of the student teachers' perceptions of a facilitator of learning and facilitation of learning practice. An example of a personal professional conflict that was experienced was when Bernice interpreted her visual as herself doing the experiment (cycle two, step 1), and then after some thought she decided that it was the learners doing the experiment (Abbot, 1999). The experience of challenging the student teachers' perceptions of the role of a facilitator of learning was essential to their clarification of what was expected of them and what decisions and actions they needed to take to facilitate learning.

In developing a Professional portfolio the student teachers revealed the tumultuous feelings and learning that they experienced during the programme. Evidence for this was in Bernice's words: "the most amazing thing for me that I learnt is that I can facilitate learners" and Carol's words: "my personal development contributed to my professional development". Clearly, the student teachers' personal development had a major influence on their professional development. Mack stated that his personal progress was a contributory factor to his development as a facilitator of learning. The student teachers were unanimous in their decision that in Carols' words that this development was "through experience".

8.2.3.5. Real-life experiences for phronesis construction

The authentic experiences that the student teachers encountered were intensely dramatic and had major impacts on their personal and professional development. For Carol, these experiences were "totally different" in that "for the first time in her life she was challenged to the maximum" and that this education experience had been different to any other that she had, had in the past. The intensity of this experience begs the need for ongoing development. This impact has an enduring nature. It is not a once-off experience that is soon forgotten. In fact, it is one that will never be "forgotten".

8.2.3.6. Facilitation of learning practice – feelings and progress

The student teachers were expected to design and operate learning tasks during their school based sessions, and these were reflected on during the specialisation sessions. It is for this reason that I position this section of work under the specialisation programme.

In designing the learning tasks the student teachers were affirmed in their construction of their practice theory for facilitating learning. The final product of the learning task once designed, after much emotional and long hours of work, was a truly rewarding sight and experience for the student teachers (Lombardi, 2007). The student teachers' learning task design was influenced by different factors, for example, beliefs about learners' learning, understanding about pedagogical content knowledge, repeating a learning task, relevant and interesting for the learners. The student teachers were at a self-awareness stage of what their knowledge about designing learning tasks was. They used this knowledge to further construct their practice theory. .

In operating the learning tasks the student teachers became aware of their competence to facilitate learning. This self awareness of progress seemed to influence their planning and operation of future learning programmes. They also became aware of the level of learning of the learners and the work ethic of learners. Furthermore, the role and responses of learners during the operation of the learning task served to influence the student teachers of how to design and operate a learning task.

From their assessment of their learning tasks the student teachers' beliefs, perceptions, feelings and knowledge about facilitating learning and designing and operating learning tasks was challenged. This claim is supported by Carol when she said that her development and awareness of her progress came "not just from her own 'acting' but also from "comparing learning tasks and ideas with your fellow students" and "getting criticism and any assessment". The comparing and assessment of learning tasks also revealed the student teachers weaknesses and progress.

8.2.4. The student teachers' construction and use of phronesis

The meaning of phronesis as conceptualised by Aristotle (in Ross, 1990) focused on the action for the good. This 'action for the good' though, does not capture the essence of modern day life and living and the uncertainty of the future. In these post-modern times where the dynamics of person and place, body and spirit, mind and matter, change and flux are in focus, and are viewed as integrated critical components in the development of individuals, an extended meaning of phronesis was required. Furthermore, this extended meaning embraced the features of professional development. The constructed meaning of phronesis (practical wisdom, practice theory) incorporates the student teachers' perceptions as facilitators of learning, as well as their knowledge, cognitions,

beliefs and actions within the context of facilitating learning in practice. In short,: phronesis, as it is conceptualised in this research, is the individually, self constructed practice theory of facilitating learning to be used to design subsequent facilitating learning practices.

My thesis:

- ☞ The student teachers' construction of phronesis is their self construction of knowledge of facilitating learning. This knowledge is viewed as essentially perceptual with limited cognitive features.

The student teachers' understanding of facilitator of learning and facilitation of learning practice was informed firstly by reflective discussions on their perceptions, beliefs and actions in this regard. During these reflective sessions the theory of learning Science was discussed and integrated with the student teachers experiences to give them greater meaning. These experiences that the student teachers shared were used as the springboard for the construction of knowledge about the issues shared. The cognitive feature of the discussions was limited to the application of "principles of operating" that student teachers constructed from their experiences. The "principles of operating" were initially constructed by the student teachers in particular contexts and then later used in other contexts. What is significant though is that when the student teachers applied these "principles of operating" to new contexts they underwent a re-construction and re-defining. A general principle is constructed then applied to a particular context where it does not inform the practice; instead the practice informs the theory.

- ☞ The perceptual knowledge that is constructed is personally, emotionally and socially motivated.

This knowledge construction starts from an internally motivated realisation that each individual has of who they are as people, their beliefs and feelings about facilitating learning and their reasons for wanting to become teachers. A crucially important realisation for each student teacher is that they want to 'teach' (facilitate learning). This internal realisation (Korthagen, 2001) is the beginning of an intense, continuous process of student teachers challenging their beliefs and actions about facilitating learning. This process enhances the construction of knowledge about facilitating learning. Ultimately, this knowledge construction is concerned with them constructing their own theories about facilitating learning. Of crucial importance is that the internal realization is not an automatic process. Student teachers need to experience interventions that challenge their accepted and mundane thinking that teaching and learning is a passive process. Furthermore, student teachers need to be challenged to be critical reviewers of their own experience of being taught at school and their perceptions of current teaching practices. This intervention occurs in the frame of constructing knowledge about what an educator really is (Slabbert, 2003).

The perceptual knowledge constructed is personally, emotionally and socially motivated by within a social setting in different contexts. This knowledge is constructed in group settings structured within the programme and other spontaneous groupings outside the programme. The student teachers shared their emotional (frustration and joy) and organisational aspects of facilitating learning during the specialisation discussion sessions. These emotions were shared freely and openly. Each student

teacher supported his/her peer by expressing how they felt about particular facilitation of learning experiences. This sharing was not an individual but group experience in the presence of the teacher educator. The context of this sharing was within a structured university session.

The student teachers also shared their frustrations of facilitating learning during unstructured open meetings which they arranged. These meetings were driven by the intense frustrations that they were experiencing. At these meetings they talking (in their own words- moaned) about all the bad feelings and frustrations that they were experiencing. These sessions were crucial for the enhancement of each student teacher's personal security and comfort (Van Huizen *et al,* 2007) with regard to being a Facilitator of Learning. It is as if these moaning sessions seemed to re-affirm their perception of who they were as novice Facilitators of Learning and the role that they needed to play in this context. Another aspect of these sessions is that the student teachers became aware of not just their own frustrations and weaknesses but also those of their peers. In so doing for each of the student teachers there was a comfort in knowing that there are others who are experiencing what I am experiencing. This surprisingly was a motivation for the student teachers to persevere and to makes strides in being a Facilitator of Learning.

- ☞ An important feature of phronesis construction is that it can take place in any context in interaction with others and also in intra-action with oneself.

Phronesis construction took place in different venues, for example, university specialisation discussion sessions, in the school classroom and in the staffroom. Of significance is that this construction of phronesis occurred when the student teachers were in interaction with others. This interaction was with learners, the teacher educator, mentor teachers and peers. The evidence that an interaction with learners promotes phronesis construction is from the statement that Bernice made "you learn from class and the reactions of the class."

Phronesis construction is also promoted by an intra-action. Here, the student teachers were interacting with their own ideas, thoughts, feelings, decisions and judgements that they were making in the process of facilitating learning. The student teachers were constantly questioning and checking their ideas and actions linked to facilitating learning.

- ☞ The student teachers' phronesis of facilitating learning is self-constructed from their immersion, and not just exposure over an extended period of time, to authentic, problem-based learning, in particular school contexts.

The student teachers spent sixty percent of their professional development time in the school facilitating learning and forty percent of their time at the university. This extended period provided the opportunity for them to learn from their practice (Korthagen, 2001). Facilitators need to be facilitating learning experiences with learners in the school. In this context the facilitators of learning are expected to design and operationalise learning tasks and to reflect on their facilitation of learning. The student teachers use this to construct theory about how to facilitate learning. We need to

recognize the importance of the student teachers experiencing the schooling context to construct an understanding and to develop a baseline practice theory about what he/she would do when they are facilitating Life Sciences.

- ☞ phronesis construction will only take place if the student teachers' beliefs about teaching and learning are explored, challenged and then changed.

Student teachers had beliefs, at the beginning of the programme, about teachers and the role that they played. These beliefs and perceptions were challenged at the outset of the programme (Feiman-Nemser & Remillard, 1996; Leavy, Mc Sorley & Bote, 2007). Thereafter the student teachers were introduced to a new paradigm – facilitation of and for learning. Here, they were expected to reveal their beliefs and perceptions about a facilitator of learning. The student teachers' beliefs were challenged by the interventions that they experienced. These beliefs were further challenged by their personal and direct experience of facilitating learning in the school classrooms.

Challenging student teacher's beliefs needs to occur on a continuous process where the student teachers are forced to question their role as a facilitator – what would they like it to be and how they see themselves as facilitators of learning. The belief must be a personally generated on that has an emotional and social basis. This could be due to the practice of facilitating learning that the student teachers have already experienced.

- ☞ The initial intervention after exploring the baseline phronesis

In exploring the baseline phronesis significant techniques, time and setting were crucial for the opportunity for student teachers to be confronted, confused, frustrated and emotionally challenged to develop a sense of who they are as people firstly and who they are as facilitators of learning secondly.

- ☞ Contribution of the specialisation sessions to the student teachers' construction of phronesis

Student teachers were aware of the contribution of these sessions to their construction of phronesis. But this becoming awareness was not an instant process. It was due to the extended time that the student teachers spent in the school and their understanding of what the facilitation of learning entailed. Also the discussions that the student teachers had with the teacher educator were crucial for their construction of phronesis. These sessions did not contribute to developing the student teacher's understanding about the content of Biology. Instead they focused on how the student teachers were facilitating Life Sciences learning tasks.

- ☞ During the specialisation discussion sessions the student teachers are expected to reflect on their practice of facilitating learning.

The student teachers are expected to use the experiential reflections that they share to construct and re-construct their practice theory of facilitating learning. This process of reflecting is explored and enabled by the teacher educator during these specialisation discussion sessions. The nature and extent of this exploration and enabling by the

teacher educator is critical for the student teachers elicitation of their reflections and construction of their phronesis.

☞ University specialisation discussion sessions – their structure, timing and sequence, composition (who is present); the nature of the participation and the sharing of reflections where the what, the process and the underlying premises of these are, was critical as well as the role that the teacher educator played to the construction of phronesis. The nature of the role of the teacher educator is crucial – in motivating, stimulating, supportive and re-assuring at the time when student teachers were still beginners in the process. Also initially this role could be seen as having a power dynamic but this was necessary for the development of the session and the expose' of the student teachers' experiential reflections.

☞ Constructing and using phronesis is a process and not an outcome of professional development.

Throughout the programme the student teachers were engaged with constructing "phronesis." This process was evidenced from the elicitation of their beliefs about teaching and learning in cycle 1 through to cycle 4.

☞We need to recognize the importance of the student teachers experiencing the schooling context to construct an understanding and to develop a baseline practice theory about what he/she would do when they are facilitating Life Sciences.

Student teachers are open and willing to participate in different facilitation of learning experiences; they have the ability to experience and reflect on their experiences

leading to further construction of their phronesis. It is important that the personality of the student teachers is also focused on.

- ☞ The student teacher activities during the programme – self profile; reflections; designing and implementing learning tasks were critical to their construction and use of phronesis.

During the specialization sessions when the student teachers were asked to reflect at the beginning of the year, they did not understand the full process and the outcome of reflecting. They had basic understandings of what it means to reflect. Encouraging reflection needs to be a conscious effort on the part of the facilitator of learning to do more than just say “reflect on this:” it needs to be a planned activity (Beaudin & Quick, 1995, p. 4). In constructing phronesis, the process of reflecting is a constructive one where, initially, a student teacher is not how to reflect. The process of reflecting is an evolving one and it is enhanced by the individual and group reflection actions that the student teachers are expected to participate in during their specialisation sessions.

- ☞ Contribution of mentor teachers to the student teacher’s construction of their phronesis.

Mentor teachers were responsible for the student teachers facilitation of learning in the school. Student teachers were assigned to mentor teachers. These mentor teachers had attended a mentor workshop at the university where the expectations of mentoring student teachers was discussed. Here, the roles of a mentor teacher were discussed and they were informed about the expectations of the programme. It can be assumed that mentor teachers were aware of the programme expectations and yet, they varied in their support of the student teachers. This support varied from minimal input to supporting

the student teacher extensively. This support was evidenced in the provision of ideas and resources for facilitating particular sections in Life Sciences.

The teacher mentors who contributed extensively to the student teacher's construction of phronesis were those who had attended and completed this particular teacher education programme.

- ☞ Student teachers' cognitions, beliefs, feelings and actions about the learning task - design and implementation are essential to a positive experience rewarding emotionally. Emotional and social competences are given new meanings in a professional development context.

It is in the act of designing and implementing the learning tasks that the student teachers developed further understanding about the requirements for facilitating learning and the facilitation in learning practice. More importantly their role as facilitators of learning is defined by what they do which is underpinned by what they think and belief. The role of a facilitator of learning was developed over time

- ☞ The experiential reflection sessions were crucial for the student teachers' construction of phronesis. Equally crucial were the reflections that they made.

If student teacher's experience of facilitating learning in a school classroom is not elaborated on preferably in the light of his/her own and other people's experience and knowledge, then there is good reason to believe that the (practice) new learning constructed into phronesis will be richer if it is not just experienced but also explicitly reflected upon. For this to be achieved the nature of the reflection sessions must be:

- collegial support in eliciting, sharing and developing each and the groups' knowledge, emotional and confidence levels about facilitating learning in the classroom - one could refer to it as a "collegial learning community";
- Co-learners in a supportive and non-threatening context;
- The emotional freedom and confidence to 'act';
- Participation of all individuals during the sessions;
- Exploring and developing their identity as facilitators of learning;
- Exploring and developing their perceptions of facilitating learning.

In experiencing these reflection sessions the student teachers developed not just professionally but also very importantly in a personal capacity as facilitators of learning.

An essential aspect to consider with these reflection sessions is that they should have a collective and not individual focus. Where reflection do not take place in a solitary manner. The student teachers should have a reflective community of practice. In this grouping the student teachers need to adopt and use a collective, reflective dialogical approach. Here groups of student teachers are in dialogue with each other about their reflections.

☞ The student teachers' perception of a facilitator of learning was crucial to their performed role as a facilitator of learning

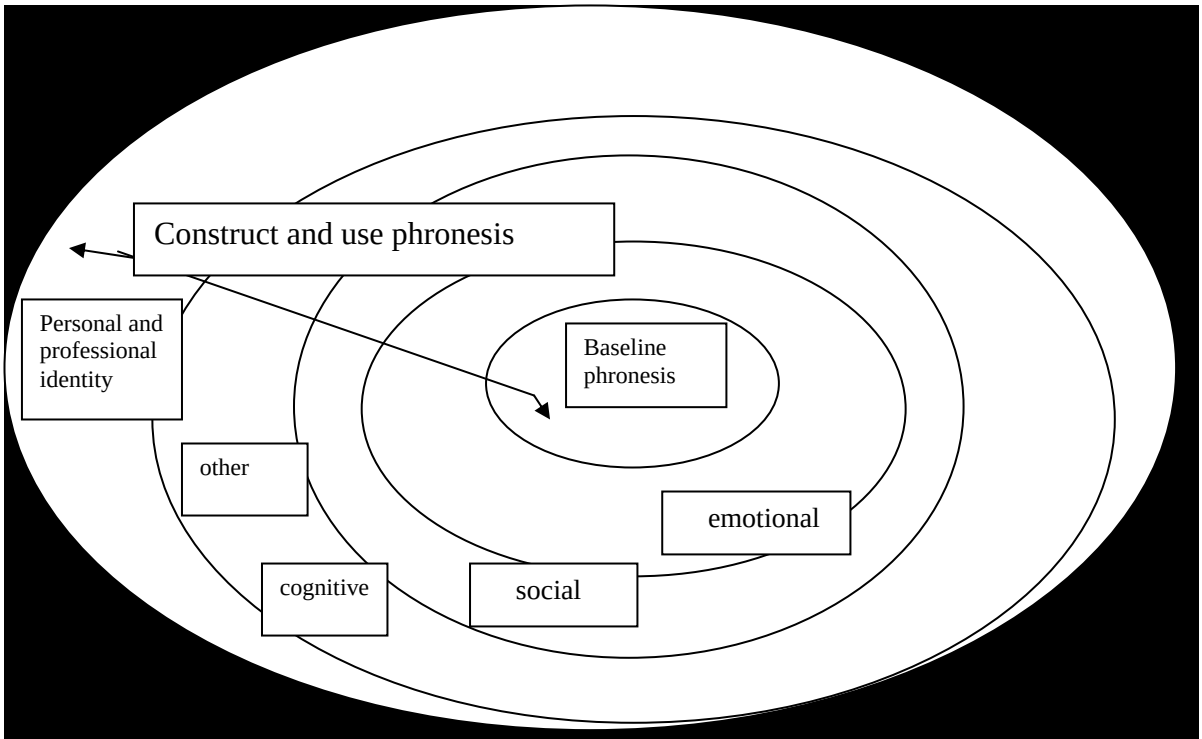
The student teachers' perception of a facilitator of learning was linked to their understanding of it, their experience of it and awareness of their own personalities including their strengths and weaknesses. The identity of how each student teacher sees

himself or herself as a facilitator of learning oscillates with refinement over the different experiences. This view extends the Vygotskian learning and development theory which views this as a static component (Van Huizen *et al*, 2005). In the classroom, when facilitating learning the student teachers are continually challenged to think and make decisions about the appropriate action to take and this enhances the belief change. This (belief change) could not be possible as Korthagen (2001) has indicated that minimal if any change takes place when methods of teaching are taught to beginner educators. However, when student teachers experience and are faced with challenges in facilitating learning, they are forced to question and re-define their beliefs about teaching (Korthagen, 2001). This change may or may not happen depending on the actual experience that student teachers are engaged with.

I present a **model** in Figure 4 below to represent student teachers' development as facilitators of learning.

The model consists of different sized circles positioned in such a way that the inner circles are smaller than the outer circles. The sizes of the circles bear no relation to the

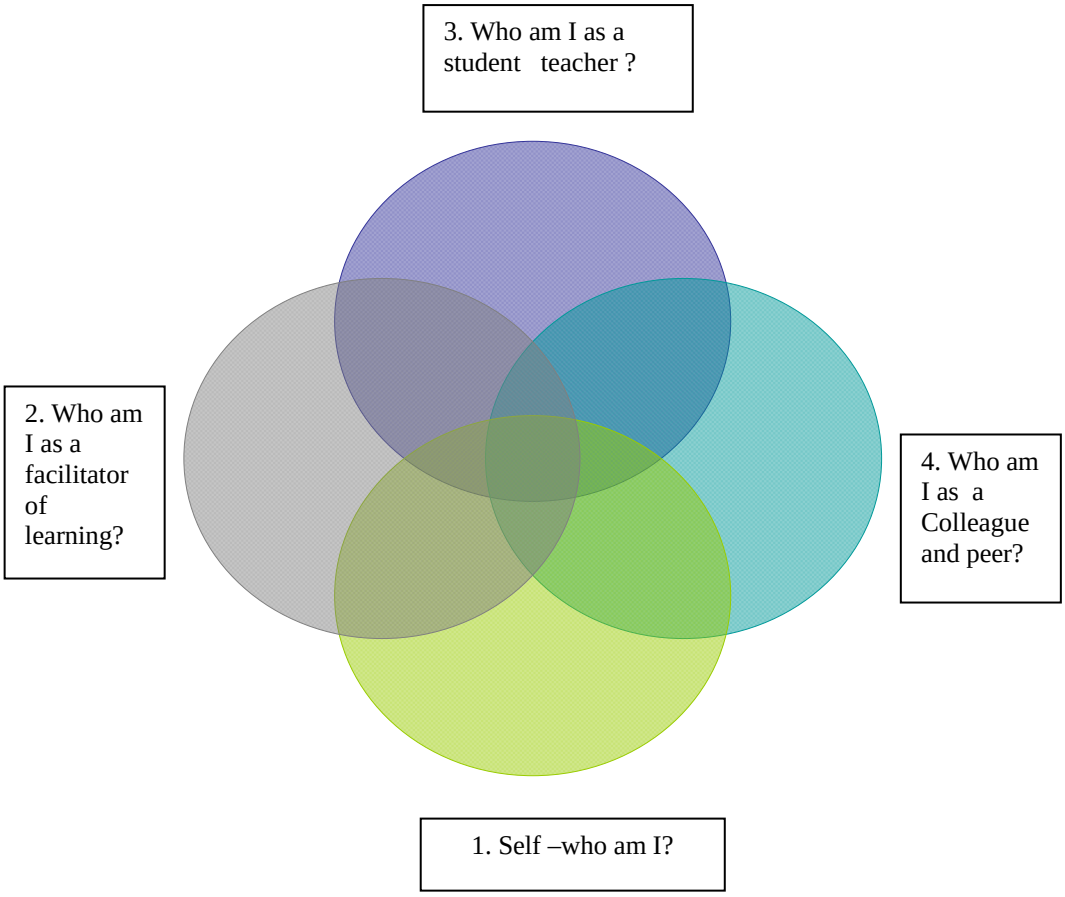
Figure 4: Student teachers' development as facilitators of learning.



size or amount of the aspect that occupies it. The inner circle is labeled baseline phronesis. It is the inner circle because this is what the student teachers enter the programme with. It is personal and it is part of their inner core, their thinking and beliefs. The next circle is labeled emotional. The reason for its positioning is that student teachers have extreme emotional experiences during their construction of phronesis. These emotional experiences are closely linked to their beliefs, that is their baseline phronesis. The third circle is labeled social. It is the social interaction that the student teachers experience that support, challenge and enhance their belief orientated paradigm. The act of believing you can do it and then doing it has a powerful positive impact on the student teachers' construction of phronesis, just observing that you can do it. The third circle is labelled social. The social interactions that the student teachers had with various individuals (specialization lecturer, mentor teachers, peers, learners) during the programme supported their construction of phronesis. The fourth circle is labeled cognitive. This is the area where the student teachers used these baseline phronesis, their emotions and the social interactions to make meaning of their experiences. The other in the block could cater for other features that are evident in this development. The last circle is labeled personal and professional identity. This is the ultimate point of development for the student teachers. This development uses all the features discussed to construct a meaning for identity. The personal identity of the student teacher is crucially important for their professional development. I do not view them as two sides of a coin (Van Huizen *et al*, 2005). I view them as totally intertwined. The line drawn across from baseline phronesis to the outer circle indicates the connections and also the development to the point of identity formation.

☞ The construction of the student teacher's identity (professional and personal) during their professional development was essential. This identity construction is represented in the following figure:

Figure 5: Construction of a personal and professional identity



The model in figure 5 above represents the construction of a personal and professional identity that the student teachers experienced.

The components of this identity construction are listed and described below.

1. Who am I (self) involes exploring the self in terms of your personal skills, your self image, temperament and Neethling Brain Instrument;

2. Who am I as Facilitator of Learning is concerned with the student teachers' perceptions, feelings and actions as a Facilitator of Learning;

3. Who am I as a student teacher is concerned with the student teachers' role in the programme as a PGCE student teacher, the expectations of the programme, role in the programme, position in relation to peers and teacher educator and partnership dynamics;
4. Who am I as a colleague or peer is concerned with the supportive, emotional, social and psychological and pedagogical interactions that the student teachers encounter with their peers.

An essential aspect of the student teacher's identity construction is: I for myself (personal development) and with, and for others in my professional development. Any student teacher professional development has the personal and professional development comprising of four different components and these are tightly intergrained. A change in one component will influence a change in another.

8.4. Implications and recommendations

The construction and use of phronesis holds a key to the future of student teacher professional development in South Africa. The implementation of this new paradigm that focuses on the construction of a practice theory of, and for, facilitating learning in student teacher professional development programmes, could improve the quality of learning and teaching in our schools (Morrow, 2007).

This construction and use of phronesis, in a student teacher professional development programme, provides a framework for the development of student teachers as future facilitators of learning. These facilitators of learning should have appropriate content knowledge and skills, "practical, creative wisdom" (Slabbert, 2006, p. 1) and human

qualities that empower their moral character. A teacher would need to cultivate this wisdom to enable him/her to adopt teaching methods through which the potential of all learners could be maximised and fully utilised. Student teachers' development of human qualities, as stated by Gulke (2000) and Barnett (2004), in chapter one, will be essential for them to be prepared for an unknown and uncertain future when they are facilitating learning in the schools. It is therefore necessary, for student teachers during their professional development, to develop assuredness of being and action. Student teachers should be developed to possess the qualities of flexibility, courage, thoughtfulness, resilience, independence and self-reliance. In the multi-varied schooling contexts and changing education systems, possessing these qualities will enable student teachers to facilitate learning effectively. The necessity for this act is observed in the inability of many teachers to respond to change and provide quality teaching within the current education system. These teachers lack appropriate content knowledge, pedagogic content knowledge, an effective work ethic, inflexibility and resistance to change and innovation. Clearly, if these teachers had experienced a professional development programme focused on the construction and use of phronesis, their competence to provide quality teaching, within a changing education system, could possibly have been heightened. The implications of this study for the professional development of student teachers in South Africa raises a number of issues. These issues are discussed below.

8.4.1. Teacher education programmes

Teacher education programmes should focus on the experiences of the student teachers and their personal beliefs and expectations in a programme. The immense personal and professional development was possible because:

- Student teachers were immersed in the contexts and expected and challenged to facilitate learning in different contexts.
- The student teachers' baseline phronesis was elicited, explored and they became aware of who they were as persons, their role as a facilitator of learning and what the process of facilitating learning entailed was being constructed by them.
- The time allocated to facilitation of learning experiences in the particular contexts was extensive – sixty percent of the teacher education programme. This was an essential component as it was during these periods that the student teachers questioned, planned and acted on their perceptions, beliefs about facilitation of learning practice; the role of learners and their role in the facilitation process.
- The social learning dynamics which operated during the specialization discussion sessions and reflection sessions with the teacher educator and the moaning discussion sessions which took place among the three student teachers were self-affirming and emotionally supportive.
- Student teachers observed experiences of teachers teaching; themselves facilitating; discussions about facilitation and they were expected to reflect on these. Of significance is that these reflections were an essential aspect of their personal and professional learning.
- Student teachers spent extended periods (16 weeks, two sessions of eight continuous weeks and other school observation visits at the beginning of the year) at a school. An extended school-based period is desirable.
- Sessions for specialization discussion periods with reflections soon afterwards are crucial for the construction of the individual needs and understandings of

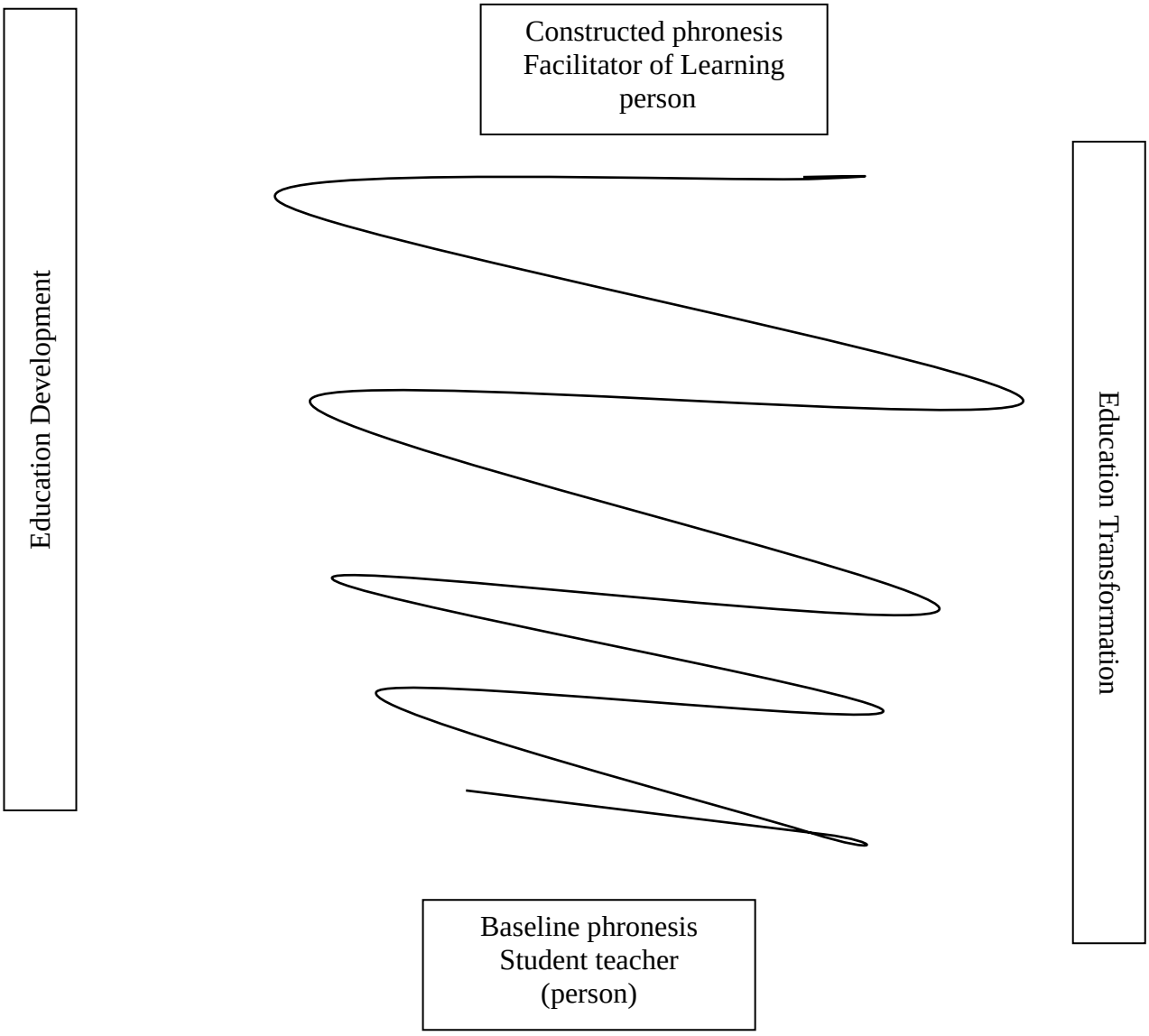
student teachers and the development of knowledge and the social dynamics that take place during learning.

- Social moaning sessions where student teachers meet to share and discuss their concerns should be included in the programme. Student should be alerted to the inclusion of these sessions in that the teacher educator could share the experiences of the student teachers from this project and discuss the need for the sessions. What is crucial is that the student teachers themselves, would have to decide on where and when in the programme the sessions would occur (happen) and they should be expected to reflect on these sessions.
- The university specialization sessions should focus on providing student teachers with experiences (observing teachers teach) and elicit the student teachers' experiences of this. The discussion starts with what the student teachers, think, feel and know. Student teachers should be challenged to make suggestions on how they would facilitate learning in comparison to what is observed from the mentor teacher teaching. These discussions can then focus on integrating learning theory to support justifications for decisions and actions for facilitating learning.
- The construction of an understanding of reflections by reflecting is an essential action learning component. Inherent in this process is the development of each student teacher's framing and inclusion of detail in reflections. The inclusion in the programme on a discussion of what student teacher mean by reflections and how they reflect using their actual reflections is important for them to construct a more in depth and a meta-analytical understanding of how to develop and use their own reflections in a teacher education programme.

- The emphasis on the use of concept maps to explore the student teachers' understanding of practice theory is a crucial component. Student teachers while constructing their concept maps are critically analyzing and structuring and questioning their experiences. More than this the student teachers would be expected to compare their concept maps with what they originally started off with so that they themselves can understand and learn what their practice theory was and how it developed.
- All student teachers entering a teacher education programme should be orientated to teaching. This orientation should focus on the knowledge, skills, values and attitudes of student teachers to teaching. But, more importantly it should focus on the student teachers' exploration of their emotional, psychological, personality and perceptual aspects in revealing to them who they are as individuals firstly and as facilitators of learning secondly. This exploration is crucial for student teachers to meaningfully make decisions about their essential role as teachers in the changing times.
- The teacher educators' personality, knowledge about phronesis and focus and understanding of the role of the student teacher in the teacher education is a crucial component for the successful implementation of phronesis in any teacher education programme. Not any teacher educator would be able to work with phronesis in a teacher education programme. Professional development of teacher educators would be a major requirement as many still work in the realm of "technical-rationalist approach (Schon, 1986) and a one size fits all lesson approach. Teacher educators need to be exposed and experience their own development of their practice theory for them to see and change from their teaching frameworks.

A model that every teacher education programme should be developed upon is:

Figure 6: Model for a Teacher Education programme



In this model student teachers enter the teacher education programme as novice student teachers. They enter the programme with their beliefs and perceptions of teaching. In most instances these beliefs will fall within the Education development frame which is indicated by the column to the left of the figure. The teaching approach used in this frame would be that of a traditionalist one. As the students experience the interventions

in the programme they move upwards in a looping pattern towards the Education transformation frame. These movements continue throughout the programme. They indicate the growth of student teachers in the programme. What also happens is that the loop widens sideways. This indicates the student teachers' ability to start moving and working towards the transformation frame. This movement is due to student teachers' original beliefs and actions which change. The changes are small and limited at first and then they are broadened and are extensive. At this point at the top of the wave the student teacher is now a person of being, a facilitator of learning.

This model indicates the evolving nature constructing phronesis and the pressures of working in situations where the Developmental frame is present and the student teacher is expected to work within a Transformative frame.

8.5. Suggestions for future research

This study provides useful guidelines for teacher professional development programmes and the professional development of student teachers. It also paves the way for further research on a comparative study of student teachers' professional development programmes of different universities. Further research could be a comparative study of student teachers' professional development in different professional development programmes. A longitudinal study of novice facilitators of learnings' experiences of their first year of facilitating learning after completing a professional development programme focused on the construction of phronesis. An evaluation of a teacher professional development programme that is focused on the construction and use of

phronesis. An investigative study on the development of learners whose learning was facilitated by facilitators of learning. A quasi-experimental study on the development of learners who learning was facilitated by facilitators of learning. Research on the three student teacher participants' experiences of facilitating learning after five years of completing the professional development programme.

8.6. Conclusion

It is hoped that the findings to this study will make a valuable contribution to the already existing body of knowledge about the professional development of student teachers more particularly with one focused on the construction and use of phronesis. In this study the voices of the student teachers were presented to extend the understanding about the process of learning and developing within a professional development programme. Through this venture into the exploration of how student teachers used and constructed phronesis, to enhance their professional development, I have discovered that personal and professional development is an important process and outcome principle.

The radical, innovative student teacher professional development programme at the University of Pretoria heralded in changes to the role of teacher educators, student teachers, mentor teachers and the curriculum in developing student teachers for effective teaching and learning in South African schools. Improvements in schooling can be effected if student teachers are developed as committed, flexible, innovative, independent, resilient professionals. Developing the student teachers professionally

entails changing the pedagogic content knowledge to one that is focuses on student teachers constructing and using phronesis, to develop the capacity to act in the most effective and appropriate way in every particular situation, rather than possessing a body of "spatially temporally detached universal knowledge" (Slabbert, 2003, p. 7).

The development of student teachers focuses on their personal and professional development from the onset into a programme and continuously throughout the programme. This development had an evolving nature, in that the basline phronesis was an extended, comprehensive one at the end of the programme. Initially in the programme they were concerned with developing learners' attitudes to learning Life Sciences and as their development evolved they were concerned with developing learners as active learners who take responsibility for learning, meta-learning faculties and their co-operative learning abilities. The changes that the student teachers experienced were focused on teacher educator roles, student teacher personality types; their roles of facilitating learning and their immersion in real contexts in schools over extended periods of time in a reflective and supportive atmosphere. Changes that are sprung focus not just in curricula but also changes in the teacher educator roles, personality types; student teacher roles and the immersion in real contexts in schools. The research literature raises issues in the gap between the theory and practice of teacher education. This gap, in this study, was definitely bridged by the students themselves and the experiences they had to the outcome of their realization of their potential as Facilitators of Learning.

The three PGCE student teacher research participants were immersed in authentic environments. They experienced many first-hand (authentic) facilitating learning experiences, over extensive periods of time. During their professional development programme they were faced with a number of challenges to their beliefs, perceptions and emotions with regard to constructing their phronesis. An example of such a challenge was exploring who they were as people and their understanding of their role as facilitators of learning. Even though the student teachers were aware of the constraints that teachers currently experience when teaching they were proactive in deciding on the actions they could take to improve teaching and learning. They observed the teaching contexts as challenges to their development as facilitators of learning. Furthermore, the frustrations and jubilations that they experienced during their professional development were crucial for their learning process of becoming a Facilitator of Learning.

An important factor that has been revealed is that the personal learning and development of students is crucial for their professional learning in a teacher education programme. The student teachers' personal development forms the backbone of learning, as a professional. In fact it contributes to the professional development of student teachers. The construction of phronesis, therefore, was influenced by the personal development of student teachers and the contributions of the mentor teacher and the specialisation sessions.

Chapter 8 brings together the findings from cycles four, five, six and seven. These findings are synthesised and the thesis for the study is presented. The thesis puts

forward a number of issues which characterises the student teachers' construction and use of phronesis within a professional development programme.

References

Abbot, J. (1999). Master and Apprentice: The Rhythm of human learning: Unpublished book.

Alexander, T., & Potter, J. (2005). *Education for a change - Transforming the way we teach our children*. New York: Routledge Falmer.

Amarel, M., & Feinman-Nemser, S. (1988). *Prospective teachers views of teaching and learning to teach.* Paper presented at the AERA Annual Conference, New Orleans.

Anderson, T. (1987). Political Philosophy, Practical Reason, and Policy Analysis. In F. Fischer & J. Forester (Eds.), *Confronting Values in Policy Analysis: The Politics of Criteria* (pp. 22-44). Newburry Park: Sage Publishers.

Aristotle. (1941). *The basic works of Aristotle*. New York: Random House.

Armstrong, T. (1991). *Awakening Your Child's Natural Genius: Enhancing Curiosity, Creativity and Learning Ability*. Los Angeles, CA: Pedigree Books.

Aspin, D. N., & Chapman, J. D. (1994). *Quality Schooling: A Pragmatic Approach To Some Current Problems, Trends and Issues*. London: Cassell.

Barbour, R., & Kitzinger, J. (1998). Introduction: The challenge and promise of focus groups. In R. Barbour & J. Kitzinger (Eds.), *Developing Focus group research* (pp. 1-20). London: Sage Publishers Inc.

Barge, J.K. (2004). Articulating CMM as a practical theory. *Human Systems: The Journal of Systemic Consultation & Management*, 15(X), 187-198

Barnett, R. (2004). Learning for an unknown future. *Higher Education Research & Development, 23*(3), 247-260.

Beaudin, B. P., & Quick, D. (1995). *Experiential Learning: Theoretical Underpinnnings*. Fort Collins: High Plains Intermountain Centre for Agricultural Health and Safety.

Beihler, R. (1974). *Psychology applied to teaching*: Houghton Mifflin Company.

Beijaard, D., Meijer, P.C., & Verloop, N. (2004). Reconsidering research on teachers' professional identity. *Teaching and Teacher Education*, 20, 107-128

Bennet, N., & Carre, C. (1993). *Learning to teach*. London: Routledge.

Bigelow, J. (1992). Developing managerial wisdom. *Journal of Management Inquiry, 1*(2) 143-153.

Black, A. L., & Halliwall, G. (2000). Accessing practical knowledge: How? Why? *Teaching and Teacher Education, 16*, 103-115.

Black, P., & William, D. (1998). Inside the black box. *Phi Delta kappan, 79*, 139-148.

Boud, D., Cohen, R., & Walker, D. (1993). Introduction: Understanding learning from experience. In D. Boud, R. Cohen & D. Walker (Eds.), *Using experience for learning* (pp. 1-17). Buckingham: The Society for Research into Higher Education & Open University Press.

Bowman, C., & McCormick, S. (2000). Comparison of peer coaching versus traditional supervision effects. *Journal of Educational Research, 93*(4), 256-261.

Brookfield, S. D. (1986). *Understanding and facilitating adult learning*. San Francisco: Jossey-Bass.

Brookfield, S. D. (1987). *Developing critical thinkers.* San Francisco: Jossey-Bass.

Brookfield, S. D. (1988). *Developing Critical Thinkers: Challenging Adults to explore alternate ways of thinking and acting*. San Francisco: Jossey-Bass.

Brookfield, S. D. (1995). Adult Learning. Retrieved 14 February, 2006, from http://nlu.nl.edu/ace/Resources/Documents/AdultLearning.html.

Brouwer. (1989). *Geubtegreerde kerarebiokeudubgm orubcuoes eb effecteb [Integrated teacher education, principles and effects]*. Amsterdam: Brouwer.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32-42.

Buchberger, F., Campos, B.P., Kallos, D., & Stevenson, J. (Eds.) (2000). *Green paper on teacher education in Europe: High quality teacher education for high quality education and training*. Umea University, Sweden: Thematic Network for Teacher Education in Europe (TNTEE).

Bullough, R. V. (1997). Practicing theory and theorizing practice in teacher education. In J. Loughran & T. Russel (Eds.), *Purpose, passion and pedagogy in teacher education* (pp. 13-31). London: Falmer Press.

Bullough, R., & Gitlin, A. D. (1994). Challenging teacher educational training: Four propositions. *Journal of Education for Teaching, 20*(1), 67-81.

Bullough, R.V., & Gitlin, A. (1995). *Becoming a student of teaching: Methodologies for exploring self and school context*. New York: Garland.

Burke, W. W. (1994). *Organisation development: a process of Learning and Challenging (2nd ed.)*. MA: Addison-Wesley.

Burr, V. (1995). *An introduction to social constructionism*. London: Routledge.

Byron, S. (1995). *Computing and other instructional technologies: faculty perceptions of current practices and views of future challenges*: (ERIC Document Reproduction Service No. ED390381).

Calderhead, J. (1996). Teachers: Beliefs and Knowledge. In D. C. Berlinger & R. C. Calfee (Eds.), *Handbook of Educational Psychology* (pp. 709-725). New York: Macmillan.

Calderhead, J., & Robson, M.(1991). Images of teaching: Student teachers' early conceptions of classroom practice. *Teaching and Teacher Education* 7, 1–8.

Calderhead, J., & Shorrock, S.B. (1997). *Understanding teacher education: case studies in the professional development of beginning teachers*. London: The Falmer Press.

Callahan, J. and Root, S. (2003). The diffusion of academic service-learning in teacher education: A case study approach. *Advances in Service-Learning Research, Volume 3: Deconstructing Service-Learning: Research Exploring Context, Participation and Impacts*, Berkeley, CA: Information Age Publishers.

Carr, D. (2007). Character in Teaching. *British Journal of Education Studies, 55*(4), 369-389.

Carr, W., & Kemmis, S. (1986). *Becoming critical: Education, knowledge and action research*. London: Falmer Press.

Carter, K. (1990). Teachers' knowledge and learning to teach. In W. R. Houston (Ed.), *Handbook of research on teacher education* (pp. 291-310). New York: MacMillan.

Clark, E. T. (1997). *Designing and Implementing an Integrated Curriculum: A Student-Centered Approach*. Brandon, VT: Holistic Education Press.

Connelly, F. M. & Clandinin, D.J. (1987). On narrative method, biographies, and narrative unities in the study of teaching. *Journal of Educational Thought, 21*(3), 130-139.

Clark, C. M., & Peterson, P. L. (1986). Teachers' thought processes. In M. C. Wittrock (Ed.), *Handbook of research on teaching (3rd ed)* (pp. 255-296). New York: Macmillan.

Clarke, S., Timperley, H., & Hattie, J. (2003). *Unlocking formative assessment: practical strategies for enhancing students' learning in the primary and intermediate classroom*. Auckland: Hodder Moa Beckett.

Claxton, G. (1999). *Wise up: The challenge of lifelong learning*. London: Bloomsbury.

Claxton, G. (2000). *Wise Up: The Challenge Of Lifelong Learning*. London: Bloomsbury.

Cochran-Smith, M. (2003). Learning and unlearning: The education of teacher educators. *Teaching and teacher education*, 19, 5-28.

Coffey, A. (2001). *Education and Social Change*. Buckingham: Open University Press.

Coghlan, D., & Brannick, T. (2001). *Doing Action Research in your own organisation*. Thousand Oaks, California: Sage Publishers.

Cohen, L., Manion, L., & Morrison, K. (2000). *Research Methods in Education (5th ed.)*. United Kingdom: Routledge Falmer.

Combs, A.W. (1982). *A Personal Approach to Teaching: Beliefs that make a difference*. Boston, MA: Allyn & Bacon

Connelly, F. M., & Clandinin, D. J. (1988). *Teachers as curriculum planners: Narratives of experiences*. New York: Teachers College Press.

Connelly, F. M., & Clandinin, D. J. (1990). Stories of experience and narrative inquiry. *Educational Researcher,19*(5), 2–14.

Corey, S. (1953). *Action Research to Improve School Practices*. New York: Educator's College Press.

Cresswell, J. W. (2003). *Researcher design Qualitative, Quantitative, and Mixed Methods Approaches*. California: Sage

Cronen, V. E. (1995). Practical theory and the tasks ahead for social approaches to communication. In W. Leeds-Hurwitz (Ed.), *Social Approaches to communication* (pp. 217-242). New York: Guildford Press.

Cronen, V. E. (2001). Practical theory, practical art, and the pragmatic-systemic account of inquiry. *Communication theory, 11*(1), 14-35.

Cunliffe, A. L. (2002). Reflexive dialogical practice in management learning. *Management Learning, 33*(1), 35-61.

Cunningham, J. B. (1993). *Action Research and organisation development*. Westport, CT: Praeger.

Darling-Hammond, L. (1999). Educating teachers for the next century: Rethinking Practice and policy. In G. A. Griffin (Ed.), *The education of teachers: The 98th yearbook of the National Society for the Study of Education, Part 1* (pp. 221-256). Chicago, IL: National Society for the Study of Education.

Darling-Hammond, L. (2006). *Powerful teacher education*. San Francisco: Jossey-Bass.

Day, C. (1993). Reflection: a necessary but not sufficient condition for professional development. *British Educational Research Journal, 19*(1), 83-93.

de Kock, D. M. (2004, October). *To clone or not to clone: that is the question.* Paper presented at the Kenton Conference, Drakensberg.

de Kock, D. M., & Slabbert, J. A. (2003). Overcoming the impasse: challenging the belief system of the professional educator: Pretoria: Faculty of Education.

Dempster, E. R., & Reddy, V. (2007). Item readability and science achievement in TIMMS 2003 in South African Science Education. *Science Education, 91*, 906-925.

Denscombe, M. (2003). *The Good Research Guide (2nd ed.)*. Maidenhead: Open University Press.

Denzin, N. K., & Lincoln, Y. S. (2000). *Handbook of qualitative research (2nd ed.)*. Thousand Oaks, Ca: Sage Publishers Inc.

Department of Education. (1998). *Assessment Policy Grades R-9 schools*. Pretoria: DoE.

Department of Education. (2002). *Curriculum 2005 - Assessment Guidelines Natural Sciences Senior Phase*. Pretoria: DoE.

Department of Education. (2003). *National Curriculum Statement Grades 10-12 (General). Life Sciences*. Pretoria: DoE.

De Vos, A. S. (Ed.). (1998). *Research at grass roots*. Pretoria: J.L. van Schaik, Academic.

Dick, B. (2000). Postgraduate programmes using action research [Electronic Version]. Retrieved February 2006 from http://www.scu.edu.au/schools/gcm/ar/arp/ppar.html.

Dictionary.com. (2007). Webster's Revised Unabridged Dictionary 1998. Retrieved 5 April, 2007, from http://dictionary.reference.com/search?q=authentic

Doyle, M. (1997). BEYOND LIFE HISTORY AS A STUDENT: PRESERVICE TEACHERS' BELIEFS ABOUT TEACHING AND LEARNING [Electronic Version]. *College Student Journal*, 31. Retrieved 2 February from http://web7.epnet.com/citation.asp.

Dryden, G., & Vos, J. (1999). *The learning revolution - to change the way the world learns*. Torrance: The Learning Web.

Drucker, P. (2000). *Management Challenges for 21st Century*. New York: Amazon.com.

Duckworth, E. (1986). Teaching as research. *Harvard Educational Review, 56*, 481-495

Duignan, P. A., & Macpherson, R. J. S. (1993). Educative Leadership: A Practical Theory. *Educational Administrative Quarterly, 29*(1), 8-33.

Dunne, J. (1993). *Back to the Rough Ground: 'Phronesis' and 'Techne' in Modern Philosophy and in Aristotle*. South Bend, IN: University of Notre Dame Press.

Elam, S. M. (1971). *Performance-Based Teacher Education: What Is the State of the Art?* Washington, DC: American Association of Colleges for Teacher Education.

Elbaz, F. (1983). *Teacher Thinking: A Study of Practical Knowledge*. New York: Nichols.

Elliot, J. (1991). *Action research for educational change*. Bristol: Open University.

Fals Borda, O. (2001). Participatory (Action) Research in Social Theory: Origins and Challenges. In P. Reason & H. Bradbury (Eds.), *Handbook of Action Research: Participative Inquiry and Action* (pp. 27-37). London: Sage Publishers Inc.

Feiman-Nemser, S., & Featherstone, H. (1992). *Exploring teaching:Reinventing an introductory course*. New York: Educators' College Press.

Feiman-Nemser, S., & Remillard, J. (1996). Perspectives on learning to teach. In F.B. Murray (Ed.), *The teacher educator's handbook: Building a knowledge base for the preparation of teachers* (pp. 63-91). San Francisco: Jossey Bass.

Fenstermacher, G. D. (1994). The knower and the known: the nature of knowledge in research on teaching. *Review of research on teaching, 20*, 1-54.

Ferraro, J. M. (2000). Reflective Practice and Professional Development [Electronic Version]. Retrieved 10 July 2002 from http://www.ed.gov/databases/ERIC-Digests/ed449120.html.

Flake, C. L. (2002). Teacher education, spiritual transformation and child advocacy. In V.H. Kazanjian Jr & P. L. Laurence (Eds.), *Education as Transformation: Religious Pluralism, Spirituality, and a New Vision for Higher Education in America* (pp. 285-298). New York: Peter Lang Publishing.

Frankl, V. E. (1984). *Man's search for meaning: An introduction to logotherapy*. New York: Washington Square Press.

Freire, P. (1970). *Pedagogy of the oppressed*. New York: Herder and Herder.

Fullan, M. (1982). *The meaning of educational change*. New York: Teachers College Press.

Fuller, F.F. (1970). *Personalized Education for Teachers: An Introduction for Teacher Educators*. (Austin, TX: University of Texas, Research and Development Centre for Teacher Education. [ERIC ED 048 105]

Furlong, J. (2000). Higher education and the new professionalism for teachers.: School of Social Sciences, Cardiff: Cardiff University.

Gallego, M. A. (2001). Is experience the best teacher? The potential of coupling classroom and community-based field experiences. *Journal of Teacher Education, 52*(4), 312-325.

Gibbs, A. (1997). Social Research Update: Focus Groups, Issue 19. from http://www.soc.surrey.ac.uk/sru/SRU19.html

Goodlad, J.I. (1994). *Educational Renewal*. San Francisco: Jossey-Bass.

Goodson, I. (1996). Representing teachers: Bringing teachers back in. In M. Kompf, W. R. Bond, D. Dworet & R. T. Boak (Eds.), *Changing research and practice. Teachers' professionalism, identities and knowledge* (pp. 211-221). London: The Falmer Press.

Griffin, G. A. (1986). Issues in student teaching: A review. In J. D. Raths & L. G. Katz (Eds.), *Advances in teacher education* (Vol. 2, pp. 239-273). Norwood, NJ: Ablex.

Grulke, W. (2000). *Ten lessons from the future - 21st century impact on business, individuals and investors*. Parklands: @One Communication.

Halverson, R. R. (2002). *Representing Phronesis: Supporting Instructional Leadership Practice in Schools.* Northwestern University Illinois. Doctoral Thesis.

Halverson, R. (2004). Accessing, Documenting and Communicating Practical Wisdom: The Phronesis of School Leadership Practice. *American Journal of Education, 111*(1), 90-122.

Halverson, R. R., & Gomez, L. (2002). Phronesis and Design: How Practical Wisdom is disclosed through collaborative design. Retrieved September, 2004, from http://www.google.com

Handal, G., & Lauvas, P. (1987). *Promoting Reflective Teaching - Supervision in Practice*. Great Britain: The Society for Research into Higher Education & Open University Press.

Hargreaves, A. (1994). *Changing Teachers, Changing Times: Teachers' Work and Culture in The Postmodern Age*. London: Cassell.

Hargreaves, A. (1998). The emotions of educational change. In A. Hargreaves, A. Lieberman & D. Hopkins (Eds.), *The international Handbook of Educational Change* (pp. 558-570). The Netherlands: Kluwer.

Hargreaves, A. (2001). Emotional geographies of teaching. *Teachers College Record, 103*, 1056-1080.

Hargreaves, A. (2003). *Teaching in the Knowledge Society: education in the age of insecurity*. New York: Teachers College Press.

Hargreaves, A. (2005). Educational change takes ages: Life, career and generational factors in teachers' emotional responses to educational change. *Teaching and Teacher Education*, 21(8), 967-983.

Harris, B., & Furlong, L. D. (1997). *Using Autobiography to Teach Teachers: A Resource for Teacher Educators.* Paper presented at the American Research Association (AERA) Annual Meeting, Chicago, Illinois.

Heathcote, D. (1991). *Collected writings on education and drama*. New York: Northwestern University Press.

Herrington, J., Oliver, R. & Reeves, T. (2002). Patterns of engagement in authentic online learning environments. In A. Williams, C. Gunn, A. Young & T. Clear (Eds), *Proceedings 19th ASCILITE Conference* (pp.279-286). Auckland, NZ: UNITEC.

Heyligen, A. (1997). Epistemological constructivism [Electronic Version] from http://pespmc1.vub.ac.be/CONSTRUC.html.

Hoban, G. (2004). Seeking quality in teacher education: a four dimensional approach. *Australian Journal of Education, 48*(2), 117–127.

Hoffman, P. (2008). Reforming Basic Education in South Africa. Retrieved 27 July, 2008, from http://edulibpretoria.files.wordpress.com/2008/04/reformingbasiceducation.

Holdstock, L. (1987). *Education for a new nation*. Sandton: Media House Publications.

Hollingsworth, S. (1989). Prior beliefs and cognitive change in learning to teach. *American Educational Research Journal, 26*(2), 160-189.

Holt-Reynolds, D. (1992). Personal history-based beliefs as relevant prior knowledge in coursework: Can we practice what we teach? *American Educational Research Journal, 29*, 325-349.

Hopkins, C. D., & Antes, R. L. (1990). *Educational Research: A structure for inquiry (3rd ed).* Itasca, IL: F.E. Peacock.

Houston, W. R. (Ed.). (1974). *Exploring Competency Based Education*. Berkeley, CA: McCutchan.

Howie, S. (2001). *Mathematics and Science Performance in Grade 8 in South Africa 1998/1999*. Pretoria: HSRC Press.

Howie, S. (2004). A national assessment in mathematics within an international comparative assessment. *Perspectives in Education, 22*(2), 149-162.

Hughes, J. A. (2006). Bridging the Theory-practice Divide: A Creative Approach to Effective Teacher Preparation. *Journal of Scholarship and Teaching, 6*(1), 110-117.

Hunter, J., & Hatton, N. (1998). Approaches to the writing of cases: Experiences with preservice master of teaching students. *Asia-Pacific Journal of Teacher Education, 26*, 235-246.

James, A. (2000). *OBE IN ACTION*. Unpublished Masters of Education, University of Durban Westville, Durban.

Jansen, J. D. (1999). 'A very noisy OBE': The implementation of OBE in Grade 1 classrooms. In J. Jansen & P. Christie (Eds.), *Changing curriculum: Studies on outcomes-based education in South Africa* (pp. 203-217). Kenwyn: Juta & Co Ltd.

Johnson, R.B. & Onwuegbuzie, A.J. (2004). *Mixed Methods Research: A Research Paradigm Whose Time Has Come*. Educational Researcher, 33(7), 14-26

Johnstone, S. (1994). Experience is the best teacher: or is it? An analysis of the role of experience in Learning to teach. *Journal of Teacher Education, 45*(3), 199-208.

Jonsen, A. R., & Toulmin, S. (1988). *The abuse of casuistry. A history of moral reasoning*. Berkeley, CA: University of California Press.

Kagan, S. (1984). *Cooperative Learning*. San Juan Capistrano, CA: Kagan Cooperative Learning

Kagan, D. M. (1990). Ways of evaluating teacher cognition: Inferences considering the Goldilocks Principle. *Review of Educational Research, 60*(3), 419-469.

Kagan, D. M. (1992). Implications of research on teacher belief. *Educational Psychologist, 27*(1), 65-90.

Kemmis, S., & McTaggart, R. (1988). *The action research planner (3rd ed.)*. Geelong, Victoria: Deakin University Press.

Kessels, J., & Korthagen, F. (2001). The relation between theory and practice: back to the classics. In F. Korthagen, J. Kessels, B. Koster, B. Lagerwerf & T. Wubbels (Eds.), *Linking Practice and Theory: The pedagogy of Realistic Teacher Education* (pp. 20-31). London: Lawrence Erlbaum Associates, Inc.

Kettle, B., & Sellars, N. (1996). The development of student teachers practical theory of teaching. *Teaching and Educator Education, 12*(1), 1-24.

Keirsey, D. (1998). *Please understand me II: Temperament, character, intelligence*. Del Mar, CA: Prometheus Nemesis.

Kitching, G. (1988). *Karl Marx and the Philosophy of praxis*. London: Routledge.

Knowles, M. S. (1980). *The modern practice of adult education: from pedagogy to andragogy*. Engelwood Cliffs, NJ: Prentice-Hall.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Engelwood Cliffs, NJ: Prentice-Hall.

Kolb, D. A., & Fry, R. (1975). Towards an applied theory of experiential learning. In C. Cooper (Ed.), *Theories of group processes* (pp. 33-57). London: John Wiley.

Korthagen, F. A. J. (2001). *Linking practice to theory: The pedagogy of realistic teacher education*. Mahwah: Lawrence Erlbaum Associates.

Korthagen, F. A. J. a. (2001). Teacher Education: a Problematic Enterprise. In F. A. J. Korthagen, J. Kessels, B. Koster, B. Lagerwerf & T. Wubbels (Eds.), *Linking Practice and Theory - the pedagogy of realsitic teacher education* (pp. 1-19). London: Lawrence Erlbaum Associates, Inc.

Korthagen, F. A. J. b. (2001). Building a realistic teacher education program. In F. A. J. Korthagen, J. Kessels, B. Koster, B. Lagerwerf & T. Wubbels (Eds.), *Linking Practice and Theory - the pedagogy of realistic teacher education* (pp. 69-87). London: Lawrence Erlbaum Associates, Inc.

Korthagen, F. A. J. c. (2001). The realistic approach: its tenets, philosophical background, and future. In F. A. J. Korthagen, J. Kessels, B. Koster, B. Lagerwerf & T. Wubbels (Eds.), *Linking Practice and Theory - the pedagogy of realistic teacher education* (pp. 254-274). London: Lawrence Erlbaum Associates, Inc.

Korthagen, F. A. J. (2005). Teaching teachers - studies into the expertise of teacher educators; an introduction to this theme issue. *Teaching and Teacher Education, 21*, 107-115.

Kruss, G. (2008). *Teacher Education and Istitutional Change in South Africa*. Cape Town: HSRC Press.

Kubler LaBoskey, V. (1993). A conceptual framework for reflection in preservice teacher education. In J. Calderhead, & P. Gates (Eds.), *Conceptualizing reflection in teacher development* (pp. 23–38). London: The Falmer Press.

Kwo, O. (1994). Learning to teach: Some Theoretical propositions. In I. Carlgren, G. Handal & S. Vaage (Eds.), *Teachers' minds and actions: Research on teachers' thinking and practice* (pp. 215-231). New York: Falmer Press

Lasky, S. (2005). A sociocultural approach to understanding teacher identity, agency and professional vulnerability in a context of secondary school reform. *Teaching and Teacher Education, 21*, 899–916.

Leavy, A. M., McSorley, F. A., & Bote, L. A. (2007). An examination of what metaphor construction reveals about the evolution of preservice teachers' beliefs about teaching and learning. *Teaching and Teacher Education, 23*, 1217-1233.

Lebler, D. (2005). Learning and Assessment through Recording. In E. Mackinlay, D. Collins & S. Owens (Eds.), *Aesthetics and Experience in Music Performance*. London: Cambridge Scholars Press.

Leinhardt, G. (1988). Situated Knowledge and expertise in teaching. In J. Calderhead (Ed.), *Teachers' Professional Learning* (pp. 146-168). London: Palmer Press.

Lewin, K. (1952). Group Decision and Social Change. In G.E.Swanson, T. M. Newcomb & E. L. Hartley (Eds.), *Readings in Social Psychology (2nd ed)* (pp. 459-473). New York: Henry Holt.

Lewis, A. (1992). Group Child Interviews as a Research Tool. *British Educational Research Journal, 18*(4), 413-421.

Lewis, C. (2001). *Literacy practices as social acts: Power, status, and cultural norms in the classroom*. Mahwah, NJ: Lawrence Erlbaum Associates.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage Publishers.

Lombardi, M. M. (2007). Authentic Learning for the 21st Century: An Overview. *Boulder, CO: EDUCAUSE Learning Initiative*, from http://www.educause.edu/ir/library/pdf/ELI3009.pdf

Loucks-Horsely, S., Hewson, P., Love, N., & Stiles, K. (1998). *Designing professional development for teachers of science and mathematics*. Thousand Oaks, CA: Corwin Press.

Marsh, M. (2003). *The social fashioning of teacher identities.* New York: Peter Lang.

Mattson, E., & Harley, K. L. (2003). Teacher identities and strategic mimicry in the policy/practice gap. In K. Lewin, M. Samuel & Y. Sayed (Eds.), *Changing patterns of teacher education in South Africa: Policy, practice and prospects* (pp. 284-305). Sandown: Heinemann.

McKenna, B., Rooney, D., & Liesch, P.W. (2006). Beyond Knowledge to Wisdom in International Business Strategy. *Peometheus, 24*(3), 283-300.

McNiff, J. (1988). *Action Research: principles and practice*. London: Routledge.

McNiff, J., Lomax, P., & Whitehead, J. (2003). *You and Your Action Research Project (2nd ed.)*. London: Routledge Falmer.

McNiff, J., & Whitehead, J. (2005). Action Research for Teachers, *Winter Research School Notes*. Cape Town.

Meijer, P. (1999). *Teachers' practical knowledge: teaching reading comprehension in secondary education*. Leiden: University Leiden.

Meijer, P. C., Zanting, A., & Verloop, N. (2002). How can student teachers elicit experienced teachers' practical knowledge? *Journal of Teacher Education, 53*(3), 406-419.

Merriam, S. M. (1988). *Case study research in education: A Qualitative Approach*. San Fransisco: Jossey-Bass Publishers.

Mezirow, J. (1991). *Transformative Dimensions of Adult Learning*. San Francisco, CA: Jossey-Bass.

Miles, M. B., & Huberman, A. M. (1984). *Qualitative data analysis: A sourcebook of new methods*. Newbury Park, CA: Sage.

Mims, C. (2003). Authentic Learning: A Practical Introduction & Guide for Implementation. Retrieved 27 August, 2007, from http://www.ncsu.edu/meridian/win2003/authentic_learning/

Mohanan, K. P. (2005). Assessing quality education in higher education. Retrieved 20 May, 2007, from http://www.cdtl.nus.edu.sg/publications/assess/unpack.htm

Moon, J. A. (1999). *Reflection in Learning and Professional Development Theory and Practice*. London: Kogan Page.

Morrow, W. (2007). *Learning to Teach in South Africa*. Cape Town: HSRC Press.

Mouton, J. (2001). *How to succeed in your Masters and Doctoral studies*. Pretoria: Van Schaik Publishers.

Moyles, J., Suschitzky, W. and Chapman, L. (1998) *Teaching Fledglings to Fly?? Mentoring in Teacher Education*. London: Association of Teachers and Lecturers/University of Leicester.

Mullis, V. S., Martin, M. O., Kennedy, A. M., & Foy, P. (2007). *PIRLS 2006 International Report: IEA's Progress in International Reading Literacy Study in Primary School in 40 Countries*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Myburgh, C.P.H., & Poggenpoel, M. (1995). A qualitative research strategy: and what now? *Raucur, 1*(2), 4-9.

Nave, B. (2000). *Among Critical Friends: A study of critical friends groups in three Maine schools (Dissertation)*. Retrieved 30 October 2008, from ProQuest Digital Dissertations Database (Publication No. AAT 9968318).

Nelson, N., & Wright, S. (1995). Participation and Power. In N. Nelson & S. Wright (Eds.), *Power and Participatory Development: Theory and Practice* (pp. 1-18). London: Intermediate Technology Publications.

Neuman, L. (1997). *Social research methods*. Boston: Allyn and Bacon.

Nias, J. (1996). Thinking about feeling: The emotions in teaching. *Cambridge Journal of Education, 12*(3), 293–306.

Noffke, S., & Zeichner, K. (1987, 20-24 April). *Action Research and Teacher Thinking: The First Phase of the Action Research Project at the University of Wisconsin-Madison.* Paper presented at the Annual Meeting of the American Educational Research Association, Washington, DC.

Noddings, N., & Shore, P. J. (1984). *Awakening the Inner Eye: Intuition in Education*. New York: Teachers College Press.

Nussbaum, M. C. (1986). *The fragility of goodness. Luck, Greek tragedy and Philosophy*. Cambridge, MA: Cambridge University Press.

O'Connor, K. E. (2008). "You choose to care": Teachers, emotions and professional identity. *Teaching and Teacher Education, 24*, 117-126.

Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research, 62*(3), 307-332.

Paton, C. (2006, 8 September). Education in Crisis: A lot to learn. *Financial Mail*.

Penny, A. J., Harley, K. L., & Jessop, T.S. (1996). Towards a Language of Possibility: critical reflection and mentorship in initial teacher education. *Teachers and Teaching, 2*(1), 57-69.

Perry, C. M., & Power, B. M. (2004). Finding the Truths in Teacher Preparation Field Experiences. *Teacher Education Quarterly, 31*(2), 125-136.

Peterson, P. L., Fennema, E., Carpenter, T. P., & Loef, M. (1989). Teachers' pedagogical content beliefs in mathematics. *Cognition and Instruction, 6*(1), 1-40.

Piaget, J. (1945). *Play, dreams and imitation in childhood*. New York: Norton.

Pink, D. H. (2006). *A whole new mind - Why right-brainers will rule the future*. London: Cyan Books.

Pollard, A., & Tann, S. (1997). *Reflective teaching in the primary school: A handbook for the classroom*. London: Cassell.

Polanyi, M. (1967). *The Tacit Dimension*. London: Routledge and Kegan Paul.

Raelin, J. A. (2000). *Work-Based Learning: the New Frontier of Management Development*. Upper Saddle, NJ: Prentice Hall.

Ray, M. (1999). Community building as metaphor for a worldwide paradigm shift [Electronic Version] from http://www.vision-nest.com/cbw/Metaphor.html.

Rearick, M. L. (1997). Educational researchers, practitioners, and students of teaching relfect on experience, practice, and theories: Action research in a preservice course: Paper presented at the annual meeting of the American Educational Research Association, Chicago.

Reddy, V. (2006). *Mathematics and Science Achievement at South African Schools in TIMSS 2003*. Cape Town: Human Sciences Research Council.

Resnick, L. B. (1987). Learning in school and out. *Educational Researcher, 16*, 13-20.

Reynolds, M. C. (1989). *Knowledge base for the beginning teacher*. Oxford: Pergamon.

Richardson, V. (1989). The evolution of reflective teaching and teacher education. In R.T. Clift, W.R. Houston and M.C. Pugach (Eds.), *Encouraging Reflective Practice: An Analysis of Issues and Programs* (pp.3-19). New York: Teachers College Press.

Richardson, V. (1996). The role of attitudes and beliefs in learning to teach. In J. Sikula (Ed.), *Handbook of research on teacher education* (pp. 102-119). New York.

Roca, E. (2007). Intuitive Practical Wisdom in Organisational Life. *Social Epistemology, 21*(2), 195-207.

Rooth, E. (1995). *Lifeskills: a resource book for facilitators*. Cape Town: Nolwazi Educational Publishers (Pty) Ltd.

Rooth, E. (2000). *Introduction to lifeskills: hands-on approaches to lifeskills education*. Cape Town: Via Afrika.

Ross, W. D. (1980). *Aristotle, The Nicomachean Ethics*. New York: Oxford University Press.

Rule, A. C. (2006). The components of authentic learning. *Journal of Authentic Learning, 3*(1), 1-10.

Saddington, J. A. (1985). *An evaluative study of a university course for professional adult educators using an experiential learning methodology*. Cape Town: University of Cape Town.

Samuel, M. (2002). *On Becoming a Teacher of English: Life History Research and the Force-Field Model of Teacher Development.* Paper presented at the Advances in Qualitative Research Methods Conference, RAU/Unversity of Alberta, Canada, Sun City, 24-25 January.

Samuel, M. (2003). Autobiographical Research in Educator Education: Memories as Method and Model. In K. Lewin, M. Samuel & Y. Sayed (Eds.), *Changing Patterns of Teacher Education in South Africa* (pp. 253-272). Cape Town: Heinemann.

Samuel, M. (2008). Accountability to whom? For what? Teacher identity and the Force Field Model of teacher development. *Perspectives in Education*, 26(2), 3-16.

Saunders, W. L. (1992). The constructivist perspective: Implications and teaching strategies for science. *School Science and Mathematics, 92*(3), 136-141.

Schein, E. H. (1996). Kurt Lewin's change theory in the field and in the classroom: notes toward a model of managed learning. *Systems Practice, 9*(1), 27-47.

Schein, E. H. (1999). *Process consultation revisited: building the helping relationship. Reading*. MA: Addison-Wesley.

Schepens, A., Aelterman, A., & Van Keer, H. (2007). Studying learning processes of student teachers with stimulated recall interviews through changes in interactive cognitions. *Teaching and Teacher Education*, 23(4), 457-472.

Schon, D. A. (1983). *The reflective practitioner*. New York: Basic Books.

Schon, D. A. (1987). *Educating the reflective practitioner*. San Francisco, CA: Jossey-Bass.

Schon, D. A. (1996). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*. San Francisco: Jossey-Bass.

Senge, P. M. (1990). *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday Currency.

Senge, P. M. (2006). *The Fifth Discipline - The Art & Practice of the Learning Organisation*. London: Random House.

Shavelson, R., Webb, N., & Burnstein, L. (1986). The measurement of teaching. In M. Wittrock (Ed.), *Handbook on teaching (3rd ed)* (pp. 1-36). New York: Macmillan.

Slabbert, J. (2003). PGCE Professional Educator Information package: University of Pretoria, Faculty of Education.

Slabbert, J. A. (2006). Radically Innovative: PGCE Lecturer Information Package: University of Pretoria, Faculty of Education.

Slabbert, J. A. (2007). Facilitating learning. What is it really? Pretoria: University of Pretoria, Faculty of education.

Slabbert, J. A., & Hattingh, A. (2006). Where is the Post-Modern Truth We Have Lost in Reductionist Knowledge? A Curriculum's Epitaph: University of Pretoria, Education Faculty.

So, W.W. (2006). A study of teacher cognition in planning elementary science lessons. *Research in Science Education*, *27*(1), 71-86

Soudien, C. (2007). The 'A' factor: Coming to terms with the question of legacy in South African education. *International Journal of Educational Development, 27*, 182-193.

Stacey, K., Rice, L. R., & Langer, G. (2001). *Academic Service-Learning Faculty Development Manual*. Ypsilanti, MI: Eastern Michigan University, Office of Academic Service-Learning.

Stenhouse, L. (1979). The problem of standards in illuminative research. *Scottish Educational Review, 11*(1), 5-10.

Stringer, E. T. (1993). Socially responsive educational research: linking theory and practice. In D. J. Flindes & G. E. Mills (Eds.), *Theory and Concepts in Qualitative Research. Perspectives from the field* (pp. 141-162). New York: Teachers College Press.

Swantz, M. (1975). Research as an educational tool for development. *Convergence, 8*(2), 44-53.

Tabachnick, R., & Zeichner, K.M. (1999). Idea and action: Action Research and the development of conceptual change teaching of Science. *Science Education, 83*(3), 309-322.

Teddlie, C., & Tashakkori, A. (2006). A general typology of research designs featuring mixed methods. *Research in the Schools, 13*(1), 12-28.

Terre Blanche, M., & Durrheim, K. (2006). *Research in Practice: Applied methods for the social sciences (2nd ed.)*. Cape Town: University of Cape Town Press.

Van Driel, J. H., Verloop, N., & De Vos, W. (1998). Developing science teachers' pedagogical content knowledge. *Journal of Research in Science Teaching, 35*, 673-695.

Van Huizen, P., van Oers, B., & Wubbels, T. (2005). A Vygotskian perspective on teacher education. *Curriculum Studies, 37*(3), 267-290.

Van Manen, M. (1995). On the Epistemology of Reflective Practice. *Teachers and Teaching: theory and practice, 1*(1), 33-50.

Van Merrienboer, J. J. G., & Paas, F. (2003). Powerful learning and the many faces of instructional design: Towards a framework for the design of powerful learning environments. In E. D. Corte, L. Verschaffel, N. Entwistle & J. V. Merrienboer (Eds.), *Powerful Learning Environments: Unraveling basic components and dimensions* (pp. 3-20). Oxford: Pergamon.

Van Veen, K., Sleegers, P., & van de Ven, P. (2005). One teacher's identity, emotions, and commitment to change: A case study into the cognitive–affective processes of a secondary school teacher in the context of reforms. *Teaching and Teacher Education, 21*(8), 917-934.

Villegas-Reimers, E. (2003). *Teacher professional development: an international review of the literature*. UNESCO: International Institute for Educational Planning. Accessed 20 May, 2008, from http://www.unesco.org/iiep.

Vithal, R. (2008). An analytical framework for mathematics teacher education from a critical perspective. *Perspectives in Education, 26*(2), 29-40.

Von Glaserfeld, E. (1984). An introduction to radical constructivism. In Waltzlawick (Ed.), *The Invented reality* (pp. 17-40). New York: Norton.

Von Glaserfeld, E. (1995). *Radical Constructivism: A way of knowing and learning*. London: The Falmer Press.

Von Glaserfeld, E. (2001). Radical Constructivism Teaching. *Prospects, 31*(2), 161-173.

Vonk, J.H.C. (1995). Teacher education and reform in Western Europe: sociopolitical contexts and actual reform. In N.K. Shimahara, & I.Z. Holowinsky (Eds.), *Teacher Education in Industrialized Nations*. New York: Garland Publishing.

Wade, R. C., & Yarbrough, D. B. (1996). Portfolios: A tool for reflective thinking in teacher education? *Teaching and Teacher Education, 12*(1), 63–79.

Wagner, J. (1999). *Dorothy Heathcote: Drama as a learning medium*. London: Heineman Drama.

Wang, V. C. X., & King, K. P. (2006). Understanding Mezirows' Theory of Reflectivity from Confucian Perspectives: A Model and Perspective. Retrieved November, 2006, from http://radicalpedagogy.icaap.org/content/issue8_1/wang.html

Weiler, J. (2001). Promoting the dialogue: role of action research at Belvedere Technical Teachers' College, Zambia. *Educational Action Research, 3*, 413-436.

Wenger, E. (1998). *Communities of Practice: Learning, Meaning, and Identity*. Cambridge: Cambridge University Press.

Williams, A., & Katz, L. (2001). The use of Focus Group Methodology in Education: Some Theoretical and Practical Considerations [Electronic Version]. *International Electronic Journal for Leadership in Learning*, 5(3) from http://www.ucalgary.ca/~iejll//volume5/katz.html.

Winter, R. (2002). Truth or fiction: problems of validity and authenticity in narratives of action research. *Educational Action Research, 10*(1), 143-154.

Wortham, S. (2001). Social construction and pedagogical practice. In K. J. Gergen (Ed.), *Social construction in context*. London: Sage.

Yinger, R. J. (1986). Examining thought in action: a theoretical and methodological critique of research on interactive teaching. *Teaching and Teacher Education, 2*(3), 263-282.

Yost, D.S., Sentner, S.M., & Forlenza-Bailey, A. (2000). An Examination of the Construct of Critical Reflection: Implications for Teacher Education Programming in the 21st Century. *Journal of Teacher Education*, 51(1), 19-49.

Zeichner, K. (1983). Myths and Realities: Field-based experience in teacher education. *Journal of Teacher Education, 31*(6), 45-55.

Zeichner, K. (1986). The practicum as an occasion for learning to teach. *The South Pacific Journal of Teacher Education, 12*(1), 11-27.

Zeichner, K. (1990). Changing Directions in the practicum: looking ahead to the 1990's. *Journal of Education for Teaching, 16*(2), 105-132.

Zeichner, K. (1992). Rethinking the practicum in the professional development school partnership. *Journal of Teacher Education, 43*, 296-307.

Zeichner, K. (2001). Educational Action Research. In P. Reason & H. Bradbury (Eds.), *Handbook of Action Research: Participative inquiry and practice*. London: Sage.

Zeichner, K. (2005). Contradictions and Tensions in the Place of Teachers in Educational Reform: Reflections Upon the Role of Teachers in Recent Educational Reforms in the United States & Namibia: Paper presented at the International Council for Education in Teaching Conference, Pretoria.

Zeichner, K.M. & Liston, D.P. (1987). *Teaching student teachers to reflect*. Harvard Educational Review, 57(1), 23-48.

Zeichner, K., & Liston, D. (1996). *Reflective teaching*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Zeichner, K., & Tabachnik, R. (1981). Are the effects of university education 'washed out' by school experience. *Journal of Teacher Education, 32*, 7-11.

Zeichner, K.M., & Tabachnick, B.R. (2001). Reflections on reflective teaching. In J. Soler, A. Craft, & H. Burgress (Eds.), *Teacher development: exploring our own practice*. London: Paul Chapman Publishing and The Open University Press.

Zirkel, S. (2000). Social Intelligence: The development and maintenance of purposive behaviour. In R. Bar-On & J. D. A. Parker (Eds.), *The handbook of emotional intelligence: Theory and practice of development, evaluation, education, and implementation at home, school, and in the work place*. New York: Jossey Bass.

Zull, J. E. (2002). *The Art of Changing the Brain: enriching the practice of teaching by exploring the biology of learning*. Virginia: Stylus Publishing.

APPENDIX 1

SECTION 1

APPENDIX I: Chapter 3

1. Group interviews - copies of questions asked

2. Copies of Personal profile questionnaires

a. Neethling Personal Skills Instrument,

b. Temperament indicator - David Keirsey and

c. Self Image Evaluation.I.

3. Signed consent letters from the student teachers

1. Group interviews - copies of q

Interviews

Group discussion/interview 1 *11/02*

The teacher educator, (Professor Ned) used a group interview at the outset of the programme during the first week. The questions that the teacher educator asked were concerned with eliciting the students' baseline understanding of the role of a teacher. Examples of the questions were: If you want to describe your role in the Life Sciences, what would your role be as a teacher? Have you had a chance to see some of the Life Sciences teachers at work during your observation or any other experience and have you observed that the teachers are more or less teaching the theoretical work?

Group discussion/interview 2 *11/03*

During this interview the student teachers and the researcher were the participants. This interview was held in the first forty minutes of the planned time for the university specialisation discussion session and straight after the interview the discussion session took place. The interview was started by asking each student teacher if they felt comfortable with the tensions - the one was the video aspect (student teachers had stated previously that they did not feel comfortable about being videoed) and what some of the things were that they you would like to raise at that time. The questions asked focused on each student teacher's knowledge construction, what would be expected of them in the schools and their drawing of how they saw themselves as facilitators of learning.

Group discussion/interview 3 - *29/03*

This interview was held during a planned university specialisation session and the researcher and student teachers were present. The interview took place in the first hour of the session. On this day the student teachers were at the university for the full day designing and preparing their learning tasks and activities for facilitation of learning for the first school based session. This interview was held after the student teachers had spent a week observing at the school that they were to facilitate learning in for the first school-based practicum session.

Some of the questions that I asked dur elings at this point in time and your personal experiences? Had you planned the activities for them (the learners) or were you just doing what the teacher asked you to do? Have you used anything of what you developed here (university sessions) so far or did you just go out to observe? If you had to think about your experience at school - would you re-design it or would you change it in anyway? At this point I need to understand how you are personally interpreting what a reflection is? When in the programme did you get clarity about reflection and what you need to focus on? Are you comfortable with reflecting? What is your understanding of "phronesis" and practice theory? A - Do you see - is there a link or is there a space in the programme that you are experiencing that gives you this development of practical wisdom? Have you encountered and how have you encountered- practice theory? Do you experience the construction of practice theory at university and how do you experience it? You stated that the reflection sessions at the university that you had after school, were helpful- how were these reflections used? When you were discussing problems that you experienced at the school, what was your participation in this?

Group discussion/interview 4 - *19/04*

This group interview was held on the first day that the student teachers spent at the school facilitating for their first school-based facilitation session. The group interview was held during the afternoon when the student teachers came to the university for a planned university specialisation discussion session. The student teachers and the researcher participated in the group interview.

I asked the student teachers to respond to the following questions which I presented one at a time at particular points during the interview: How are you feeling right now? What is your expectation of the contribution of the mentor teacher towards constructing your practice theory? How do you see yourself at this point in time with regard to your construction of your practice theory? Did you see the university specialisation session that you experienced during the last term (Term 1) as contributing to the construction of your practice theory and how did it contribute? What specifically helped? During the group interview I also shared the research questions with the student teachers and asked them about their feelings and their comments about the following questions:

What was your base-line unc[illegible] entered the programme? What is your expectation of the contribution of specialization programme towards constructing your practice theory? How do you perceive the actual contribution of specialization programme to your practice theory? How do you use the contribution of specialization programme? What are your expectations in regard to the contribution of the mentor teacher? How do you perceive the actual contribution of mentor teacher? How do you use the contribution of the mentor teacher?

The student teachers were also asked: how do you feel about being involved in exploring the construction of your practice theory? Are you comfortable; is there anything that should be changed? If you look at the way in which this research is going, looking at participatory action research, see it as four phases: beginning of the programme; first term strong focus on specialisation, second term school-based and third term - school-based. Within each of these particular cycles what we are looking at is what was the experience of the students and how have these experiences changed?

Group discussion/interview 5 - *24/05*

The teacher educator, researcher and student teachers were present during this interview. The teacher educator took on the role of the interviewer and I was a participant observer in the process. During this discussion/interview the teacher educator explored the student teachers' thinking and feelings about the assessment of the learning tasks that they were to present during the school-based practicum session.

The teacher educator started the discussion interview by stating that the purpose of this interview is to observe the videos of Mack and Bernice facilitating learning of a Life Sciences learning task. The instructions that the teacher educator put to the student teachers were: while observing the video, think and pick out the things that we need to be assessing? Before the video was played, a discussion on the issues to look for when assessing the learning task presentation ensued. The student teachers shared their ideas of what should be looked for and then a list was compiled from these inputs. The teacher

educator played the video and stopped [illegible] was required. During the discussion, assessment criteria that could be used to assess the facilitation of the learning tasks were listed and an assessment rubric was constructed.

a. Neethling Personal Skills Instrument

The Neethling Skills Instrument is a descriptive, non-judgemental assessment with no profile being superior to the other. The individual Skills Profile identifies the strengths of the skills in every quadrant. The profile report focuses the specific quadrant scores and makes recommendations based on these scores.

General information regarding the quadrants: LI skills - examples of skills are investigative, critical, questioning, reasoned, rational, logical, balanced and well-argued. Examples of jobs that usually require L 1 skills: Engineer ; L2 skills are methodical, implementation, traditional, organisational, planning, meticulous, painstaking, comprehensive, thorough, reliable, punctual, consciences; R2 skills are responsive, interpersonal, receptive, aware, people insightful, expressive, listening, approachable, sympathetic, eager, networking, coaching, teaching (especially young children), communication and RI skills are possibility finding, incorporate ideas, conceptualising, experimenting, generating ideas and solutions, integrative, idea-intuition, associate, relate ideas and experimenting.

The Individual Skills Profile indicates high, average and low preference areas. The scores can be divided into the following categories: 95+ very high preferences; 80 - 94 High preference; 65 - 79 Average preference; 50 - 64 low preference and -50 very low preferences.

An individual's profile is evaluat to exact marks. As the instrument measures skills and not preference, it is possible for an individual to have a low skills profile for a specific quadrant, yet love the functions and characteristics associated with that particular quadrant. The most common reason for this happening is that preferring ("liking") something does not automatically ean you have the sills to execute or implement the preference. A preference may have the preference for singing but does not have any singing skills.

The opposite is also sometimes true. A person may have excellent skills for accounting but has little or no preference for doing the wok of an accountant. It would be very difficult to sustain passion and energy, if the correlation between the preference profile and skills profile is low. As no person is completely one-quadrant dominant, the profile indicates a high, average and low preference areas. It is important to note that the total in every profile is 300. Skills can be developed and it is possible that a person's skills profile may change over time

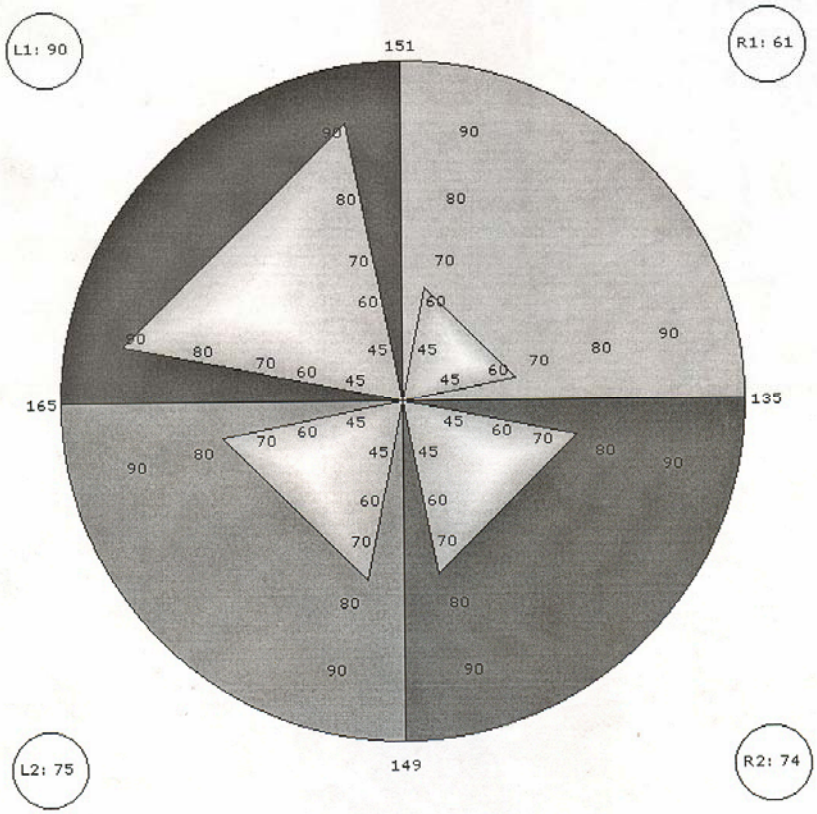
2(a)

solutionsfinding.com
PART OF THE KOBUS NEETHLING GROUP

EXAMPLE REPORT

2004-Jan-27 12:14:00 (GMT)

Personal Skills Instrument



Interpreting the Results

The Neethling Skills Instrument is a descriptive, non-judgmental assessment with no profile being superiour to the other. The individual Skills Profile identifies the strengths of the skills in every quadrant. The profile report focuses the specific quadrant scores and makes recommendations based on these scores.

It could happen that a person's skills profile differs form his/her preference profile. The most common reason for this happening is that preferring ("liking") something does not automatically mean you have the skills to execute or implement the preference. A person may have the preference for singing but does not have any singing skills.

The opposite is also sometimes true. A person may have excellent skills for accounting but has little or no preference for doing the work of an accountant. It would be very difficult to sustain passion and energy, if the correlation between the preference profile and skills profile is low.
As no person is completely one-quadrant dominant, the profile indicates high, average and low preference areas. It is important to note that the total in every profile is 300.

The scores can briefly be divided into the following categories:

95+ Very High preference
80-94 High preference
65-79 Average preference
50-64 Low preference
-50 Very low preference

Please note that an individual's profile should always be evaluated in categories and not according to exact scores.

As this instrument measures skill and not preference, it is possible for an individual to have a low skills profile (such as 57) for a specific quadrant, yet love the functions and characteristics associated with that particular quadrant. For example a person could have a low skills profile for Quadrant L1; yet still love working with numbers, facts etc. However, in the long run, such a person would not be able to continue productively, as he/she would be doing a job for which he/she has little skills. Skills can be developed and it is possible that a person's skills profile may change over time.

General information regarding the different quadrants

L1 – Skills

Examples of L1 skills:

Investigative, Diagnostic, Critical, Questioning, Reasoned, Rational, Logical, Balanced, Well-argued

A Few examples of jobs that usually require L1 skills:

Engineer, Actuary, Researcher, Economic sector, Surgeon, Treasurer, Bank Manager, Financial sector, Natural Sciences, Dentist

L2 – Skills

Examples of L2 skills:

Methodical, Implementation, Traditional, Organizational, Planning, Meticulous, Painstaking, Comprehensive, Thorough, Reliable, Punctual, Consciences

A few examples of jobs that usually require L2 skills:

Foreman, Finance clerks, Record keepers, Military Managers, Administration, Planners, Supervisor, Bookkeepers, Certain Engineering Professions

R2 – Skills

Examples of R2 skills:

Responsive, Interpersonal, Receptive, Aware, People insightful, Expressive, Listening, Approachable, Sympathetic, Eager, Networking, *Coaching, Teaching (especially young children), Communication*

A few examples of jobs that usually require R2 skills:

School Counselor, Nurse, Social worker, Teacher (especially young children), Consultant, Direct sales, Journalism

R1 – Skills

Examples of R1 skills:

Possibility finding, Incorporate ideas, Conceptualizing, Experimenting, Generating ideas and solutions, Integrative, Idea-intuition, Associate, Relate ideas, Experimenting

A few examples of jobs that usually require R1 skills:

Entrepreneur, Art director, Marketing consultant, Designer, Strategic planning, Advertising, Pediatrics, Architect

Areas of Application

* Design your ideal job.
* Appoint the right (skilled) person for the job.
* Apply a multi-skilling approach within the work place.

* Choose high impact teams with whole brain skills.
* Get the whole brain working for you in sport
* Apply teaching/training skills effectively
* Determine special skills (dealing with people, organising, etc) to enhance specialisation.
* Discover why an individual can DO a job without having any passion for it (no alignment between preferences and skills)

EXAMPLE REPORT

solutionsfinding.com
PART OF THE KOBUS NEETHLING GROUP

Candidate specific information

Quadrant: L1 - 90
High Preference

A high score in the L1 quadrant indicates that you are good at digging deeper, researching and solving problems. You can stay impartial until you have gathered all the necessary information. Your skills include probing and examining problems in a critical and clinical way. You can be reasonable, realistic and make objective decisions without allowing your emotions to interfere. This also allows you to set realistic goals and to achieve the targets set. You possess the skills to work in a focused and accurate way, investigating, identifying mistakes and getting to the essence of a problem. You are probably good at working with numbers.

Quadrant: L2 - 75
Average Preference

An average score in the L2 quadrant indicates that, although you can be comfortable with working in a disciplined and detailed fashion, this is not your dominant skill. You will be able to follow procedures and to complete tasks timeously, but not on an ongoing basis. You may have the skill to maintain order in certain areas of your life, but probably not in all.

Quadrant: R2 - 74
Average Preference

An average score in the R2 quadrant indicates that you may be able to network with people, cooperate with others to complete tasks, but being a team player is not your dominant skill. You may be able to socialise and seek companionship, but not on an ongoing basis. Although you may be able to share ideas with others and show sensitivity in certain circumstances, you do not always find it comfortable to do so.

Quadrant: R1 - 61
Low Preference

A low score in the R1 quadrant indicates that you lack the skills to see the world through other people's eyes, to stay open-minded and to embrace change. You do not use fantasy, daydreaming and intuition effectively to help you solve problems. You do not cope well with uncertainty, contradiction and challenges to the status quo. You are unable to function in an disorderly environment

b. Temperament indicator - Dav

The Keirsey Temperament indicator is a powerful forty question personality instrument that helps individuals discover their personality type. The data from using this indicator gives people insight into themselves which is useful for choosing a career and also for self-understanding.

According to Keirsey (1998, p. 2) people may be "sorted into one of four temperament categories. A category is Popular Sanguine (extrovert) who is outgoing and people-oriented. The characteristics of A are: inspiring, influential, impressive, interesting, convincing, important to be noticed, flexible (friends all over), interested in people, imaginative, impulsive, illogical, you enjoy them, good beginners, poor finishers, lovable, exaggerating, easily cheered up. **In** control/out of control: optimistic/unrealistic; convincing/manipulative; excited/emotional; outgoing/without focus; fiery/irritable; involved/lost; imagine/dream; warm/without focus. They like: to be loved; expression of their ideas and feelings, to be part of a group, surprises, many social activities, fun and pleasure, to talk a lot, recognition and acknowledgement.

Category B is an Influential Choleric (outwardly forceful) who is outgoing and task-oriented. The characteristics of B are: dominant, dominating, exhausting, direct, determined, definite, executor, goal directed, director, dogmatic, hardworking, in a hurry, energetic, dynamic, and proud. Difficult to please, self-assured, busy, performer. **In** control/out of control: brave/reckless; quick to react/rude; visionary/impatient; results oriented/unpleasantly ambitious; consulting/dictatorial; self-assured/egocentric; direct/attacking; independent/arrogant; competing/cruel. They like: winning, planning, new ideas, results, to be their own boss, to move fast, challenges.

Category C is a Perfectionist Melancholy and task-oriented. The characteristics of C are: careful, competent, clever, careful judging, critical thinkers, wants to be accommodated, dependable, perfectionist, correct, stable, cold, wants detail and input, difficult to please, knitpicking, self-sacrificing, noisy and self-deprecating. In control/out of control: neat/compulsive; logic/critical; dedicated/unsocial; noisy/interfering; teachable/takes exception; careful/fearful; correct/rigid; questioning/doubtful. They like: to be right, to know what is expected of them, fixed procedures, clear instructions, to finish what they are busy with, planning- prior predictions, setting long term goals.

Category D is Tranquil Phlegmatic (careful) who is withholding and people-oriented. The characteristics of D are: supportive, stable, sure, servant, quite, submissive, shy, sentimental, equality, unity, can't say no, easily manipulated, loyal, poor beginners - good finishers, team workers. In control/out of control: relaxed/no initiative; trustworthy/dependent; cooperation/slave; stable/no decision; good listener/no communication; focused/unflexible; stable/resist change; good/manipulative; systematic/slow. They like acceptance; team work and cooperation, stay with what works for them, harmony, that things must remain the same, predictability, rest and peace.

		TEMPERAMENTE		
Nie om te oordeel of om te Etiketeer nie maar om mense te verstaan.				

Maak 'n merkie agter elk van die volgende rye van vier woorde wat meeste van toepassing is op jou lewe, as nie een van toepassing blyk te wees op jou nie, merk in elk geval een wat miskien die meeste van toepassing kan wees op jou lewe.

STERKPUNTE / STRENGTHS

	A		B		C		D	
1	Avontuurlik Adventurous	B	Aanpasbaar Adaptable	D	Opgewek Animated	A	Ontledend Analytical	C
2	Hardkoppig Persistent	C	Speels Playful	A	Oorredend Persuasive	B	Vreedsaam Peaceful	D
3	Onderdanig Submissive	D	Self-opofferend Self-sacrificing	C	Gesellig Sociable	A	Sterk-wil Strong-willed	B
4	Bedagsaam Considerate	C	Beheersd Controlled	D	Mededingend Competitive	B	Oortuigend Convincing	A
5	Verfrissend Refreshing	A	Beleefd Respectful	C	Terughoudend Reserved	D	Vindingryk Resourceful	B
6	Tevrede Satisfied	D	Fyngevoelig Sensitive	C	Selfstandig Self-reliant	B	Opgeruimd Spirited	A
7	Beplanner Planner	C	Geduldig Patient	D	Positief Positive	B	Voorstander Promoter	A
8	Seker Sure	B	Spontaan Spontaneous	A	Geskeduleerd Scheduled	C	Skaam Shy	D
9	Ordelik Orderly	C	Vriendelik Friendly	D	Uitgesproke Outspoken	B	Optimistiies Optimistic	A
10	Vriendelik Friendly	D	Getrou Faithful	C	Snaaks Funny	A	Dominerend Forceful	B
11	Waaghalsig Daring	B	Genotvol Delightful	A	Taktvol Diplomatic	D	Breedvoerig Detailed	C
12	Opgeruimd Cheerful	A	Aandring Consistent	D	Beskaafd Cultured	C	Selfversekerd Confident	B
13	Idealiseer Idealistic	C	Onafhanklik Independent	B	Ergeloos Inoffensive	D	Inspererend Inspiring	A
14	Demonstreerder Demonstrative	A	Beslis Decisive	B	Droë-humor Dry-humor	D	Diep Deep	C
15	Bemiddelaar Mediator	D	Musikaal Musical	C	Beweger Mover	B	Meng maklik Mixes easily	A
16	Bedagsaam Thoughtful	C	Hardnekkig Tenacious	B	Geselserig Talker	A	Verdraagsaam Tolerant	D
17	Luisteraar Listener	D	Getrou / lojaal Loyal	C	Leier Leader	B	Opgeruimd Lively	A
18	Tevrede Content	D	Vernaam Chief	B	Grapmaker Chartmaker	C	Oulik Cute	A
19	Perfeksionisties Perfectionist	C	Aangenaam Pleasant	D	Produktief Prodective	B	Gewild Popular	A
20	Nooit dieselfde Bouncy	A	Vrypostig Bold	B	Gemanierd Behaved	C	Gebalanseerd Balansed	D

Sterkpunte	A=	B=	C=	D=

SWAKPUNTE / WEAKNESSES

	A		B		C		D	
21	Uitdrukkingloos Blank	D	Skaam Bashful	C	Luidrugtig Brassy	A	Baasspelerig Bossy	B
22	Ongedissiplineerd Undisciplined	A	Onsimpatiek Unsympathetic	B	Onintoesiasties Unenthusiastic	D	Onvergeeflik Unforgiving	C
23	Swygsaam Reticent	D	Bitterheid Resentful	C	Weerstandbiedend Resistant	B	Herhalend Repetitious	A
24	Puntenerig Fussy	C	Vreesagtig Fearful	D	Vergeetagtig Forgetful	A	Uitgesproke Frank	B
25	Ongeduldig Impatient	B	Onseker Insecure	C	Besluitloos Indecisive	D	Onderbreek Interrupts	A
26	Onpopulêr Unpopular	C	Onbetrokke Uninvolved	D	Onvoorspelbaar Unpredictable	A	Afsydig (koud) Unaffectionate	B
27	Eiewys Headstrong	B	Sorgeloos Haphazard	A	Moeilik tevrede gestel Hard to please	C	Besluitloos Hesitant	D
28	Gewoon Plain	D	Pessimisties Pessimistic	C	Trots Proud	B	Toestemmend Permissive	A
29	Vinnig Kwaad Angered Easily	A	Doelloos Aimless	D	Twisgierig Argumentative	B	Vervreemd Alienated	C
30	Naief Naïve	A	Negatiewe Houding Negative Attitude	C	Senuweeagtig Nervous	B	Onbetrokke Nonchalant	D
31	Bekommerde Persoon Worrier	D	Teruggetrokke Withdrawn	C	Werkolis Workaholic	B	Wil Erkenning Hê Wants Credit	A
32	Oor Sensitief Too Sensitive	C	Taktloos Tactless	B	Skaam Timid	D	Spraaksaam Talkative	A
33	Onseker Doubtful	D	Ongeorganiseerd Disorganized	A	Dominerend Domineering	B	Depressief Depressed	C
34	Wispelturig Inconsistent	A	Introvert Introvert	C	Onverdraagsaam Intolerant	B	Agterlosig Indifferent	D
35	Wanordelik Messy	A	Buierig Moody	C	Mompelaar Mumbles	D	Manipuleerder Manipulator	B
36	Traag Slow	D	Hardkoppig Stubborn	B	Pronkerig Show-off	A	Skepties Skeptical	C
37	Alleenloper Loner	C	Baasspelerig Bossy	B	Lui Lazy	D	Luidrugtig Loud	A
38	Stadig Sluggish	D	Agterdogtig Suspicious	C	Kort Humeur Short Tempered	B	Verstrooid Scatterbrained	A
39	Wraakgierig Revengeful	C	Rusteloos Restless	A	Onwillig Reluctant	D	Haastig Rash	B
40	Ooreenkoms Aangaan Compromising	D	Kritiek Critical	C	Handig Crafty	B	Veranderlik Changeable	A

Swakpunte	A=	B=	C=	D=

GROOT TOTAAL: **A =** **B =** **C =** **D =**

— LEADER —

A **POPULAR SANGUINE** **Extrovert** **(Outgoing, people-oriented)**	B **INFLUENTIAL CHOLERIC** **Outwardly forceful** **(Outgoing, task-oriented)**
Characteristics: Inspiring, influential, impressive, interesting, convincing, important to be noticed, flexible (friends all over), interested in people, imaginative, impulsive, illogical, you enjoy them, good beginners, poor finishers, lovable, exaggerating, easily cheered up. In control / out of control: Optimistic/unrealistic; convincing /manipulative; excited/emotional; outgoing/without focus; fiery/irritable; involved/lost; imagine/dream; warm/without focus They like: To be loved, expression of their ideas and feelings, to e part of a group, surprises, many social activities, fun and pleasure, to talk a lot, recognition and acknowledgement.	Characteristics: Dominant, dominating, exhausting; direct, determined, definite, executor, coal directed, director, dogmatic, hard working, in a hurry, energetic, dynamic, proud. Difficult to please, self-assured, busy, performer. In control / out of control: Brave/reckless; quick to react/rude; visionary/impatient; results oriented/ unpleasantly ambitious; consulting/dictatorial; self-assured/egocentric; direct/attacking; independent/arrogant; competing/cruel They like: Winning, planning, new ideas, results, to be their own boss, to move fast, challenges
D **TRANQUIL PHLEGMATIC** **Careful** **(Withholding, people-oriented)**	C **PERFECTIONISTIC MELANCHOLY** **Introvert** **(Withholding, task-oriented)**
Characteristics: Supportive, stable, sure, servant, qute, submissive, shy, sentimental, equality, unity, can't say no, easily manipulated, loyal, poor beginners – good finishers, team workers In control / out of control: Relaxed/no initiative; trustworthy/dependent; cooperation/slave; stable/no decisions; good listener/no communication; focused/unflexible; stable/resist change; good/manipulable; systematic/slow They like: They like: Acceptance, team work and cooperation, stay with what works for them, harmony, that things must remain the same, predictability, rest and peace.	Characteristics: Careful, competent, clever, careful, judging, critical thinkers, wants to be accommodated, dependable, perfectionist, correct, stable, cold, wants detail and input, difficult to please, knit-picking, self-sacrificing, nosy, self-deprecating. In control / out of control: Neat/compulsive; logic/critical; dedicated/unsocial; nosy/interfering; teachable/takes exception; careful/fearful; correct/rigid; questioning/doubtful They like: To be right, to know what is expected of them, fixed procedures, clear instructions, to finish what they are busy with, planning – prior predictions, setting long term goals

P L A Y

c. Self Image Evaluation.

-

2(c)

SELF IMAGE EVALUATION

This is not a test; therefore there is no right or wrong answer. Mark the score that correlates with your circumstances.

1 = Never, no; 2 = Seldom; 3 = Sometimes; 4 = Often; 5 = Always, Yes

1.	I feel that people won't like me if they were to know me well	1	2	3	4	5
2.	Other people cope much better with life that what I do	1	2	3	4	5
3.	I think that I am a beautiful person	1	2	3	4	5
4.	I feel that other people are happy when I am with them	1	2	3	4	5
5.	I think that people really enjoy talking to me	1	2	3	4	5
6.	I feel that I am a competent person	1	2	3	4	5
7.	I think that I make a good impression on people	1	2	3	4	5
8.	I need more self-confidence	1	2	3	4	5
9.	I am very nervous when I am amongst other people	1	2	3	4	5
10.	I think that I am a boring person	1	2	3	4	5
11.	I feel ugly	1	2	3	4	5
12.	I think other people have more fun than what I have	1	2	3	4	5
13.	I think I bore other people	1	2	3	4	5
14.	I think my friends find me interesting	1	2	3	4	5
15.	I have a good sense of humour	1	2	3	4	5
16.	I feel self conscious amongst other people	1	2	3	4	5
17.	I wish I was more like other people	1	2	3	4	5
18.	I think that people enjoy themselves when they are with me	1	2	3	4	5
19.	I feel out of place when I go out	1	2	3	4	5
20.	People push me around more than others	1	2	3	4	5
21.	I think that I am a kind person	1	2	3	4	5
22.	I think that other people really like me	1	2	3	4	5
23.	I think I'm cute	1	2	3	4	5
24.	I'm scared that I'll make a fool of myself	1	2	3	4	5
25.	My friends think highly of me	1	2	3	4	5

Write down the marks that you scored for the following questions in this space

Write down the marks that you scored for the following questions in this space, after you've deducted it from 6

70 TO 120	No Self image
55 TO 69	Dissatisfied Self image
40 TO 54	Average Self image
30 TO 39	Very Good Self image
0 TO 29	Excellent, too good

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Signed Consent Letters

University of Pretoria

Pretoria 0002 Republic of South Africa
Tel (012) 420 2885; Fax (012) 420 3003
http://www.up.ac.za

Department of Curriculum Studies

1 February 2007

Dear Participant

You are requested to confirm with your signature at the bottom of this letter that you have invited to participate in the research indicated in the content that follows:

HOW DO STUDENT TEACHERS CONSTRUCT AND USE "PHRONESIS" TO ENHANCE THEIR PROFESSIONAL DEVELOPMENT

You are invited to participate in a research project aimed at gaining insight into the meaningfulness of the radical innovation in teacher education, which is the PGCE programme at University of Pretoria. To determine the meaningfulness of this PGCE programme, only the experiences of the Biology (Life Sciences) student teachers will be explored as a case study.

Your participation in this research project is voluntary and confidential. You will not be asked to reveal any information that will allow your identity to be established, unless you are willing to be contacted for individual follow up interviews. Should you declare yourself willing to participate in an individual interview, confidentiality will be guaranteed and you may decide to withdraw at any stage should you wish not to continue with an interview.

Your role in the research will be the following:
(1) Your participation will be for the duration of one year at specific time periods. The time periods will be discussed and negotiated with the students.
(2) You will be expected to engage in activities that will reveal: their perceptions as facilitators of learning e.g. biographic interview, developing a collage; their experiences of the university-based education e.g. personal reflective journals, participatory reflective class discussions (will involve students, lecturer and researcher) and their experiences of the school-based experience e.g. reflective diaries, researcher observing the lessons taught.

The results from this study will be used to enhance the professional development of student teachers through the construction and use of phronesis (practical wisdom).

If you are willing to participate in this study, please sign this letter as a declaration of your consent, i.e. that you participate in this project willingly and that you understand that you may withdraw from the research project at any time. Participation in this phase of the project does not obligate you to participate in follow up individual interviews, however, should you decide to participate in follow-up interviews your participation is still voluntary and you may withdraw at any time. Under no circumstances will the identity of interview participants be made known to any parties/organisations that may be involved in the research process and/or which has some form of power over the participants.

Participant's signature Bleaccm ; Date: 15-02-2006

Researcher's signature A James ; Date: 15/02/07

Yours Sincerely

ANGELA JAMES

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

University of Pretoria

Pretoria 0002 Republic of South Africa
Tel (012) 420 2906; Fax (012) 420 3003
http://www.up.ac.za

Department of Curriculum Studies

1 February 2007

Dear Participant

You are requested to confirm with your signature at the bottom of this letter that you have invited to participate in the research indicated in the content that follows:

HOW DO STUDENT TEACHERS CONSTRUCT AND USE "PHRONESIS" TO ENHANCE THEIR PROFESSIONAL DEVELOPMENT

You are invited to participate in a research project aimed at gaining insight into the meaningfulness of the radical innovation in teacher education, which is the PGCE programme at University of Pretoria. To determine the meaningfulness of this PGCE programme, only the experiences of the Biology (Life Sciences) student teachers will be explored as a case study.

Your participation in this research project is voluntary and confidential. You will not be asked to reveal any information that will allow your identity to be established, unless you are willing to be contacted for individual follow up interviews. Should you declare yourself willing to participate in an individual interview, confidentiality will be guaranteed and you may decide to withdraw at any stage should you wish not to continue with an interview.

Your role in the research will be the following:
(1) Your participation will be for the duration of one year at specific time periods. The time periods will be discussed and negotiated with the students.
(2) You will be expected to engage in activities that will reveal: their perceptions as facilitators of learning e.g. biographic interview, developing a collage; their experiences of the university-based education e.g. personal reflective journals, participatory reflective class discussions (will involve students, lecturer and researcher) and their experiences of the school-based experience e.g. reflective diaries, researcher observing the lessons taught.

The results from this study will be used to enhance the professional development of student teachers through the construction and use of phronesis (practical wisdom).

If you are willing to participate in this study, please sign this letter as a declaration of your consent, i.e. that you participate in this project willingly and that you understand that you may withdraw from the research project at any time. Participation in this phase of the project does not obligate you to participate in follow up individual interviews, however, should you decide to participate in follow-up interviews your participation is still voluntary and you may withdraw at any time. Under no circumstances will the identity of interview participants be made known to any parties/organisations that may be involved in the research process and/or which has some form of power over the participants.

Participant's signature ..... : Date: 26 Feb 2007

Researcher's signature ..... : Date: 28 Feb 2007

Yours Sincerely

ANGELA JAMES

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

University of Pretoria

Pretoria 0002 Republic of South Africa
Tel (012) 420 2966; Fax (012) 420 3003
http://www.up.ac.za

Department of Curriculum Studies

1 February 2007

Dear Participant

You are requested to confirm with your signature at the bottom of this letter that you have invited to participate in the research indicated in the content that follows:

HOW DO STUDENT TEACHERS CONSTRUCT AND USE "PHRONESIS" TO ENHANCE THEIR PROFESSIONAL DEVELOPMENT

You are invited to participate in a research project aimed at gaining insight into the meaningfulness of the radical innovation in teacher education, which is the PGCE programme at University of Pretoria. To determine the meaningfulness of this PGCE programme, only the experiences of the Biology (Life Sciences) student teachers will be explored as a case study.

Your participation in this research project is voluntary and confidential. You will not be asked to reveal any information that will allow your identity to be established, unless you are willing to be contacted for individual follow up interviews. Should you declare yourself willing to participate in an individual interview, confidentiality will be guaranteed and you may decide to withdraw at any stage should you wish not to continue with an interview.

Your role in the research will be the following:
(1) Your participation will be for the duration of one year at specific time periods. The time periods will be discussed and negotiated with the students.
(2) You will be expected to engage in activities that will reveal: their perceptions as facilitators of learning e.g. biographic interview, developing a collage; their experiences of the university-based education e.g. personal reflective journals, participatory reflective class discussions (will involve students, lecturer and researcher) and their experiences of the school-based experience e.g. reflective diaries, researcher observing the lessons taught.

The results from this study will be used to enhance the professional development of student teachers through the construction and use of phronesis (practical wisdom).

If you are willing to participate in this study, please sign this letter as a declaration of your consent, i.e. that you participate in this project willingly and that you understand that you may withdraw from the research project at any time. Participation in this phase of the project does not obligate you to participate in follow up individual interviews, however, should you decide to participate in follow-up interviews your participation is still voluntary and you may withdraw at any time. Under no circumstances will the identity of interview participants be made known to any parties/organisations that may be involved in the research process and/or which has some form of power over the participants.

Participant's signature ..... : Date: 9/02/2007

Researcher's signature ..... : Date: 10/02/2007

Yours Sincerely

ANGELA JAMES

APPENDIX 1

SECTION 11

Cycle One – Descriptive data for Chapter 4

Cycle Two - Descriptive data for Chapter 5

Cycle Three - Descriptive data for Chapter 6

Cycle Four - Descriptive data for Chapter 7

Descriptive data – cycle one

4.2. Step 1: Experiential reflections

4.2.1. Bernice

4.2.1.1. My role as a Life Sciences teacher/educator

Bernice described how she saw her role as a Life Sciences Teacher in terms of what children should be exposed to when learning Biology. Bernice was of the understanding that children can only appreciate something if they are shown it, "they need to see it, feel it, live it." She did state though that "this does not happen when Biology is taught". She saw her role as "I will take my children to a farm to experience the real thing [and my] passion for the subject must be carried out." Bernice thought that feelings were important as "when people love something and when you discuss it with them and they click, you want to show everyone that others can also 'see' what you have discussed."

Bernice thought that the best situation when teaching Biology is "if you work with theory and practice together." She stated that "You cannot have theory without practical". She illustrated her understanding of a Biology practical by "observing leaves and using litmus paper to test for an acid where the children can observe the colour changes with their chommie[1]".

Bernice's experience of observing Biology teachers teaching Biology led her to belief that "the teacher does not have many resources and they do not have time." This belief prompted Bernice to "make time for the children to have a bit of a practical experience where they can observe pictures or watch a few slides using group work" when she teaches at a school.

Bernice expressed a concern about her role in the classroom in that she was not ready, and questioned "how will I get them interested and what will happen if I do not get anything out of them". This concern was based on her observation that "the children sit there with the lights on but no-one is home" (implying that the children are physically present but they are not cognitively present). The concern of how she could learn to get a reaction out of the children was linked to her expectation of how to be an educator in the Life Sciences programme.

Bernice was aware of what was lacking in what she needed to know to be a teacher out in the schools. What she lacked were "the things that I do not know about when the teacher is standing in the front, all the behind the scenes activities, how much of the various teaching aspects." Her deficiencies raised a concern about where the children's' appreciation fitted into the teaching.

[1] Chommie is an Afrikaans colloquial word that means friend.

Bernice said that to be the best presenter she "must not be boring as a boring teacher cannot get the learners to learn". This awareness informed what she wanted to achieve in the programme "learn how to get a reaction out of the children." She was also interested in finding out "If we (student teachers) will learn more about the subject or will we learn about how to teach the subject?"

4.2.2. Carol

4.2.2.1. My role as a Life Sciences teacher/educator

Carol described her perception of her role as a Life Sciences Teacher as "people could only appreciate something that they love and know about and understand and believe". She saw her role as providing people with the opportunity to see it in order that "they will believe it as your own experience is important".

Carol also described her role as a Life Sciences teacher in terms of her feeling of passion and she stated "I know that I have passion as it 'borrel' (bubbles) in me". Her passion though was not really linked to teaching Biology, but it was a passion to help the children. She was aware that "when teaching Biology it is important that children should just learn something." Carol though thought that learning Biology "if it is just theory or just practical you will not help anyone" She thought that to help anyone she would "put the theory and the practical together [as this] is the best lesson."

In describing her experience of observing Biology teachers teaching Biology, Carol stated that they "did not have time to teach". She suggested that if she had to do practicals with the children then she would make time to do them.

Carol expressed a concern about her role in the classroom in that she was "uncertain about the type of relationship that I should have with the learners, must I be chommie, chommie or must I not be chommie, chommie." A further concern was her fear of the situation "sorting out the type of relationship with the learners."

Carol did not express any expectations as to how she was to develop as an educator in the Life Sciences. She did indicate her desire to "know how I can learn the best ways of how to help the children, how I can make it (Biology) interesting and how I can be the best teacher".

When Carol was asked to explore what she was lacking in what she needed to know to be a teacher out in the schools, she indicated that she lacked many things. She turned the focus from what she lacked to what she needed to be when she said "The teacher that I was with was good and I am trying to put my finger on it, what I need to know to be good, that is why I am here". She was aware of her needs and also what she wanted to achieve in this PGCE module. She stated that she wanted to be "the best teacher that I can be and I do not want to be the teacher that others expect me to be. Just what I can be; I want to

decide what I will be". This thinking was evident in her thoughts about what is required to be the best presenter. She stated "you have to develop your own style and methods. Every teacher has his/her own style and methods and they know when to use it and when it is important". What was interesting was that she wanted to be the best and was "prepared to try new things and use new things". But in trying new things she would not feel comfortable if "people tried to convince me that the ideas work for them therefore they should work for me". An essential aspect of trying new things was that is that if you try to be "what you are not as you will not feel it".

Carol was interested in finding out "What will we do, will we learn more facts in Biology, will we learn more about the curriculum, how will they get us to learn how to teach Biology". She thought that the specialisation lecturer was going to teach them (student teachers) how to teach Biology. She was also interested in wanting to know "when I am at a school will I know what stuff I need to teach the grade nines, will it be the same Biology that I had at school?"

4.2.3. Mack

4.2.3.1. My role as a Life Sciences teacher/educator

Mack described how he saw his role as a Life Sciences teacher in terms of his appreciation for nature and living things and the importance of developing this appreciation in learners. He linked this importance to current world needs by stating "the world needs a more appreciated attitude towards living things….and we need to bring that love and appreciation of nature to the children." But he was concerned that this appreciation was not developed as learners had "a lot of learning words".

Mack also described his role as a Life Sciences teacher in terms of his feelings for nature as he "always had a passion for nature". He felt that this feeling and his enjoyment for reading Zoology articles could enable him to portray this to learners. But, he was concerned with "how I could teach this to my students."

Mack stated that when teaching Biology "you cannot split what you want to teach in Life Sciences from the theory to develop appreciation, you have to show them". He did warn though that "you could bore them with practicals as well." Mack felt strongly that appreciation was a foundation for the learners' learning and that this appreciation could be developed by concrete experiences. He thought that this was possible if a teacher linked Biology practicals to the learners' thought processes.

Mack stated that from observing teachers teaching Biology they taught the theory in the syllabus and they did not have an "option as to what theoretical work they can teach." He thought that all Biology teachers should give learners concrete experiences not just theory.

Mack's concern about his role when getting into the classroom was that even though he had a passion for the subject he "may not be able to really portray it adequately to my learners".

Mack's expectations as to how to be able to become an educator in the Life Sciences were informed by his and his school friends' experiences of learning Biology. He expressed a desire "to do things differently" as many of his friends at school hated Biology. Mack did not want to teach Biology in a traditional sense. He wanted to get the best out of his students and to develop their respect for nature.

Mack knew that he needed to be "aware of the sort of the degree to which I must sort out what [content] I should be teaching in the class." He questioned if he should only be teaching the terminology and the percentages for subject content and appreciation. Mack was interested in developing "more than just the facts" in the programme, as he could find out the facts himself.

Mack expressed his desire to be a "passionate teacher that makes the work fun and always great, not this boring thing". He was aware that to be a good teacher you need to get learners to express their potential. He needed to be the best. To achieve this he thought that he needed to "find out what works for him. As if he was going to "copy another teacher it is probably not going to be really as effective or really work."

Mack was interested in finding out where education is heading as "all the subjects are changing and will Biology change much". His concern was "Is there place for us to make a change in it (the subject Biology)."

4.3. Step 2: Reflecting and interpreting

- What was the role of the teacher-educator in the discussion-group interview during the experiential reflective step of the cycle and why did he have this role?

The specialisation lecturer stimulated the student teachers to participate in the discussion group interview by using a *questioning strategy.* He posed questions to: prompt the student teachers to respond; to seek clarity about the statements that they made and to understand the student teachers' underlying meaning. He encouraged the student teachers to dig deep and to explore their feelings by asking "you say you have passion, how do you know that you have passion?" He also provided opportunities for the student teachers to ask questions during the discussion but stated that "I will only answer the questions if it is the right time for me to do so". He also inspired them to use their past experiences to try and respond to their own questions. He *motivated and encouraged* all the student teachers to participate in the discussion by saying "all of you talk", and "what do you all say" and "do not look at poor Mack all the time, you all must talk." He provided support saying "it sort of seems that you pretty much know what you should do". This support acted as a further stimulus for the student teachers to think further and deeper about their particular experiences and concerns. He provided *reassurance.* When a student teacher asked "how will we know what to do at the school, he replied that "you must know precisely what is required at the school and you will find this out when you are at the school". He also *set the scene for the year* by stating that "we cannot ignore what you need to be able to do and at the end of the year your professional portfolio will be used for assessment." The purpose of the portfolio was shared by indicating that "the

idea for the portfolio was to see what develops and how it develops." The nature of the interaction between him and the student teachers was indicated by "you will engage in discussions with me, as to how you are experiencing what and how we are doing, how you suggest we could improve on that for the benefit of everyone."

He seemed to *project a power* relationship as evidenced in the communication pattern. Even though he encouraged the student teachers to participate, he posed all the questions and he prompted the students to respond. This was the first interaction between the student teachers and the specialisation lecturer so this power relationship was essential in driving this interaction. This power relationship therefore can be viewed as constructive to exploring and giving meaning to the **baseline phronesis** (practical wisdom, practice theory) of each of the student teachers.

It is evident that the specialisation lecturer played a multiple role. He was concerned with the holistic development of the student teachers. He did not use the interview to just elicit information from the student teachers; instead he actively engaged them in developing intellectually and emotionally. During this time the student teachers also worked through their perceptions and underlying fears of teaching that they were experiencing.

- What was the student teachers' participation in the group discussions?

All the student teachers participated but the extent of their participation differed. Initially, Mack and Bernice responded to the first two questions asked and Carol's first response was only made when she was directly prompted by the specialisation lecturer. After her first response she seemed to relax and open herself more to question and respond to questions. Mack was aware that he was responding to the questions more than the others when he stated "no, she is going to rip my brains out" and he laughed and did not respond. He spoke in reference to his brain as he had shared extensively. When responding he did not just supply a simple response to a question, but provided detailed responses. All the student teachers made comments or answered questions, in some instances, to share their experiential reflections and, in other instances to support their colleagues' inputs. The student teachers were relaxed during the discussion group interview as they joked and laughed with one another and the specialisation lecturer. This relaxed spirit was essential for the student teachers to share their reflective experiences openly and to feel a part of the process of learning.

- What do each of the student teacher's understand about his/her role as a Biology teacher and about teaching Biology; the role of learners in the learning process, and what informed his/her description of the particular roles?

Bernice saw her role in personal and professional attributes. These attributes were interlinked - passionate and interesting Biology teacher. Her desire was to be a unique, interesting Biology teacher when teaching Biology. She wanted to use teaching and learning strategies that exposed learners to

concrete experiences. What is surprising though is that Bernice adopted the behaviourist approach as her understanding of teaching was that the teacher transmitted the knowledge to the learners.

Bernice displayed a weakness in her role as a professional. Her weaknesses were: getting learners interested and, responding to and developing an understanding of the planning that teachers have to do before they can teach a class. She was aware though of the professional challenges - the lack of time and resources at schools. Her foundation (purpose) for teaching Biology was based on developing children's' attitudes and values, and exposing them to concrete structures.

Carol saw her role in both personal and professional aspects. The personal aspect focused on affective (passion bubbling in her) and individual personal aspects – she wanted to be herself. Her professional aspects focused on developing as the best teacher that she could be and to feel comfortable with the type of teacher she was.

Her role in the teaching and learning context was to provide learners' opportunities to use their personal experiences as these were important for learning. She also wanted to expose learners to theory and practical aspects of Biology. Even though Carol was aware that the learners must experience concrete things, she still viewed the learners as dependent on the teacher. A significant professional aspect is that Carol was open to change as she wanted to try new things out for herself. She wanted to make her own discoveries about teaching, not to be told about how to teach by others.
An intertwined personal and professional aspect which illustrated Carol's weakness was on how to manage the type of relationship that she should have with her learners and how she could make the teaching of Biology interesting within the time constraints that teachers experienced. Carol used the occasion (observing the Biology teacher) as an assessment of her own performance and a re-definition of what she needed to be - to be a good teacher.

Mack saw himself as a teacher in terms of personal affective and performance attributes. The professional aspects were in terms of teaching and learning strategies and the goals for teaching learners.

Even though Mack was aware of his strengths and his weaknesses, he doubted himself and his ability to portray his passion adequately. He was aware of professional challenging aspects: time; theoretical work in the syllabus; exposing learners to concrete experiences; use of resources; volume of subject content and the development of learners' appreciation. Mack though, was aware of what he wanted to develop in the learners.

Mack was aware of his role and that of the learners in the teaching and learning context. He was aware that: the teacher had to set the scene for learner encounters; of the importance of context (scene) and that

learners all had their own ways of responding to different things. An important aspect for Mack was to develop the learners' attitude to nature.

Mack's experience of Biology at school extensively informed his thinking about how to teach it. His personal experiences both in life with nature and at school were necessary for him to construct his understanding of his role as a teacher.

- What terms linked to education did the student teachers use, what was their understanding of them and why did they use them?

The terms that the student teachers used can be used to illustrate their understanding of education, the role of the teacher and the student.

The words that **Bernice** used: learners learn; teachers teach; children experience the real thing; transmission of the subject were associated with Behaviourist practices

The words that **Carol** used: every teacher has his/her own style and methods;; children learn and the best teacher cannot be limited to Behaviourist practices. Clearly this is a transformed position, which is in line with the requirement of the curriculum policy documents.

The words that **Mack** used were: developing learners' appreciation; portray passion to students; teach to students; teachers teach. These words are associated with mixed Behaviourist and constructivist tenets to teaching and learning. This is further evident in the following metaphors for the teaching terms words Mack used:

> Teaching is like the wind in the sails of a boat; this is because it directs the person in the right direction across the ocean, without this direction the person would sail aimlessly around the body of knowledge;
> The teacher is like the sails of a boat; this is because with some fine adjustments, the teacher is able to maximize the students' potential and growth (Professional portfolio, 2004).

- What feelings did the student teachers express about teaching or associated to teaching?

Bernice expressed a feeling of passion for the subject, but she did not express how she felt about teaching.

Carol expressed a feeling of passion that bubbled in her, but it was not really associated with teaching Biology. It was associated with teaching in general - she would be able to help the children. She also expressed the feeling of fear for what she did not know about teaching and the feeling of uncertainty about the type of relationship she should have with learners.

Mack expressed a feeling of passion and enjoyment for nature and he wanted to portray this to his learners when teaching them.

- What underlying assumptions did the specialisation lecturer have for asking the student teachers to share their understanding of the role of teachers and student?

When the student teachers entered the programme the specialisation lecturer established their baseline understanding of the role of teachers and in an attempt to explore what and how this understanding would change during the programme. What was significant was that the student teachers needed to be aware of their own perceptions about these roles from the outset of their professional development experiences. The specialisation lecturer was aware that the student teacher's construction of "phronesis" would be strongly influenced by their existing perspectives and understandings about teaching and learning. This thinking is reflected in the literature by Hollingsworth (1989); Holt- Reynolds (1992) and Resnick (1987).

- What expectations did the student teachers have of the programme?

Bernice wanted clarity as to what the focus of her development was going to be, whether it was about the subject or how to teach the subject.

Carol wanted clarity about the focus of her development - Will it be learning about the content of Biology, the curriculum or how to teach Biology?

Mack was concerned about his role as a teacher teaching Biology in South Africa where a change in education was in place. Mack wanted to teach Biology differently to the traditional approach and he wanted the space and scope to make that change.

4.4. Step 3: Planning Action

During this step Professor Ned (specialisation lecturer) planned the intervention (action) activities. The purpose of this intervention was to challenge the student teachers to change their existing preconceptions of teaching and learning. This intervention comprised two types: intervention one and intervention two. Intervention one during week two of the programme, focused on each student teacher observing two local Life Sciences teachers teaching Life Sciences in their respective schools. Intervention two during week three of the programme focused on each student teacher participating in a five day workshop whose theme was 'What is an educator really?' This workshop was conducted at a remote destination from the university campus at a Nature Reserve called Hammanskraal.

4.5. Step 4: Taking Action

4.5.1. Bernice

4.5.1.1. School observation

Bernice stated that she had "sort of forgotten after three years (the length of time she spent at university to complete her degree) what it is like to be at a school." She said that "it was a good experience" because it made her more determined to teach.

4.5.1.2. "What is an educator really" - Hammanskraal

a. Challenged by a paradigm shift

Bernice stated that "everybody was confused by the facilitating learning thing" but she was not confused. She attributed her lack of confusion to her experience of a lecturer who had taught her. This lecturer expected her to think for herself and not to rely on answers been provided by her (the lecturer). Bernice established some justification and clarity about her decision to teach when as she stated that "I am now doubled as positive as I was when I first joined the programme to teach." Therefore this experience was a re-assurance for her about becoming a teacher.

b. Interpretation of Personal Profile questionnaires

(i) Bernice's scores on her Neethling Personal Skills Instrument were L1:67; L2:62; R1:92; R2:79. According to these scores, Bernice has a high preference for a R1 and an average preference for a R2. This indicates that Bernice functions as a right-brained person. In linking this finding to the type of person that Bernice is the following was stated: a person who searches for alternatives, prefers the big picture, not the detail, idea-intuition, strategy, synthesis, integration, risk, restless, becomes bored quickly, experimenting, diversity, comfortable with chaos, fantasy, surprise, association. The teaching preference for the type of person described above is an R1 trainer/teacher. This teacher usually gives a holistic view of the lesson. This teacher prefers to link it to other subjects and to point out how it applies to the "real world". This teacher will encourage spontaneous participation and create opportunities to experiment and visual aids will form an important part of the lesson. Lessons could be unstructured, with the teacher deciding on different content, etc. on the spur of the moment. This teacher could create opportunities to speculate, to strategise, discover and very importantly have fun during a lesson. Administrative duties, deadlines and thoroughness can sometimes be lacking.

(ii)Bernice's score for the Temperament Test indicates that she is a Popular Sanguine (extrovert) person who is outgoing and people-oriented.

(iii) The score for the Self-Image test (50) indicates that she has an average self image. These scores support the identity description that she gives of herself.

c. An identity description (Who am I?)

I love horses and was practically raised by my pony which I have had since I was six years old. I am always friendly, positive and cheerful – except when I am in traffic. I am patient, spontaneous and confident. I am adventurous and love challenges. I enjoy doing my own thing. I am sometimes stubborn and I am strong-willed. I need space; I enjoy being alone and the outdoors. I suffer from claustrophobia, vertigo and am touch –sensitive. I have a large personal space. I am a bit of a 'nervous Nelly' and frighten easily –that's why I am always looking around me! I am lively and always busy. I hate sitting still and get bored very easily! I only go out to dance. I think it's impossible to really know me as I am an introvert (who is good at hiding feelings) and I do not trust people easily. I am someone that when I am told that something is impossible or not, a lot of people get this done – I am a natural rebel – and I will say I can do it. The moment I can be different I am happy. I am someone who has to go and study stuff and repeat it and then I know it and then I am comfortable.

d. Learning task design

Bernice designed her first learning task at Hammanskraal. She stated that she was proud of it and it "did not seem very difficult". She included learning task features: learning area, learning phase, theme, resources, class organization and time allocated. She described the class organization as children working in two large groups and then in groups of 4. She had also included specific outcomes and assessment criteria using her own ideas of what they meant. She was aware though that her "perception of a good learning task was obviously a bit skewed" but she used it to illustrate her development.

e. Concept map - Practice theory of facilitating learning

Bernice did not have a concept map for this cycle in her file.

4.5.2. Carol

4.5.2.1. School observation

No reflection notes were inserted in her professional portfolio

4.5.2.2. "What is an educator really" – Hammanskraal

a. Challenged by a paradigm shift

Carol said "No one knew what to expect from the week at Hammanskraal – the only clue we had about this week was printed on our year programme: 'what is an educator really?" Carol stated that when she read this that it sounded useless to her as she already "knew what a teacher was and what I wanted to achieve with my learners." She expressed her irritation by stating "So how can they tell me what a teacher should be?" But she also expressed surprise in that "It took one day to show me that maybe I didn't have everything figured out and that my idea of education was challenged."

Before Hammanskraal, Carol thought that her role as a teacher would be to convey and explain information to her learners. She stated that "the role of an educator was conveyed in a totally new and different way to me." Her ideas of what education was and the kind of teacher she wanted to be "were shattered." She expressed her feeling "I felt lost and confused and yes, I was very skeptical!" She felt skeptical about the new paradigm.

b. Interpretation of Personal Profile questionnaires

(i) Carol's scores on the first questionnaire were L1:80; L2:81; R1:66; R2:73. According to these scores Carol has a high preference for a L1 and a L2 and she functions as a left-brained person. In linking this finding to the type of person that Bernice is the following was stated: seeks accuracy, digs deeper into a problem, works for precision, critical correctness – not to make mistakes, organization and promptness. The teaching preferences for Carol's score of L1 and L2 are for a formal lesson and the use of a textbook or other teaching material. The lesson content is usually well-planned and presented in a sequential order. Putting content into practice is very important to this teacher and therefore repetition and reinforcement are strong elements of the teaching style. Thoroughness is very important and untidy and incomplete work is not tolerated. This can be an authoritative trainer who likes to be in control of the situation at all times. This trainer could resist new teaching methods and could tend to be inflexible with regard to change within the system.

(ii) Carol's score for the Temperament inventory indicates that she is a Perfectionistic Melancholy (introvert) who is withholding and task-oriented.

(iii) The score for the Self Image Evaluation Test 70 – 120 is no self image. Carol obtained a score of 71. This indicates that she has no self image or does not have fixed ideas about her image of who she really is. The justification for this is evident in her identity description of who she is.

c. An identity description (Who am I?)

I am a good listener and not a 'talker'. I will rather listen to people than chatter away. I can get along with any/sort/age/race etc. person. People are so interesting and you can learn so much from each person. I am a very stable, hardworking and reliable person. You can really count on me. Although I am very shy and an introvert I will not shy away from my responsibilities and will stand up for my beliefs and values. I will not judge a person for his/her belief and values (even if I think they are wrong), because I truly believe each person has the right to his/her own opinion and have the freedom to speak his/her mind.

I can be critical and negative especially in frustrating situations. I am not a very emotional person and I won't easily show my true feelings to people, but other peoples' emotions and feelings are of the utmost importance to me. I sometimes expect too much of people and of myself and can then be easily disappointed if my expectations are not met. I will make up my own mind about what must happen or what must be done and then do it. I like to plan and organize to make sure everything happens according

to schedule. I am responsible, strong willed and don't like changes in my life. I am not very creative (my spring is definitely hidden deeply away), so that side of my brain does not get enough exercise.

d. Learning task design (See Appendix for copy of the design)

When Carol was asked to design a learning task, she had no idea of what it was as her first reaction was to say "design a what?" She indicated that this new experience was a "huge challenge for me and I felt a bit lost and confused at the time." Carol was going to use this first designed learning task to build and improve on her future learning task. She included learning task features: learning subject, learning phase, time allocated, class organization, resources (classroom), programme organization, problem, resources and worksheet, constructing of meaning (content), competencies acquired, relationship, meta-cognition, co-operative learning, feedback learning outcomes and assessment standards. She viewed this experience of designing a learning task as "a momentous moment in my development as a facilitator of learning."

e. Concept map - Practice theory of facilitating learning (See Appendix 2 for a copy of the concept map)

Carol's concept map indicated that the concept of education meant preparing the child for knowledge. This knowledge preparation required a facilitator of learning. A facilitator of learning has the following characteristics: versatile; can communicate; quick thinking; enthusiastic and fair. A facilitator of learning is unique and s/he works to a result/product which is a challenge and requires time. The use of resources supports facilitation. Assessment is important and is concerned with achieving an outcome. When the outcome is achieved, this feeds back to the facilitator of learning and the knowledge that was prepared. If the outcome was not achieved then the facilitator of learning needs to prepare something different.

Carol's concept map focused extensively on the characteristics of a facilitator of learning. She was aware of the link between assessment and outcomes, and that learners need to be challenged but that they require time to achieve the appropriate outcomes. The concept map was represented in a flow chart where one term was linked in a linear manner to another and only three linking terms were used. (See appendix for a copy of the concept map).

4.5.3. Mack

4.5.3.1. School observation

Mack stated that the week of observing at the school got him to really feel motivated to go out and teach.

4.5.3.2. "What is an educator really" – Hammanskraal

a. Challenged by a paradigm shift

Mack stated that his experience at Hammanskraal "was a challenging one" in that he was confronted by many different things. He developed knowledge about the diversity of learners. He said that "I experienced that students differ according to their intelligences and they must be treated differently."

b. Interpretation of Personal Profile questionnaires (Refer to appendix for report)

(i) Mack's scores on his Neethling Personal Skills Instrument were L1:79, L2:69, R1:84, R2:68. According to these scores, Mack has a high preference for a R1 and an average preference for a L1 person and he functions as a right-brained person. Mack according to the analysis scoring sheet is a person: who searches for alternatives; prefers the big picture, not the detail. His characteristics are idea-intuition, strategy, synthesis, integration, risk, restless, becomes bored quickly, experimenting, diversity, comfortable with chaos, fantasy, surprise and association. His teaching preferences are those of a R1 trainer/teacher. This teacher usually gives a holistic view of the lesson, prefers to link it to other subjects and points out how it applies to the "real world". This teacher will encourage spontaneous participation and create opportunities to experiment. Visual aids will form an important part of the lesson. These lessons could be unstructured, with the teacher deciding on different content, etc. on the spur of the moment. Opportunities to speculate, to strategise and discover are often created. Also a fun element is often part of the lesson. Administrative duties, deadlines and thoroughness may sometimes be lacking.

(ii) Mack's score for the Temperament inventory indicates that he is a Popular Sanguine (extrovert) person who is outgoing and people-oriented.

(iii) The score for the Self Image Evaluation (59) indicates that he has a dissatisfied self image. He felt that he was seriously lacking in self confidence and tended to doubt himself a lot. He sometimes felt that he relied too much on the approval of others and too little on his own approval.

c. An identity description (Who am I?)

I am a Christian and therefore I follow the Christian beliefs, doctrines and modes of worship. There are a number of things that make me enjoy life to the fullest. The first and most important is my belief. I feel that without my belief I would not have reason to live and my life would simply not make sense.

I cherish my family; I have a large group of friends and I love children. I am a holist by nature and it is important for me to see the bigger picture rather than the isolated facts. I like to know how things are connected, rather than the exact detail of what they are. I am also a realist and I am practical. Things must seem as if they will work in practice or else I will not pay much attention to them. This can be limiting because if I cannot see the immediate solution to a problem I would rather move on to the next one that seems more practical and realistic.

I am also what I call an intro-extrovert. That is I am not quite an introvert, but not quite an extrovert. I enjoy being sociable but sometimes find it rather challenging: this is especially the case when I am talking about myself to someone. I sometimes have the problem of not expressing my feelings adequately enough. This can cause me to bottle up my feelings, which can lead to me getting very distressed at times.

I have a fairly good self image of myself and sometimes I feel that I am seriously lacking in self confidence and tend to doubt myself a lot.

I am pretty good at leading people through a task; however where I do have problems is in the planning of that task. I sometimes feel that I rely too much on the approval of others and too little on my own approval. People get frustrated with me because I seem indecisive. I do not like to voice the views that I have because I am scared of standing on someone's toes. I am very dedicated to a cause and will therefore execute a task to the best of my ability, but I do procrastinate. I believe in simplicity and balance.

d. Learning task

Mack's learning task design had the following features: learning area, learning phase, specific outcomes, assessment standards, resources, class organization, resources and time allocated. The class organization stated that children will work singularly and work in groups of 4. This learning task had one specific outcome and one assessment standard which were not in line with the requirements of the Life Sciences curriculum. It did though have some essential sections that are expected in learning tasks: outcomes, assessment and a meta-learning aspect of facilitating learning. (See appendix for a copy of Mack's Learning task).

e. Concept map - Practice theory of facilitating learning (See Appendix 2 for a copy of the concept map).

Mack's concept map had the concepts of facilitating learning, learning task design, learning task operation, learning task feedback and learning task consolidation. The relationship between the concepts was shown by a unidirectional line linking the concepts in a continuous cycle where there was a sequential flow from one concept to another. There were no linking words between the concepts.

Mack understood facilitating learning as having a learning task design where the requirements and guidelines were provided. This learning task design was used to provide the learning task operation which focused on a presentation and execution. The execution was concerned with co-operative learning and meta-learning. The learning task operation fed into the learning task feedback and this was concerned with challenging, clarifying and encouraging the learners. The feedback fed into the learning task consolidation. This feedback focused on the role of the facilitator of learning and the learner.

Mack had a basic understanding of facilitating learning. He used four basic concepts and did not illustrate many relationships amongst the concepts. Mack thought that facilitating learning was an action (path) that had a particular sequence that had to be followed.

4.6. Step 5: Reflections on taking action and interpreting

4.6.1. Bernice

4.6.1.1. School observation experience

- I was at the school and all I thought of - This is what I want to do – I want to be between these kids. I want to teach them sports, I want to do everything. It was so much fun standing there between the children and seeing all their faces looking up at you.

Why did Bernice have these particular thoughts and feelings?

Bernice had these thoughts and feelings as the experience of being in the classroom and experiencing the *teaching* of Life Sciences got her psyched up to teach. She stated that standing there and hearing the teacher say "this class is impossible" made her more determined to start teaching. She stated that she could not wait to go so that she could prove them wrong. She said "the feeling of I can do it, I sommer[2] want to start so that I can see if I can do it".

4.6.1.2. "What is an educator really" – Hammanskraal

- I gained an important experience at Hammanskraal

What did Bernice gain from this experience?

Confirmation that teaching was what she wanted to experience and she developed a positive attitude about teaching.

- When you examine my very first learning task, the following becomes clear:

  there is no proper logical presentation, the order is wrong. There is no problem statement, only a boring question. The outcomes that I wrote were my own ideas and do not conform to the requirements of the RNCS. The learning task

  is organised as one long story and this gives the impression of a rough draft, rather than a professional learning task.

How did Bernice become aware that her learning task was not appropriate?

All the student teachers were given documents that had a learning task format. Bernice checked her learning task against the required format and she experienced the change and came to the decision that her perception of a good learning task was obviously slightly skewed.

Bernice's reflections did not include or focus on why she had the thoughts and feelings; who she is; her understanding of education, the role of the learner and the teacher; her concept map; her Brain profile, Temperament and Self image tests.

4.6.2. Carol

4.6.2.1. School observation experience

No reflection notes were inserted in her professional portfolio

[2] Sommer is an Afrikaans word that means just.

4.6.2.2. "What is an educator really" – Hammanskraal

- What is the context/purpose of this quotation? Some introductory line will help. The week at Hammanskraal was an experience I will never forget. It was a very difficult week for me. So much new information was bombarded onto us and I found myself in a very negative and skeptical place. The paradigm shift that I learnt was totally different to what I learnt at school and university. All the new terminology, concepts and high expectations made me feel overwhelmed. I truly felt that they were expecting too much from people who never taught before in their lives. As I look back I could see that they definitely threw us in the deep end and expected us to sink or swim. We were challenged beyond our abilities so that our maximum potential could be achieved.

Why did Carol have these thoughts and feelings? Why do you have these questions, or where do they come from?

It was a totally different experience from what she had ever had before. For the first time in her life she was challenged to the maximum. As a novice, the newness of the language and the activities where she had to constantly work out what she understood and felt was different to any education experience that she had in the past.

- I could not understand why I should write about myself and what does this have to do with teaching. While I was struggling with this, I could really think critically about myself, my points of view, my ideas and what I viewed as important in life. I got to know myself better. I never thought about what I want to achieve as a teacher other than teaching. By critically evaluating what others would say of me gave me the opportunity to get to know myself and my capabilities.

Why did Carol have this thinking and why did it change?

Carol thought that she was attending the programme to learn how to teach, not who she was, as she already knew this. She was aware that knowing your strong and weak points and making a concerted effort to improve them can only lead to development and growth personally and professionally.

- Although it was a frustrating and hard week, looking back on it, it was definitely the place where new concepts and ideas were planted. It was the place where I started to think differently about education. It was a new beginning for me as an educator. Although I was very skeptical about this new paradigm it was the 'birth of a new facilitator of learning.' I thought all the time that a teacher was someone who explains, transfers and promotes the potential of a learner.

  This new idea, that learners construct their own meaning and it is his/her responsibility and that they must reach their maximum potential with the help of a teacher is new for me.

What is Carol's understanding and **how** did she come to have a different understanding of education, the role of the learner and the teacher?

She constructed new meaning about concepts and she started thinking differently about education. She now saw herself as a facilitator of learning not a teacher. This change in thinking was due to the new,

different and challenging experience. Her understanding about education, the role of the teacher and the learner was a new one and a teacher should see everyone's (learners') individual uniqueness, where learners construct their own meaning. It is his/her (learners') responsibility and that they must reach their maximum potential with the help of a teacher.

- We were introduced to the inside out paradigm, multiple intelligences and facilitating learning……The multiple intelligence idea was a real eye opener. The inside out paradigm and facilitating learning was totally new concept to me and at Hammanskraal – I was very skeptical but willing to think about it. The meaning of an item does not lie in its name but in the concept as names are used only for communication to take place. The multiple intelligence experiment – (done with leaves) was a new experience. The different intelligences also opened my eyes that different learners use different intelligences.

What were Carol's experiences of the new knowledge and **how** did she deal with this?

She experienced the inside-out paradigm, multiple intelligence and facilitating learning and that understanding concepts and not just knowing the name is important. She was very skeptical but willing to think about it. As a novice she was not resistant to the new ideas but felt challenged, overwhelmed and skeptical. She stated "I realised how important multiple intelligence in the classroom was and that I should make use of it."

- We had to reflect at the end of a day/session. These reflections meant something to my development as a facilitator

How did these reflections come to mean something to Carol's development as a facilitator?

In the reflections, Carol shared the newness of the experience that she was going through. She also expressed the feelings that she had, the knowledge that she had gained and also what she still needed to learn and think further about. The reflections were descriptively written with no deep analysis.

- The idea of co-operative learning is a new idea for me, since group work was always a part of my thoughts. I therefore had the beginning of how to include co-operative learning in the structure of my learning tasks.

What was her understanding of a learning task? And how did she develop this understanding?

Carol was aware that the structure of the learning task had to have co-operative learning in it.

- The whole process is still new for me. It is very interesting but I am still skeptical over the matter. I will first myself have to try it out to see if it works. It sounds very idealistic but now that we have come to the end of the week everything is possible.

What was the inner turmoil that Carol experienced and why did she have it?

At Hammanskraal, all Carol's ideas about education and teachers were shattered. She felt lost, confused and skeptical. She thought that she would have to do it herself in order for her to believe that it works (If

you see it, you'll believe it). She thought that even though it was idealistic she was open to the possibilities.

- As I look back on that first learning task design assignment now, it is hard to imagine that there really was a time that I didn't know what a LTD (Learning task design), LTP (Learning task presentation), LTE (Learning task execution) and LTF (Learning task feedback) was.

Why did Carol have this experience?

Carol was very confused and uncertain about a learning task design. She did not know what should be included and what should be left out, how it should be organized and planned.

- A concept map was a foreign concept and it was difficult to put your views on paper about education in this new manner.

Why did Carol find the construction of a concept map difficult?

From my concept map it is clear that I did not understand the new concept introduced to us. I couldn't figure out where the concept was supposed to fit in.

- Reading my brain profile as well as the temperament and self-image test results I could see myself clearly in the results. The tests described me with great accuracy.

What were Carol's thoughts and feelings about completing a brain profile and what did she learn from this?

My brain profile illustrated that I am a teacher who prefers a formal lesson and the use of a textbook and that I can resist new teaching methods and be inflexible regarding change within the system. The test confirmed the type of person that she is.

4.6.3. Mack

4.6.3.1. School observation experience

- I really want to teach now.

Why did Mack have this feeling?

He felt bored sitting in the class and he wanted to see how he could do in the classroom.

4.6.3.2. "What is an educator really" – Hammanskraal

- I now realise that the challenge of my future profession does not lie in the content matter but rather in the individual student. Every student is different and must be treated as such. Each student will have different ratios of the various intelligences.

What brought Mack to the realisation that the individual students differ and that they are the challenge rather than the content matter?

He was exposed to the discussion about multiple intelligence where individuals differ according to their intelligences.

- It is a challenge to improve and diversify the learning tasks for the students in order that they may construct more meaningful knowledge in their minds and by so doing be brought into realization of their maximum potential. The learning tasks can always be improved and therefore it makes teaching a very dynamic and creative profession.

How did he develop an understanding of how to develop a learning task in order for learners to construct meaningful knowledge and to develop to their maximum potential?

Phronesis is concerned with the action of student teachers drawing up a learning task and declaring their baseline understanding of a learning task using their past experience.

- I feel much excitement about my profession; however I am also rather hesitant.

Why did he feel both excitement and hesitation about his profession?

Mack was not able to always carry his great ideas across to reality. He could though at the present time, see how his could be used in a practical way in the classroom.

- I feel that a very important thing that I have learnt is the fact that education is not about the transfer of knowledge from the teacher to the student.

What was the change in Mack's understanding of education, role of the learner and teacher?

Mack's understanding of education is that it is rather the construction of meaningful knowledge by the student for the student. The teacher is therefore only a facilitator in the process and not the source of the process or the information.

How does Mack come to have a different understanding of education, the role of the learner and the teacher?

He was exposed to experiences of developing an understanding of what a teacher, educator and facilitator are. Students were asked to first share their understanding of this and then to read and discuss these understandings to bring them to the realisation of the most appropriate meaning. They also had to read the document: What is an educator?

- Another very big misconception that I had was the link between outcomes-based education (OBE) and group work - the fact that OBE does not consist of group work but rather of co-operative learning.

How did he come to realise that he had a very big misconception?

OBE is not concerned with group work but co-operative learning. The difference is that in co-operative learning, the student already has been through meta-learning and therefore understands the work. The co-operative learning is based more on developing inter-personal skills.

- The main fact that I think that I have learnt is the fact that a human being (a student) is ultimately the application of his or her potential.

What is his understanding about the potential of humans and how does this relate to students? How did he develop this understanding?

The potential that a human-being (student) has is however limited and therefore the amount to which a person applies their potential in their life is solely due to the attitude of that person towards their potential. A person can also never reach a maximum potential because there is always something more that can be achieved.

- I have started thinking more about myself and I think that it is a very important thing that you have to really know more about yourself first which I guess in my life I really have not. To be a facilitator I need to be different.

What did he think that he needed to be different in order to be a facilitator of learning?

Mack thought that the first thing that he needed to change was his self-confidence. He thought that he needed to believe in himself and believe that he had the potential to make a difference in this world and in the students' lives. He thought that he must therefore begin to believe that he had a valid point to make and that even if someone else also has a point that he had the right to stand up for his point and for what he believed. He needed to read what other people had to say about effective communication. Ultimately, he thought that it was only through practice that this could improve and therefore he would have to force himself to communicate effectively. He needed also to plan his life more and to stop taking a laid-back approach. This would prevent him from procrastinating and becoming frustrated when he could not complete his work to the best of his ability.

Mack's reflections did not include or focus on his reflections; concept map, his brain profile, temperament or self-image tests.

4.7. Step 6: Evaluating Action

This step focused on evaluating the action (intervention) of this cycle and on what feeds into the next cycle. In evaluating the action I read each student teacher's baseline "phronesis" (practice theory) of the role of a teacher as written in step 1. I then compared these responses to those that the student teachers presented in step 4 and 5. These reflections included the learning task design, the role of the facilitator of learning and learners. I then analysed and assessed the intervention on the basis of each student teacher's reflections about their constructed "phronesis" of facilitating learning. The analyses and evaluation of the intervention is presented firstly as general comments and then as a case for each of the student teachers below.

4.7.1. General comments - analysis and evaluation of the intervention

The student teachers were immersed in new experiences. These experiences challenged their thoughts, beliefs and their feelings about education, the role of a teacher, learner and more importantly themselves.

They experienced intense feelings of frustration and surprise with what was expected of them, what they expected of themselves and also with what they had achieved. What was significant was the impact of the new experienced thoughts, and actions on their construction of "phronesis".

The student teachers explored, challenged and constructed their identity as individuals; their understanding of the role of a teacher, their knowledge and understanding of the role of a learner, a learning task and facilitating learning. They were in the process of challenging and changing their own beliefs about facilitating learning. But for this to be maintained they would require further exploration and challenging over an extended period of time (Kagan, 1992). Furthermore, for student teachers to be facilitators of learning, their beliefs should be that learners are constructors of knowledge and teachers facilitate a process of learning (de Kock & Slabbert, 2003). The student teachers were in the process of constructing these beliefs. But for these beliefs to be fully constructed they would have to be exposed to different experiences and thinking about what it ought to be (Korthagen, 2001).

These interventions challenged the student teachers' understandings and they, in turn, questioned and modified their understandings. The student teachers started to think differently about education, the role of the facilitator and the learner. These experiences were important for them to construct the knowledge of education as evident in the new paradigm and to become aware of their competences of facilitating learning.

4.7.1.1. Bernice

As a result of the intervention Bernice's decision to teach was confirmed and justified and her attitude to teach was re-affirmed. Bernice was aware that teaching is what she wanted to do and she was eager to start working with the children. She shared that she had developed a positive attitude to teaching. But a further intervention is required to extend Bernice's understanding and positive attitude to facilitating learning and then for her to maintain this attitude. Bernice was aware that she needed to develop her knowledge and skill of developing a learning task.

Bernice needed to be provided with further experiences in developing a learning task. There is a need to elicit her understanding of education, the role of a facilitator, learner at this point in time and then assess and challenge her understanding further. Further provision of opportunities for her to describe the 'deep' changes that she experienced by her providing in-depth reflections on her actions, feelings and beliefs were necessary. Bernice's reflections were mainly concerned with designing a learning task. This could possibly be because she only really felt challenged by this intervention.

4.7.1.2. Carol

Carol was aware of whom she is as a person. She became aware that you have to challenge a person if you want to maximize his/her potential.

Carol needed to work on the overwhelming skeptical feelings that she had about the new knowledge, including the inside out paradigm. She will have to do it herself in order for her to believe that it works and then she will develop a "belief initiated mental model" (de Kock & Slabbert, 2004, p. 21). Carol needed more time and experiences to think about what she needed to learn and to develop the skill of writing reflections that required deep analysis or meta-learning aspects. Carol also thought that she needed to develop her understanding of a learning task further and her understanding and skill of how to construct a concept map. This personal awareness was essential for her construction of "phronesis".

4.7.1.3. Mack

Mack was aware that his challenge was to maxmise students' potential. He understood that education is about the construction of meaningful knowledge by the student and that the teacher is a facilitator. He also understood that students' learning involved both meta-learning and co-operative learning. A critical aspect is that he understood who he is as a person. He also understood what and how he needed to change in order for him to be a facilitator of learning.

Mack needed to be provided with further experiences for him to develop, modify and elicit his understanding of education, the role of a facilitator and a learner at this point in time. This should then be assessed and his understanding should be further challenged. He should describe the changes that he experienced and reflect on what promoted these changes. He needs to experience constructing ideas for teaching in order to develop his self-confidence.

4.7.2. What feeds into the next cycle?

I have described the plan of action that was to take place in the second action research cycle in this section. To be a Life Sciences facilitator of learning the student teachers needed to be provided with experiences for them to construct their knowledge about the nature and facilitation of Life Sciences and also the contents of the Life Sciences policy document. Each student teacher also needed to explore his/her perception of his/her role as a Life Sciences facilitator of learning.

Descriptive data – cycle two

5.2. Step 1: Experiential reflections

During a semi-structured interview each student teacher was asked to share their reasons why they decided to become Life Sciences student teachers and to draw how each saw himself/herself as a Life Sciences facilitator of learning. The student teacher's reasons were audio-recorded and transcribed. The transcriptions were electronically captured, the content analysed and presented as short stories for each of the student teachers below. The student teachers were asked to draw to elicit their perceptions of a facilitator of learning. This was done as the beliefs that the student teachers have about their role as faciltators of learning will influence their perceptions and judgments, which in turn, will affect their behaviour in the classroom. This view is evident in the literature by Peterson, Fennema, Carpenter & Loef (1989; Pajares, 1992). After the student teachers drew their representations I asked them to interpret the images drawn and the text written in their drawings. These responses were audio- recorded and transcribed. The content for each of the student teacher's responses were analysed and coded according to the features that were present in the drawings. These analyses are presented below.

5.2.1. Bernice

5.2.1.1. Why teaching and learning Life Sciences?

Bernice's decision to teach was influenced by the fact that she came from a family of teachers, had an amazing lecturer, taught horse riding and was interested in the medical world. Her "grandfather was a professor of Mathematics and my mom went into the Mathematics world." She completed a B Sc with three majors – Genetics, Psychology and Physiology. Her physiology lecturer expected her to think. Bernice explains "She did not answer any questions that we asked. She expected us to think about the questions and to answer them ourselves." She further explained "The kind of work she explained to us …made me excited to go into teaching." Bernice also shared that when teaching horse riding she realized that "the small kids are fun". She indicated her interest in the medical world by "I absolutely love the medical world; there is no other subject that I would think of going into. She concluded by saying "the idea of working with children in the way that you can express your subject but you can also make a difference in childrens' lives - so the area to go into was teaching for me'.

Bernice's past experiences influenced her decision to teach. She was aware that a facilitator of learning and learners had particular roles to play in facilitating learning.

5.2.1.2. Perception of her role as a facilitator of learning (visual data –drawing).

Bernice's perception of her role as a facilitator of learning is represented in the drawing and the text interpretations. Bernice's drawing of her perception of the role a facilitator of learning and the role of a learner is presented on page 172. Bernice's interpretation of the symbols that she used in the drawing and her perception of the role of a facilitator of learning and learners is presented from pages 171 to 173.

a. Bernice's interpretation of the symbols that she used in the drawing is presented below:

i) Guy blowing up the lab

Bernice saw this person as one of the learners that you say to her "just try it again or try it until you get it right." Bernice also viewed this as representing the learners having fun. .

ii) Text – wow, is it, geeh

Bernice used these words to show that "the class is actually amazed. They are not sitting looking out the window or something; they are amazed at what their friend is doing." She explained that the children sitting and watching "would want to go up front and try it themselves."

iii) Smile on the learner's face

Bernice indicated that the learner was having fun "even though he has blown up his hair or whatever".

iv) The use of the thermometer

She explained that the thermometer "is going crazy. The whole experiment is being a flop". But she stated that "he has learnt all that."

v) Position of facilitator in relation to learners

Bernice explained that she put herself on the side as she was "observing the learner demonstration with the other learners.

b. Role of a facilitator of learning

She saw herself as "walking through the class and watching them as they try things out [and] assessing what they are doing" and monitoring time. She thought that a facilitator of learning should not say that something is wrong as this "could suppress their [learners'] confidence." What should be said is "no it's

fine, but just try it again or try until you get it right." She concluded by stating that "I am all for practical work, so they are doing the hands on experiment. The question to ask is why would they want to learn this, why would they want to do this experiment.

c. Role of learners

They are doing this experiment, they are learning. Bernice stated that she wanted the children in her class to "learn through experimentation - not just with test-tube experimentation but even in their theory." The reasons that she gave for this were that "learners are afraid of the whole, afraid of exploring and afraid of practical work … [and] Biology is a practical thing." She wanted the learners to have "fun [while experimenting and] to have confidence, to try things, to try new things, because when you have confidence to try things, then you also have confidence to pose questions to yourself and also to your facilitator of learning."

5.2.2. Carol

5.2.2.1. Why teaching and learning Life Sciences?

Carol's decision to teach was influenced by a childhood wish, wanting to work with people and an amazing teaching experience. Carol stated that "as a little girl teaching was there … I always thought I would not mind becoming a teacher and I thought that I would enjoy it" even though it wasn't her first choice while growing up. Carol shared her amazing experience "I started working at Saturday school and this is where I started to think I can do this for life and this is where my passion started for teaching." She stated that "the Saturday school was the 'spuit op die kop' (the nail on the head) – that was it for me." Carol shared her feelings about teaching at the Saturday school as "skeptical in the beginning … [and] it was frustrating but I loved it." This experience revealed to her that she "was a patient person" and she could teach. She was concerned though that "something was missing. I was unsure of many things. I had no formal training in the education field and I realized that I needed help." She concluded that "the enrichment that you get out of teaching was very fulfilling and it makes you bubble inside. It is great to see those children and to see that you make a difference."

5.2.2.2. Perception of her role as a facilitator of learning (visual data –drawing).

Carol's perception of her role as a facilitator of learning is represented in the drawing and the text interpretations. Carol's drawing of her perception of the role a facilitator of learning and the role of a learner is presented on page 175. Carol's interpretation of the symbols that she used in the drawing and her perception of the role of a facilitator of learning and learners.

a. Carol's interpretation of the symbols that she used in the drawing is presented below:

i) Eyes

Carol stated that eyes described her in that she "wanted to be alert to her students, their needs; changes in the curriculum and to new things that are happening."

ii) Mouth and the word friendly written on the mouth

Carol thought that she would get "more out of the children by being not their friend but by being friendly." She stated "the shape of the mouth is a friendly smile'.

iii) An instrument

Carol stated that she saw the "textbook as an instrument and it must be used by the learners."

iv) > FOL

Carol stated that she wanted to be "more than a facilitator." In that she did not want to give them "just the content I want to prepare them for life." She also wanted them to "trust me enough to feel secure enough with me so that they can come to me with any problem not just the academic side".

b. Role of a facilitator of learning

Carol described herself as a friendly and alert person who provided fun but was "a stable factor in the classroom". She also saw herself as providing "motivational aspects for the learners, being a positive influence, encouraging and someone that they could confide in." She did say though that she was "especially serious about the learning, making sure that they understand and that they have what they need."

c. Role of learners

Carol viewed her learners as individuals who would be "serious about learning and fun would be an important element of this learning."

5.2.3. Mack

5.2.3.1. Why teaching and learning Life Sciences?

Mack's decision to teach was influenced by his interest in teaching and his passion for nature. Mack stated that he had "always been interested in teaching people things. This started off at church where I have led youth groups for a long time." He shared that he had tried one year of a B Sc degree but left when he realized that he was not heading anywhere. His interest was in teaching but he was concerned about the salary – insufficient to raise a family. This made him hesitant to teach. Mack also stated that he had grown up on a farm and has "always enjoyed nature – have a great passion to conserve it". Mack concluded that "Children hold nature's future in their hands … I can help them to see the beauty of nature. The only way to teach my students about the enjoyment of nature was through Biology/Life Sciences.

5.2.3.2. Perception of his role as a facilitator of learning (visual data –drawing).

Mack's perception of his role as a facilitator of learning is represented in the drawing and the text interpretations. Mack's drawing of his perception of the role a facilitator of learning and the role of a learner is presented on page 178. Carol's interpretation of the symbols that she used in the drawing and her perception of the role of a facilitator of learning and learners is presented from pages 179 to 180.

The following is Mack's drawing of his perception of the role a facilitator of learning and the role of a learner:

a. Mack's interpretation of the symbols that he used in the drawing is presented below:

i) Lines of different colour

Mack used different coloured lines to represent truth. A blue line represented "the truth that is transcribed directly". A purple line as the truth and the orange line as "the truth that is distorted". He interpreted the

continuous line as “the one which carries on, the learner as I see it can both obtain knowledge and experience from this body [of knowledge].”

ii) The eye

Mack used the eye to symbolize the learner. The reason he gave for this was that “I think cause that is what symbolically you want to do, to open their eyes to the world around them. Through the questioning and through giving them a problem, placing a problem in front of them, this gets the learners to question.” He represented this questioning action of the learner by a question mark

iii) The tree

It represents the truth that is present in the world. He stated that the natural world includes everything natural, which has to be truth.”

iv) Position of facilitator

I position myself between the knowledge and the learners. I will give the learners a problem. He located himself in the in the top corner in the drawing “me as a facilitator which is there.”

b. Role of a facilitator of learning

Mack viewed himself as a facilitator whose role was to check and correct the “knowledge that learners have as I do not want them getting incorrect truth.” He also viewed it as “crucial in the learning process in that he had to establish inquiring minds in learners and make them realise that what they believe in, is not the truth.” He stated “You as a facilitator intend or try to get them to answer the questions, therefore they have to observe things and in doing this they have to acquire things in order to solve problems.” He also stated that to get the learners to start thinking about something “they need someone who can encourage them when they are on the right track or when they are establishing the truth coming out and question them if you see something wrong”

c. Role of learners

Learners can experience the world by using their senses to answer questions that they have or to solve the problem given to them by the facilitator of learning. In order to do this, the learners have to acquire knowledge.

5.3. Step 2. Reflecting and interpreting

- What was my role in the session and why did I have this role?

I together with the student teachers planned the questions for the semi-structured interview. I designed the questions for the visual data section.

- What underlying assumptions did the researcher have for asking each student teacher to draw how each saw himself/herself as a facilitator of learning?

I assumed that after each student teacher had drawn and interpreted his/her drawing each would start to challenge his/her perception of how each saw the role of a facilitator of learning. Each student teacher would now be aware of his/her deep understandings and insight of a facilitator of learning. If they are aware of this, then they will be open to constructing the appropriate perceptions. Also by eliciting these perceptions each student teacher could challenge and review his/her identity as a facilitator of learning. These identities are evident from their stories of how they came to decide to teach and the interpretations of their drawings.

- What was the student teachers' participation in the session and could this be done differently?

Each student teacher freely drew the image, shared his/her interpretations and enjoyed sharing and learning from the drawing experience. They thought that the session was well structured and should not be organised differently.

- What was each student teacher's identity as a facilitator of learning?

Bernice saw herself as a person who will provide the learners with a fun learning context and the confidence and encouragement that they require.

Carol saw herself as friendly, alert and a stable factor in the school life experience of the learners. She saw her role as including motivational aspects for the learners – a positive influence and encouraging.

Mack saw himself as the person with the truth who wants to encourage the learners to achieve the truth.

- What does each student teacher understand about his/her role as a Life Sciences facilitator of learning, the role of learners in the learning process, and what informed their description of the particular roles?

Bernice saw the learning context taking place in the school laboratory. Bernice, as a facilitator is not a central figure in the facilitation process as she is standing on the side observing the learner demonstration. She stated that a facilitator should support the learners by being present and encouraging them, even if they feel like saying and thinking "it is wrong". She would say "no it is fine but try it again." She saw this as developing the learners' confidence and a learner could view it as either motivating or being given a message that is misleading – positive but negative at the same time. In this learning process, the important aspect of learners developing trust for the facilitator is taken into account. Initially Bernice stated that "I thought that it would be me doing the experiment" (comment about the main person in the picture) and then she changed the statement and said that it was a learner doing the experiment. The internal conflict that Bernice experienced was an indication that she was going through a change process in her thinking about the role of a facilitator. She was also establishing reasons/underlying assumptions about her role as a facilitator and how children learn.

The aspect of peer influence in learning was directly worked with when she said "Learners should have fun and be amazed by the activity (demonstration) that is done in the class by a peer so that they can pay attention and be motivated to also do the activity". Also, the importance of learners doing the work themselves was realised in her saying "learners learn by trial and error, by the fact that they should be given opportunities to perfect what they are doing by repeating the activities." This view of learning by doing was enhanced by her own experience in school when she "sat for afternoon after afternoon memorizing the pink one goes blue … you do not have to go and learn it – you don't have to go and poppegaai[3] the whole thing, you know it and it makes sense to you". Bernice also thought that learners should participate by asking questions of themselves and of the facilitator of learning. She felt strongly that a relaxed atmosphere should be provided in the classroom by the facilitator of learning. She also felt strongly that learner's self-attributes should be developed and used to enhance their learning.

[3] Poppegaai is an Afrikaans colloquial word meaning stupid. Bernice uses it in the sense of memorizing.

Bernice saw Biology as a theoretical and a practical component as this is how she experienced it at school.

Carol saw herself as more than a facilitator of learning who provides fun for the children but is also serious about them learning and understanding their work. She is also aware of the children's needs. Carol saw learning and understanding as essential for the development of children and that understanding is a part of learning. She wanted to provide Biology content and life skills for the learners so that they could deal with ''problems that they experience''. I attributed this thinking to the fact that Carol has a Psychology background (Psychology Honours) and that her care and feeling for children was intense. It went beyond that of a teaching and learning relationship. She was also aware of the importance of a relaxed classroom environment where her relationship with the learners was a central issue to her in that she stated that she must be friendly. She saw herself as knowing a little bit more than the learners in terms of knowledge but that was not all that facilitators of learning should be. Carol also saw her role as a facilitator of learning in a broad educational sense with regard to her developing her knowledge about the curriculum and curriculum change. The play of words that she used – can and not must, illustrate her awareness of the social aspects of a facilitator of learning and the power relationship between 'teachers' and learners. She does not want to be seen as having all the power in this facilitator of learning - learner relationship. This thinking lends itself to the behaviour necessary for an effective facilitator of learning.

Carol stated that learners can do things for themselves and they can access resources e.g. facilitator of learning and textbooks, and that learners should be given responsibility for their learning. This thinking is in line with constructivist theory of teaching and learning where the learners play a central role in their own learning process but here it is not that the learners can take responsibility, they are given it, and therefore it is an external and not an internal action/influence.

Mack viewed the world as being natural and learners learn about the world through their experiences and "acquire a body of human knowledge in interaction with the facilitator." This implies that learners at times actively participate in the classroom. He also stated that "learners are acquirers of knowledge and they can discover it themselves or get it from the facilitator." Further evidence that learners are receivers of knowledge can be seen in the uni-directional arrows that are drawn from the knowledge to the learner.

Mack is taken up with the truth of the world issue. This could be linked to his Christian belief where telling and knowing the truth is important. Ontologically and epistemologically, this understanding of truth can be linked to his expose of who he is (cycle one). The first statement that he made was "I am a Christian and therefore I follow the Christian beliefs, doctrines and modes of worship. There are a number of things that make me enjoy life to the fullest. The first and most important is my belief." He does however acknowledge that there is a possibility of falsehood. This is where a teacher can correct these false beliefs. Mack stated that "you realise that you can question learners about their falsity (the incorrect and the misconceptions that they have). Mack is aware of the importance of working with learners' misconceptions due to his strong focus on truth and experience (see cycle one) with his own misconception of OBE and group work. The use of a questioning strategy in facilitating learning is necessary for learners to realise for themselves that what they believe in is inappropriate, but more importantly as a result of this, the learners will come up with a correct view. This is based on the constructivist principles of teaching and learning. These principles are partially adopted where learners are given a problem, but they have to acquire things in order to solve the problems. Here the role of the learner in solving the problem is not clear as the process of how they acquire things is not stated.
Mack has a conflicting perception of the role of a learner. He is not certain about what their roles are as there is evidence that his perception wavers from learners as acquirers of knowledge and as learners realise for themselves and come up with a correct view.

Mack developed this knowledge from his personal position as a Christian believer and his experiences of the programme when he was exposed to - what is the aim of education and what is a learner really at Hammanskraal.

- What underlying assumptions did the student teachers have about their role as a facilitator of learning?

Bernice thought that children learn by doing, carrying out experiments and that experimentation has a practical and theoretical component.

Carol wanted to support learners emotionally and provide them with a relaxed environment where they could learn.

Mack thought that learners required truth in the world and he was going to provide them with the truth which will come from their experiences in nature.

- What words linked to education did the student teachers use, what was their understanding of them and why did they use them?

Bernice - Kids, pupils, students and learners whatever they are. Initially, Bernice used these terms interchangeably and then she later used the term learner more often.

Facilitator – observes learners and motivates them and is not the central figure in the learning process.

Learning – is an activity that learners carry out by doing an activity. The activity is for the children to learn through experimentation, not just with test tube experimentation even in their theory.

Biology – a practical thing, it is out there.

Carol - Children/learner – can do things themselves and they should be given responsibility.

Facilitator/teacher – a facilitator prepares the children for life and does not give them just the content. She wants to be more than a facilitator.

Learning – is an activity that students carry out and it leads to them understanding.

Mack - Mack uses the term problem in two senses – where the facilitator has a difficulty with the learners; learners should be given a problem but they have to acquire things in order to solve the problems.

- If you were asked to draw what you did in step 1 (how you saw yourself as a Life Sciences facilitators of learning) right at the beginning of the year would you have drawn what you had drawn?

Bernice stated that her drawing would have been different as she would have been the person in the front demonstrating.

Carol stated that the drawing would have been different as she would not have

brought in the process thing, with the eyes observing. She stated “I would not have indicated that I as a facilitator had to give the learners the responsibility and that they must take the responsibility and do the learning. “

Mack stated that he probably would not have drawn what he did. He did state that the programme had changed his view of a facilitator and he was still trying to work it out.

- What feelings did the student teachers express at this point in time in the programme?

Bernice felt happy doing the programme

Carol enjoyed what she was doing “but it was difficult to grasp the new things about facilitating learning and the paradigm shift in education at first”. This was totally different from what she was used to (experienced) in school and at university. She felt uncertain, but she knew that in time she would learn, understand and experience more. She stated that there were frustrating moments and sometimes she wanted to scream, but most of the times she felt pretty good.

Mack felt good because he had done quite a lot of thinking about himself. Also being a guy it was a good bonding experience. He stated “I sort of felt quite haphazard at times and felt really quite lost but I really enjoyed myself.

- Community of discussion - communication patterns - this was not expressed during this session as the student teachers worked individually. In the individual sessions what the students shared was:

Bernice stated that sharing her story was a nice experience. She stated that now I could understand where she was coming from and I could understand her better.

Carol stated that she felt a bit intimidated as she did not know what I expected of her. She questioned me as to whether she was saying the right thing as she wanted to be right. Carol felt challenged by the drawing as she struggled to think up things to represent it outwards for it to be seen. She stated “I am not a creative person”, and anything like this was quite a challenge for her, difficult for her to do. She did mention that it was “more fun this way”, even though she felt more secure with writing. She stated that she would probably have shared more about her role as a facilitator if she had written it out as she have felt more secure with the writing.

Mack stated that he felt good about sharing his story as what he saw in it was his passion for teaching and passion for really helping other people.

5.4. Step 3: Planning Action

The specialisation lecturer planned the action. This step was concerned with planning for the elicitation and exploration of the student teacher's interpretation and perception of the Nature and Structure of Life Sciences and the South African schools implementation policy for Life Sciences (Grades 10 – 12). The specialisation lecturer gave each student teacher three readings – Biology Teaching – an information manual by Schwab; Natural Science and Technology Booklet and the National Curriculum Statement - Life Sciences Policy document. The first two readings focused on the structure and nature of Biology and the last one on the policy implementation, principles, outcomes, content areas and assessment of Life Sciences in South African schools in grades 10-12. The students were given a few days to read and interpret the content in these documents with a view to constructing their knowledge about these particulars aspects of Life Sciences.

5.5. Step 4: Taking Action

5.5.1. Bernice

5.5.1.1. Nature and structure of Biology

Bernice stated, "There is a difference between Biology teaching and the Biology that we did at school." She was aware that Biology as a discipline had particular characteristics and could be distinguished into theory and practical components.

5.5.1.2. Facilitating Biology – role of facilitator of learning

Bernice stated that as a facilitator of learning we need to ask "what is the Biology that we need to teach to make them (the learners) aware of it." She expressed that "if you have the nature and structure of Biology then as a facilitator of learning it gives you the platform from which you can work things out". She concluded that "this makes the teaching of Biology more understandable."

5.5.1.3. Developing learner attitudes and the link to science process skills

Bernice stated that children can develop respect for things in nature if they get to know it.

5.5.1.4. Exploring the link between science process skills and knowledge development

Bernice was of the view that in learning Biology "you come across it you realise it and you experience it." She stated that for learners to establish what something is "they need to feel it, touch it". Bernice thought that process skills were important as children could find the truth in some experiments using all their senses.

5.5.1.5. Learners and learning Biology

Bernice was of the view that learners should take responsibility for their own learning. She stated that she "would throw them in the situation so that they realise that they need a wake up call". She shared her ideas "if I give learners activities to do and they do not want to respond to requirements then I will show them that they needed to do it."

5.5.1.6. Relationship with learners

Bernice stated that when you have authority placed on your shoulders and you show learners that you are serious then "they will respect you."

5.5.1.7. Understanding of facilitating learning

Bernice stated that when facilitating learning a facilitator should ask a learner, "is this the best way that you can do this", so as to get the learners to discover another way.

5.5.1.8. Exploring the content areas of Life Sciences - Indigenous Knowledge

Bernice thought that indigenous knowledge was related to the Life Sciences by the fact that some indigenous plants were used to cure ailments. Her understanding of indigenous knowledge was that it was about "Bushmen as they had ways of doing things that were basically thought out by them."

5.5.2. Carol

5.5.2.1. Nature and structure of Biology

Carol stated that the Science subject, Biology must relate to the Biology discipline in that "they were the same." She was aware that the nature and structure of Biology was changing all the time. According to Carol, "in learning Life Sciences there are practical and theory parts that must be worked with. Carol had the view that a fact is acquired through learning. According to her, "through practicals you learn theory and there is substantive knowledge that will not change for example, these are my lungs" as this is a fact.

5.5.2.2. Facilitating Biology – role of facilitator of learning

Carol held the view that in order for learners to develop facts they would "need to be busy with practicals each period and this could be impossible in a schooling system." She stated that these are demands that she will have to work on.

5.5.2.3. Developing learner attitudes and the link to science process skills

She was aware that learners "observed through their senses [and] they needed to use cognitive skills." She held the view that if two people view an object the one person will be more correct in describing the object because two people perceive it differently.

5.5.2.4. Exploring the link between science process skills and knowledge development

Carol stated, "the essence of science was observation". She supported this by saying "learners need drawing skills to draw in Life Sciences and for them to construct meaning they needed to observe and give their meaning. She was aware that if she did this the learners would develop knowledge and process skills.

5.5.2.5. Learners and learning Biology

Carol stated that as a facilitator she needed learners to develop better syntactical structure (developing process skills). She could do this by asking "the question of how can learners' thinking skills be developed?" She knew that if she wanted learners to take responsibility for their own learning she still

had to ensure that learning took place. And she could use assessment to see if they had reached the outcomes.

5.5.2.6. Relationship with learners

Carol stated that "as I have the authority placed on my shoulders learners will start respecting me if I respect them."

5.5.2.7. Exploring the meaning of mediator of learning and facilitator of learning

Carol stated that based on the specialisation lecturers' response on the meaning of a mediator, she understood it to be a person who mediates learning from whatever you wish to whatever you wish. Carol understood the meaning of a facilitator of learning to include the construction of meaning and maximizing the potential of learners by challenging them with a real life problem.

5.5.2.8. Exploring the content areas of Life Sciences – Indigenous Knowledge

Carol's understanding of indigenous knowledge was about indigenous people like "the Tswana people and like the lobola thing." She also stated, "the Bushmen carried out their indigenous practices of tracking animals".

5.5.3. Mack

5.5.3.1. Nature and structure of Biology

Mack stated, "There is a difference between Biology teaching and the Biology that we did at school". Mack was aware that the nature of Biology is such that it was changing, but "a child must be taught facts". He thought that children obtain knowledge via/through process skills.

5.5.3.2. Facilitating Biology – role of the facilitator of learning

Mack, as a facilitator of learning, believed that to get learners to learn Biology he would have to establish (develop) their process skills in order for them to obtain facts. Furthermore he believed that for learners to learn Life Sciences they needed to be taught respect for nature.

5.5.3.3. Development of learner attitudes and the link to science process skills

Mack stated that you cannot tell children "to respect nature if they do not know anything about the object (nature)." He said, "children come to have respect for things that they can see". According to him they "can see if they take the magnifying glass and have an aha experience, not through me telling them - they need to experience it."

5.5.3.4. Exploring the link between science process skills and knowledge development

Mack stated, "when you observe through the senses you need to use cognitive skills". He was aware that in learning Life Sciences learners must be able to apply the theory. His view was that "when learners construct meaning they can do whatever they can, they can create new things to use in new situations." He concluded that if learners used process skills to construct knowledge, then they could use the knowledge however they wanted.

5.5.3.5. Learners and learning Biology

Carol stated that "as I have the authority placed on my shoulders learners will start respecting me if I respect them."

5.5.3.6. Relationship with learners

Mack stated that when you have authority placed on your shoulders learners will start respecting you if you are being professional.

5.5.3.7. The kind of teacher/facilitator

Mack stated that as teachers "we need to keep up with the trends in Science of what is currently going on". He thought that teachers should teach more than just facts and these do not only have to come from a teacher. Mack when talking about the policy document stated, "the term teacher is used but the role described is that of a facilitator." He distinguished "a mediator [is a person] that directs learning, a facilitator of learning is that s/he is engaged with construction of meaning and to maximize the potential of the learners."

5.5.3.8. Policy document - exploring the content areas of Life Sciences - Indigenous Knowledge

Mack understood that the Bushmen were indigenous people of South Africa and that everything that they did had to be sustainable. Mack was aware of current practices of a sustainable activity. At a number of game reserves indigenous practices was the basis of sustainable partnerships.

5.6. Step 5: Reflections on taking action and interpreting

5.6.1. Bernice

- Now I understand it, the difference between syntactical and substantive, but I want to be able to take the document home and read it to highlight the sections that I did not understand.

How did Bernice develop an understanding of syntactical and substantive?

Bernice experienced the questions and statements that the specialisation lecturer made. She participated in the session by responding to questions asked. She listened to the responses given by her colleagues. The importance of social learning was realised in these particular sessions

- I am happy and I am not concerned about anything, nothing is bothering me.

Why did Bernice express these feelings?

Bernice had the experience of a lecturer in one of her undergraduate courses, who expected her to think about the questions and to answer them herself. Bernice by nature is a relaxed person who takes things calmly and she was enjoying the experience of the programme and she felt happy.

- The work that we are doing is interesting. It is not really the idea that I had. I had a different experience at school. We never did any practical at school or work in the laboratory. No practical work really. We were just fed information from the textbook.

Why did Bernice say that it is not really the idea I had?

Bernice's schooling experience was such that she learnt Biology in the transmission style where content from the textbook was the primary focus. Her experience of learning Biology at school and her observation of Biology teaching at the school impacted on her beliefs about how she was going to teach

Biology. The perceptual and cognitive knowledge that she constructed during the university sessions about the approach to teaching and learning Life Sciences (Biology) was a new and different experience for her. The idea that you teach the way you were taught (Hargreaves, 1994) could have impacted on her original thinking about how to teach Biology.

- When I reflect on my drawing of me as a facilitator of learning I think I would leave mine pretty much the same because I was drawing a laboratory situation, which is what we discussed in the last session.

Why did Bernice say that she would leave her drawing pretty much the same?

Bernice was aware that children need to use process skills, “feel it, touch it”, for them to construct knowledge. The setting in her drawing was a laboratory where the learners used process skills of observing and communicating and only one learner was demonstrating an experiment. She may have been aware of the importance for learners to use process skills but the level of this engagement and extensive use needed to be developed further as, in her drawing, only one learner conducted an experiment. Also, aspects of social learning were not present.

- When we are discussing I know that I can ask Professor (specialisation lecturer) something. So, yes I did know that I can ask questions.

Why did Bernice make these reflections about the discussion sessions?

The specialisation lecturer (Professor Ned) at the beginning of the session always asked the student teachers if they had any questions to ask and if they were feeling comfortable. This was important to relax the student teachers. Even though the student teachers were aware that they could ask questions Bernice knew that she would not get a response to their questions. Professor Ned did tell them that “I will answer a question if it is appropriate to do so and the right time to do it.” He wanted the student teachers to think about the questions they asked and to respond to their own questions. At one point during the discussions the specialisation lecturer (Professor Ned) stopped Bernice from asking a question by stating, “already done.” Bernice was not happy with this incident and she had the confidence to raise it, discuss it and confront him with it. This indicated that she felt comfortable with the setting and the

initial power relationship between Professor Ned and the student teachers evident in the first cycle during these discussion sessions was now more relaxed.

- I do not know if it is wrong not to answer a question. I am used to, I do not know if it is the way we were educated or whatever but I am used to sort of you send your mind in a certain direction knowing that there will be someone to say no that is not so to the answer that you give.

What explains why Bernice had this thinking?

Bernice was evaluating how her learning in the past was influenced by the way her questions were answered. She shared her personal experience of how she felt and thought when her response to a question was either approved or rejected by a teacher. She strongly felt that "the assurance that a learner gets for her response is comforting as she is not left in a state of turmoil and confusion." This assurance is at the expense of the learners taking risks to learn in new ways. Bernice, though is comfortable with externally and not internally motivated actions as the "learner is not left in a state of turmoil where he/she has to figure out whether the response is appropriate or not."

- When I look at what reflections are, it is writing down what you have learnt. I sometimes add something really important that I have learnt also into my reflections, like an important fact. I add it in before I forget it. The other day in class Professor was saying stuff that was not in the notes. He was saying stuff that was really interesting, that I wanted to remember, so I added it to my reflection. From my reflections you can see from what I knew up to what I know now.

How and **why** did Bernice come to understand reflections in this way?

Bernice was still in the process of developing an understanding of what reflections are and also the skill of reflecting. Her understanding of reflections was simple in that it was concerned with her writing what she had learnt. Her reflections were at an academic level and not a personal level. Bernice's reflections could be used to assess her progress even though they only focused on the content cognitive knowledge that she had learnt.

- Relationship between school and university - I feel responsible and will have to keep from trampling on peoples' toes.

Why did Bernice state this?

Bernice wanted to carry out her role as a facilitator in a manner that was free from any conflict situations with staff at the school.

5.6.2. Carol

I would feel more free to communicate if this was just a chat session.

He just wants to ask questions, questions.

Why did Carol express this?

Carol was not comfortable with Professor Ned asking questions even though he did this to challenge and prompt them (student teachers) to respond. This discomfort could be due to, as stated earlier in cycle one step 5, that Carol is a good listener and not a talker.

- In terms of knowledge development we started with the basics. We have not done Life Sciences really but just the syntactical and substantive structures. So jah, I think that is a good beginning for us to understand that it (Life Sciences) is one thing not separate. It is very nice. We learnt a lot.

How did Carol develop an understanding of syntactical and substantive?

She participated in the session by responding to questions asked even though she did not feel comfortable with been asked a number of questions. As Carol thought that the specialisation lecturer was going to teach them (student teachers) how to teach Biology (cycle 1, step 1), this is still reflected in “we have not done Biology really”. This indicates that it is important to elicit and discuss the expectations that the student teachers have for the programme. This thinking is described in the literature by Kagan (1992). Carol was exposed to new knowledge about the structure and nature of Biology. Her feeling expressed above indicated that she felt good about learning this new knowledge.

- The idea that the content was the most important and now we know the principles. [4]Maak my deurmekaar. I am very confused because I had the idea that the content was important now the

[4] Makes me confused

science processes are. Now you have to rethink what you are going to do in the classroom – that is the whole paradigm thing.

Why did Carol have these experiences?

Carol was experiencing a personal challenge and change in her thinking about facilitating learning in Life Science. Even though she felt good about learning the new knowledge on the nature and structure of Biology she also felt very confused with it. She was expressing problems with processing this knowledge as it was too different from what she had experienced in her past experiences of being taught. This links to (Pajares, 1992)

- When I reflect on my drawing of me as a facilitator of learning I think that I would keep some of the things the same but I would bring the process thing in because I did not do that at all but just had some technology. I am not sure how I will represent it – had the eyes in there so I will just bring that into the observing – because observing is the most important syntactical (process) activity.

Why did Carol say that she would keep some of the things but bring in the process thing?

When analyzing her drawing of a facilitator of learning Carol stated, “I know with what we learnt now is that you mustn’t like give them the textbook; you have to let them do it themselves.” Even though an eye was drawn in her drawing it represented her action as a facilitator not the action of the learners. Carol now understood that learning Biology entailed the use of both process skills and content development but she was experiencing inner turmoil with this new knowledge.

- I think that the whole thing on reflection is kind of what you did and what you learnt about it, how you feel about it. Jah that is what I understand about it. Reflection - can you see yourself in what you have written? In the feeling thing you can see yourself but not the fact that I have learnt this…not the fact. So we can say if we were bored.

How and **why** did Carol come to understand reflections in this way?

Carol understood and had the experience of writing personal reflections about the feelings that she experienced not just the knowledge that she had gained. She also understood reflections to be used as an

indicator of “who you are as a person.” But, in reflecting she was also sensitive that she should not offend anyone with what she wrote. She was therefore surprised that she could be absolutely open and honest with what she wrote or stated in her reflections.

- With the relationship between the school and the university being such a sensitive one, I feel scared of screwing up. If I screw up then they will say you are not coming here again. It makes me kind of nervous.

Why did Carol state this?

Carol was aware that the relationship between the school and the university was a sensitive one. She wanted to carry out her role as a facilitator in a proper manner as she did not want negative feedback from the school. The basis of Carol’s feeling of inadequacy stems from if she would know the stuff that she needed to teach at the school. This experience of learning about the syntactical and substantive aspects of Biology further challenged her beliefs about teaching and her understanding of what she was capable of.

5.6.3. Mack

- At first I felt confused by the meaning of the actual words (syntactical and substantive) because they are quite similar. The discussion brought some good understanding in some parts especially with regard to the meaning of syntactical and substantive and the relationship between them.

How did Mack develop an understanding of syntactical and substantive?

During the discussion the specialisation lecturer asked a number of questions that the student teachers had to think about. Some questions asked were: What do they say in the syntactical structure - about basic competencies? Could you observe without syntactical structure? He also made statements like: Substantive nature is changing through the syntactical and the syntactical structure does not change. Mack developed a good understanding of syntactical and substantive. He had prepared for the sessions - he had read the documents provided. As a result he could respond to the questions and in the process

construct appropriate understanding. But it was not just in reading the document that enabled this understanding, it was his active participation in the session that was of intense importance.

- I feel that some of the questions were quite tough

Why did Mack make this statement?

Even though Mack stated that he had a good understanding of the nature and structure of Biology he felt that the questions were difficult. The reason for this is that Mack's original perception about the structure and teaching of Biology was being challenged.

- It has been nice, we have learnt a lot about the theory behind the Life Sciences, things to use directly in the classroom, it will help us in our practice, what we are teaching, the nature of it and I am keen to get down to it. How are we going to go about it?

Why does Mack exhibit a mixed emotional stance?

Mack was in the process of experiencing change in his beliefs about teaching Biology. He was aware that the discussion about what could be used in the classroom could influence his practice. But, he was anxious about the actual action of teaching i.e. how will he teach in the classroom. This is a clear indication that the technical – rationality approach (Schon, 1983) was not used to inform his practice. Furthermore, he was asking questions not about what to teach but about how he was going to teach. This was his challenge. He had not facilitated learning Biology in the classroom as he had not done this as yet.

- When I reflect on my drawing of me as a facilitator of learning, I think mine is, like I have a lot of lines going everywhere on my paper and there is no connection between the knowledge of the student and if I had to change it I could just add more quality to it. I would add in the whole process of the Life Sciences and how the students go about constructing the knowledge for themselves.

Why did Mack say that he would make changes to his drawing?

Mack was in the process of constructing knowledge about the nature and structure of Biology. He has experienced a change in his belief that learning Life Sciences focuses on knowledge only. He was aware of the link between process skills and the development of knowledge, and that when learners construct meaning they can create new things and also use this knowledge in new situations.

- When I look at what reflections are, it is going over all the important things that you think has been discussed and how you sort of assimilate that in your own life. I think I am doing it because you (the specialisation lecturer) said we should do it but I definitely think there is value in it. After doing it, I really realise it is actually thinking deeply about what we had done in the session and yes, it has really made it clearer.

How and **why** did Mack come to understand reflections in this way?

Mack had the experience of reflecting when he was in Hammanskraal. His reflections then focused on important things that had happened to him and this is evident from the words that he used – the important thing that happened to me, the main fact that I learnt. At this stage the reflections were still about important things but they focused on what was reflected on, the process of reflecting and the value of reflection for his professional development. His awareness about the need for reflecting is being developed.

- I feel that I have definitely progressed over these sessions but I definitely do not know where we are going from here. I am wondering about the end point in terms of my progress.

Why has Mack expressed these feelings?

Mack felt uncertain as he was not given guidelines on how to teach and what type of teacher he was going to end up as. He felt uncertain as the process was one where the individual due to his/her own experiences constructed and used his/her practical wisdom to construct knowledge. There were no fixed guidelines and endpoints given to the student teachers. His development was linked to who he is as a person and his expectations of what will happen in the facilitating learning experience in the classroom. Mack as an individual lacked self-confidence, believing in himself and he needed to plan his work more.

This together with the brain profile result that he prefers the big picture, not the detail further impacted negatively on his feelings.

- I have been nervous about the relationship between the school and university and also that the teacher has to give 40% of her time, which is quite a lot and I am then responsible.

Why did Mack state this?

In preparing the student teachers for the schools the specialisation lecturer shared the preparation for the schools. The responsibility of being the facilitator of learning for this time period elicited fear in Mack.

5.7. Step 6: Evaluating Action

The evaluation stage focused on the analysis and evaluation of the intervention for this cycle and the issues that fed into the next cycle.

5.7.1. General comments - analysis and evaluation of the intervention

Each student teacher's experience of each step in the cycle was essential to their self-constructed practice theories. The construction of each practice theory entailed the dynamic exploration and challenge to their developing identities of a facilitator of learning both at a personal and professional level. This exploration and development was evident from the issues raised during this cycle and their responses to these issues. The issues focused on the nature and structure of Life Science (Biology); facilitating learning in Life Sciences with regard to her/his role of as a facilitator of learning, the role of science process skills in learning Life Science; the role of learners in learning Life Sciences, the type and importance of his/her relationship with learners and his/her perception of the role between the university and the school during the practicum period. Korthagen (2001c, p. 255) reminds us that these explorations of "student teachers' preconceptions about learning and teaching" are necessary if we want the student teachers to construct their own practice theories.

Bernice, Carol and Mack's experience of the action step challenged their current beliefs of facilitating learning and reflecting, their emotions, and their expectations of the professional development

programme. The importance of a Life Sciences facilitator of learning integrating process skills and content for learners to construct the appropriate knowledge was a new experience for all three student teachers. The old belief of the importance of content was definitely challenged. But, with this challenge came the question of how were they going to do this integration in the school as evidenced by Mack's question "How are we going to go about it? So, this new experience brought further concerns and challenges about what would be expected of them in their role as facilitators of learning.

They were aware that they had to focus and plan for the role of learners as active participants in the process of learning. This clearly is in line with the principles of experiential and authentic learning. This belief of a learner as active in learning was far removed from their own experiences of learning (Lombardi, 2007). This 'shakening' of beliefs further made the student teachers feel uncomfortable and in Carol's words "deurmekaar". The social learning was a concrete experience for these student teachers. But even with this experience their learning was a "messy process" (Abbot, 1999). But without this messiness and uncertainty authentic and experiential learning may not have been possible.

The messy nature of learning is also intertwined with emotions, reflections and expectations. We need to recognise and integrate the emotional, cognitive (Kolb & Fry, 1975) and perceptual experiences of the student teachers for them to learn. We also need to encourage student teachers to actively reflect on their experiences as awareness of their own learning (Korthagen, 2001b) was important for their construction of "phronesis" As student teachers were only told to reflect with no template or guide as to what to reflect on and how to structure their reflections they had to experience the process as a intensely personal one. This personal nature came from the depth of emotions and thoughts shared in these reflections. But, this process of reflecting does not take place automatically and it is for this reason that student teachers were asked to record their reflections and then to share them during the reflection sessions which were structured into the professional development programme. The elicitation of student teachers' expectations about aspects in the programme needs to be shared. In as much as Carol stated "we have not learnt any Biology yet" as she expected to be taught Biology in the programme. These expectations if left unattended could develop into concerns and these could impact on the process of learning. Negative

emotions are normally associated with concerns and these could impact negatively on the construction of "phronesis".

Bernice, Carol and Mack were each constructing their own practice theories of facilitating learning. These theories were influenced by the nature of who they were as people. But the challenge to their current beliefs of facilitating learning and reflecting, the emotions that they experienced, and their expectations of the professional development programme served to re-assert and also re-establish their identities. Their identities as facilitators of learning were different now to what they were when they started off with at the beginning of this cycle.

5.7.2. What feeds into the next cycle?

The student teachers were engaged in a discussion with the specialisation lecturer to prepare them for the schools. This discussion focused on the specialisation lecturer preparing the student teachers for the school experience. The student teachers were to spend a week tutoring at the school and collecting the programme for the seven weeks that they were to facilitate at their assigned schools. He did warn them though that "what you are going to experience in the school may be very different from what you have experienced and learnt up to now." He advised them to go to the laboratory when they were at the school. They were expected to interview the laboratory manager to establish the laboratory organisation. This would be important for them when designing a learning task as they needed to be able to do that before they got the learners to do it.

The student teachers were to spend eight weeks at a particular school with a particular teacher that they were to be assigned to. They will spend the first week of the eight weeks at the school tutoring the learners and collecting the facilitation of learning programme for the seven weeks of facilitation that will take place at the beginning of the second semester. This preparation was linked to the suggestion by Dryden & Vos (1999) that student teachers facilitate learning in a real context.

Descriptive data – cycle three

6.2. Step 1: Experiential reflections

6.2.1. Bernice

6.2.1.1. Experience of tutoring the learners and observing the teacher mentor teaching

Bernice's teacher mentor gave her transparencies with notes to place on the overhead projector for the learners to work from. Bernice felt uncomfortable to do this and expressed this by stating "just feeding the learners with stuff". Bernice stated that she wanted "to give the learners some interesting things to do not just the transparencies". This view is presented in the literature by Aspin & Chapman (1994).

6.2.1.2. Meaning of practice theory

Bernice's constructed meaning of practice theory was, "you need to be in the situation and try and try different things until you found something that really works." She further illustrated her meaning by stating "the Bushmen were not told to sit and then the instructions on how to go hunting was told to them. They had to learn how to hunt through experience. Practice theory is to be used by us."

6.2.1.3. *Constructing "phronesis"/practice theory about designing learning tasks*

a. Ideas for learning tasks

Bernice got ideas for designing her learning tasks from looking at real life crises (Slabbert & Hattingh, 2006). She described the process of getting ideas for the Blood system - *she wrote down all the problems you can get (stroke, cholesterol, blood clotting, and anaemia), combined all the problems and linked them to the parts of the blood system included activities like, heart dissection and measuring heart rate.* She did state though that these ideas for activities were "not my bright idea, I got this from a textbook". Her choice of activities in the learning task was influenced by her beliefs that if learners enjoyed it then they would learn more. Also if the learners were interested then the learning task would have meaning for them and if it is relevant then they will enjoy it. She was aware that as a facilitator of learning she had to make a plan on how to prevent learners from going off task during a learning task operation. She was concerned though with how she was going to solve any problems if she experienced them.

b. The laboratory work of a learning task design

Bernice planned to do a heart dissection with the learners as this was a practical in the section on the Blood system. She stated that "the last time that I did a heart dissection was when I was at school". She knew that she had to work out how to dissect the heart -"I will find out, that is why I am here, in the laboratory". She described this finding out process. She and Carol worked together as they were both designing learning tasks on the blood system. She expressed her feeling of working collaboratively with Carol when she said that "it is nice to do it with someone who is at your level as we can look and talk about the structure." She was aware that she needed to discover for herself when she stated "maybe I

would be tempted to ask him [Professor Ned] questions instead of finding it out myself." Bernice constructed knowledge about preparing specimens for practical work. She had observed these preparation requirements when she worked with Carol in the laboratory. They experienced problems with the heart specimens as they were frozen and "the sheep heart was okay but the ox heart was a problem as it was cut into pieces." Bernice was aware of her role in facilitating learning of practical investigations in that it was important for her to "record what she did because if something went wrong I will be able to re-do what I did". Bernice said that for the learning task consolidation she would "get the rest of the learners to ask critical and clarifying questions of the group that was presenting."

c. Presenting ideas for the initiating learning section of a particular learning task

Bernice's idea for initiating learning was to present the learners with a game puzzle to solve. This initiating learning section had instructions and learning organization

6.2.2. Carol

6.2.2.1. Experience of tutoring the learners and observing the teacher mentor teaching

Carol was concerned that her teacher mentor spoke in Afrikaans and also in English and that the particular language speaking learners were placed on different sides of the classroom. She decided that when she is facilitating learning she would "speak in English only and I will get the learners to work it out." Even though Carol is Afrikaans speaking she felt that a lot of time was wasted in class to talking.

6.2.2.2. Meaning of practice theory

Carol viewed practice theory as linked to who the person is and "what you would like to happen." She did not want learners to do badly so she suggested that she would "reward them. The real reward for the learners lies in them experiencing the activity." Her understanding of practice theory was that it was developed from "research that was done then they developed the theory." But later she stated "we use practice theory to facilitate learning".

6.2.2.3. Constructing "phronesis"/practice theory about designing learning tasks

a. Ideas for learning tasks

Carol's ideas for learning tasks were influenced by enjoyment and learning, types of activities and the learners' views of learning. She supported the enjoyment and learning from her own experience - "if I enjoyed an activity I will learn more and I will remember more and I will remember less if something is boring". Carol thought that some activities required more teaching while there were others "that you could learn more from". The learners' views of learning were that learners were exposed to "immediate gratification in life [and] this was linked to their thinking that education and learning was easy" therefore they did not have to put effort into it. This view she said was enforced "by the one word answer worksheets that they fill in for class activities." She was aware that a child would feel good "if she/he came up with something that the teacher did not know, as a result of research". Carol thought that this

expectation of substantial justification from learners is what made a learning task different and challenging.

b. The laboratory work of a learning task design.

Carol had planned a learning task on the Blood system. She commented on planning the practical co-operatively with Bernice when she said "we observed the various parts of the heart and found it interesting." She was aware that "we can design as best we can but in the classroom the design could change." She was also aware that in designing the learning task you need to consider resources "available to the learners at home and if they can bring the stuff to school", provide guidelines by saying to the learners that they have "to explain their findings and link them to the problem statement."

c. Presenting ideas for the initiating learning section of a particular learning task

Carol's ideas for initiating learning in a learning task on the Human skeleton for grade 10 learners was to give the learners questions like "What do you think are the best material to build different parts of a skeleton and then you need to decide on which part of the skeleton you can improve on". She stated that she would also present learner instructions and organization.

6.2.3. Mack

6.2.3.1. Experience of tutoring the learners and observing the teacher mentor teaching

Mack stated that the teacher was quite organised as she had told him what sections of Biology he was to facilitate. Mack had observed that the teacher made use of group work and she had "groups of all boys, all girls, all Blacks, all whites". The teacher's reason for grouping the learners in this way was based on geographical reasons "they all live in different areas and when they are given a project then it is difficult for them to meet to complete the project".

6.2.3.2. Meaning of practice theory

Mack's constructed meaning for practice theory was "what you learnt in theory and how you put it into practice. Part of developing practice theory is that people tried things differently."

6.2.3.3. Constructing knowledge about designing learning tasks

a. Ideas for learning tasks

Mack's idea for an activity was suggested by the teacher mentor. His understanding of constructing a learning task was that there are questions that need to be focused on like "what are you trying to achieve in the activity, are the activities in the learning task relevant and enjoyable?" When he evaluated the learning tasks that he had designed he said they "were stimulating but not enjoyable yet." According to him the relationship between enjoyment and learning was his belief that "enjoyment makes a person want to learn as it is an intrinsic thing. His thinking was that "learning becomes intrinsic automatically because if they are enjoying it, it (the learning) comes by itself" and that "the learners' enjoyment during the process of learning lay in what they achieved at the end by learning." Another feature which he

thought needs to be considered in designing a learning task "is to ensure that learners take up a challenge." He was concerned with what would happen, "if they did not take up the challenge". He was aware that he would have to present the learning task properly to the learners for them to take up the challenge. He was also aware that the best way to "grab the learners' attention is creatively" by getting "the children's' minds going as they think that they are scientists and they get interested." To do this he said that he would "not just enter the class and then speak to the learners as what the teacher normally does." He was going to stimulate the learners from the outset.

b. The laboratory work of a learning task design.

Mack saw the need to trial the practical before giving it to learners when he said "we will be on our own in the schools, we will make mistakes there, so it is better that we trial things here" and "I will have to get to grips with how to do it and how to handle the material." Mack stated that he needed agar but did not know how to make it. When he asked the specialisation lecturer for advice he was told "there is agar in the laboratory, you will have to sort out the quantities, so go to the library, get the book, and you work it out". This expectation of learners to access resources is presented in the literature by Armstrong (1991). Mack was aware that when he gave the learners an experiment linked to the learning tasks he would have to ask them to describe the process that they used and to substantiate their findings. He stated that for the learning task consolidation he would, "get the learners to present", and if the learners asked tricky questions, this would be important so as to, "increase the quality of their learning and thinking".

c. Presenting ideas for the initiating learning section of a particular learning task

Mack's ideas for initiating learning in a learning task on Classification for grade 11 was to divide them into groups and for them to work out the reasons for the choice of group. Also a game could be used where learners sort cards out into groups. This could be followed by a class discussion (Slabbert, 2007).

6.3. Step 2. Reflecting and interpreting

- What was the role of the teacher-educator in the discussion-group sessions and why did he have this role?

The following exchange is presented as it is representative of the way in which the specialist lecturer conducted the challenges to student teachers' construction of their practice theory, and in this particular section dealing appropriately with sensitive and/or controversial issues regarding the construction of a practice theory of and for facilitating learning in the Life Sciences.

The specialisation lecturer *initiated the discussion*. Mack stated, "Professor initiated it." The specialisation lecturer *set the scene for the discussion session and prompted the students to participate* in the discussion by stating, "you have come from the schools and are there any things that you want to

share and any questions that you want to ask?" The specialisation lecturer challenged and supported the student teachers by stating "I think that is good that you can look at things and ask the questions like the one that you asked, this is what this teacher is doing but what will I do?" (Claxton, 1999). He made the student teachers *aware of the guidelines* with regard to the interaction between the school and the university when he said, "we can guarantee that work will be done but cannot guarantee that all classes will be paced the same." He also made the student teachers *aware of the relationship between the schools and the university*, this "is a very sensitive thing. We need to be very careful as schools are running at a pace and we must not disturb them". He *prepared the student teachers for the context of the schools* (de Kock & Slabbert, 2003) that they could possibly experience by stating that "what you are going to experience in the school may be very different from what you have experienced and learnt up to now. Some schools are not … implementing Outcomes based education".

He raised the *concerns that the student teachers had* about stepping into the classroom and the role that they would have to play in the classroom. He advised them by saying "the first impression and the first steps are crucial as the learners need to know where they stand with you and you have to take a firm stand to let them know what they can and cannot do". He further advised "do not become familiar with the children; when children challenge you be sharp and do not challenge back and this will turn them around." He also advised "When you get into class you must know what you are going to do……and do it, but if you are uncertain…this could be destructive" (Slabbert, 2007).

The specialisation lecturer also highlighted the importance of how learning should take place. He used the example of the Bushman and asked "how did they learn and what were they educated for?" He wanted to re-enforce the purpose of learning and more importantly the role of learners in the learning process. He also raised the importance of the feelings linked to learning and he used skateboarders as an example. He said that "the feelings that skateboarders get when they achieve "a trick – they experience happiness and fulfillment and they feel proud, they also experience a change in their order of consciousness." He challenged them to respond to the question "does this happen in school?"

He *elicited the student teacher's understanding about practice theory* when he asked them to "talk to me, what is your perception of practice theory. We have already established that it is not theory and practice". He was prompting the students to think back to a previous discussion about practice theory and to rethink their understanding of practice theory. He used Carol's understanding that practice theory is linked to her rewarding the learners" (Kolb, 1984). He got her to think further when he stated, "reward or recognition" and challenged her on the underlying assumptions that she had about this. He challenged her further when he asked her about what the real reward for learners should be. Carol stated that the real reward for the learners lay in them experiencing the activity. Professor Ned also challenged her response further by stating "the real reward for learners is when they experience exhilaration when they do what they did not think they could do".

He told the students that when they are *discussing the designing learning tasks* (Aspin & Chapman, 1994) they need to consider restructuring the tasks given by the teacher. He suggested that they "work out some challenging question that will take the learners' time to figure out and solve the problem". He

shared ideas about co-operative learning which arose from Carol's input about the teacher and the learners where there was a language issue in the class with Afrikaans learners on one side of the class and English learners on the other side of the class. He said "this is a bad situation as this accentuated separation, whereas this situation could be used to exploit co-operative learning". He further stated, "It may take time for the learners to work in co-operative groups and they need to have the experience of it for them (the learners) to see this is how it needs to work". He also stated that co-operative learning is not a necessity but it is essential.

He provided the student teachers with a case study and he questioned their thinking about it. He did not provide them with answers instead he got them to question their own responses further. Evidence of this can be seen in the following excerpt:

> Mack: The teacher mentor gave me things about spermatogenesis. How will I make sure without telling them exactly how spermatogenesis takes place, that they will learn the terms that they need to know?
> Specialisation lecturer: I do not know. Only when they go to the particular step and you start doing it will you know.

In discussing learning task design the issue of morals and ethics was raised (Department of Education, 2003). The specialisation lecturer did not tell the student teachers what to do in these instances but he challenged them (Von Glaserfeld, 1984) as is evident in the following exchange:

Carol: I am against abortion and that person is not, how will we work this?
Specialisation lecturer: The question is not how but what about it?
Carol: I will not compromise?
Bernice: In psychology, the aspect of abortion has been one long fight
Specialisation lecturer (clicking his fingers): The disadvantage of argument is that there is anger. What attracts people to you?
Mack: Respect
Carol: You listen to them
Specialisation lecturer: If you listen to someone what does the other party feel?
Mack: You value their views
Specialisation lecturer: but if I am in a relationship with you, this is different. Also never compromise.
Mack: At what point does Carol share her true feelings?
Carol: I cannot say that I am against it.
Mack: You can- you have an opinion.
Specialisation lecturer: You can
Bernice: The learners may feel that they are on an opposing side, might feel that they are wrong because the teachers don't agree with them

Specialisation lecturer: If you are asked

Carol: Yes I will tell them.

Bernice: If I just stand up and say I agree with them but not them

Specialisation lecturer: It is not what is said only. It is how you are as a human being; a full person and also that you have convictions

Mack: I believe I will not cover myself. I do not see why I should back down from my beliefs

Specialisation lecturer: Carol you need to feel comfortable with how you handle in your circumstance. I think that we got to the point that controversial issues and there is diversity. As a facilitator what immediately do you need to do in the learning task now?

Carol: I will look at it again. I will strengthen it.

In this social grouping (Wortham, 2001) the student teachers constructed their "phronesis" of how to facilitate controversial issues that are raised/discussed in class.

The specialisation lecturer *elicited the student teachers understanding about designing learning tasks* (Smith & Blake, 2005), "let us start by asking how you got ideas into the learning tasks", and later he stated, "what are the underlying principles, what are you trying to achieve in the activity?" They discussed the responses that the student teachers gave and he gave guidelines about learning task design, still challenging them further, "The one principle is whatever you focus on, look at activity; activity should not be done for the sake of the activity, done for the sake of learning."

The specialisation lecturer made the *student teachers' aware of the importance of learners learning from the designed learning task* (Slabbert, 2007*)* as evidenced in the following extract:

Specialisation lecturer: What are we after, … enjoyment or learning? Surely learning. Don't look for enjoyment then add learning. First criterion is learning, is it quality learning, then add enjoyment. Again, remember- what is the relationship between enjoyment and learning?

Mack: Enjoyment makes person want to learn- intrinsic thing.

Specialisation lecturer: When will the thing they do become intrinsic? When will the enjoyment be intrinsic?

Mack: Automatically, if they enjoying it comes by itself.

Specialisation lecturer: What makes enjoyment?

Bernice: When interested has meaning to you or is relevant, and then you enjoy it.

Specialisation lecturer: Think about it, when do you enjoy things?

Bernice: When they are generally different

Specialisation lecturer: Let us jump to the point. The point is the following: learning is very hard and often protracted, difficult and not easy, therefore it is not enjoyable.

So in the process of learning, wherein lies the enjoyment?

Mack: What they achieve at the end by learning

Specialisation lecturer: The achievement at the end, wow we did it. The new order of consciousness that comes because of the peak experience.

Further discussion about some of the *learning task outcomes* (Slabbert, 2007) that the specialisation lecturer shared with the student teachers took the following path:

Specialisation lecturer: End product outcome is the product that they (learners) need to produce. There are four kinds of end-product outcomes - physical object, decision, process and service that the kids produce or generate. A process to produce something In this case what is end product.

Bernice & Carol: Decision

Specialisation lecturer: Decision to do what?

Bernice: Play a role

Specialisation lecturer: Well, play a role, what else? In process of learners telling their peers about it what are they doing?

Mack: Service

Specialisation lecturer: They are rendering a service, a consultancy. Tie into one another. Go back, how enjoyable will that be? If kids know that they are going to interview mothers, sexologist how enjoyable do you think they will think that is?

Mack: Could be enjoyable if you take up challenge, but if they don't take up challenge.

Specialisation lecturer: What is your concern? What should you do for them to take up the challenge?

Mack: Present it properly.

The specialisation lecturer *elicited the student teachers' feelings of sharing their ideas (Hargreaves, 1998) in the group setting when he asked* Carol "how do you feel, using your ideas for the learning task example?" He then used Carol's idea to extend the stage for them to construct knowledge about designing learning tasks:

Carol: The learners can build the skeleton and work out how it functions etc. I will let them choose parts, where the learners pick a piece and see how you can make it better.

Specialisation lecturer: Do not let them choose. All may choose the foot. Ensure that it is done equally. Give them parts to do equally.

The specialisation lecturer *shared the laboratory focused learning task expectations* with the student teachers when he said "when you are designing the learning tasks we would like you to be able to do that (practical) as mentioned in the literature by Heyligen (1997) before you get the learners to do it. You can then re-design the practical in your own time".

The specialisation lecturer *raised questions about the student teachers' presentation of their initiating learning* part of their learning tasks:

What were your experiences – was it easy for you to stand up and just present it. How can we re-work, re-phrase the problem so that the problem is the focus. Then you go to presenting the organizational part. If you confuse the problem with the organizational aspects then the essence of the problem disappears.

He also asked the student teachers to reflect on their problems and on how they will ensure that learners are made aware of the importance, urgency and action linked to the problem (Boud, Cohen & Walker, 1993).

The specialisation lecturer used one of the student teachers presentations as a focus and to share ideas/suggestions of what needs to be done (Lombardi, 2007) to improve the presentation:

Specialisation lecturer: Let us think about Mack's problem. What was your intention about the first part of your presentation?

Mack: That they see that their criteria would be different from someone else's

Specialisation lecturer: Is this the only way that this could be done?

These experiences were important for the student teachers' construction of their practice theory (Brown, Collins & Duguid, 1989). A significant and essential role was played by the specialisation lecturer. He did not give the student teachers answers to the problems that they shared but he expected them to construct and co-construct ideas and actions (Burr, 1995) that could be followed in particular teaching and learning contexts (Slabbert, 2007) .

- What was the student teachers' experience of developing an understanding of the participatory case study action research process?

The student teachers stated that they felt comfortable with designing and responding to questions during the interview as they had structured their own questions they were asking what they were interested in sharing. I also asked the student teachers, "is there anything that should be changed with regard to the research process?" They stated that they were fully aware of the process and understood it, and were happy with it.

- What was the student teachers' participation in the group discussions and could this be done differently?

The students' participation is evident from what Bernice said "anyone could pitch in". Their participation was open and they freely shared their opinions.

- What were the student teachers' feelings and understanding about their construction of knowledge about a learning task

Bernice, Carol and Mack indicated that they were the only group who understood learning tasks.

Bernice expressed her feelings about this "I am not afraid of a learning task as I know what it is like and what is expected of you."

Carol said that the other students had knowledge of it but "they understand them differently because their lecturers have a different idea." This difference in understanding was linked to the duration of a learning task "we stretch our learning tasks over five weeks while they have a different learning task for each day".

Mack stated that the other students "did not know if they will find time for co-operative learning." Mack stated that "they saw it separate to facilitating learning.

- What were the student teacher's reflections of their school-based experience (one week)?

Bernice stated that "she had fun" as her mentor was not in the classroom. She described her role as "explaining the stuff to them". She concluded that it was "nice to see it was working out". The evidence that she used to make this conclusion was based on the learners giving her positive feedback about the way she explained and that they enjoyed the class.

Carol expressed mixed feelings about the experience. Initially she felt excited and enthusiastic about going to the school but these turned to "a damper on my enthusiasm" as she experienced fear and boredom. The lack of enthusiasm and fear were attributed to her observation of the learners' behaviour in the classroom. She stated that "the children did not listen to her [the teacher mentor] it was chaos in her class most of the time"; "the classes that I was to take are the two most difficult classes". She stated that it was boring because "I just sat there the whole time". But she used this experience to decide on how she was going to work with the learners "I think that they are not that bad it is just that she does not handle them very well. I will be the opposite. I will be very strict."

Mack stated that he had **"**enjoyed my time at the school – it was lekker[5]." But he also experienced boredom as "I was just sitting and observing."

- What was each student teacher's practice with reflections?

Bernice described her practice in terms of her feelings about reflecting when she said "reflecting does not stress me out. It is not that big a deal."

Carol shared her understanding of reflecting when she said "a reflection is referring to what happened, what you learnt, how you feel." She also shared her action of reflecting "I did not know what to do, I just guessed" and her concerns "the problem that I have is that I forget to reflect."

Mack shared his uncertainty about what and when to reflect when he said "I do not think that we are sure about when to reflect. I reflect on the school sessions but I am not sure about reflecting about lectures." The use of the words I and we are interesting in that we is used as a collective linked to a problem. He also shared the contribution of the specialisation sessions when he said "we are supposed to reflect every day…on what had happened at the school. He also indicated the purpose of reflecting when he said "used these to discuss the problems we were experiencing."

[5] Lekker is an Afrikaans word that means nice.

- What was the student teachers' understanding of "phronesis" (practice theory)?

Bernice's understanding was also informed by "we spoke about this in the specialisation session." Her understanding was that "the only way you can get something like practical wisdom is by experience." She thought that when some lecturers tell you "this happened to me that is worth more than plain theory." She said that she could then relate these happenings to her own and "think yah I saw that."
Carol gave meaning to it in terms of her own practice theory which she saw as a "kind of just theory at this point". But she then stated that she "saw all the students as having the theory no practice."
Mack stated that practice theory meant **"**forming your theory from your practice." He understood that "through your experience in the classroom you are able to build on your theory." His understanding also included practical life experiences and what you know "about yourself, how you interact with other people."

The student teachers each have their own particular meaning for practice theory. Mack was aware that practice forms your theory and its importance would be in the school where it could be used. Bernice was aware of experience but she saw the practice as that outside herself and as a complement to the theory. Carol on the other hand only saw it as theory.

- Collegial support of practice – what was the student teacher's experience of sharing sections of their learning tasks during the discussion sessions.

Bernice stated that she **"**felt good" only when the comments made sense to her. She did admit though that sometimes "it was really good advice" but because she could not see herself doing it, "it was not really good advice.
Carol stated that she **"**felt good" only when she thought that the advice would work and when she could see that she would "be able to do that."
Mack stated that he "felt good to get advice and to see how other people think."

All three students felt good about the collegial support*. Each student's feeling was due to certain factors: Mack – advice and peoples ideas, Bernice and Carol – the evaluation of the advice was linked to how it applied to them, if they could do it.*

- What were the student teachers' experiences of the university laboratory session?

Bernice expected the session to be organized and she was disappointed when she saw that it "was less organized as I hoped for. Things were not there". But she expressed that she "learnt something… class organization, two learners will work on one heart and they could both cut one … you cannot force everyone to do that" (dissect the heart). She also learnt that "if you want to have the kids to develop the skills then you have to get them to dissect the heart." She valued the experience as she could now "use all the equipment & make sure that everything is not so hard."

Carol stated that even though she expected more assistance during this session, "she still enjoyed it." This enjoyment came from her realising that "at the school we are going to be alone anyway and we are going do everything ourselves. This is a real life thing, an opportunity to experience." She also realised that she already had a "better understanding." From this experience she concluded that "planning for a practical session is a crucial part because I know what they (learners) need and what they have to do."

Mack experienced the session to be "a bit less organized than I hoped." This lack of organization was due to him not finding apparatus and knowing how to make agar (a substance that he needed for the practical). He was frustrated because he had to go to the library to look for information on agar. But, he had "fun making the agar." He realized that "once you have experienced the practical, you can then work out what and how to assess it." He concluded that "when he is working with learners he will assess them in order for me to work out if they understand." He stated that his "most valued experience…was finding a very nice book in the library that had the necessary information".

- What do the student teachers' understand about their role as a Biology facilitator of learning; facilitating learning of Life Sciences and the role of learners in the learning process?

Bernice saw her role in feeling terms as she said it was "a fun experience and also in a role of "explaining stuff" to the learners. She saw the learners in an "active questioning" role.

Carol perceived her role in an emotional way as she was excited and enthusiastic but these feelings were dampened by the fact that she was to take the two most difficult classes. She also perceived her role in a management aspect in that she was going to be "strict with the learners."

Mack understood his role as a facilitator in an organizational manner - he stated that he would "be organized" and he would "use group work with mixed groups."

- What were the student teacher's reflections on their experience of presenting initiating learning of their learning tasks?

Bernice thought that it was **"**fun and I felt fine doing it." This experience led her to believe that "if I stood in front of a class I will not worry".

Bernice had presented a problem because she thought "this is the thing that needs to be given to them [the learners] first."

Bernice stated that the problem that she presented to the learners "had too many different things" for them to do. She realised that she "confused the problem with the organizational aspects of what the learners need to do."

Carol evaluated her presentation when she said "I do not think that mine or anyone else's presentation was gripping enough or stimulating."

She was aware that she had given necessary organizational instructions to the learners about what "they needed to do about the activity." But after reflecting on the problem that she posed she realised that she had not given the children "enough information for them to understand how to go into action."

Mack evaluated his presentation when he said **"**I should have split the presentation in two." Mack described his presentation as "explaining to the learners what they need to do." After reflecting on his problem Mack stated that "it does not encompass everything … it is important that [it] has clarity." He decided that he would have to "think further about it … [to] "make sure that the learners understand what I said."

6.4. Bernice, 6.5. Carol and 6.6. Mack

Step 3, 4 and 5 for each of the student teachers is presented in this section.

The data for step 3 was collected using document analysis (learning task planning documents and the student teacher's reflective journals in their professional portfolios). The data for step 4 was collected using the observation schedules, document analysis from the student teacher's professional portfolios and my observations. The data for step 5 was collected from the semi-structured, stimulated recall interviews conducted in the post-lesson session and the student teachers reflections. The analysed according to Mezirow's levels of analysis - by looking at the content (what), the process (how) and the premise (why) to make meaning (Wang & King, 2006) of each of the student teacher's constructed "phronesis". The data is described and analysed on pages 236 – 281.

6.4. Bernice

6.4.1.A. Step 3: Planning action (Learning task 1)

Bernice was based at a High School from the 19 April to the 4 June. During this time she facilitated two learning tasks: Human skeleton and the Human Circulatory system. Her first learning task was on the Human skeleton. This learning task was presented to a group of twenty-six Grade 10 learners from 19 April to the 21 May.

6.4.1.1.A. *Learning task design (See Appendix for a copy of the learning task designed).*

This learning task had the following features: learning outcomes, assessment standards, problem put to learners, time allocation, learning task preparation, class organization, authentic learning conditions, resources, leaner expectations and methods of assessment. Two activity sheets were attached to this learning task design. The first activity sheet had the problem statement clearly written and organisational aspects e.g. group evaluations. The second activity sheet had the Human Skeleton final report assessment rubric. The assessment planned was for each group of learners to set a 10 mark test for the rest of the class members and for the learners to submit a written report which was to be assessed according to an assessment rubric that Bernice had designed.

6.4.2.A. Step 4: Taking Action (Learning Task 1)

6.4.2.1.A. Learning task operationalised

Bernice presented the problem that she had designed to the class group: At the back of the classroom was a drawing of the human skeleton for each co-operative group. Bernice told the learners that the

drawing looked strange because an Orthopaedic Surgeon had made changes to the skeleton. She challenged the learners to observe the drawing and to "determine if these changes are an advantage or a disadvantage to people and what the implications of these changes are" (Claxton, 1999). The learners were then left to work in their groups.

This learning task focused on both substantive and syntactical aspects of Biology. Bertha had considered and implemented co-operative learning (Slabbert, 2007). She had divided the learners into eight co-operative learning groups of four learners each. Bernice used appropriate criteria to place the learners into groups - learner performance (previous terms marks were used), gender, culture, and no friends. Her method of grouping was based on her rationale that the use of heterogeneous groups in class was effective. Bernice was aware of the impact of the syntactical and substantive aspects of Biology on her competence to facilitate learning.

6.4.2.2.A. Learning task assessment

The learning experience was assessed by Bernice herself (self-assessment), and the researcher (see appendix).

a. Self assessment

Bernice's written self assessment focused on the initiating learning and maintaining learning parts of the learning experience. In the initiating learning section she assessed: the learning climate as "one that captivates attention"; the problem posed as "relevant, challenging and urgent but lacked clarity"; the learning management as "needs more design and planning for leaner activities". The assessment of the initiating learning also focused on: use of learning media as relevant; cooperative learning as highly effective and successfully used and learner involvement as "at times a few learners show an interest." She assessed the time management as inefficient as it allowed for distraction. She assessed her communication as "enthusiastic, energetic and clear." In the maintaining learning section she assessed her monitoring skills as "I tend to give solutions" and the managing feedback as "attentive listening, gives recognition and interprets main ideas.

Her development target was concerned with her using her time more effectively.

b. Researcher

The assessment had written comments and no marks. I advised Bernice to be clear about the instructions that she gives to learners. I also advised her to consider what she needs to do in the initiating learning phase to really get learners involved. I reported to her that her facilitation of the group presentation and the individual learners was good. I also challenged her to think about how she could have used the opportunity where a learner group presented inaccurate information about the ribs as a learning moment. I suggested that she "ask the other learners about the information presented." Finally, I asked her if she noticed the learners' excitement and boom of words during the demonstration that she had done and the implications of this for facilitating learning.

6.4.3.A. Step 5: Reflecting on action and interpreting (Learning Task 1)

- **What** was Bernice's understanding of practice theory and **how** was it constructed?

Bernice stated that she "learnt from class and the reactions of the class." She was aware that some learners are used to being told things and some people are verbal. She needed to "consider this when I am constructing a learning task."

- What were Bernice's feelings about facilitating learning of a learning experience at the start of the school based session

Initially Bernice felt worried that she was not going to feel as excited "as she felt when she spent the week at the school." But these feelings changed due to the learners' response to the learning experience "they are quite excited about what the surprise is and now I am excited again, looks like I am going to be learning something."

- **What** concerns did Bernice raise about operationalising the learning experience and **why** did she have these concerns?

She was concerned with the learners' behaviour "if they were going to be good" and if "everything would work out in terms of what I think". She was also concerned with what I expected when I assessed her. She knew that the class should be organised but she challenged this when she said it is "not usually organised, kids run the class- they do the presentation." .

- **What** highlights did Bernice experience and **why** did she have these?

Bernice was surprised that "some of the learners actually did the biology work after the presentation" and that they "were so good".

- **What** is Bernice's awareness of the learners' learning?

She thought that it was going well as evidenced by her following statements, "the learners are getting extra stuff done", "they come with interesting stuff that I did not make provision for", "collected information", "amazing stuff I didn't even think of". She concluded that they were "definitely learning beyond the curriculum."

- **What** is Bernice's awareness of the learners' feelings and actions and how did she come to have this awareness?

Bernice stated that the learners "were stressed about being videotaped" and therefore they were passive and did not ask many questions. This was related just to the observation of the learning task on that day.

- **What** was Bernice's thinking about the relationship between the facilitator and the learners?

Bernice thought that it was important to establish a "relationship with your learners." She was experiencing different relationships with different learners and she expressed this when she said "one of

the learners in the class asked the other learners to work with me, because I deserved it." She also shared that "I can laugh with them". She thought that having a relationship with them was important as "they then have respect and so they will work with you."

- **What** was Bernice's understanding of the role of a facilitator and how did she use this understanding to her construct her practice theory?

Bernice wanted to be relaxed and herself with the learners. She wanted to "laugh with them." She concluded from observing many teachers that they "are totally stuck up and boring". She could not understand why teachers did not have an open experience with the learners. She questioned why they are "keeping the wonderful person away (the teachers as people)?"

Bernice shared that in reflecting on her interaction with learners and these led to her changing her actions. She shared an experience where she was angry with a few learners and then she got cross with the whole class. She decided that "I needed to be fair" and to change her approach. She decided that she needed to be cross with just those "learners who caused disruptions".

She purposely chose to work with "the two naughtiest classes" (I am using this word because it is used generally by the teachers and the psychologist, but I do not use it) and she evaluated her role when she said "I got more out of them than the other teachers."

- **How** does Bernice perceive and use the actual contribution of the teacher mentor towards her construction of her practice theory?

She stated that the teacher had made a huge contribution in that she "answers every little question" and she "knows what the university expects". She stated that she was "the happiest student of all with my mentor". She also stated that she had observed the teacher mentor handling lively children in the class and "I have reflected on this" and from this she learnt what she needed to do.

- **What** was Bernice's experience of the contribution of the specialisation programme towards her construction of her practice theory?

Bernice had listened to Carol describing the trouble that she had in her class. She also listened to the advice that was given by Professor Ned when he stated that "if you do not get co- operation, do not work." She stated that "when I was designing the learning task I used the information" especially about how to form groups. She shared that she also "did it like how I experienced it on campus." (her own experience in her undergraduate years – cycle 1, step 5). Bernice concluded that she did get help for Professor Ned and that "he mainly helped with administration stuff not really with content and context stuff."

- What was Bernice's experience of collaborative support?

Bernice valued working with her two colleagues in that "we sorted things out ourselves.

6.4.1. B. Step 3: Planning action (Learning task 2)

The second learning task that Bernice planned focused on the Human Circulatory System. It was presented to Grade 10 learners from 24 May to 4 June. (See Appendix…..for copy of learning task)

6.4.1.1. B. *Learning task design*

This learning task had the following features: learning outcomes, assessment standards, problem put to learners, time allocation, learning task preparation, class organisation, authentic learning conditions, resources, what is expected of each learner and methods of assessment.

6.4.2.B. Step 4: Taking Action (Learning Task 2)

6.4.2.1.B. Learning task operationalised

During the initiating learning phase Bernice presented the problem by reading a letter from the blood bank. This letter was addressing the shortage of blood in the blood bank and the urgent requirement for blood donations. She then managed the organisational aspects by giving the learners instructions on what was expected of them. She also gave the learners time to discuss the problem presented and she organised the learners to work in groups. The groups of learners discussed the task given and read the textbooks provided. She was a bit disorganised as while the learners were doing their group work tasks she started discussing the test that they were to write in the next few days. Bernice in monitoring the work progress of the learners walking from group to group and asked the learner groups questions about the task.

6.4.2.2.B. Learning task assessment

The learning task was assessed by Bernice herself (self-assessment) and the teacher mentor. (See appendix).

a. Self assessment

Bernice's self assessment of her learning task operation focused on initiating learning and maintaining learning. In the initiating learning section she assessed: the learning climate as "one that captivates attention"; the problem posed as "relevant, challenging and urgent but lacked clarity". She also assessed the learning management as "needs more design and planning for leaner activities"; and the use of learning media and other resources as "relevant." Bernice assessed her use of cooperative learning as "partially effective" and the learner involvement as "good" as the "the total group of learners were involved, highly interested, motivated, took responsibility for their own learning." Bernice stated that she was "aware of the learners' needs". In maintaining learning her monitoring skills challenged learners to be confident, independent thinkers. She assessed her management of feedback as good as she focused on "attentive listening, gave recognition and interpreted the main ideas." She was happy with her time management as it was "well paced". She assessed her preparation of resources before the learning experience as bad and she concluded that "I need to rely on myself to get everything ready. I should not rely on anybody as everything was late." She decided that in future she "will do everything in advance."

b. Teacher mentor

The teacher mentor assessed the planning, all the outcomes and assessment criteria as "good." She stated that Bernice was "enthusiastic and she had a good interaction with the learners." In assessing the organization aspects she stated that "the learners were restless until the problem was presented to them and the creative presentation grabbed the learners' attention." The teacher mentor also assessed the role that Bernice exhibited by stating that "good introductory questions were asked to get the learners started but do ensure that all learners are working and not talking about other things." The teacher mentor also assessed Bernice's management of the learners' discipline by stating "pay more attention to discipline".
Even though this assessment was directed to specific aspects of the learning task the teacher mentor praised Bernice for the good aspects and she also offered advice as to what could be done differently.

6.4.3. B. Step 5: Reflecting on action and interpreting (Learning task 2)

- **What** was Bernice's construction of her practice theory and **how** was it constructed? (see concept map in appendix)

Bernice stated that this was the second learning task that she had presented. She saw the learners as being "taken out of their usual way of getting notes." She described her role as "I am not giving them notes, I just ask questions." Bernice stated that she had learnt from her operationalisation, assessment and reflections of her first learning task operation. She provided the following as evidence for her learning "with the second learning task I made a big difference. I did research and I checked the stuff before I started." She also stated that she now "checked the learners' work when they were doing co-operative learning to make sure that they are on the right track."

Bernice was motivated by the learners' responses "what is wonderful is that the learners tell me that they enjoy my classes because they are now able to explain things on their own." She also stated that "they are becoming to realise that I will not give them any answers and that they have to think." She observed that the learners could "answer questions, even difficult ones." She stated that in the past "if the information was not in the learners' notes they could not answer." From this she concluded that "they are now independent thinkers". She therefore thought that she could "increase their challenges and they would still answer the questions."
She also thought that her role was to get "them to read it (problem statement brief) for themselves and to construct meaning."

- **What** were Bernice's feelings about the learning task operation and why did she have these feelings?

Bernice felt that this learning task did not go well as the learners were for some reason "trying to be funny" even though they responded in the learning experience.
Bernice stated though that she "had fun and I enjoyed it."

- **What** was Bernice's understanding and practice of designing and operationalising a learning task linked to a context

Her understanding of this is that she "set the problem in the context of the learner's uncle who has a blood circulation disease." She was aware as to why she did this "because it is something that could really happen" it was relevant for the learners (Slabbert & Hattingh, 2006). She justified her choice of problem as "the use of this context made it more of a real life problem and also all the learners have an uncle."

- **What** concerns/challenges did Bernice experience designing the learning task and **why** did she have them?

Bernice stated that the challenge "was to see whether the learners would ask annoying questions or whether they would start work." She saw her problem with presenting as "how to get them started properly." The challenge therefore was for her to "design something that would get them" started quickly.

- **What** highlights did Bernice experience with operationalising the learning experience and **why** did she have these experiences?

She was happy that "the learners just started the work" and did not ask a lot of questions as they did in the past learning experiences. She thought that they "understand what I want from" and that the learners themselves were enjoying "the act of thinking … the challenge."

- **What** was Bernice's expectation of the contribution of the teacher mentor?

Bernice stated that she expected the teacher mentor to support her "in a way that I can question her about things that I do not know."

- **What** was Bernice's use of the contributions of the teacher mentor in constructing her practice theory?

She stated that she used "planning of learning tasks and I have used the way the teacher mentor handles discipline."

- **What** was Bernice's perception of the contribution of the specialisation programme?

She thought that it had not "contributed a lot." The reasons that she gave were that "it is not that practical to do everything that we worked" with at university. She further stated that "the stuff you know you are supposed to do is not working because the class is not responding".

- What was Bernice's actual use of the contribution of the specialisation programme?

Bernice stated that she "could assess the quality of maintaining learning by looking at whether the learners are active; their discipline is managed and if she could organise them into groups.

- What was Bernice's overall reflections of her first school based education programme and how did these reflections give meaning to her construction and use of "phronesis".

Bernice stated that the two learning experiences were **"**more professional than the Hammanskraal attempt, but I have not yet reached the required show quality." She thought that these learning tasks could be used to "demonstrate progress". She compared these learning tasks to the one that she designed at Hammanskraal and she stated that "these learning tasks were complete in terms of their planning and they have clearly defined outcomes with problem statements."

Bernice was aware that the first learning task on the skeleton had "the disadvantage that much time was lost in each period"; as she had not organised and managed the task effectively – learners did short presentations and then had nothing do for the rest of the period. She was aware that the second learning task on the Circulatory System was "the better of the two … [as] the learners were more actively involved" and they were "given more opportunities to think."

Bernice concluded that these learning tasks were the first ones that "contributed to the development of my practice theories as this is the first time I encountered concepts such as meta-cognition and co-operative learning."

6.5. Carol

6.5.1.A. Step 3: Planning Action (Learning Task 1)

Carol was based at a High School from 19 April to 4 June. During this time she facilitated three learning tasks: Human Skeleton, Human Skeletal Muscles and Levers, and the Human Circulatory system. The first learning task on the Human Skeleton was presented to a group of twenty-six Grade 10 learners from 19 April to the 21 May. (See Appendix for a copy of the learning task designed.

6.5.1.1.A. *Learning task design* (See appendix for the learning task designed)

This learning task design had the following features: problem statement, resources, meta-learning, co-operative learning, learning task presentation, class organisation, product, critical outcomes, learning outcomes, assessment standards, assessment criteria and assessment method. Attached to the learning task design was a worksheet with the activity instructions and dates for various activities, the assessment rubric for the learner exhibition assessment, report assessment rubric and cooperative group assessment.

6.5.2. A. Step 4: Taking Action (Learning task 1)

6.5.2.1. A. Learning task operationalised

Carol designed the problem statement and gave it to the learners. The problem was relevant and challenging as the learners had to work with different levels of difficulty and a variety of activities to try to solve the problem. The problem was: What is the best, most economical materials that can be used to build different parts of the human skeleton. By using these materials what would be the most efficient and functional improvements that can be on the existing part and how do these improved parts fit

together to form a complete human skeleton. Substantiate and motivate the build of the improved part of the skeleton in a report. This problem challenged learners' understanding (Slabbert & Hattingh, 2006; Lombardi, 2007) about materials and design features important for the structure and also functioning of a particular part of the skeleton.

6.5.2.2.A. Learning task assessment

The learning experience was assessed by Carol herself (self-assessment), her colleague (peer assessment) and the teacher mentor. (See appendix for original documents)

a. Self assessment

Carol's assessment focused on initiating learning and maintaining learning. In the initiating learning section she assessed: the learning climate as "pleasurable but irrelevant to the learning outcome"; the problem posed as clear, but it "lacked relevance, challenge and urgency." She assessed her leaning management as "needs more design and planning for learner activities." The learning media was assessed as "little/some use of learning media and other resources." The cooperative learning was assessed as "managed group and/or pair work." The learner involvement was assessed as "at times a few shows an interest" and her time management as "allows distraction and the focus is on individual needs". Her communication was "clear and audible." In maintaining learning she assessed her monitoring skills as "tends to give solutions" and the managing feedback as "attentive listening, gives recognition, interprets main ideas."

Her development targets that she listed were: practice better management skills in the class, must be stricter, must create a better learning environment and must get the learners to listen as they have no option.

b. Peer assessment

Carol's peer assessed her learning task as "learning climate captivates attention, posing a problem was exceptional, clear, relevant, challenging and urgent." She assessed the learning management "as highly organized, suitably relevant for learner activities and you used relevant learning media and other resources." She described her cooperative learning as "highly effective as you made successful use of cooperative learning" The evidence for this was that "the whole group of learners were involved, highly interested, motivated, and took responsibility for own learning." She assessed her time management as "well paced." She stated that "she is aware of learner's needs and her communication was enthusiastic, energetic and clear." She also stated that during the maintaining of learning Carol "challenged learners to be confident, independent thinkers." Further comments that the peer assessor wrote were "I think that your learning task was outstanding as you had the attention of even the naughty children in the class and everyone participated." Another comment was: "You handled the facilitation of learning very well. Even when the buzzer went the children were still working and they wanted to work further. I think that this says a lot."

c. Teacher mentor

The teacher mentor's assessment of the learning task was: "the planning for the learning task was complete and innovative." She assessed the problem statement as "challenging but there are still learners whose attention must be captivated." She created a good learning climate but this can be improved. She also stated that the learners discipline was very good. She advised that Carol should see if she could get all the learners' attention before she started the learning task.

6.5.3.A. Step 5: Reflecting on action and interpreting (Learning Task 1)

- **What was** Carol's understanding of practice theory and **how** was it constructed?

Carol stated that she had a clearer understanding of practice theory. "It looks at what I do in class." She shared an incident in the class that she used to construct her practice theory. She described the "difficult" experience that she had with a learner and she concluded that "although I was very shocked with this situation in my classroom I know that next time I am equipped to handle it the right way. She felt that she had "learned from this situation."

- **What** were Carol's feelings and thoughts about the learning task designed and operationalised and why did she have them?

Carol stated that this was "the first **learning task that I designed and presented** to learners" She said that it was "hard to describe how I felt when I was busy preparing and then presenting my first learning task." This was the case as she expected more from this learning task but she did say that she was a 'bundle of nerves" while operationalising the learning task. She also felt "so much pressure and stress … [and] unsure" while designing and presenting.

Carol realised that the learning task "could be improved on … as it was not too bad but it was also not outstanding." Carol thought that the following aspects of the learning task could be improved on: clarity of problem, instructions, meta-learning, time and learner management. Carol stated that she had "realised that my standard was too high for the learners and I am struggling to find a middle ground." She stated that "after presenting my first learning task the skepticism I felt about this new paradigm was soaring and I was sure that it would never work". Her own practice of presenting the learning task and the teacher's assessment made her feel skeptic and negative. But she did conclude that the "whole experience was not necessarily a negative experience, and I did grow from this."

- **What** challenges did Carol experience and **why** did she have these challenges?

Carol did not have confidence in herself and she felt "uncertain about designing and managing the learning task." Her challenge was to develop confidence, feel secure and good about working with the learning task. Furthermore, Carol stated that "the learners have never done learning tasks in their lives and they were quite baffled with this new concept". She also stated that the learners were not used to "doing something" as they were used to just "sitting and listening to the teacher." A challenge that she

experienced was a conflict situation with a learner. She stated that she never "though something like this would happen in my classroom and not in the first week, but it did."

- **What** highlights did Carol experience and **why** did she have these?

Carol described the experience that she had when she was observing the teacher mentor teaching. She said "I was very bored and stared at the information on the transparency that she [teacher mentor] was busy explaining." She also observed the learners in the classroom and "suddenly realized that there were maybe two learners in the class that were listening to the teacher in front". At this point she felt the internal need as described by Korthagen (2001) in the literature, for her to change. She stated that this was "the day that I had the AHA feeling for the first time." She also "realized that this new paradigm in education is not absurd as I thought."

- **What** was Carol's expectation of the contribution of her teacher mentor to her practice theory?

Carol stated that "I expected her to support me with my learning task design presentation, consolidation and feed-back." The reason for this expectation was that the teacher mentor "had been through the PGCE programme and she can give me some tips on that side."

- **How** did Carol perceive the actual contribution of the teacher mentor towards her development of her practice theory?

Carol described her mentor as "very nice and helpful … she does not restrict me," and she said that she felt relaxed with her. Carol also said that the teacher mentor "will help if I ask her, but she will not volunteer".

Carol's perception is expressed by "she [teacher mentor] cannot influence my practice theory in a positive way." She perceived this as the teacher mentor "teaches like a teacher, she stands and talks [and] … she teaches different from what we expect." Carol said that it seemed as if the teacher mentor did "not know anything about what we [student teachers] are doing." Carol then concluded that she did "not think her [teacher mentor's] practice theory and ours is similar."

Carol also stated that when the teacher mentor assessed her learning experience she was confused and she did not learn from it as she "did not know what I did wrong, or how I could improve according to her."

- **What** was Carol's understanding of the role of a facilitator of learning and how did she construct this?

Carol constructed her understanding of the role of a facilitator of learning from observing the teacher mentor teaching, the conflict she experienced with a learner in her class and from facilitating learning through the execution of learning tasks herself. When she observed the teacher mentor teaching Carol questioned her own facilitation of learning – "maybe I didn't research all the learners in my class and maybe they did not construct their own meaning about everything." Carol though did conclude that "I

know for sure that the learners in my class achieved more than those that were sitting and listening in this [teacher mentor's] class.

Carol had experienced a conflict situation with a learner. After the conflict with the learner Carol said "I showed the learners that I am serious about 'teaching' and discipline in our classes and that I was not going to back down." She also said "although I was very shocked with this situation [conflict] …I know that next time I am equipped to handle it the right way." She felt that she "grew in confidence … I feel more self-assured in handling difficult situations."

After facilitating her first learning experience Carol wrote, "this was the first really momentous moment in my development as a facilitator of learning. My first baby steps in the right direction." This indicated her growth. – the beginning and the continuous, as she saw that more growth was going to take place. She concluded by stating "Teaching looked so mundane and ordinary with no real challenge and I finally accepted that the aim of education truly is to maximize human potential through facilitating life long learning as stated by (Slabbert, 2003).

- **What** was Carol's experience of the collaborative peer support?

Collaborative peer support took place during the university and the school based sessions. Carol stated that her colleagues were a great support – assessing the learning experience and also involved in discussing how "to design and operationalise learning tasks." Carol shared an experience of "a week before I was planning the learning task I contacted my colleagues and told them that I had problems with ideas of how to teach the section." She described how the three of them met to discuss the issue. She described how they socially shared their frustration (Wortham, 2001). She remarked that she did not think that the "meeting was very constructive as it was just a moaning session. We spoke about our frustrations and the difficulties that we were experiencing."

- **What** was Carol's perception of the role of learners?

Carol was aware that it was important to work with learners' feelings. She stated that "it was a difficult situation for me [working with the new learning tasks] … the learners were negative about the improvement that they had to make on the skeleton". She shared that when she had conflict with a learner "I followed his lead and I treated him with human dignity, respect and assisted him as well as I could." As a result of this the "learner continued to work hard in his cooperative group and gave his best". She was surprised that he really wanted to maximize his potential because even though he might not have been the 'smartest' learner he really showed improvements"

6.5.1.B. Step 3: Planning Action (Learning Task 2)

Carol had planned a learning task on the Human Circulatory System and the focus was on Cardiac diseases. This learning task was presented to eighteen Grade 10 learners. Carol had planned and prepared assessment rubrics which had excellent structure (see assessment rubrics in appendix).

6.5.2.B. Step 4: Taking Action (Learning task 2)

6.5.2.1.B. Learning task operationalised

The learners entered the class and organised themselves in groups that they had been working in. There was a heterogenous grouping of learners of mixed race and gender. Carol started the learning experience by reminding the learners that they were presenting their projects on Human Circulatory system – Cardiac diseases. She also cautioned the learners to be prepared to speak when it was their turn to present. When she asked the learners if they were ready to start with the presentations the problem of group members being absent was raised. The learners were frustrated, and one learner stated "she is absent and she has all the material for her part now our presentation will be incomplete and we will lose marks." In Carol trying to sort this out the learners were getting unsettled, but she managed to contain the situation.

6.5.2.2.B. Learning task assessment

a. researcher (See appendix)

This learning task was only assessed by me. Carol, the preparation for this learner group presentation session was excellent. You presented and explained the assessment rubrics to the groups very clearly and methodically. Do ensure that they all understand how to use the assessment rubrics and you could practice this with them before they start the presentations. When the groups are presenting do intervene to support them with their language difficulties. Your discipline control was well managed. Carol, the overall learning experience was well managed. The idea of the group presentations was excellent. You need to focus on managing the time and the dynamics of the group presentation.

6.5.3.B. Step 5: Reflecting on action and interpreting (Learning task 2)

- **What was** Carol's understanding of practice theory and **how** was it constructed?

Carol stated that her "understanding of practice theory is clearer now than what it was in the beginning". She understood that it was constructed "from the experience at the schools … [where] I have to facilitate more." She stated that when she went to the school she had her theory "but now you are developing your practice. So by developing your practice you can actually now make it your practice theory". She thought that "the theory is the theory and your practice makes it kind of yours." She described her practice theory when she said "I wanted to do so much in one period, that you forget about the time and then the period is over and you think I did not consolidate or get feedback I just did my action."

When Carol spoke about her discipline she was aware of what she needed to improve and she said "for my next school I will be stricter from the beginning rather than try to be relaxed." She also evaluated the use of group work "I do not think group work, works." She had observed the learners working in groups and she said that the learners "do not like it. Learners think: I do the work and I get this mark. Someone in my group does not do work and they get the same mark." Carol thought that co-operative learning had its uses but it had problems as the learners "do not like presentations and they do not listen to their

classmates." She was aware of this from her own experience "at university I do not listen to my classmates when they are presenting".

- **What** were Carol's feelings about the learning experience operation and why did she have these feelings?

Carol did not feel good about this learning experience because "learners were not excited at all." Her feelings were also linked to the learners' performance "I was disappointed, I expected more of them."

- **What** challenges did Carol experience with operationalising the learning experience and **why** did she have these challenges?

Carol's challenge that she "experienced is that I must also know the stuff [content] in order to ask them questions." She stated that she wanted "to know so much more [so that she could] challenge them". Carol also saw "time is a challenge" especially when working with learner group presentations. Further challenges were with disciplining the learners and motivating them to ask questions. Carol stated in lessons where learners present their work she found it difficult to "focus on the learners, listen to the presentations and keep them quiet."

- **What** highlights did Carol experience in operationalising the learning experience and **why** did she have these?

Carol stated that she was excited when two learner groups had completed and presented their presentations very well, they could answer questions asked and they "found stuff that they did not need to know about, which was outside the curriculum."

- What did Carol expect of the teacher mentor? **How** did she perceive the actual contribution of the teacher mentor towards her construction of her practice theory?

Carol stated that she did not "expect that much." She did say that she "really does help with problems. She asks if I am okay or I need help." Carol assessed the teacher mentor as a person who "really thinks about her children even though her discipline is not the best." From observing the teacher mentor she acceded to the thinking "that everyone has his or her own method [practice theory].

- How did Carol perceive her role as a facilitator of learning and how did she construct this perception?

Carol while facilitating learning at the school was aware that she wanted "to be a mixture of all these things: to know my subject; the children to enjoy, and I do not want to be boring; for it to be fun, but not too much fun because it gets out of hand." She understood her role as "I have to set the tone in the classroom" and facilitation of learning "I can see the use of feedback and consolidation and "I teach very little and would like to teach more but I resist it." She shared that some learners had asked her why she did not "stand in front and teach them". The reason that she gave for this was "do you actually listen to the person while they are teaching?" She shared the learners' responses "they said that they did not."

Carol wanted to be a motivating force in the lives of the children "I like Ramon and Mack, I like them both, and they are nice boys. I want them to do something with their lives." She also wanted to develop their time management skills and responsibility attitudes "I am also getting the learners to manage their time efficiently from a young age. If you are under pressure and you do not complete properly and you get bad marks then it is your responsibility." She was also aware of the effort, development and change that the learners were going through in themselves "Stav on the first day he just sat around and he did very little work. Now he gives in his work."

Her perception was also informed by her experiences as a learner at school where "many teachers were horrible. My mathematics teacher was a real teacher; he explained well but was horrible to children." Even though he was horrible she thought he was "the greatest math's teacher." Another great teacher "Afrikaans teacher was totally different - she was cool." Her Biology teacher was also great because "you could ask him anything and he knew everything but the class was so boring."

Carol's perception of a facilitator of learning was: "A fun, cool teacher who was not boring but set the tone, who did not teach all the time, who knew everything and explained well, and was a motivating force in the children's lives." This perception was essentially similar to what she stated in cycle two step one – experiential reflections. This facilitation of learning at the school extended and affirmed her perception (Kolb, 1984; Kagan, 1984) of the role of a facilitator of learning.

- What was Carol's perception and actual use of the contribution of the specialisation programme?

Carol said that "it did more like help with the syllabus the stuff we did not know about." She also shared the contribution in terms of "I explained to learners what they had to do, but I was also aware that Professor Ned had told us that we should not explain any theory to them, they must read the instructions and interpret them". She also expressed her needs when she said "I do not know much about zoology and botany". Because she was aware that as a facilitator of learning she needed to know more, the action that she took was "I now have to go and learn more." She also compared her expectations with what she had gained "what we got was not what we expected at all, but it was not useless because we use some of it and it helps to develop overall."

She said that it "developed us as teachers and not as biology teachers" as she was not learning Biology content (what she expected to do). Carol evaluated two sessions that were a huge contribution: "the one on substantive and syntactical" and "the theory and practice one."

Carol, during the specialisation session on the assessment of learning experience expressed her frustration "I wanted a mark and the specialisation lecturer just gave me comments". The importance of the quantitative over the qualitative is fore-grounded especially if this was what she always got after doing an activity during her schooling and tertiary life. Carol stated that an assessor should: "focus on

how the student teacher maintained learning"; "why learners loiter around the class (is it because they do not understand instructions or because they are lazy, do not want to do the task?)"; "look at the learner groups and to work out if everyone was busy (involved)".

- What was Carol's overall reflections of her first school based education programme and how did these reflections give meaning to her construction and use of "phronesis".

Carol expressed her feelings about facilitating learning at the school when she said "I had a lot of ups and downs during those seven weeks. There were times that I really did not think I would be able to continue." She also said "although it was a testing and trying time I did enjoy the first SBEP."

Even though she found it to be a "very challenging and exhaustive time" she was aware of her gains and that "it was a great learning curve." She described these gains more fully when she said that "the amount of knowledge I gained and experiences I encountered developed me as a facilitator of learning." She declared that "there will never again be a situation I will learn more from, in such a short time. I definitely had my most challenging time."

Carol's perception of the role of a facilitator was extended "I learnt that a facilitator's job is definitely not 7:00 to 14:00." She described how during this school-based experience that "there was not one day that I got home and could do nothing, I burned the midnight oil more than once."

Carol used her learning tasks as evidence for her professional growth when she said "my learning task design improved my confidence in presenting my learning tasks and my maintaining of learning improved." Carol used a metaphor to describe her development as a facilitator of learning "when under pressure you must sink or swim. My head was sometimes just above the water, but I swam." This really typifies the challenging experiences that she had but more importantly the type of person she needed to be to be able to swim.

Carol's awareness of what she needed to improve on to be an excellent facilitator of learning focused on "I knew that my learning task could be improved on" and her management of learners' discipline "my discipline and 'consequences' for my learners had to be of a higher standard." She was aware that for her learning tasks to be excellent she needed to improve on "my real life problems as well as my clarity with which I presented the problem and the instruction to the learners."
Carol concluded that in a "short amount of time I went from a 'teacher' to a beginner facilitator."

6.6. Mack

6.6.1.A. Step 3: Planning Action – **(Learning task 1)**

During this school-based experience Mack designed and operationalised three learning tasks. The first learning task was on Classification, the second on the Kingdom Monera and the third on Human Sexual Reproduction. Mack presented the learning task on Monera.

6.6.1.1.A. Learning task design (See appendix for the learning task designed)

This learning task had the following features: learning outcomes, assessment standards, the problem, resources, class organization and time allocated.

6.6.2.A. Step 4: Taking Action (Learning task 1)

6.6.2.1.A. Learning task operationalised

Mack presented a learning task on the practical investigation of the Kingdom Monera. At the beginning of the initiating learning phase of the learning task Mack told the learners that they were at the South African center of microbiology (Lombardi, 2007; Slabbert & Hattingh, 2006) and that they were going to observe the agar plates that they had infected. Mack then proceeded to tell the learners that he had placed the plates in the fridge and explained why he did this. The learner groups observed their agar plates. They then designed the plan of the investigation and responded to the questions written in the worksheet.

6.6.2.2.A. Learning task assessment

a. Peer assessment

Mack's peer noted that the learning task presentation was concerned with "initiating learning and maintaining learning." In the initiating learning section she (Mack's peer) assessed the learning climate as "an attempt was made to make it pleasurable but it was irrelevant to the learning outcome." She noted that "the problem posed was relevant, challenging and urgent but lacked clarity." The learning management was assessed as "well organized for limited learner activities and there was little/some use of learning media, and other resources." She assessed the cooperative learning as "highly effective and successfully used." Learner involvement was such that "at times a few of them showed an interest." The time management "allowed for distraction and the focus was on individual learners' needs." The maintaining learning section was concerned with "the monitoring skills where Mack tended to give solutions". She managed feedback by "listening attentively and she gave recognition to the learners."

The general comments that his peer wrote about the learning task were: The development targets were concerned with the fact that Mack focused his attention on one side of the class, answered individual questions and some learners lost out on learning. His peer suggested that Mack should try to involve the whole class in the activities and if they did not respond then he needed to pick on them. His peer also suggested that Mack needed to have "more structure (organise himself better) so that he would not forget important resources for the learners."

b. Specialisation lecturer

The specialisation lecturer assessed Mack's as "you are projecting very strong and you are a very relaxed person". He also stated, "must congratulate you on the stuff given to the kids, it was excellent and you had all the basis from which you could have worked excellently". In assessing the maintenance of learning section of the learning task the specialisation lecturer wrote "took longer than it should have and the kids were clueless, they did not understand the investigation guidelines". He commented on the assessment of the learning activity, "I think that the whole idea for this learning task was really excellent and the assessment rubric was great". He also stated, "in future, although it takes time you will have to consider developing their skills of observing and recording." He commented on Mack's management of the learners, "did not spoon feed the learners". He questioned Mack's management of the learners, "what else in the learning process, apart from the individual, could the learner group develop and could the learners look at why is yours (bacterial growth) better than mine".

c. Researcher assessment

I assessed the initiating learning phase as rushed and the learners' understanding was not challenged. I thought that the introduction was a great stimulation but the learners' ideas were not questioned/elicited and then discussed. I suggested that Mack thinks about how he could use the introduction differently. I also suggested that Mack asks the learners to think about what they did and why they did it? I asked him if he noticed the learners' excitement when he asked them to move to their laboratory and if he noticed the learner interaction? I suggested that he lets the learners focus on the development of the report and he gives them time to read the instruction before he discusses what he expects from the learners.

6.6.3.A. Step 5: Reflecting on action and interpreting (Learning Task 1)

- **What** was Mack's understanding of the context of the school?

Mack thought that the school was a "pretty good school." Mack supported his judgement with "the students I teach, they're relaxed with things here and with the setting." Mack was generally a nervous person who lacked confidence and he was concerned with the learner's behaviour. But he was relieved that the learners in his class were "a tough class but can be very co-operative and well disciplined." He attributed this to the type of "school system" at this school.

- **What** was Mack's feeling about the learning task at the start of the school-based session and why did he have these feelings?

Mack stated that he was "looking forward to the school experience," but he did feel nervous about "what exactly I am going to facilitate and how I am going to go about it". His nervousness was associated with his lack of knowledge about the "what and how of the learning tasks" that he was to execute. He also stated that he "still did not have all my learning tasks worked out as yet". He was also worried that "the learning task investigation [that he had designed] was not going to be effective."

- **What was** Mack's understanding of practice theory and **how** was it constructed?

Mack stated, "I have a lot to develop on practice theory; how I am actually going to go about teaching or facilitating, as I see it as undeveloped". Mack said that he had tried "co-operative learning with the learners but he had found it tricky." He attributed this to "the uncertainty of a new experience and to learner discipline." He decided that he needed to work with the learners' discipline. One way of doing this was to change learners' positions in the class "swop learners from the front and put them at the back of the class." According to Mack "it worked well". He was aware that he had to consider learners' needs while facilitating learning. This awareness was developed from his interaction with learners in the classroom. He shared a case about Lou "who sits at the back, struggles to get going. I talked to him afterward about his work and now he is keen to start." Mack's action was self-rewarded in an emotional way (Hargreaves, 1998) as he "felt nice talking to him." But this action alluded to the larger action that Mack thought was essential when facilitating learning "I felt that it was important to get the learners to learn and be enthusiastic about learning". These features are expressed in the literature by Slabbert (2007), and Lombardi (2007).

Mack's construction of practice theory also focused on the learners developing science process skills and organisational aspects "they should have developed a hypothesis before the investigation and not after they have observed the results (bacterial growth on the agar plates)." It was also influenced by the theory of constructivist teaching and learning (von Glaserveld, 2001) as he stated "I should not give the learners answers; instead I should leave them with questions." He further stated "I could have left them with a question … They could have then talked about it in their groups and it would have been best if during the learning task consolidation the class discussed". This social constructivist learning (Von Glaserfeld, 2001; Wortham, 2001) is essential for the learners learning.

Another organisational aspect that he needed to work on was providing complete clarity about what learners had to do. He then decided that in the future he will "set out my learning task presentation in a more structured and clearer manner, making sure to make it clear, important and urgent for the learners." He was also aware that he had not made the "learning task have any importance to the learner even though it does have a lot of real life significance" (Slabbert & Hattingh, 2006; Lombardi, 2007). He realised that this was due to him as "I merely failed to present it to them."

- **What** were Mack's feelings about the learning task operation and why did he have these feelings?

Mack stated that he felt nervous as "things went wrong", they did not go according to his plan. He also stated that he felt frustrated because the organisation of the activity took so long but that he did "eventually get the learning task going." These feelings were linked to his initiating learning of the learning experience.

- **What** challenges did Mack experience in designing and operating the learning task and **why** did he have these challenges?

Mack described how in the initiating learning of the learning experience he had "left the agar plates outside the classroom. I had to control the class and I had to fetch the plates outside". He stated that at this point "I was confused as to what to do… and then my plan was lost." Another challenge that he experienced was that he had presented the activity to the learners but he observed that they did not understand what to do. Because he wanted the learners to understand what they had to do "I went to each desk and explained what they had to do." Even though this indicated a lack of organisation, Mack was aware of what he could have done to rectify it. He stated that "it may have been more productive to have a short introduction at the beginning of the class and then to provide them with the rubric which they could read through for five minutes."

- **What** highlights did Mack experience in designing and operatonalising the learning experience and **why** did he have these?

Mack stated that the highlights were that the learner "groups worked well … nice to see this even though I was running around like a mad man." Another highlight was that he had a chat with Louie (learner) and he (Louie) showed "such enthusiasm for the first time". Mack's highlights were linked to both organisational and learner behaviour aspects. Since Mack was concerned about learner discipline and progress, it is not surprising that the highlights focused on the learners.

- **What** were Mack's expectations of the contribution of the teacher mentor towards constructing his practice theory?

Mack expected her to support him with his facilitation and the development of his practice theory. He stated that "I see them as giving feedback after your lesson. Can see where they think you are going wrong and you can decide on this and then obviously you can mould this into your practice theory." He further stated that she could "inform me about all the things the department wants from classes like portfolios, etc." and "support me with what learners need to learn and what I have to teach them-subject/content wise." The interesting aspect is that he also saw her as helping him "when I'm troubled, how to deal with an unruly student within the school system." This link with the "I' personal aspect is essentially important for his construction of his practice theory with particular reference to his role as a facilitator of learning and his identity as such (Zirkel, 2000; Brookfield, 1995).

- **How** does Mack perceive the actual contribution of the teacher mentor towards his construction of his practice theory?

Mack stated that on his first day at the school his expectations were not met as the teacher walked out of the classroom and was not there to give feedback. Mack had expectations about the teacher being in the class all the time while he was teaching. But he said "what I expected would happen, didn't happen. He

realised though that this was actually a good thing for him as “I was given space to learn about things by myself” (Brookfield, 1995).

- **What** was Mack’s use of the contribution of the teacher mentor to his construction of his practice theory?

He was aware of the teacher’s actual contribution “in practice theory, incorporating things laid down by government, so you need to know how to incorporate this. She’s helped me there”. He further stated that she gave him a subject file with the sections that he had to teach and what she wanted the learners to know. He stated, “she could not have been more supportive, as she critted me and told me where I went wrong and how I could improve.”

Mack stated, “I think that it is definitely to our benefit that they are sort of critical of us”. He further stated, “I enjoyed her critting my lessons; stating what could be better, so that I could improve”. “I could use some of the suggestions that she made”.

- **What** was Mack’s expectation of the specialisation programme to his construction of his practice theory?

He expected to learn more about “how to teach sections of Biology.”

- **How** did Mack use the contribution of the specialisation programme to his construction of his practice theory?

Mack stated that he used all the things about how to design a learning task and how to facilitate learning as opposed to teaching that he got from the discussion sessions. Mack stated that he had used “his learning task lessons [that he designed in the laboratory] in facilitating learning in the school. He also stated that “professor gave good guidance with regard to the learning task presentations that we did”. Mack thought that these sessions were important as “we reflected on what we had done and on how we could improve them to make them more effective.” During these sessions he stated “we together looked at facilitating learning as opposed to teaching.”

6.6.1.B. Step 3: Planning Action (Learning task 2)–

Mack planned a learning task that focused on the Kingdom Monera

He presented this learning task to twenty five Grade 11 learners.

6.6.1.1.B. Learning experience design (See appendix - Copy of learning task 14 June)

This learning task had the learning outcomes for the relevant content areas, the assessment standards and problem statement. It also had the presentation of learning task features: clarity, importance and urgency, the learning task descriptive activities (learner), authentic learning context, time allocated, resources, assessment method, operation of learning task, description of occurrences during the lesson, learning task execution. Attached to the learning task was an assessment rubric for each group and an individual

assessment rubric…information (template) on the format for the report that the learners were expected to develop.

6.6.2.B. Step 4: Taking Action (Learning task 2)

6.6.2.1.B. Learning task operationalised

The problem that Mack gave to the learners during the initiating learning phase focused on the beer bellies that many men had and also what in beer makes you burp. This problem is relevant but not critically important for the lives of the learners (Slabbert and Hattingh, 2006; Lombardi, 2007). The co-operative learning focused on leaner groups been given particular tasks and five minutes to brainstorm their understanding of their particular one and then to construct a mind map. Each group was then presented with one page of a reading based on their particular focus of the topic. The learner groups were given time to complete the task for the presentation. At the end of the class for the group presentations Mack either nominated someone from the group to present or the whole group decided on their own to present.

6.6.2.2.B. Learning task assessment

a. Researcher

I thought that the choice of problem and the use of the transparency with beer and yeast and the questioning about carbon dioxide in the beer – where does it come from etc. was appropriate and relevant. The management of the co-operative learning was effective and each group had a different task from the other group. I suggested that he write up the tasks on the chalkboard so that all the groups are aware of what the others are doing? I questioned his time management of the co-operative learning tasks - “you gave the learners time to brainstorm their task but it was too much time. Did you notice their behaviour?” .I praised him – “Your understanding and implementation of co-operative learning principle has really improved because you got all the learners to construct their own mind map – individual task” I asked him questions about his observations and awareness of the learners’ behaviours – “Did you notice the extent of the interaction in the learner groups? Every group was engrossed in the activity and did you notice how they organized themselves to do the presentation? They were wonderful.” I praised him for his design and implementation of the learning task group activities – “overall the learning task group activities were an excellent idea.”

6.6.3.B. Step 5: Reflecting on action and interpreting (Learning task 2)

- **What was** Mack’s understanding of practice theory and **how** was it constructed?

Mack understood his practice theory as “practice forms your theory and I am now using it.” He was aware that he had constructed his practice theory from his experiences of facilitating learning. He described how he “gave broad outlines for all the groups on what they should be looking at for the class presentation, but they could pretty much decide what they want to present.” He said that he did this as he wanted the learners to be “creative in their presentation” [and] … too many guidelines would have limited them.” He became aware after observing the groups that “I could have given definite guidelines

for the brainstorming. This would have been more helpful and constructive for the learners." He also became aware that "it helps a lot for learners in their groups to sit down and write something on paper" as this is the time when "they thought about it [and] they became interested." Another example with group work is linked to his understanding of "where the whole meta-learning comes in where you work first with the individual – once they have established what they know and have something, then you work with the group" (Claxton, 1999). He was aware that "some people [learners] will have more content knowledge and more insight into the topic and …will be able to teach the rest of the group … they can share ideas" (Smith & Blake, 2005). Mack was aware that learners are constructors of meaning when he said "[the learners] construct the best understanding of the topic by putting ideas together, using the resources that they have (Slabbert, 2007).

Another experience focused on his awareness of the importance of his spatial position in the classroom in relation to that of the learners. He indicated this importance "I noticed that when you stand in a spot, half the class is not focused or is going wild [and] … I have a tendency to stand next to the OHP and some learners don't get involved and I tend to ignore them." He became aware that "more interaction happens when I am not standing behind a desk or the OHP." He shared how he was using his practice theory when he said "lately, I have been trying to move to the centre of the class." He stated that "no one told me this, it comes with practice."

Mack was aware of his choice of problem statement, when he said "I chose the example of bread and beer because this is more relevant to them" (Slabbert, 2007).

He was also aware of the importance of planning for a presentation and the crucial role that he needed to play in planning when he said, "I enjoyed the learning task … because I planned something interesting for the learners". He also realised the choice and use of appropriate resources "they [learners] did not get this [information] from the resources that they were using, as they [the resources] did not say clearly what lichens are." He concluded that "it is important to pick suitable resources but it is difficult to find articles."

- **What** were Mack's feelings and perceptions about being a facilitator of learning and why did he have these?

Mack experienced mixed emotions "I am enjoying it. I am stressed at the moment … I am a bit worried". Mack had these mixed feelings due to the time demands that he felt as a facilitator "I do not know if I will get everything done" [work programme for the term]. Mack was amazed with himself - facilitating learning "I never knew that I could be like this – facilitating learning." He perceived his professional development in a personal frame in saying "it was enjoyable … the fact that you see yourself going somewhere, you see that you are developing." He further stated "I see myself enjoying it as a facilitator, being capable and being able to develop as I go along."

- **What** were Mack's feelings about designing and operationalising the learning tasks and why did he have these feelings?

Mack expressed his feelings by comparing how he felt after the first learning task and now when he said "I feel better than after the other learning task operations… I liked it." He attributed these feelings to the learners as "they seemed to be enthusiastic about what they were doing, they were not talking or bored, they were getting involved. In my other learning tasks they did not seem enthusiastic." Mack had received positive energy from the students and from himself "presenting was quite nice, I enjoyed it and I could see that it was working and it seemed like they learnt a lot".

- **What** challenges did Mack experience in designing and operating the learning task and **why** did he have these challenges?

His organisational planning for learner participation in group work was a challenge for him "to get everyone involved in the groups." But this challenge was reduced by the evidence that "most of the people in the groups were interested in the articles, talking about it and working out how to present it." He concluded that "time as a facilitator of learning is hard… for me what makes the learning task development easier – if you have something to work from". Mack was looking for lesson plans but he could not "find decent ones – lesson plans" that he could use, instead of designing them.

- **What** highlights did Mack experience and **why** did he have these?

Mack stated "the enthusiasm from the learners was a highlight and the fact that they were brainstorming when they were supposed to."

- **What** was Mack's expectation of the contribution of teacher mentor towards constructing his practice theory?

Mack stated that he still expected the teacher mentor to help him to function in the school system.

- **How** did Mack perceive the actual contribution of the teacher mentor towards the construction of his practice theory?

Mack stated that he required "help with what I should do with marks for tests and questions about tests" He said that the teacher mentor "helped me out with marks for tests and questions about tests … how I could improve on the test memorandum … advise about lessons … problems with classes and noise levels."

- **What** was Mack's expectation of the specialisation programme to his construction of his practice theory?

Mack stated that he specifically wanted information on "where I could get biology resources." Here he was referring specifically to specimens.

- **What** was Mack's experience of the contribution of the specialisation programme to his "phronesis"?

Mack stated that "I am constantly growing on ideas from the specialisation programme. We work on how we can better the factors in our lives and shape them to our personality." He described how he constructed his practice theory of assessment criteria for assessing a learning task. He said "to maintain learning you need to ask the learners questions so that you can improve the quality of their learning; bring in a criterion like, are they talking to each other about it". He stated that another criterion for maintaining learning is that the initial instruction must be clearly understood by the learners as, "when the initial instructions were not clear the learners loitered around". A further learning task assessment criterion should be on how the facilitator of learning "managed the time." Mack stated that to get the learners to complete a task and not take their own time you "need to state the urgency (Slabbert, 2007) about it, it needs to be done now". Mack further stated that time management could be effective if, "learners are left to explain to one another in their groups and in so doing they could come up with their own understanding" which is the focus of meta-learning.

He also constructed his practice theory of how to manage discipline. He stated that "when the facilitator shouts at the learners and they are still left to carry on, the message that they are getting is that they can carry on misbehaving." He decided that "when the learners are unruly you have to take charge and be an authority person".

Mack had observed a video of himself facilitating a learning task and he assessed it as "you can improve". He was aware that he could improve on his time management, initiating learning instructions and managing learner discipline.

- What was Mack's overall reflections of her first school based education programme and how did these reflections give meaning to her construction and use of "phronesis".

Mack expressed his feelings about facilitating learning at the school when he said "it was an enjoyable and frustrating time." Mack stated that he had learnt a lot about himself and also about facilitating learning. He also said "I developed more as a person … felt less nervous … started enjoying facilitating learning."

He became aware of his progress "I could see that it was working and it seemed like they [learners] learnt a lot". This awareness was based on his practice of operationalising the learning experience, the inputs from the teacher mentor and the specialisation lecturer. He stated that in operationalising the learning tasks "in the past I had problems with bringing clarity and what they're supposed to do". He was aware of his weaknesses and also what action he needed to do "I know that I could have written it on an overhead".

Mack attributed some of his progress to the "positive energy from the students". He stated that "in my other learning tasks they did not seem enthusiastic". He was more relaxed now when working with learners. He had constructed his practice theory of how to work with learner discipline and group work

"the learning experiences and activities for the learners were more organized and things went more to plan."

Mack's perception of the role of a facilitator was extensively constructed. He had perceived what was required of a facilitator of learning e.g. with "time management … learner organization". Mack was amazed with himself as a facilitator of learning "I never knew that I could be like this – facilitating."

6.7. Step 6: Evaluating Action

6.7.1. Comments - analysis and evaluation of the intervention

Each student teacher's experience of each step in this cycle was essential to their construction and use of his/her practice theory. This construction and use was evident from the exploration of each student teacher's understanding of the meaning of practice theory and its' construction and use. This construction and use of practice theory was also evident from the student teacher's designed learning tasks, operationalisation of learning tasks, facilitation of learning, expectations, perceptions and use of the contributions of the teacher mentor and the specialisation sessions, and the nature and content of his/her reflections.

The student teachers constructed their practice theories from in Bernice's words "her operationalisation [of learning tasks], assessment and reflections" and "learnt from the learners' response"; in Carol's words "the experience at the schools" and Mack "experiences of facilitating learning". These practice theories were not transmitted from a specialisation lecturer to the student teachers as referred to in the literature by Von Glaserfeld (1984) and Korthagen (2001). These practice theories were self-constructed by each student teacher.

The use of the word I by each student teacher when talking about how they constructed their practice theories clearly supports this claim of self-construction. Evidence for this is seen in the statements by each of the student teachers: Mack stated "I merely failed to present it to them", Carol "I am equipped" and Bernice "I am not giving them notes". The common denominator for the self-construction of practice theory was for each student teacher to facilitate learning in an actual classroom, an authentic context.

Furthermore, Bernice, Carol and Mack were aware of what they needed to do to further construct their practice theory. This awareness was informed from their practice of facilitating learning. As Carol stated "I know that next time I am equipped to handle it the right way". Student teachers could also identify the problem areas; give reasons for why they experienced these problems and what they needed to do to improve in operationalising their learning experiences.

The practice theories comprised both cognitive and perceptual knowledge. While Bernice and Carol's practice theory focused on the learners' actions "could answer questions for themselves" (Bernice, 2004); co-operative learning and group work, Mack's focused on learners' needs, developing science

process skills in learners and organizational aspects. The practice theories of all three student teachers focused on I (each student teacher) as well. While Bernice's theory focused on procedural aspects in an unemotional manner, Carol's theories focused on her actions of interacting with learners in an emotional manner. One of Mack's organisational aspects focused on his spatial position in the classroom in relation to the learners. He was aware that the distance between him and the learners impacted negatively on how he could manage discipline and also keep the learner's attention as intimated in the literature by Saunders (1992). Korthagen (2001) reminds us that practice improves due to the perceptual knowledge that is constructed.

Bernice, Carol and Mack's feelings about facilitating learning impacted on their construction of their practice theory. This impact of emotions on learning is stated in the literature by Hargreaves (1998). Feelings of uncertainty as expressed by Mack were linked to "what exactly I am going to facilitate and how I am going to go about it (facilitate the learning tasks)". The student teachers' feelings that they experienced were also linked to how learners responded "they are quite excited about what the surprise is and now I am excited" (Bernice) and in Carol's words "I was disappointed, I expected more of them [from the learners]. The student teacher's feelings were in waves of despair and elation. But these waves were in constant motion and at different levels at different times. The crest of despair was initially very high and the ebb of elation was low. After facilitating learning during the school-based session the crest of elation for all three student teachers was higher than the ebb of despair or frustration that they experienced at the beginning of the school based session.

The student teacher's feelings impacted on their beliefs about teaching and learning. This relationship is discussed in the literature by Korthagen (2001b). This was evident from comparing the statements that they made after facilitating learning of their first and their last learning task for the school-based session. Bernice was concerned with "how to get them [learners] started properly." She then believed and acted on what she needed to do as the "learners just started the work". Mack's beliefs about group work were challenged in that he did not understand how to get them participating in the group. His belief about what to do was perceived when the learners in their groups "were brainstorming". Carol's beliefs were that the "skepticism … about this new paradigm was soaring and I was sure that it would never work". She then realised that "this new paradigm in education is not absurd as I thought." These beliefs depended on the student teachers using inner wisdom and authority as suggested by Ray (1999). Bernice, Carol and Mack's beliefs played a crucial role in promoting their paradigmatic shift (Slabbert, 2007). But this shift was possible **ONLY** due to the student teachers being placed in new, challenging situations where they risked these new unknown practices and created the reality of their belief. This type of shift has been described in the literature by de Kock & Slabbert (2004). In these encounters with practice the student teachers adopted the "belief initiated mental model" which is described by de Kock & Slabbert, (2004) in the literature chapter.

The beliefs that Bernice, Carol and Mack had were enhanced by their reflections. It was through reflecting that each of the student teachers could share their beliefs and experiences (practice) of facilitating learning. What was significant was that in the process of reflecting the student teachers were also constructing knowledge about how and when to reflect. Carol shared that she "did not know what to do, I just guessed". But it was from this action and then reflecting on how they reflected (the practice of reflecting) that they were enabled to construct and use their particular reflections to construct their "phronesis" of and for facilitating learning In this enabling reflective learning process each student teacher was learning how to reflect and also how to facilitate learning.

The student teachers experienced the reflective learning process in solitary and social settings. In both these settings they reflected on their feelings, actions and thoughts about facilitating learning. During these reflection sessions each student teacher gave meaning to his/her understanding of: who I am as a person (identity) and what is my role of and professional identity of being a Facilitator of Learning? It was during the social reflection sessions that the student teachers first realised and experienced relief from intense negative emotions and the essential construction of self- confidence. This value of togetherness in frustration for learning alludes to the social learning that was essentially necessary for each student teacher's construction of "phronesis". This value of togetherness in frustration for learning prompted the student teachers to organise meetings outside of the specialisation meeting times. A reason that Mack gave for why they met was "we on our own would meet to share our concerns and discuss our progress." These meetings gave the student teachers space to share and value themselves as individuals, Facilitators of Learning and provide co-operative support. Even though in Carol's words the meetings were "not very constructive as it was just a moaning session" they were critical for the student teachers to develop as persons. It was during these meetings that they "spoke about our frustrations and the difficulties that we were experiencing" And in Bernice's words "I valued it [the meetings]". So, during these meetings the student teachers were crucial co-operative support for one another. These social settings where togetherness in frustration for learning transpired were essential for the student teachers construction of a practice theory of and for facilitating learning.

The teacher mentors also contributed to the student teacher's "phronesis" But each of the student teachers had different expectations of their respective teacher mentors. While at the beginning of the school-based session Bernice expected her teacher mentor to support her by answering her questions, Carol expected support with her "learning task design presentation, consolidation and feed-back." Bernice and Carol thought that their teacher mentors ought to be competent to provide this support as they had completed the PGCE programme a year earlier. Mack on the other hand expected support with both substantive and syntactical features of his facilitating learning, including learner discipline. Even though his teacher had not completed the PGCE programme she had attended the mentor workshops. Furthermore, Mack's anxiety and his insecurity with his lack of knowledge and confidence with "what and how of the learning tasks" impacted on his extensive support expectation. But after the student

teachers had facilitated learning of Life Sciences for an extended period their expectations of their respective teacher mentors was reduced. Mack at this time only expected support with “function[ing] in the school system.”

The student teachers were also aware of their perceptions and use of their respective teacher mentors’ actual contribution to their construction of their particular practice theories. But even though Bernice was happy with her mentor’s support she only used her (the teacher mentor’s) learning task design ideas and her disciplinary measures. Carol was “confused” by her mentor’s assessment of her learning task operationalisation and thought that her practice theory was not influenced by her (teacher mentor). What Carol did perceive though is that her mentor cared for the learners and had her own practice theory. Mack experienced a revelation that the absence of the mentor from the classroom gave him “space to learn about things by myself”. But he had used the support and guidelines that she had provided. Even though she was “sort of critical” of his lessons he valued her constructive suggestions and the spirit in which it was done. Clearly the expectations and the actual contributions of the teacher mentors to each student teacher’s construction of their practice theory was different.

The contribution of the specialisation programme was in terms of the syntactical aspects as expressed by Bernice “administration stuff, not really with content and context stuff.” This programme was not in accordance with Mack’s expectation of learning about “how to teach sections of Biology” and Carol’s “what we got was not what we expected at all”. Even though Bernice perceived it as not having “contributed a lot … as it was not practical” to implement she did learn how to assess her practice of facilitating learning. Carol on the otherhand perceived it as “not useless because we use some of it and it helps to develop overall.” Carol had also internalised (Korthagen, 2001) her experiences of the specialisation discussions as she was “aware that Professor Ned had told us that we should not explain any theory to them [the learners], they must read the instructions and interpret them”. She also realised that she needed to know more about particular content areas and she took the necessary action “go and learn more” to achieve this. This focus on taking responsibility for her own construction of “phronesis” was essential for Carol. Mack attributed his construction of “phronesis” to the theory and action that was shared during the sessions about facilitating learning. He came to realise what changes he had to make for him to facilitate learning effectively. He valued the contribution and focus of the specialisation programme “how we can better the factors in our lives and shape them to our personality.” And most importantly he was aware of his gains “I am constantly growing on ideas”.

Each student teacher actively participated in the interventions and constructed their particular practice theory. They were experiencing a transformation in their feelings, beliefs and practice of facilitating learning. These transformations impacted on the student teachers’ construction and use of belief-initiated mental models.

6.7.2. What feeds into the next cycle?

Bernice, Carol and Mack's experiences of the first school based session could be used as a baseline for their further construction and use of their particular practice theories/"phronesis". Each Student teacher was experiencing the construction of the belief-initiated mental model. It was imperative that the student teachers experience further facilitation of learning Life Sciences in particular school contexts to affirm and further construct their mental models and ultimately their "phronesis".

Descriptive data – section II – cycle four

7.2. Step 1: Experiential reflections

7.2.1. Bernice

7.2.1.1. Observation of the teacher mentor at the second school

She said that the teacher mentor from the second session was "different in her teaching approach and her discipline was bad." Bernice described the teachers' actions as "spoiling the learners".

7.2.1.2. Understanding of the level (standard) of work for learners and the context of the school

Bernice stated that the learners at her second school were used to people going down to their level, and "they are fed everything because the teachers think that they are not capable". Bernice decided that she was going to get the learners to do extra. She was aware that she needed to "boost the learners' confidence" to get them to want to participate and perform.

7.2.1.3. Understanding of her progress

Bernice thought that her progress now at the beginning of the second session was already better compared to the first session when she "felt like she was nowhere." She gave an example of her progress now as "the assessment is much better because my first assessment stuff was kind of don't know how to, where to". She also stated that seeing as she was doing the same type of learning tasks, she knew what was expected of her and she could "see how the facilitation of learning could happen better." She also stated that she had "time to ask them the clarifying questions and actually see the result of what it does" (Senge, 2006).

7.2.2. Carol

7.2.2.1. Observation of the teacher mentor at the second school

Carol stated that she had not observed her teacher mentor teaching and could not report on this. She did state though that he "seemed to have old ideas of teaching". She made this statement based on her observation of his planning documents.

7.2.2.2. Understanding of the level (standard) of work for learners and the context of the school

Carol evaluated the "standard of work at the school as low." She stated that the learners at the second school "did not want to do much work … but this was due to the teacher, who only gave them a little work." She said "I can't handle that anymore because each period they tell me that we do too much, we work too hard". Carol realised from the learners' performance in the learning tasks at both the first and second school that her standards were too high. She was aware that she expected too much from the learners and that in order for her to construct an understanding about the performance level of learners in grade 10 it "would have to come from experience and a talk to my mentor, he can help."

7.2.2.3. Understanding of her progress

Carol stated that her organisation now was better because she knew what she had done in the first session. She recognized that she could now improve on her organisation. She was aware that this improvement was possible and that she could build on it because "she was facilitating similar learning tasks to that of the first session."

7.2.3. Mack

7.2.3.1. Observation of the teacher mentor at the second school

Mack said that his present teacher mentor "is brilliant; she must be one of the best mentors". But he found it "easier in my first SBEP [school-based education programme] where the teacher mentor knows how much she wants done in that certain period". He felt that with greater time guidelines from the mentor "if she was very specific- two weeks for this, one week for that" it would have been easier for him to write up a timetable.

7.2.3.2. Understanding of the level (standard) of work for learners and the context of the school

Mack stated that a facilitator's standards "could never be too high but you had to be careful not to go over the heads of learners." He did think though that many teachers expect too little from the learners, which he felt was totally wrong. He supported this thinking by saying "just the stuff that I have seen them produce all by themselves. I got them working and many of them produced superb work. They taught me some stuff, which I did not know and that was great". Mack realised that learners operate at varying levels and a facilitator of learning needs "to provide an activity to cater for students (learners) that maybe are not academically so strong."

Mack stated that what he realised was that there was a totally different work ethic with the children at his second school. According to him this was due to "a lot is expected of the kids and therefore they perform." He gave the example of when he gave the learners a task where he "did not suggest a power point presentation; it was really their initiative that they did it all." Mack thought that this response would not have happened at his first school and the learners there would not have had such good presentations. He associated the learners' performance to the type of school and not due to himself when he said "they have a very high academic standard here in them. To a large extent it's not really myself. I don't see that as me who made it all happen".

7.2.3.3. Understanding of his progress

Mack stated that it was going well. He also said, "Facilitating learning would be great if we could have a teaching assistant to do all the marking for us". He thought that this second session of facilitating learning that he was to experience would be a bit more exciting than his first one but he did feel a lot of stress due to his slow pace (leaving a lot of content out of the lesson because time is up). He said "we have been very busy, but it does not seem like we got through the content that we should have today.

When Mack thought about his own progress he stated “I realise now that there is still a lot that I can improve on and that I am probably not going to improve on before the end of this session that will always be something I need to do”.

7.3. Step 2: Reflecting and interpreting

- What was the role of the teacher-educator in the discussion-group interview during the experiential reflective step of the cycle and why did he have this role?

Professor Ned provided the context for the session and he asked the students to share their reflections with respect to their experience at the placement school. As the student teachers shared their reflections he challenged them to dig deeper and to share at a meta-cognitive level what and why they had the particular concrete experiences at the placement school. He challenged them to use their constructed “phronesis” to give meaning to the concrete experiences that they had at the placement school. He expected them to make decisions about how they would facilitate learning in the particular placement school contexts that they had experienced. Since this interaction between the specialisation lecturer and the student teachers was later in the year he did not have to prompt the student teachers to share their reflections. During these sessions the specialisation lecturer did not *project a power* relationship in the communication interaction in that the student teachers dominated the discussion when sharing their reflections. There was no reason for the specialisation lecturer to dominate the interaction as the student teachers were comfortable and practiced with sharing their reflections.

The role of the specialisation lecturer was to facilitate the social interaction, the exploration and the meaning making process of the student teachers’ reflections.

- What was the student teachers’ participation in the group discussions?

All the student teachers participated as each was expected by the specialisation lecturer to share their reflections of their concrete experiences at the placement school. All three students were relaxed and comfortable with sharing their thoughts, actions and feelings that they had experienced. A sense of safety and trust had developed among them, also with Professor Ned. This safety and trust relationship is coupled with the fact that the student teachers were developing in confidence and knowledge about what they expected of themselves and the positive feedback that they received from their own actions.

- What were the student teachers’ reflections on the utilisation of their practice theory as an assessment tool for observing teacher mentors teaching at a placement school?

The student teachers were comfortable with assessing the teacher mentor’s teaching. They were pleased with the action of being able to assess the lesson and project their role in facilitating learning as much more than what the teachers were doing in the classroom. The student teachers were unhappy and

frustrated with observing how the teachers taught as they did not challenge the learners instead they were spoiling the learners (Bernice, 2004).

- What was the student teachers' awareness and assessment of their progress with regard to facilitating learning in practice?

As the student teachers used their practice theory to assess the teachers' teaching they became more aware of the nature and content of their practice theory. They saw this as a good learning experience.

7.4. Bernice, 7.5. Carol and 7.6. Mack

Step 3, 4 and 5 for each of the student teachers is presented in this section.

Steps 3 and 4 were concerned with the planning and taking action for the intervention on each student teacher's construction and use of "phronesis". Three interventions were planned over different time periods: one and two from weeks twenty to twenty–nine and three in week thirty-nine. Intervention one focused on how each student teacher designed and operationalised Life Sciences Learning Tasks at the school. The purpose for this intervention was for each student teacher to further construct and use his/her "phronesis" of facilitating learning. Intervention two which was planned by Professor Ned (specialisation lecturer) focused on the specialisation discussion sessions that the student teachers participated in at the university. The purpose of this intervention was two-fold: (1) for each student teacher to challenge and further construct his/her "phronesis" of facilitating learning (2) to become aware of his/her own identity as a person (De Kock & Slabbert, 2000). To achieve the first purpose each student teacher and Professor Ned viewed and discussed Mack's learning task on the Heart and Bernice's learning task on Genetics. The rationale for doing this was stated by Professor Ned when he said "What I would like to do is to look at what happened". The student teachers were given the learning task assessment form that the teacher mentor, specialisation lecturer, researcher and their peers had used to assess them. The specialisation lecturer prepared them for the activity by saying "we are going to really dig into those criteria and say to ourselves - what is it that was happening there and what is it that really needs to be improved?" Professor Ned shared an important aspect with the student teachers when he said "the point is not to discredit you. The point is: do I recognise this and do I see something I didn't realise". So, the purpose of this specialisation session was to observe the recorded learning task operations for Bernice and Mack; assess them and to make suggestions about how to improve them. To achieve the second purpose each student teacher completed a short paragraph on who am I (an identity description) and the Personal Profile Questionnaires: Neethling Personal Skills Instrument, Temperament Inventory and a Self Image Evaluation. Intervention three focused on the Professional Portfolio that each student teacher was expected to compile and then present during the Portfolio Defense Presentation at the end of the programme. Each student teacher was expected to carefully select work done, which could be used to represent his/her development from the beginning to the end of the programme and to compile this in a portfolio – Professional Portfolio. In short each student teacher had

to select work that represented his/her professional competence. These selected pieces of work were to be supported by substantial and meaningful reflections from each student teacher (Slabbert, 2004). Each student teacher then presented this portfolio during the Portfolio Defense Presentation at the university. Step 5 focused on each student teacher's reflections on the interventions. The analysed data is presented on pages 300 to 342.

7.4. Bernice

7.4.1. Step 3: Planning Action -

7.4.1.1. Learning task design (See Appendix for a copy of the learning task designed).

Bernice was based at a High School from the 19 July to 3 September. During this time she facilitated two learning tasks: one on Genetics and one on the Blood circulatory system. The planned learning task section used for this research was on blood transfusion. It was designed for a period of two 40 minute sessions for Grade 11 learners. This learning task had the following features: learning outcomes and assessment standards, problem put to learners, time allocation, learning task preparation, class organisation, authentic learning conditions, resources, final results of the learning task, methods of assessment, process followed to solve the problem, final product outcome. The problem planned was**:** We are all aware of the increasing danger of the transmission of HIV/AIDS, as well as other blood related diseases. Your task as a group is to find a solution, to the best of your ability and of the highest quality, to the problem associated with the transmission of HIV during blood transfusions. How will you ensure that you get uncontaminated blood? On your own, think about the best solution. This will be followed by an opportunity to share your ideas in groups; select the best idea and develop it fully.

7.4.1.2. Specialisation session

Planned by Professor Ned

7.4.1.3. Planning the Portfolio for the Portfolio Presentation Defense

Bernice stated that she planned for her portfolio defense by compiling a portfolio which reflected her love for horses and the fact that she was "an equestrian rider". Bernice stated that her "professional development as a facilitator of learning may be compared to my development as an equestrian". In her portfolio she used metaphors of: man meets horse, mount up and upgrade. She used the metaphor of Man meets horse to represent her initial experiences of the PGCE. She used the metaphor of mount up to represent her development as a facilitator of learning during the PGCE. The metaphor of Upgrade was used to represent her final outcome as a facilitator of learning. She stated that her reason for planning the portfolio was to demonstrate her professional development during the year with regard to her role as a facilitator of learning.

7.4.2. Step 4: Taking action

7.4.2.1. Learning task

a. Learning task operationalised

During the initiating learning phase the problem was presented to the learner groups and they were given ten minutes to work this out. They worked this out individually and they then discussed their ideas in a group setting. A transparency with various blood diseases were presented to the learners. The learners asked a number of questions seeking clarity about the activity and Bernice patiently responded to them. She convinced the learners to work on their own ideas. Each individual worked quietly on his/her task and Bernice moved from group to group asking questions and providing support to the learners.

b. Learning task assessment (see appendix for a copy of the reports)

The learning experience was assessed by the specialisation lecturer and the researcher

(i) Specialisation lecturer

He assessed the learning task challenge as excellent. The learning task presentation was assessed as clear, explicated importance, emphasised urgency and demanded immediate learner action. He assessed the meta-learning, co-operative learning and facilitation as good and the consolidation was inadequate.

(ii) Researcher

I assessed the learning task challenge as excellent. I also assessed the learning task presentation as clear, explicated importance and emphasised urgency. I assessed the meta-learning, co-operative learning, facilitation and consolidation as good.

I praised Bernice for the problem presented as I thought that it was great, relevant and personal. I suggested to her that she could have asked the learners if they had experienced any relatives or friends dying from mismanaged blood donations. I told her that the individual task was a good idea and that it was important that each learner thinks about the problem and writes down his/her ideas. I assessed the group session as good and I advised her to work on managing her time and the group outputs effectively. I challenged her to think about the following questions: what about the Biological aspects and regulations linked to drawing blood and storing it, what is the link between HIV/AIDS and blood grouping and did you consider looking at blood groupings as well not just clean blood? I suggested that she includes a general group discussion as this would really place a cap on this experience. I ended off by praising her for her wonderful innovative ideas.

7.4.2.2. *Specialisation sessions*

a. Observation of Mack and Bernice's video

When Bernice observed Mack's operationalising the learning task she noted that the learners were chaotic even though he had given them instructions for them to conduct the practical investigation on the heart, and they knew what to do and were ready to dissect the heart, they were distracted by Mack "pointing to the lungs" and talking about them. This made her realise how she could distract the learners. When Bernice observed her own video on her operationalising her learning task on Genetics she became

aware of the importance of accuracy of information. Professor Ned challenged her to think about her inaccurate use of genetic terms to indicate genotypes as evidenced in the following exchange during the specialisation session:

Specialisation lecturer: Which colour is dominant?
Bernice: Which colour is dominant? Brown is dominant
Specialisation lecturer: What is the danger of simply saying, brown is dominant? I'm talking [about] scientific rigidity?

Bernice used the evidence of many more people in the public having Brown eyes as a reason for dominance. She was working with the phenotype – Brown eyes. She was not aware of the complexity and the detail with regard to the heterozygous genotypes the possible combinations that indicate dominance.

b. Identity description (Who am I?)
The very first thing about me you should realise is that I am mad about horses!
I am an introvert, but am usually able to conceal this quite well. I manage this by using my stable sense of self worth, self –confidence and spontaneity. I generally am a friendly person who laughs often. The only time I become angry is when my time is wasted. I do not trust people easily, but I manage to hide this quite well! Therefore I would rather be alone than amongst other people. Although I love working with people, I would rather be amongst animals or in the outdoors- if only you could make a living out of this! My fears? Easy, the same as those of a horse! I suffer from claustrophobia, am tactile sensitive and have an enormous personal space. I am a lively person and love the rat race. I stress if I have nothing to do or nowhere to go! I believe: The more I have to do, the more I am able to do!

c.. Interpretation of Personal Profile questionnaires
(i) Bernice's scores on the Neethling Personal Skills Instrument were L1:80; L2:70; R1:85; R2:65. According to these scores Bernice's L1 and R1 were not very far apart and she has a high preference for both. Bernice functions as a right brained person but the left brained score is not very small. According to the analysis scoring sheet for the instrument, Bernice is a person who searches for alternatives, prefers the big picture, not the detail, idea-intuition, strategy, synthesis, integration, risk, restless, becomes bored quickly, experimenting, diversity, comfortable with chaos, fantasy, surprise, association. The teaching preferences for a person with Bernice's score is – the R1 trainer/teacher usually gives a holistic view of the lesson and prefers to link it to other subjects and point out how it applies to the "real world". Bernice is the type of teacher who will encourage spontaneous participation and create opportunities to experiment. Bernice considers visual aids an important part of the lesson. Her lessons could be unstructured, with her deciding on different content, etc. on the spur of the moment. She will create opportunities to speculate, to strategise and discover new things. She is a teacher who includes a fun

element in parts of her lesson. Her administrative duties, deadlines and thoroughness could sometimes be lacking.

(ii) Bernice's score for the Temperament Indicator indicated that she is an Influential Choleric (outwardly forceful) person who is outgoing and task-oriented.

(iii) Bernice's score for the Self-Image Evaluation (58) indicates that she has a dissatisfied self image.

7.4.2.3. Presenting the Portfolio at the Portfolio Defense

During her presentation Bernice stated that "the most amazing thing for me that I learnt is that I can facilitate learners and a traditional lesson is so incredibly boring." She saw her role as that of a facilitator of learning when she is at a school. She did not see her role as a teacher where "I go out next year saying to the learners that they must take out a book and write this in your book." She saw her learners as not been bored and "they will learn so much more."

Bernice described the construction of her practice theory at the beginning of the programme as "where you get theory in a book" and later during the second school based education as "I started thinking that developing practice theory is not so difficult." She was of the belief that "practice theory without a foundation" could not be constructed. She thought that the interventions that she had experienced during the programme were crucial for her construction of her practice theory when she stated that "you cannot leave someone to do something totally on their own".

Her frustration that she experienced in the programme is related to the schools. She described the problem that she experienced when she said "in the schools we do not see the things that we learn about at university, we do not see it at all at the school." She expressed her gains from the programme "personally, from the PGCE I have learnt to work with different people with different personalities."

7.4.3. Step 5: Reflecting on action and interpreting

- **What was** Bernice's understanding of practice theory and **how** was it constructed?

Bernice thought that practice theory was "your basic learning." She constructed her practice theory from different experiences. She described how she "tried her best to make the lesson as interesting as possible **and to challenge them [the learners]".** This action links to her being a task-oriented person as indicated by the Temperament Indicator. She described how to do her best that she **had to "**read up on the topic and prepare carefully – this reminded me of the role of: Scholar, researcher and lifelong learner)." She also posed "**many meta-cognitive questions to get the learners thinking,** rather than spoon feed them." This action of getting learners to think paid off as the "learners are **actively involved with meta-cognition.** I am starting to enjoy this." As a result of this experience Bernice had now "**become more confident in posing meta-cognitive questions."** She described how as she **"**engaged with this learning task, I was able to distinguish quite effectively between meta-cognition and thereafter co-operative learning (this assists me in the development of my practice theory)." This realisation came with her

thinking that "if implemented properly [co-operative learning], learners learn more from each other's opinions than when weaker learners simply agree with stronger learners without expressing an opinion." She became aware that "successful management of meta-cognition, followed by co-operative learning ensures the acquisition of appropriate life skills." She described how she was now using this technique in the classroom when she said "**at the end of each lesson I allow time for consolidation," "**in future I'll change the groups. At the moment learners decide who will be part of each group," "I am going to force four learners to form two groups of two each, to ensure that they do some work themselves." Bernice also realised "the importance of **being prepared.** (Preparation falls under the role of: Interpreter and Designer of Learning Programmes)" This realisation of being prepared was important and necessary for her as due to the type of teacher she is, her lessons could be unstructured, with her deciding on different content, etc. on the spur of the moment (Neethling Personal Skills Instrument). Bernice also realised that "**a good educator must be able to improvise!** (When it becomes necessary to change direction on the spur of the moment, this covers: the role of Learning Area/ Discipline/ phase specialist. This should ensure that I am never caught unawares)." Bernice should be able to improvise quite comfortably seeing that she saw herself as a person who has "self –confidence and spontaneity."

Bernice learnt about what "would challenge learners or put them off." She said that "you have so much to do with so many different people, you start thinking when I plan it this way will this get learners to work with it, will it interest so and so, the clever ones as well" Bernice stated that she had "learnt a lot from working with the children and I also learnt a lot from them." She found out that "when I was in front of the class, the two way interaction is important." This led her to "**realise that learners are very involved if they participate in something that applies to their lives." Bernice concluded by saying that she "got more ideas from facilitating learning…** makes you become a more creative person - a creative thinker."

- **What** were Bernice's feelings about the learning task operation and why did she have these feelings?

Bernice felt pleased that "it went alright." The evidence that she gave for this was that "all the learners, except the two in the front, were working, even the ones that never work … the meta-learning went well." She was also pleased with her choice of problem as it concerns all of us and "the learners realised it was a real life problem and they were aware of the whole AIDS thing." Her feelings with her choice of problem are also linked to the fact that she is a teacher who points out how the lesson applies to the "real world" (Neethling Personal Skills Instrument) and being able to do this was also where her pleasure possibly came from as well.

- **What** challenges did Bernice experience when designing and operationalising her learning task and **why** did she have these challenges?

Her first challenge in designing the learning task was thinking about ideas on what to do. She grappled with this for some time as she said "the idea to do this came to me when I was in bed just last night. If I

could have come up with it last week". She also expressed the impact that the late formulation of the ideas had on her planning when she said "it (lesson) would have been perfectly planned concerning the resources and the problem." She was aware that she "could have said the problem in a different way" given the time to do so.

In regard to operationalising the learning task, Bernice thought that her learning task was **"**quite straightforward" for the learners to understand. The evidence she gave was that "the problem statement was clear and simple, one that most people must have wondered about these days." She stated that in presenting the learning task she took into account her knowledge of facilitating learning and she "attempted to meet all the requirements of a good learning task presentation (LTP) as specified in the Study Manual for Facilitating Learning (Slabbert, 2004, p. 16)." She also said that she tried to present what she had planned in her LTP "as clearly as possible." She was aware that her challenge was that "I did not though make any allowance for meta-cognition." She was aware of what she needed to do but did not put it into practice as evidenced by "this is in conflict with my practice theory. I did however; rectify this in the next learning task that I have designed."

Bernice expressed what still challenges her "I do not believe that I have perfected the problem statement, learning task design or learning task presentation" She was aware that doing it more will help her to improve. She used a metaphor to describe this learning "after four years of show horse riding, I still fall off now and then! One is never too old to learn and experience comes with time."

- **What** highlights did Bernice experience when designing and operationalising her learning task and **why** did she have these?

Bernice expressed her excitement and amazement with the learners. She said that "by now learners are used to the fact that they are expected to THINK! Everyone immediately got stuck into the problem." She was amazed by Amaol (a learner who had experienced discipline problems) "as he had the right answer. I thought that was impossible."

- **How** did Bernice perceive the actual contribution of the teacher mentor towards her construction of her practice theory and why did she perceive this contribution in this way?

Bernice stated that her teacher mentor described her as a person who has "patience and that I am winning the difficult learners over (community, citizenship and pastoral role)." This positive feedback made her feel good. This positive feedback also came from Bernice observing that the "learners enjoyed my classes more than hers." Bernice expressed that she had not learnt so much from my mentor." She stated "my mentor was not good with the learners and I learnt how not to behave with the learners." She described her as a "monster with the learners… it is punishment for me to sit in the class and observe her yelling at the learners."

Bernice had experienced difficulties at the school in that the teacher mentor would "inform me at such a late stage of the day's programme to take a lesson" and that some teachers "are making it very difficult for me to present a learning task".

- **What** was Bernice's understanding of the role of a facilitator of learning and how did she construct this?

Bernice believed that "patience is a very important characteristic of a good educator **(**this characteristic is encapsulated in the role of: Learning mediator)." She said that "I enjoy teaching and I love the kids. I worked with Grade 11 learners and I got them to" do different things. She also said that when working with co-operative learning "I was moving from group to group and listening to ideas, prompting learners to share and setting an open, relaxed atmosphere." She was aware of what she had to do to get "them to think and write about the problem." She thought that in listening to a group and "they were confused and then after questioning them the work was clarified." She also thought that if a group needs discipline in doing their work "I spent time with this group" to get them to share and write ideas.

- **What** was Bernice's perception of the contribution of the specialisation programme towards her construction of her practice theory and why did she perceive it in the way she did?

Bernice expressed that "the comments the professor made were very helpful. The ideas that he gave me were very good." Bernice was aware that her "role as a specialist facilitator of Biology" was enhanced by her participation in the specialist sessions. She enjoyed the interaction and exchange of ideas that took place during the specialization in that she stated "one of us would throw ideas and another would get ideas".

7.5. Carol

7.5.1. Step 3: Planning Action

7.5.1.1. Learning task design (See appendix for the plan)

Carol was based at a High School from the 19 July to 3 September. During this time she facilitated Learning tasks on Mammalian Tissue and the Human Skeletal System, Human Blood Circulatory system. The planned learning task used for this research was on the Human Skeleton. This Learning task section was designed for Grade 10 learners. The learning task had all the required elements in the plan: the programme organization, the problem statement, resources, meta-learning and co-operative learning, learning task presentation, class organization, product, critical outcomes, learning outcomes, assessment strategies and criteria. Included in the design was the assessment activity - the assessment rubric for the learner exhibition assessment, report assessment rubric and cooperative group assessment.

7.5.1.2. Specialisation session

Planned by Professor Ned

7.5.1.3. Planning the Portfolio for the Portfolio Presentation Defense

Carol stated that "the purpose for presenting the portfolio is to show my professional development as a facilitator of learning during this year. When she compared herself to the teachers at the school she said that "despite my age and relative experience I am a well equipped professional facilitator." She further stated that she was a "left brain thinker and her portfolio was presented in a way to reflect this – her creative development." She stated that in her professional portfolio she had "included all the items and evidence of things that had made an impact on her professional development as a facilitator of learning." She also shared that "my personal development contributed to my professional development and I included this as well in my professional portfolio."

7.5.2. Step 4: Taking action

7.5.2.1. Learning task

a. Learning task operationalised

No notes on this…I did not observe this. …..

b. Learning task assessment (see appendix for assessments)

The learning task was assessed by the student teacher herself, specialisation lecturer, teacher mentor, and her peer.

(i) Self-assessment

Carol assessed her learning task as "it went well" The evidence that she used for this was that "the challenge is a problem in real life context", and that it "adheres to most problem and learning task design criteria." She also stated that "the presentation is clear" and the "learners were asking questions". She also assessed it according to the assessment criteria on the lesson assessment sheet: it explicates importance; meta-learning - learners plan, monitor and assess their own individual learning; cooperative learning – groups consist of heterogeneous groups of optimal size and members are individually accountable and positively interdependent. She further ticked: learning task facilitation was concerned with providing support to learners and reverting their questions back to them; the learning task consolidation – cooperative learning groups provide feedback with all members contributing and is critically assessed on the quality of their product and presentation by peers and beginner educator. In assessing herself Carol was aware that she needed to "work with the meta-learning questions."

*(ii) Peer*s

Carol's peer assessed her learning task as "original and it was very well planned." She assessed the meta-learning as "especially good" as it "was challenging and the meta-learning questions were again very good." She stated that she liked the fact that Carol had changed "the learning task and the real life problem …for [the learners] to rather design and make prosthesis" instead of Carol telling them what to do and making it for them. She stated that it was "always a pleasure to sit in your class and I always learn something from you." When completing the assessment sheet she ticked the excellent performance of outstanding quality – learning content; non-verbal communication, learner action, learning quality, discipline and consolidation. She also rated the learning task as good performance with no weaknesses.

(iii) Teacher mentor

The teacher mentor stated that he and the learners "enjoyed the learning task presentation immensely." He said that "the learners' knowledge was well tested and the learners used very good models to complete their investigations." He assessed the learning task operation as excellent.

(iv) Specialisation lecturer

The specialisation lecturer stated that he "liked the learning task idea." He stated that the "beginning and the instructions were the most important, and the pureness of it is critical." He challenged Carol to "look at how you can improve the instructions" and "the individual work – meta-learning". He advised her to pay "attention to the individual work where each individual must observe carefully" and to "avoid asking so many questions." He assessed the learning task operation as good.

7.5.2.2. Specialisation sessions

a. Observation of Mack and Bernice's video

When Carol was viewing Mick's video and she observed him asking the learners questions she wanted to find out "what is the best way to ask a question?" This directed the discussion amongst the student teachers and Professor Ned to types of questions, and when, how and why questions are asked. This was done by Professor Ned providing case scenarios and the student teachers understanding was elicited and shared in the group discussion. Carol used this input to question Mack's questioning of group management and reporting that she observed later in the video.

In observing Bernice's video Carol observed and reported that the learner organisation during the initiating learning was "was noisy in the beginning and it got worse". She was aware that during this phase of the learning task operation that learners should be quiet and listen to the instructions (organizational aspects) of the lesson.

b. Identity description (Who am I?)

At the beginning of the year I was a shy, introverted person. I really had my doubts if I would be able to stand in front of a classroom and act with confidence. I was uncertain if I would be able to 'stand my ground' as an authority figure in the classroom. Although I am still shy and introverted, I think I developed my self-image immensely this year. However through experience I gained the confidence and ability to handle myself as a professional facilitator of learning at all times.

I definitely learned to think on my feet, improvise, and switch things around. This was not a tool I had in my personal profile at the beginning of the year. I always assumed that I was not a creative person and a total left-brain thinker. I realised that I could be creative. It just took a great effort, hard work and time to come up with ideas. It really drained me and I became very negative. When I became negative a different person aroused and I did not like that person at all. I made a conscience decision to look at the

positive aspects. This made a huge impact on my personal development. I learned how to handle negativity and stress. My 'conscience' got better.

I am not a very emotional person and will not easily show my true feelings to people, but other people's emotions and feelings are of the utmost importance to me. During the year I realised that disappointments will occur during your lifespan but it is what you do with it that counts. This made my ability to work with learners better. My relationship with my learners was established quickly and it was of a good nature.

I like to do things my way but during the year we had to work in groups from time to time. This helped me to let the control go and trust that others will do a good job. This was very difficult for me, but my interpersonal skills definitely improved through this.

During the year I encountered a variety of experiences and situations….I gave my first baby steps as a facilitator of learning in my first SBEP1 and could handle myself with confidence in my second school based education programme.

There were a lot of aggravating, frustrating and low moments during the year. At the beginning I thought I made a huge mistake enrolling in the course and that it would be a waste of time. Fortunately there were also proud, satisfying and high moments. I know that I received a gift this year by looking at education in a different manner.

Although I am still Carol at the end of the year, I am an improved and better-equipped Carol. I realize that something going wrong is not necessarily a bad thing nor does it mean that you are a bad facilitator of learning; it is what you do with it that counts! I think I can give myself a tap on the shoulder. I developed and have grown immensely since the beginning of the year. From a teacher that wanted to teach to a facilitator that knows that the only way in which learners can reach their full potential is to take control of their own learning.

I can think critically about myself, my points of view, my ideas and what I viewed as important in life. I got to know myself better. All the good and the bad integrated produced a well-developed professional facilitator of learning.

This year was one of the most challenging and difficult years of my studies, but it ***was a year in which I developed personally and professionally immensely.***

c. Interpretation of Personal Profile questionnaires (See Appendix for Scan in brain profile in appendix)

(i) Carol completed a Neethling Personal Skills Instrument, Temperament Indicator and Self Image Evaluation. Carol's scores on her Brain profile were L1:81; L2:77; R1:72; R2:70. According to these scores Carol has a high preference for a L1. Carol functions as a left brained person and her scores for the R1 and R2 indicate that her right brained functioning is improved. Her scores for L2, R1 and R2 indicate that she has average strength with the skills for the quadrants L2, R1 and R2. According to the analysis scoring sheet for the Neethling Brain Instrument Carol is a person, who seeks accuracy, digs

deeper into a problem, works for precision, critical correctness – not to make mistakes, goal oriented, facts and rational information are of fundamental importance. This teacher usually prefers a formal lesson and the use of a textbook or other teaching material. Summaries will be used and encouraged. Logical argument and opportunity to analyse content are usually elements of the lesson. Instructions are given in a precise manner. This trainer tends to do research regarding the content and will encourage this in students. The content will be factually, technically and mathematically correct. This can be an authoritative trainer who likes to be in control of the situation at al times. He/she can tend to be too critical and will not allow emotions to cloud the issue.

(ii) Carol's score for the Temperament Indicator indicates that she is a Perfectionistic Melancholy (introvert) who is withholding and task-oriented.

(ii) The score for the Self-Image Evaluation (63) indicates that she has a dissatisfied self image.

7.5.2.3. Presenting the Portfolio at the Portfolio Defense

Carol stated that at the beginning of the year she "started off as a teacher and at the end of the year I was a facilitator of learning." She said her most memorable learning moments during the year was when she had "the experience in my mentor teacher's classroom where I had the "aha" feeling and the learning task on levers where I wanted to see if it would work and it did."

She described her practice theory at the beginning of the year as "it was just a theory but later I constructed my own meaning about these aspects." She thought that if she "did not get the explanations and discussions about the stuff, I would not have developed my own theory." She also thought that her own actions were crucial to her constructing her own theory when she said "I decided to stand up/wake up." She also said that "reflections helped her construct her practice theory as she "could see what works and what does not work." Other factors that had greatest impact was "meta-learning, everything linked to learning; my experience at the second school [which] was a diverse environment". Carol said that all these experiences "opened my eyes."

Carol stated that she had "experienced three years in one [the one year of PGCE, as] there was so much that I had to take heed of" and learn. She declared that if she had not done this PGCE programme "I would not have changed my understanding of what a teacher is and I would have been a teacher." She described the feelings that she had experienced during the programme as "I had all ups and downs, it is hard work and you experience feelings of being satisfied and unsatisfied. At the end you feel satisfied." I have come a long way, it was definitely not a waste of my time and it does not stop here. This is a huge stepping stone to the rest of my life.

Carol described the impact that this programme had on her personal development as "personally I have developed - I was very afraid, I was a terrible person and I do not want to be this type of person. Now I have become a stronger person, I have grown up in the class."

7.5.3. Step 5: Reflecting on action and interpreting

- **What was** Carol's construction and use of her practice theory and **how** was it constructed?

Carol stated that her understanding of practice theory in the beginning "there was nothing but now I understand what it is". Carol understood practice theory to be "if you do not work with it, I do not think that you will get that learning." Carol said that she did "not think that all the concepts of facilitative learning were perfect" for her to construct her practice theory. She thought that her practice theory was constructed when she started "with a learning task design… firstly plan everything and then go and operationalise your learning task." She realised that "you learn through practice theory and if you do not get your practice theory you will have a problem facilitating learning." She related this to an experience that she had when she "presented this learning task to the learners at the other school and I decided to take it and improve on it [and present it to learners at the other school]. My meta-learning was improved tremendously (I think it was the best meta-learning of all my learning tasks)." Carol concluded that "my practice theory has had an impact on the way I design and operationalise my learning tasks." She said that she "can do things quickly and I can quickly change as well." Carol said that before she had her practice theory she "needed the exact structure before I could even start 'teaching.' She believed that the "experience that you get in the classroom" is important for the construction of her practice theory. She said that "when you think that you can do something and you get in front of the class the children can surprise you" and then you will need to do it differently.

Carol realised and believed that it was not just from her own 'acting' but also from "comparing learning tasks and ideas with your fellow students" and "getting criticism and any assessment" which are valuable resources for the construction of her practice theory. She said that when she "read through the learners' assessment of me I gained a lot of knowledge of myself as facilitator." She thought that "every facilitator must be evaluated by his of her learners. It keeps you on your toes and informed about the standard and quality of facilitating learning".

Carol stated that now she could "change something and I am not worried that it will be a flop because of the experience that I have had." She was now "aware of what works and what does not work (not everything though)."

- **What** were Carol's feelings about the learning task operation and why did she have these feelings?

Carol felt good as her learning task "went well". She also felt more relaxed now as she had constructed her practice theory and felt more confident to operationalise the learning task.

- **What** challenges did Carol experience when designing and operationalising her learning task and **why** did she have these challenges?

Carol stated that the only problem she experienced was with "time". She spent a lot of time on designing the learning task. She experienced a challenge with designing and operationalising the "meta-learning questions."

- **What** highlights did Carol experience when designing and operationalising her learning task and **why** did she have these experiences?

The highlights that Carol experienced was "seeing that the learners could understand the problem", "they really enjoyed this learning task" and they "did the preparations for their presentations in a short period of time."

- **How** did Carol perceive the actual contribution of the teacher mentor towards her construction of her practice theory and why did she perceive this contribution in this way?

Carol stated that her teacher mentor "did not mind that I did learning tasks (although I could see that he did not like it in the beginning)". She said that he had wanted her to "explain the work to the learners" not to get them to do it themselves. She thought that he did not contribute to her construction of "phronesis" as he "told me that I gave the learners too much to do and moved too fast with the learners" In reflecting and analysing his comment Carol thought that "I might move too fast but I saw what the learners are capable of if they really work." She said that he also "expected me to teach the section [on the heart] first using a transparency and then give them tasks." She decided not to do what he told her to do. Instead she "decided to do it [the lesson] in groups [learner]". She concluded that the "learners learnt more now rather than if I had worked with the transparency."

- **What** was Carol's understanding of the role of a facilitator of learning and how did she construct this?

Carol said that "at this school for the first time I was the 'thing' I thought I was going to be at the beginning of the year: a teacher" which she did not now want to be. She thought that the teacher role was "boring and not just for me …I can see that the learners are not listening and I am feeling frustrated." Carol stated that she "realised again that facilitating of learning is the only way in which the aim of education can be obtained" and it is "not in the children's nature to passively sit and listen." She concluded that "learners just sitting and listening to a 'teacher' in front should not be the aim of education."

Carol thought that she "became more professional as a facilitator" during this school-based period". The reasons that she gave for these were "because of the setting, the high standards and pressure that the school and the parents place on the learners … I became more confident in my abilities as a facilitator of learning". She stated that her "organisational and planning skills were quite good" and this made her job as a "facilitator of learning easier". She stated that she "will always remember the quote - 'I will never

rest until my good is better and my better best." She believed that "you can always improve on any part of your repertoire as a facilitator."

- **What** was Carol's experience of the contribution of the specialisation programme towards her construction of her practice theory?

Carol stated that "the specialised module contributed to my development in that my organisation is better." She said that "every session you do different things and you learn." She said that "critique helps from the specialisation lecturer, it helped a lot."

7.6. Mack

7.6.1. Step 3: Planning Action

*7.6.1.1. Learning task design (*See Appendix for a copy of the learning task designed).

Mack was based at a High School from the 19 July to 3 September. During this time he facilitated three learning tasks: Plant Tissues; the Human Circulatory System and Nutrition. The learning task used for this research was on Blood Grouping. The learning task was designed for Grade 10 learners.

The learning task had the following aspects: problem statement, category of learning task, format of learning task, subtasks of learning task, end product outcome, authentic learning context – which included the resources, class organization; cooperative learning groups, assessment – methods, tools and techniques; learning task presentation- clarity, importance, urgency, Attached to the learning task were individual, group and peer assessment rubrics.

7.6.1.2. Specialisation session ……

Planned by Professor Ned……

7.6.1.3. Planning the Portfolio for the Portfolio Presentation Defense

Mack stated that in developing the portfolio this "helped him to focus on consolidating what he had done over the year, helping him to focus where he had developed, how he developed, and looked at what the learners produced

7.6.2. Step 4: Taking action

7.6.2.1. Learning task

a. Learning task operationalised

No notes on this as I did not observe this learning task operation. **…..**

b. Learning task assessment

The learning task was assessed by the student teacher himself, specialisation lecturer, teacher mentor, and his peer.

(i) Self-assessment

Mack was aware of what he could have done differently in operationalising his learning task. He stated that he could have "grouped the learners to explain the meanings of terms … [and] enforce discipline", Mack declared that he had "lost focus when introducing the lungs…[he] should have introduced [the new information] at the end of the period." He was aware that his major weaknesses were "non-verbal communication, discipline and consolidation", his minor weaknesses were "use of media, learner action and learning quality" and his good performance was "verbal communication and the competence to use a demonstration method in class.

(ii) Peer assessment

His peer observed that "learners are presenting their findings as a group and that every learner got an opportunity to present". The peer noted that the assessment rubric was given to the learners at the outset and they were referring to it while doing their tasks. The peer commented that "this is a good practice, as learners need to be aware of exactly what is required and how they will be assessed." The peer also observed that the "worksheet was used effectively… the group work was managed in such as way that keeps each learner busy and actively learning … all learners are captivated by their peer's presentations." She indicated that "time is wasted getting all the equipment organized and up and running. During this time learners get distracted and are not actively participating in learning." She challenged him to think "how will you ensure that all the learner complete their answer sheets thoroughly and have all the correct answers?" She stated that she was "very impressed … of excellent performance of outstanding quality."

(iii) Teacher mentor

The teacher mentor assessed using the learning task assessment indicators as: *the learning task challenge was excellent, presentation is clear, explicates importance and emphasizes urgency, the meta-learning, co-operative learning, facilitation and consolidation were good.* The final overall assessment that he gave was *excellent.*

The teacher mentor praised Mack for his efforts in accessing resources when he said "he made the effort to go to the Pretoria Academic Hospital to the blood bank to obtain the chemicals needed to test blood groups." He also praised Mack for using safety measures when he said "he followed strict safety precautions while the learners were working with the blood." He assessed the learning task operationalisation as "a very worthwhile learning task design" and remarked that "the learners enjoyed it thoroughly."

(iv)Specialisation lecturer

He stated that "the beginner educator is to be recommended on the quality of work that the learners produced and the skills that they learnt with him as the facilitator." He was excited with the fact that "learners did a power point presentation, used the overhead projector, made posters, and did practical demonstrations." He exclaimed that he was "amazed at what he (beginner educator) got out of the learners – excellent work on his part." He assessed the learning operation as *excellent.*

7.6.2.2. Specialisation sessions

a. Observation of Mack and Bernice's video

When Mack was observing his own video and Carol had asked about questioning, Mack shared his challenge that he was faced with in that class when he said "the problem with the class in general is that you are going to get one student asking a lot of questions, especially if you have an academic in your class". Mack had responded to the questions asked by the one learner and all the other learners were excluded. Professor Ned asked them to think about how he could have used this situation to ask questions of the whole class. Mack became aware that he needed to work on the organisational features of using group inputs to maximize the learners' learning. This awareness is evident from the declaration that he made " it would have been better if I could have used them." Mack was the first student to observe and report on the learners' chaotic behaviour while he was operationalising the lesson. He became aware as a result of the discussion in the group how he was actually the cause of the learner's distraction with the result of chaotic learner behaviour. Mack felt good about his video being used and discussed and from this experience he realised that everything should be "meaningful in the class and my learning task operation was not as meaningful as it could be."

When Mack observed Bernice's video he indicated his support for Bernice's response about Brown being dominant. But while responding his uncertainty about this Genetics content was elicited when he said "Brown is always dominant, I don't know". Mack later used his constructed "phronesis" when he suggested a possible problem that he had formulated, for Bernice to use in her learning task.

b. Identity description (Who am I?)

The reasons for acting the way I do are based on my beliefs (Christian) which will remain unchanged. The way in which I act could however change because these are based on my current attitudes and point of view.

'I am a holist by nature, it is therefore important for me to be able to see the bigger picture rather than the isolated facts'. *It is great that I am a person who likes to see the bigger picture but I have come to realise that this can be problematic and also an excuse for me to pay little attention to the details of Biology. It is important for the learners to understand and appreciate the broader systems within the subject of Biology, however it is also important for them to know and understand a certain amount of detail about these systems. It is therefore very important for me to gain a stronger content knowledge about Biology.*

I am also what I will call an intro-extrovert. That is that I am not quite an introvert but not quite an extrovert. *I was rather scared that I would have trouble in controlling the class; however I feel that the discipline in my class is quite good. I have a rather chilled out atmosphere in my class and therefore it is not a very formal or strict one. I sometimes felt that it may have been a little too chilled. I should therefore not hesitate to get involved with the learning process or create a more formal learning*

atmosphere. The last thing I want is for the learners to feel that I do not care because I am too drawn back or chilled out.

I have a fairly good self image; however it can definitely be improved in more ways than one. *I saw that my self-confidence definitely improved as time went by and I became more comfortable in the interactions with the learners, which is a very comforting thought.*

The following section focuses on my understanding of what I have learnt and what I need to change with regard to facilitating learning. I have now come to realise that there is a very big challenge for me to be firmly grounded in my knowledge of the subject before I can facilitate my learners to make the content their own. I also feel that the content is as interesting as the facilitator wants it to be because he or she can either just do what they did in the previous year or if they want to be a very successful facilitator they can constantly renew their content knowledge with the latest findings and scenarios in the life sciences and this will make their LTD (Learning task design) much more authentic and real life. It has become very apparent to me how important the LTP (Learning task presentation) is and how important it is to follow the guidelines for successful LTP. It is very important to give clarity, show importance and create urgency which all lead to the final action. Without establishing this in the LTP the maintaining of learning will be much harder (and more chaotic) and will take much more time.
Another thing that I discovered about myself is that my method of questioning during maintaining learning needs improvement. I tend to just want to answer the learners questions instead of going through the various steps that are available to me, such as referring a question back to the learners or referring the learners to resources. I must realise that I am taking their independence away from them.
I have developed in all seven roles of an educator as described in the norms and standards (2000). These seven roles have been extensively incorporated into my role as a facilitator of learning. I do not however feel that it is these roles and competencies that define me as a facilitator but rather my classroom presence which is achieved through my interpersonal relationships with the learners. I can truly say that above all, I merely enjoy being in the classroom.
I would also like to point out that I did not say that I was fully developed in my roles and competencies but rather that I had developed…..As yet I have not reached that point on the horizon for which I am aiming. However when I do reach it, I am certain I will realise that the beauty of the situation is that, there will be a new horizon with far greater challenges. Humans truly have unlimited potential.

c. Interpretation of Personal Profile questionnaires (Refer to Brain Profile in appendix)

(i) Mack's scores on his Neethling Personal Skills Instrument were L1:81, L2:72, R1:79, R2:68. According to these scores, Mack has a high preference for a L1 and an average skill strengths for L2, R1 and R2. Mack is functioning more as a left-brained person. According to the scoring sheet Mack is a person who is good at digging deeper researching and solving problems. His teaching preferences are those of a L1 trainer/teacher. This teacher usually prefers a formal lesson and the use of a textbook or

other teaching material. Summaries will be used and encouraged. Logical argument and opportunity to analyse content are usually elements of the lesson. Instructions are given in a precise manner. This trainer tends to do research regarding the content and will encourage this in students. The content will be factually, technically and mathematically correct. This can be an authoritative trainer who likes to be in control of the situation at al times. He/she can tend to be too critical and will not allow emotions to cloud the issue.

(ii) Mack's score for the Temperament Inventory indicates that he is a Popular Sanguine (extrovert) who is outgoing and people-oriented.

(iii) Mack's score for the Self Image Evaluation (61) indicates that he has a dissatisfied self image.

7.6.2.3. Presenting the Portfolio at the Portfolio Defense

Mack stated that "the purpose for presenting the portfolio is to show that I have developed in all seven roles of an educator as described in the norms and standards of Educators (2000)". Mack declared that his "learning task presentation was a big thing" for him as he had not presented it well over a very long period of time. He was troubled with "what I needed to do to lead to clarifying aspects for learners and what learners really need to know, why they need to do the work and the urgency to do it." Even though he had experienced these troubles he was aware that he had "experienced a lot of development" and also what he needed to change when operationalising a learning task. He described his eureka Learning task [on Anaemia] which set him on the path to becoming "better and more interesting to learners [as] … everyone knew exactly what they were to do. I set the tone for the urgency and stated that they had one period and they needed to hurry up."

Mack stated that initially in the programme the facilitating learning workbook made no sense to him even though he had knowledge of constructivism. He said that the only time that he came to grips with facilitating learning was "by getting into practice." The 'thing' that helped his practice was "the reflections that I did". In evaluating his reflective practice he stated that "I do think that I did not reflect enough and now I see the importance of reflection, especially critically [reflecting]."

Mack stated that there were "so many things that gave me pride and joy… [one such thing was] my compact disc Learning task Design template" that he had developed and presented during his portfolio defense.

Mack stated that in the PGCE programme "I have learnt to be a facilitator of learning rather than just a teacher teaching." What he meant by this was that he was not going to "just hand out notes, regurgitate notes" as he was going to create "circumstances where learners are engaged in developing meaning of actual content, developing personally in content, how to make it real to them and for them to use it". What Mack was working towards was "you really want the learners to maximize potential, but I think this is not the be all and the end all." He thought this way because he believed that as a facilitator of learning you are faced with and experience so many emotions and these are "a central aspect to facilitate

learning." He described his own emotions of despondency and despair when he tried to facilitate learning "and encourage learners to complete the activity and achieve what you want them to achieve and the learners are not convinced." Mack believed that a law for facilitators of learning is that they had to "have love … [and] the way in which you encourage and support" a learner is important.

Mack declared that (a) he had "reached the end of the year and I have so much that I can develop on; I am a lifelong learner," and (b) that his personal progress "got me out of my comfort zone and I am not dependent."

7.6.3. Step 5: Reflecting on action and interpreting

- What was Mack's construction and use of his practice theory and **how** was it constructed? (See Appendix for concept map)

Mack stated that he did not know "what was expected of us [me] in the curriculum… we [I] discovered this at schools." Mack stated that he had "learnt a lot about, day-to-day 'teaching' and working with people in a school. What might seem like menial things, like having notes prepared on time so they can be photocopied for your class, having tests done in advance" at the school. Mack had learnt a lot "about how to and what the importance of one [learning] task is, and how to make that a real life sort of learning task that is going to be relevant to the learners and to be able to give them positive influence in their own lives." The evidence of further learning was also in a statement that he made after operationalising a learning task, "my main development during this learning task was a total mind set change of the outcomes that I can expect from the learners." Other evidence that he gave of his learning was that "professor said that I explain things too much [during the operationalisation of the lesson]. I know that I should not so I tried to make the explanation as brief as possible". He also said that professor told me "I must not set or give a lot of the answer or problem away … he said I put too much in the problem that I set to them." Mack said that he then "set the problem according to that and I tried to make them [the learners] think as much as they can about the whole [problem]." Mack was aware that he needed to make his lessons problem-based and he said that "maybe I do not know how to yet." His lack of knowledge about how to work with problem-based lessons could be due to his own beliefs about working with them as evidenced by his comment "I feel that problem based lessons take a lot longer than just normal teaching. So I feel I would have got a lot more content … in this lesson if I had just been teaching." He was not comfortable and stable with his belief and what was expected of him when facilitating learning. This discomfort and instability with his belief and the expectations of what is required from a student teacher in the programme was evidenced by him saying:

> I mean, the process part [the development and use of process skills] is there, but I also feel that the content part is important. And maybe there is a place for pure learning or ROTE learning, whatever you want to call it. I know ROTE learning has very negative implications,

> but some of me wants to say that there is a place for some part of it in science, in Biology. Yah, but I am still working to it (Mack, semi-structured interview, September, 2004). .

During the construction of his practice theory he experienced different emotions. He felt "greatly encouraged" when he became aware of what he could expect from learners. Mack also felt confused and frustrated with himself and the changes that he was expected to make. He said "I originally intended to do [teach]. I thought, maybe it is just; I do not know how to go about the whole problem based facilitation. I don't know how I could have got them thinking about it more."
He was aware that in facilitating learning he had "not been managing my time properly. I need to be learning more to do, how to manage my time." He related an experience that he had where "I got behind on my marking and then I had this huge pile of marking and so it was ten times worse getting through that." He was aware of the action that he needed to take to organise his time "so, if I just keep day to day up to date with that stuff, it makes it easier."

Mack stated that his "practice theory informed my relationship with the learners … and my character and my beliefs influence[d] my relationship with the learners." He thought that "when you sort of operationalising a task or anything in the class, you need to, to a certain extent, have a formal relationship with your learners." He described this formal relationship as "they [the learners] need to respect you and when you need to say something they need to listen to you." Mack believed that "respect is earned. You obviously must respect them (the learners) in turn and not treat them like rubbish." He was aware that his class of learners "does not have that, but to a certain extent they do." From this he realised that full respect from learners "is what is needed in the [his] class" and he was aware that he needed to insist that when "something is being presented to them, they need to listen and this does influence the way I treat them." He said that initially when you arrive in a classroom "you just want to be just sort of a nice teacher, so you are going to be nice all the time and not have to enforce anything." From his experience of standing up in front of the classroom, he realised "somehow that you need to enforce the structure into the class. Otherwise, you will not just get anywhere with your groups [learners]."

Mack was aware that the context of the school played a role in his construction of his practice theory. He said that "I also learnt a lot of obtaining information and where to find resources to use, and what resources I can use. As I said, this school has got good resources…. and therefore I can use it (resources) a lot."
Mack's understanding of assessment was that "as a facilitator one of my important roles is to assess. I say important because I feel that this can quite frankly make or break a learner." He understood that "good assessment rubrics – peer, group and individual can be used to assess learners." He stated that when he designed a learning task he placed the assessment rubrics "in the section Learning Task

Presentation format because it is necessary that the learners are presented with the criteria with which they will be assessed before they execute the learning task."

Mack stated that "I feel that I'm definitely working in the paradigm that he wants us to work in, that I'm definitely following the whole jist of the course, what it is about and how important it is getting learners to really interact with the content." But Mack was still "sure how it fits in." He was referring to how the learners could use science process skills to construct meaning when he said "I mean, the process part is there, but I also feel that the content part is important." Mack felt that he should be working more with the content so that he could reach "each of the learners "in his class. He did not feel comfortable that all the learners would be thinking different things about the content. He thought that it would be better if he also taught content to the learners when he said "and maybe there is a place for pure learning or ROTE learning,"

Mack concluded by saying that the "ideas that I used as being in tune with the thinking within the paradigm." This thinking he said "has come about from I think the reality of working in an education system (the school)".

- **What** were Mack's feelings when designing and operationalising the learning task and why did he have these feelings?

Mack expressed his feelings when he said "I have been enjoying the facilitation a lot". This he said was due to the fact that "I have been learning a lot and I have seen myself grow a lot." He did express though that his feelings went "ups and downs". He said that before the lesson he "felt a bit distraught about what I was going to do." The reason that he gave for this was "I guess you could say it was just a lecturing sort of approach to today." He said that even though he tried "changing the lesson to see how it goes, the lesson went slowly and I do not think it was very good quality of learning taking place." The reason that he gave for this was that "the learners did not get much done in the time that was given to them."

- **What** challenges did Mack experience and **why** did he have these challenges?

Mack stated that he had experienced "some very late nights. I think the late nights are a down." He said that he had experienced challenges with making the learning task challenging for the learners. He was disappointed that most of the learners thought that "they were doing a stupid little exercise here" when he "did not feel [think] that it was stupid because I saw where I wanted them to go, but I did not quite get there" Mack stated that he had challenges particularly with designing and operationalising "a lesson like this (practical investigation of the external structure of a leaf)."

- **How** did Mack perceive the actual contribution of the teacher mentor towards his construction of his practice theory and why did he perceive this contribution in this way?

Mack said that his teacher mentor "was [6]lekker" because she was "encouraging and she opened her classroom up …she really allowed me to do what I liked… and she gave me ideas of where to get resources for the sections that I was facilitating." He thought that the teacher mentor could have given him a more structured list of what "needs to be covered" in Biology for the term. He did think though that 'this was a good thing that I had to work it out myself. I could see how long it takes to work out each section." He did say that he had "used a lot of what she showed me" and "she left it open for me to use or not use what she showed me – if I wanted to use it, I did, if not that was okay."

- **What** was Mack's understanding of the role of a facilitator of learning and how did he construct this?

Mack felt strongly that the role of a facilitator of learning is also to work with content and not just skills when he said "when the learners were observing the external structure of a leaf, maybe they are observing, maybe they are getting all these skills but where is the content?" He was aware that when the learners were recording their observations that this "is content" but that "there is also a lot of content that I wanted them to get done in that one lesson". He thought that as a facilitator of learning he should stand up "and lectured it, they would not have got the skills they did in this period and they would not have probed into the whole thing as much, but they would have got the content." He thought that as a facilitator of learning he had to have a way where he did not "split the two (content and skills) but there should be a way in which, there is a way I am sure, in which more content can be done." He was also aware that his role as an assessor was important as this could "make or break a learner."

- **What** was Mack's perception of the contribution of the specialisation programme and why did he perceive it in this way?

Mack stated "Not much, not really at the moment." He related an experience that he had had with Professor Ned when he said "Professor said last week that I should come and see him before I do my lesson this week, which I then did." He described the interaction between him and professor as "he [Professor Ned] was quite blunt with me and quite harsh … [and] I was actually quite worked up about the whole situation." Mack stated that "Professor has got very rigid views on the whole thing, if you not doing it like that then it is wrong." Mack stated that during the talk Professor "did clarify a number of things for me, which I think was needed." But Mack stated that "one big thing, that is, that I feel very strong about is … that he has not given me much encouragement about what I am doing. One of his points of facilitating learning is to encourage your students." Mack felt strongly that "You are not going to get any learning done if the student is not going to like what they are doing."

Mack stated that he felt:

[6] Lekker is an Afrikaans word that means nice in English

> like I have not got positive, positive critiques about what I have done. I understand that it is crucial to get constructive criticism - find out what you did badly in the lesson and I think it is also just as crucial, the opposite of doing that, to find out what you were doing right (Mack, semi-structured interview, September, 2004).

Mack felt strongly that "the approach that he [Professor Ned] has to the paradigm that he wants us to work in is not very focused on the content." Mack thought that the approach was more focused on "getting them [learners] to apply the content to their lives through a real life problem…. and therefore you will not get through as much content knowledge." Because Mack thought that "content still plays a part in education. … I am not sure where that is and I sort of wanted help there [with working with content and process skills]" Mack was disappointed that Professor Ned told him that "I am working in the totally wrong paradigm and that I must change my thinking to a new paradigm." Mack was really grappling not so much with the amount of content in a lesson but with the move from a transmission style of teaching to a transformative style of facilitating learning.

7.7. Step 6: Evaluating Action

This step focused on evaluating the action (intervention) of this cycle. Since this is the last cycle the section what feeds into the next cycle is not included.

The student teachers' construction and use of their practice theory during this cycle is evaluated on

a. their response to the challenge to their practice theory during the observation week at the school and
b. their response to the challenge to their practice theory during the school-based learning period.

In evaluating the action I read each student teacher's case with regard to the observation of the teacher mentor at the second school, understanding of the level (standard) of work for learners and the context of the school, and understanding of his/her progress I then compared these responses to those that the student teachers presented in step 4 and 5. I then analysed and assessed the intervention on the basis of each student teacher's reflections about their construction and use of his/her practice theory of facilitating learning and for facilitating learning. The analyses and evaluation of the intervention is presented below.

7.7.1. General comments - analysis and evaluation of the intervention

7.7.1.1. The student teachers' response to the challenge to their practice theory during the observation week at the school

The experiential reflections that the student teachers shared at the beginning of this cycle revealed their perception of teaching and learning and that of the role of a facilitator of learning. Bernice, Carol and

Mack's perception of teaching and learning was that learners should be challenged and it was the role of the teacher (facilitator of learning) to challenge the learners. Bernice, Carol and Mack thought that learners do very little because the teachers "only gave them a little work" (Carol) and "expect too little from the learners" (Mack) as they perceive the learners as "not capable" (Bernice). Their perception was that facilitators of learning should demand and expect more from learners. Mack had first-hand experience of this at his second school. He realised that there was a different work ethic at this school where "a lot is expected of the kids and therefore they perform." Carol and Bernice on the other hand were aware that teaching and learning across different school contexts were such that learners were "fed everything"(Bernice). Overall, the student teachers believed that learners could and should do more during the learning process given the support and opportunity to do so by the 'teachers'.

From their immersed concrete experiences the student teachers could project the role that they would play in the classroom. Bernice described how she would need to boost the "learners' confidence" to get them to work while Mack thought that what a 'teacher' expected of learners "could never be too high but you had to be careful not to go over the heads of learners". Carol, as a result of working with the learners and the learning tasks, was aware that she expected too much from the learners. She said that her understanding about what to expect from learners "would have to come from experience and a talk to my mentor". The student teachers were developing as critical thinkers by being engaged in an active process of reflective analysis and projected action (Howell, 1994).

The student teachers' reflective action of assessing their progress was critical to their further construction of "phronesis" as they needed to make connections between what they observed and realised at the school and their existing "phronesis" as espoused by Lombardi's (2007) in his first principle of authentic learning. The student teachers were expected to work at a metacognitive level when reflecting on their progress at the beginning of the second school-based learning period. They did this when they specifically identified and described where, what and how they had improved and what they needed to improve on. Mack realised that "there is still a lot that I can improve on", while Bernice thought that her progress in assessment was "much better because my first assessment stuff was kind of don't know how to, where to". Carol was aware that her organisation skills were better than before and she also knew how to improve them. Carol during the first school-based learning period had seen the consequences of her organisational skills, which is recognized by Senge (2006) as a crucial feature of learning which is rarely done. Her perception therefore about what she could do to "see how the facilitation of learning could happen better" informed her practice of what she was going to do which is supported in the literature by McNiff & Whitehead (2005). Mack as a result of reflecting on his learning experience was aware that he "felt a lot of stress due to his slow pace" and these feelings served to support his knowledge construction as suggested in the literature by Lombardi (2007). Mack as a result knew that he had more to learn. The student 'teachers' beliefs about what was, is and could be possible in terms of facilitating learning were colliding to form swirling waves moving higher and higher at a fast

pace resulting in the construction of "phronesis" by the student teachers. These swirling waves symbolised both the mixture of beliefs and feelings that each student teacher experienced individually and the concomitant social group sharing of his/her beliefs and feelings about facilitating learning during this cycle.

7.7.1.2. The student teachers' response to the challenge to their practice theory during the school-based learning period.

a. Designing learning tasks

The requirement for student teachers to be engaged with authentic learning tasks and be immersed in authentic learning contexts for them to construct "phronesis" cannot be undermined and undervalued. Bernice Carol and Mack designed learning tasks according to the learning task requirements as suggested by (Slabbert, 2004). It was the challenge and demands of designing the learning tasks and not just the experience of doing this that impacted on the student teachers' "phronesis" of what this activity with the ultimate achievement of a polished end-product (Lombardi, 2007) entailed. Planning these learning tasks demanded effort as described by Bernice – **to "**read up on the topic and prepare carefully" and then the "thinking and initiating ideas". Bernice and Mack experienced challenges with generating ideas for the learning task (activities) while Carol's challenge was with designing "meta-learning questions." Mack particularly experienced challenges with designing practical investigation activities due to his intense belief that content (lots of it) must be worked with in a lesson. Bernice described her designing as "you start thinking when I plan it this way will this get learners to work with it, will it interest so and so, the clever ones as well." Bernice, Carol and Mack experienced challenges with insufficient time to design the learning tasks especially when you have last minute great ideas as in Bernice's case. These are the challenges that the student teachers shared, which are not necessarily the full complement of challenges that they experienced when designing the learning tasks. Carol had realised and believed that the positive impacts on how she designed her learning tasks came from her own 'acting', "comparing learning tasks and ideas with your fellow students" and also from using her "practice theory".

The understanding of the type of learning task that is required which is "a real life sort of learning task that is going to be relevant to the learners and to be able to give them positive influence in their own lives" (Mack), the challenges, the role, social interaction, effort, and attitude each student teacher experienced and responded to were essential for him/her to design the learning tasks in the way in which they did. .

.

b. Operationalising Learning tasks

Bernice's use of meta-cognitive questions in operationalising her learning task resulted in positive outcomes - the learners enjoyed it and were actively participating, she gained confidence, constructed knowledge and developed skills to manage co-operative learning. Carol's positive outcomes when she

presented a learning task that she re-designed – the meta-learning was the best, learners enjoyed it and she was relaxed and confident. Mack's positive outcome was a "total mind set change of the outcomes that I can expect from the learners", his enjoyment of interacting with the learners and his awareness of his development. Mack though was uncomfortable and dissatisfied with his use of problem-based learning in that he wanted to use rote learning where the learners and him could work with more content.

The feelings, beliefs and actions that the student teachers had stemmed from their action of 'doing' (presenting) learning tasks. This action of doing served to promote the further construction of their practice theory.

c. Learning task assessment

The assessment of the leaning tasks by the student teacher himself/herself, their peers, teacher mentor, specialist lecturer and researcher where possible served to validate assessment comments and provide constructive criticism and suggestions for the student teachers to use. This is evident in the following where in assessing herself himself Carol stated that she needed to "work with the meta-learning questions" and Mack was aware that his major weaknesses were "non-verbal communication, discipline and consolidation". The self-assessment was crucial for the student teachers to make connections: between their beliefs, experience (action) and outcomes of operationalising the learning task, and also with the expected outcomes as outlined in the assessment guidelines for learning tasks. In this process of self-assessment the student teachers are forced to identify and confront their strengths and weaknesses and in so doing decide on a plan of action for development. The student teachers also saw the value of this assessment for their professional development. Carol realised and believed that it was not just from her own 'acting' but also from getting "criticism and any assessment" especially from "the learners' assessment of me I gained a lot of knowledge of myself as facilitator." She thought that "every facilitator must be evaluated by his of her learners. It keeps you on your toes and informed about the standard and quality of facilitating learning". So learner assessment was viewed as valuable and should be included in the assessment of the student teachers' facilitation of learning.

d. Reflections

The requirement for student teachers to reflect on their learning was a crucial eye-opening experience for them. Their reflections now focused on descriptions of what they had experienced and more significantly on the intense emotions that they had experienced. These reflections also focused on a constructive component where each student teacher had a vision for what they could change and how this would impact on the learners' learning experience. Bernice's reflection on the 30 August was, "As I engaged with this learning task I was able to distinguish quite effectively between meta-cognition and thereafter co-operative learning. … Successful management of meta-cognition followed by co-operative learning ensures the acquisition of appropriate life skills".

e. Teacher mentor

Bernice expressed that she had not learnt so much from her mentor. Her teacher mentor provided support in the form of direct positive feedback and indirect positive learning evident from Bernice stating "I learnt how not to behave with the learners". Carol also thought that her teacher mentor did not contribute as he expected her to 'teach'. She also had indirect positive learning in that she challenged his suggestion to teach by facilitating and using group work with in her words the "learners learnt more". Mack had a different experience with his teacher mentor. She was supportive and encouraging and "she really allowed me to do what I liked". This supportive, freedom to operate environment was evident in Mack saying that he had "used a lot of what she showed me" and "she left it open for me to use or not use". As Mack likes structure he expected a structured planner from the teacher. This absence of a structured planner was a positive learning experience for him in that he "had to work it out myself. I could see how long it takes to work out each section."

It is important that the personal and professional expectations of teacher mentors must be considered when deciding on who the teacher mentors will be in the programme. Comments like "some teachers are making it very difficult for me to present a learning task" should be addressed with the appropriate individuals.

f. Specialisation session

During these sessions the social interactions and learning from reflections shared was critical for the student teachers construction of "phronesis".

During the video-viewing session Bernice came to realise her weaknesses with facilitating learning on her own and in communication with the group. As Carol was experiencing problems with meta-learning questions she used this opportunity to ask "what is the best way to ask questions". Mack became aware of his weaknesses with facilitating learning and what he could do to overcome them. This freedom to critically analyse and share ideas that could enhance the facilitation of learning, during the viewing of the student teachers' videos is a necessary requirement for these sessions.

The specialisation sessions were as Bernice described them where "one of us would throw ideas and another would get ideas". This idea sharing was a necessary springboard for the students to further construct their "phronesis" of facilitating learning and engendering feelings of support and enjoyment. The nature and design of these specialisation sessions was commented on by Carol when she said "every session you do different things and you learn." What is significant is that these different things were linked to the different features of facilitating learning that the student teachers had experienced. "You learn" are powerful words used for these sessions especially since the discussions were not pre-arranged, not from theory but they stemmed from the student teachers' reflections of their concrete experiences in the authentic learning contexts (school). Both Bernice and Carol stated that Professor was very helpful in terms of ideas (Bernice) and critique (Carol). Since Mack was experiencing differences with Professor Ned and he felt uncomfortable with this experience he stated that these specialisation sessions did not

contribute to his development. This was not the case as he later said that Professor Ned "did clarify a number of things for me, which I think was needed." The support that student teachers expect is not necessarily the support that will be provided. As this programme is focused on maximizing and fully utilizing human potential the student teachers are challenged even "forced" to make the jump as it was in Mack's case from a transmission to a transformative style of facilitating learning.

The setting and the context of the specialisation sessions was crucial to challenging the student teachers' practice theory and to further construct it to one that was aligned with transformative approaches to facilitating learning. The social interactions and individual introspection with dynamic learning were critical to the student teachers transformation in their personal and professional identity. Critically important during these sessions is the character and professionalism of the teacher educator. He definitely played a major role in the student teachers' transformation. He is acutely aware of what it means to facilitate learning for the student teachers to maximise and fully utilise their human potential.

g. Portfolio Defense

This session was a time for the student teachers to reflect on their years experience and to celebrate their development. Their professional development is described in the following sentences. Bernice said "the most amazing thing for me that I learnt is that I can facilitate learners". Carol stated "started off as a teacher and at the end of the year I was a facilitator of learning." Mack stated "I have learnt to be a facilitator of learning rather than just a teacher teaching." For the student teacher to be able to say that they are facilitators of learning started with the beliefs and actions that they had and seeing the consequences of these beliefs in action. Also, assuming the identity of a facilitator of learning was critical for the student teachers to understand and assume the role of a facilitator of learning. Carol referred to herself as a facilitator of learning, while Bernice and Mack referred to being able to facilitate learners. This identity declaration instilled the being of that identity in the person.

The programme also challenged the student teachers to develop personally. Bernice who did not "trust people easily … [and who] would rather be alone than amongst other people" learnt to "work with different people with different personalities." Carol stated that she had developed her "self-image immensely" and she "gained the confidence"

And she concluded that "now I have become a stronger person, I have grown up in the class." She had identified her weakness as a scared person that she did not now "want to be". Mack saw himself as out of his "comfort zone and I am not dependent.

APPENDIX II: Chapter 4

Bernice

Learning task design (See Appendix for copy of the design)

Concept Map - none in file

Carol

Learning task design (See Appendix for copy of the design)

Concept map - Practice theory of facilitating learning

Mack

Learning task design (See Appendix for copy of the design)

Concept map - Practice theory of facilitating learning

Bernice (Aftikaans original translated to English)

Learning task design(See Appendix for copy of the design)

Concept Map – none in file

Bernice.

Hammanskraal Leertaak

Lewenswetenskap: Biologie
VOO: Gr 10

Die tema wat behandel moet word is: Die nut van plante en diere. Ek behandel dit aan die hand van die volgende voorbeeld: Die jagbedryf/wildbedryf. Is jag goed of sleg? Ek beoog om leerders ten volle te laat deelneem aan die hand van die feit dat die meerderheid van die klas wel 'n sterk mening oor hierdie onderwerp sal hê!

Program organiseerder

Is jy vir of teen die jag van diere? Dink jy dus diere moet gekoop en verkoop word vir jagdoeleindes?

Spesifieke uitkomste

- Leerders moet nadink en kan redeneer oor voor- en nadele van jag.
- Hulle moet die nut van wilde diere in SA besef.
- Hulle moet dit ook kan toepas op die nut van plante.
- Elke leerder moet sy punt kan staaf (wetenskaplik, natuurlik, nie emosioneel nie! Gebruik van bv artikels word absoluut vereis!).

Asseserings kriteria vir elke SO in volgorde.

× Hier behoort elkeen eerstens 'n mening te hê. Ek bepaal dit deur te sien of alle leerders dit moontlik vind om hulleself te plaas in die vir/teen groep.

× 'n Leerder wat nie die nut van diere besef nie redeneer emosioneel en is gladnie oop vir oortuiging nie!

× Elkeen moet op sy eie vir my (om in te handig) 'n voorbeeld gaan neerskryf vir die nut van plante wat ek dan sal asseseer.

× Elke leerder se gestaafde mening word geasseseer soos dit ingedien word met verwysings na bronne.

Tyd toegestaan.
Twee periodes en inhandiging van take op dag 3 of liewer periode 3.
Dit word gedoen oor 2 enkel periodes op 2 opeenvolgende dae om my tyd te gee om die klas op te maak.

Klas organisasie
DAG 1: Die klas kom in en stap reguit in 'n jagveld in. Daar is potplante (dis die "bos") oral en diere wat daaragter skuil. Iewers skreeu 'n sonbesie. Dis warm (vensters is toe) en die wind waai deur die bome (waaiers), mens hoor die wind.

Die klas word in 2 groot groepe verdeel: Die vir jag en die daarteen. Ek gee 10 min vir elke groot groep om met net 1 balie sterk punt af te skop.

Nou verdeel ek hulle (elke groot groep) in kleiner groepe van 4.

Ek wys nou vir hulle 'n video van 'n wildvangs en 'n wildveiling sodat almal weet hoe dit werk.

Hulle word na bronne verwys, maar daar is 'n paar artikels in die klas wat hulle nóú moet gebruik, want elke klein groep moet nou 'n paar sterk argumente versamel vir die volgende periode. Hulle mag dit ook insluit in hul eie taak, maar dié moet ook hul eie unieke bronne bevat.

Ek verduidelik hoe die volgende dag sal werk.

DAG 2: Die klas is vandag 'n veilings perseel. Hulle stap deur die seilhekke van 'n boma na 'n podium wat voor in die klas staan. Hier staan die afslaer (dis nou ek). Die veiling werk so:

Elke groepie kry geleentheid om sy stelling te maak en die ander span mag kommentaar lewer. Hulle maak beurte. Die spanne is nou die vir en teens. Hulle mag slégs deur my praat en geen direkte kommunikasie met mekaar word toegelaat. Ek sal die laat toeslaan op die span wat hul punte verdedig het met die meeste en beste feite!

Hulpbronne
Potplante
Groot prente /gemaakte prente van diere
Waaiers
Voorsulke wat vasgewerk is aan mekaar
TV en videomasjien vir die video.
Bandspeler en band met sonbesie-geluid
Podium
Artikels
Veilingsbaniere

Asseseringsmetode
Elke groep mag besluit wie hulle verteenwoordig om hul stelling te maak, daarna mag enige iemand reageer. Elkeen in die groep moet 'n kans kry om iets te sê. Ek mag (en moet) ter enige tyd enige persoon toets deur hul aan te vat oor hul mening of 'n vraag te stel. Dus hoor ek of almal wel 'n mening het.

Wat betref die werkstukke /take:

4. Leerder verstaan duidelik, het goeie stelling wat feitelik gestaaf is.

3. Leerder verstaan, maar daar is meer emosie as feite.

2. Leerder gorrel en het flou argumente.

1. Leerder weet nie waarvan hy/sy praat en het swak /geen argumente. Geen feite.

LTD : Die perfekte voorbeeld!

Leerder se mening oor jag : Voorbeeld : Vir jag.

Eu is vir jag.

Hoekom?
Bedrygde spesies word deesdae gejag vir astronomiese bedrae. Tog sterf hulle nie uit nie, nee hulle word geteel en vir groot bedrae gekoop en verkoop om gejag te word!

Wat beteken dit? Jag red bedrygde spesies! Bedrygde spesies word nou teen duurste geteel want hulle het soveel (jag-) waarde. Dit het tot gevolg groter getalle van die spesies.

Kyk maar wat gebeur met die jagluiperd. Hy het geen jagwaarde nie en word deur elke Janrap-en sy maat geskiet - dit het tot gevolg 'n spoedige afname in hul getalle!

Laat die uitlanders jagluiperds skiet en daar sal waargeneem word hoe die spesie gered word!

Bronne: ....

Hammanskraal Learning Task

Life Science: Biology

FET: Grade 10

The theme covered is: Uses of plants and animals. I taught this with reference to the hunting! game industry. Is hunting good or bad? My intention is to allow the learners to participate fully ,considering that the majority will hold strong views about the topic!

Programme Organiser

Are you for or against the hunting of animals? Do you believe that animals should be bought and sold for hunting purposes?

Specific Outcomes

Learners should consider and argue the case for or against hunting.

- They should understand the usefulness of wild animals
- They should apply this to the usefulness of plants as well
- Each learner should be able to defend his/ her position (scientifically, not emotionally! The use of resources eg articles is essential!)

Assessment Criteria for each Specific Outcome as written above

- Each one should at least have a point of view. I will know this if they are able to place themselves either in the for or against group.
- A learner who does not recognize the usefulness of animals takes an emotional stance and is not likely to change his/ her mind
- Each one has to write down one use of plants (this will be taken in and assessed)
- Each learner's informed view will be assessed when taken in along with references.

Time allocation

Two periods and submission of assignments during third period.
This will be covered over two single periods on two consecutive days to give me time to set up the classroom.

Class organization

Day I: As the learners enter the classroom, they walk into a hunting ground. There are pot plants everywhere(the 'bush') and animals hiding behind them. A cicada screeches from somewhere. Its hot (windows closed) and you can hear the wind blowing through the trees (fans).

The class is divided into 2 large groups: those for hunting and those against. 10 minutes are allocated for each group to prepare one strong point to start with.

Now each large group is divided into smaller groups of 4 .

Next I show a video of game capturing and a game auction to enable everyone to understand the process.

Learners are given a number of references to consult later, but all have to consult the articles in the classroom because each small group has to develop a few strong arguments for the next period. They may include this information in their own tasks, as well as information from their own references.

I explain what happens the next day.

Day 2:

To-day the class at an auction site. They walk through the canvas gates of a boma towards a lectern placed in the front of the classroom. This is where the auctioneer is (that's me). This is how the auction works:

Each small group is given the opportunity to present their point of view while the other groups are allowed to comment. They take turns. Now they are divided in to the 'for' and 'against' teams. They may only communicate through me and no communication with each other is allowed. I will award the bid to the team who defends their stand with the most and best facts!

Resources:
Pot plants
Posters of animals Fans
Feedings bags stitched together TV
and VCR
Tape recorder and tape with cicada calls Lectern
Articles
Auction banners

Assessment:
Each group may elect a member to present their argument. When this is done, anyone may respond. Each person in the group has to have an opportunity to respond. I may (and must) test any learner at ant time by asking a question or eliciting their points of view. This will allow me to assess if everyone has a point of view.

With regards to the tasks:
4- The learner understands, makes a good statement, based on fact.
3 - The learner understands, but responds emotionally rather than factually. 2- Learner 'waffles' and has weak arguments.
1- Learner does not understand and presents no argument or facts.

LTD: The perfect example!
Learner's view about hunting: Example: in favor of hunting

I am in favour of hunting

Why?
Endangered species are currently hunted for astronomical amounts. In spite of this they have not become extinct, because they are bred and bought and sold for large amounts of money to be hunted.

What does this mean? Hunting saves endangered species! Endangered species are bred at much expense because they have a high hunting value. This results in larger numbers of the species.

Look at what happened to th[illegible]; shot by every Tom, Dick and Harry - leading to a rapid decline in numbers!

Allow foreigners to shoot cheetah and it will be saved from extinction

References .....

Carol

Learning task design (See Appendix for copy of the design)

Concept map - Practice theory of facilitating learning

(1) card.

LTD Template

Leanng Subject Leang phase (Gr) Time Allocated	

Class Organisation

Resources (classroom)

Programme Organisation

Problem

Resarches
- Authentative
- popular learng
- general resours
- instituhonal resources.

Worksheet

Categorise
Constructing of Meaning (content)

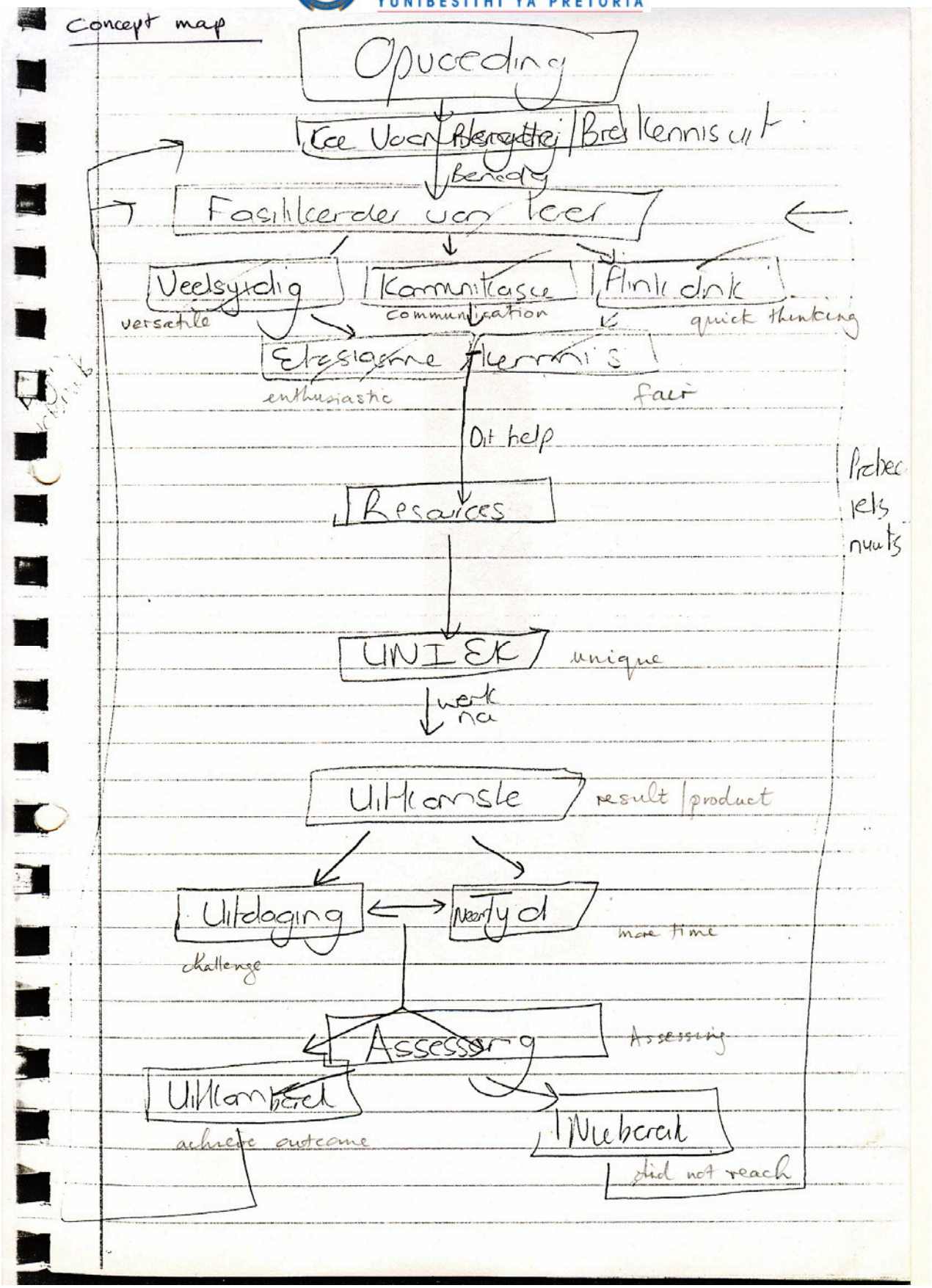
Competencies Aquired

Relationship
- Meta-Cognition
- Co-operative learning
- Feedback

Learning Task

Learning Outcomes

Assessment Criteria



Mack

Learning task design (See Appendix for copy of the design)

Concept map - Practice theory of facilitating learning

Mack

Learning Task Design Template

Date:

Learning Area:

Learning Phase: Grade

Specific Outcomes:

Assessment Standards:

Resources:

1
2
3
4
5
6
7

Class Organisation:

Time Allocated:

Period	Specific learning task.
1	
2	
3	
4	

Learning Task Design

Date: 20/02/2004

Learning Area: Life Sciences

Learning Phase: Seniour, Grade 9

Specific Outcomes: Apply & Interpret scientific, technological & environmented knowledge.

Assessment Standards: Understand sustainable use of the earths resources: Analyse information about sustainable & unsustainable use of resources.

Resources:

1. Information on genetic diversity.
2. Opaque containers.
3. Marbles - 20 x red
   - 20 x white.

Class organisation:

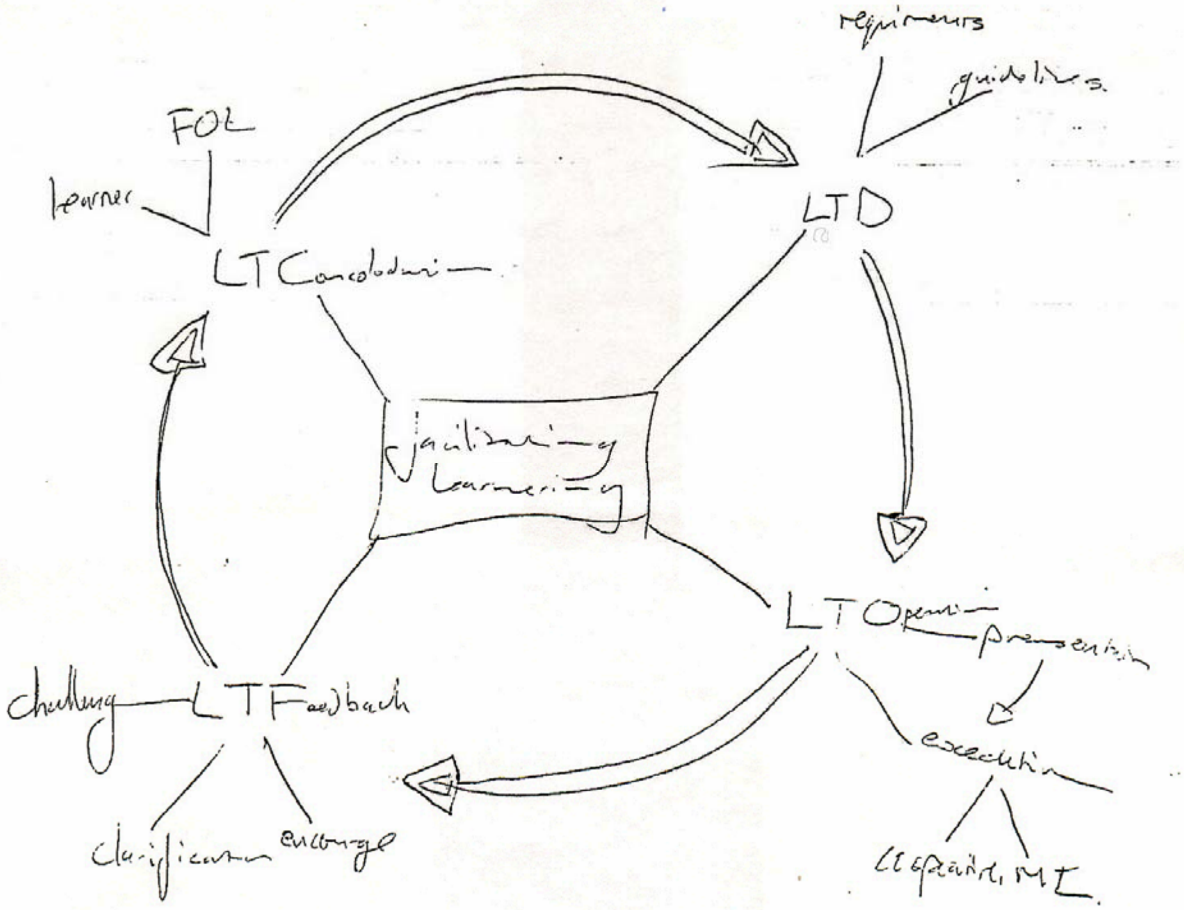
1. work singulaly.
2. work in groups of 4.

Time allocated:

Period	
1-2	Understanding genetic diversity.
3	Working with probability.

Mack

23/2 (3)


FOL
learner
LTD
guidelines
LTFeedback
challenge
clarification
encourage
execution

APPENDIX III: Chapter 5

Transcripts for interview - Group discussion interview - *11/03/08*

Transcripts for the specialization session - *11/03/08*

Audio cassette

Video cassette

Analysis indicating the categories

A- What would be the quality?
M – Add in the whole process of the life sciences and how the students go about constructing the knowledge for themselves

11.03.04 - Observation with Slabbert and students – University based sessions

Slabbert – the things that I just gave you now is just a little elaboration on the three outcomes for the life sciences and a little about what we spoke about the last time – the whole issue of basically the content that is involved. Feedback from your side – studying the policy documents, what was interesting Karien – you talk about the positive things about what you have read
C – I did not do it – I did not know that we had to do it. He did it.
Prof – Why did we give it to you as a gift? When we give you things we do expect you to study them for the next time. You need to ask.
B - ek het ook misverstaan.
M –It was very interesting - there are a few things that I do not get the connection between the critical and the developmental outcomes
S – did you get one
B- it is somewhere
P – just remember that you must bring everything that I have given to you – we could be working with them
S – Okay let us stay there. What would you describe as problematic for you – the link between the critical and developmental outcomes?
M – Well, I do not really know why there is a distinction between them and I think also trying to put them into the bigger picture of the statement of where they fit in. – they are the overruling outcome.
S critical outcome – overruling
M- They established from the constitution and therefore that comes from that
S- so just looking at what you have said in terms of fl in the life sciences – what does that mean in terms of the critical outcomes If you stand in front of a class and you want to go to class and you want to facilitate learning in the life sciences – what does that mean regarding the critical outcomes-
M – that everything that you do is in line with the critical outcomes
S- You have to achieve the critical outcomes
M – so is it a combination of the critical and the developmental?
S- Let us just go with the critical first and then we can work with the developmental outcomes
C – In the ICT all of these fall in
S – What does dev mean – read the first of the critical and the dev and what would you say is different
S- jah kom
C – here they focus on critical and creative thinking. Here there is a variety of strategies and it can be critical and creative – it is broader perspective
S right, what else
C- identify, solve, make decisions - this is the whole thing of learning more effectively
S – much more developmental than an outcome – how do you develop these critical outcomes - to collect, analyse content – does it seem to make sense so if you reflect on exploring a variety of

strategies to learn more effectively it does not only mean to reflect – you need to be able to use it, to implement it
It is more C said a broader thing – it encapsulates how the critical outcomes is/are developed that is why they are called developmental
M – how the critical outcomes are developed
S – Let us see a –collect, analyse, organize and critically evaluate information – that is an outcome – a critical outcome – how do you develop that through reflecting strategies to – being culturally sensitive when you collect etc…explore etc when you So you are going to develop these critical outcomes through the developmental outcomes – how do you get there – the interplay between these two you want to develop into that and you will also achieve the critical outcomes ….therefore you can see why all of those are critical outcomes
M – working on this going to the they say that the assessment standards are the minimum requirements and further on they say competence descriptors – what are they?
S – You are talking about pg 50 – 51 this is to promote a learner – in other words this gives an indication of a mark – it is to do with assessment – final assessment for a learner in terms of promotion – do not pay much attention to it now – assessment standards – yes you must pay attention to it in each learning task that you design you have to state the outcomes that you want the learners to achieve and the assessment standard
What else is interesting – say about how this relates to everything that you have learnt in the course so far
M – I think a lot of it is related I picked up the same words – learner potential
C- I quickly saw there life long learner
S-pgce developed long before obe and these doc so what we are trying to say
M – the doc came from the course
S- these things tie in very well
M – what do they mean here about high knowledge, skills, integration
S what does it say – principles…and then all of those principles are being discussed – principles in terms of the obe and the basis of how obe works so to speak – very interesting if you want to go there quickly to see what kind of learner is envisaged and what kind of teacher is envisaged.
M - Life-long education
S – quote from the manifesto to what do you relate that - of the course
M – seeing ed as a holistic approach – what you are learning must contribute to your values and how these contribute to your learning
S – the kind of teacher – that is your job
M - describe it as a facilitator but talk about it as a teacher
S- go back to the book – fl and the roles of a teacher - teacher as a mediator – look at that and see what has happened with that and these are the roles and go and do the roles – look at what has happened and the research – then you realise that although it says a mediator of learning and all the other roles which could also be and look at what is required inside then it is simply teaching – why we have deducted from that research that you have to be a facilitator of l and not a mediator of l
C – What is a mediator - meaning
P – mediator – just mediates learning from whatever you wish to whatever you wish –
M – it directs
S -it can be anything just as long as it directs learning. but what do we mean by a facilitator of learning – if you do not have a reason for fac l why fac l – what does fac l have to include
M C – must be construction of meaning by the learner, maximize potential

S how is a learners' potential maximized?
C –by challenging with a problem –
S - what type of problem
C a real life problem –
S- so these are all req for fac l - if you are not doing this you are not fac learning - you have to initiate it and maintain it – why maintain it
C – for life long learning
S- Learning and learning all the time Why would I ask the learners is this the best that you can do – to maximize learning
B- for learners to discover another way
C maximize potential
S – relates to what else in terms of learning quality does it improve it
C – improves it
S – req improvement of learning quality all the time – mediating learning requires – you can do anything you like – if you want to mediate learning do what you like – chalk and talk do it exp do – but there is no thing that demands and have the requirement that you have to do this – big difference – both instances mediate learning but the one fulfils the requirement of education whist the other one not necessarily – right an imp issue why fac l and not mediate learning – as we said last time for all practical purposes what you learnt in grade 10, 11, 12 – basically the same things still in grades – a few new things that you have not learnt about indigo know sys – what do you think is indigenous knowledge?
C – ind people the Tswana people – like the lobola thing – that is more cultural – but is indigo knowledge for them.
S – right – relate it to the Life Sciences – what would the indigo know for the indigo people of SA have to do with Ls.
B – Maybe they use some indigenous plant to cure it
P - all the health issues and using the natural remedies –naturalistic ways of dealing with health – there is an enormous wealth of knowledge – indigenous know – in Amazon – orchid – has a cure for cancer – they know it has but they do not know how to extract it yet. Which is valuable to us. It is not unfortunately not much of it has been practiced – it has been infused with western capitalist knowledge – that really made a mess of that as well. - World conference - sustainable dev – try and recall how ik could be valuable for us in terms of sustainable dev - think about the indigenous people when they were in SA long before agriculture – what happened there - take the Bushmen
B- they had ways of doing things that were basically thought out by them ---
C - Tracking
M- everything they did had to be sustainable
P – They had mechanisms that they could use to be able to sustain – we need to get hold of those things again.
C – Why did they not keep on existing – they are almost uitgestap – extinct
B – they are tourist attractions in the Kalahari
C – if their things were so good
S- The way in which they had a sustainable they would never run out of food – they instinctively tallied the animals all the time, knew the offspring of the animals and they would not kill an offspring – the way in which they worked was crucially important, we do not even know all the bottom-line thing of how they went about their tasks. We are not even talking conservation – what are we talking about

M – preservation
S – no that is even more
M – at a number of game reserves you have all the partnerships – no fences around
S- now environmental management than a conservation or preservation
So Ik is incredibly valuable to us which we need to explore – esp people like the Bushman who knows so much about nature – no water and they lived. Somewhere in west Africa – arid region – baobab tree – get a big one and the place where the branches start to grow – make a hole there and then hollow out the tree to just so far above the ground – what do you think happens?
M – collects water or something
P – becomes a water pit
S – fills up with water
C – for itself
S- yes from the root pressure – it fills with water – think how much botanical knowledge did they have – they did not know what a xylem vessel looked like I am not saying that you do not need to know what a …cell looks like – you need to determine what is more important – that is the wonderful thing
They know not to damage this and this – this gives the water, this gives the food – they do not have to study the botanical knowledge – right good – go through the doc – see what is in there in relation to what we have discussed. You will use the outcomes and assessment standards all the time when you are designing your learning tasks
M – what is a manifesto
Prof – it comes from the constitution –
M – so does the constititution come from a number of manifestos
S- yes. I just want to quickly talk about what will happen when you go to the schools. You will meet you mentors. The purpose of that week –is twofold – you are releasing the mentor to come to the course – you will be a tutor. The teacher will give you the work that needs to be done – you will have to see that they continue to work
C – can some of the mentors not attend
S – we are expecting everyone –we are dealing with some new transformation learning – met-learning. The other function – you will collect the programme – the teacher needs to sit down with you and say from this point you will need to
We are going to ask them to supply you with tests and examinations so that you k now what will be expected. Remind the teachers – What do you need the learners to equip themselves for the learning – week programme – planning – all these things will help us then because in the afternoons we will be working on what you require to know. Establish from the teacher where do I need to start and where do I need to end. In the afternoons when you come back we can devise some means of how we are going to manage that. I hope that you are all in gr 11 – so that we can really support one another – get excellent work done.
The relationship between schools is a very sensitive thing. We need to be very creful – schools are running at a pace -
We do not want to interrupt the school programme – teachers willingly dong the mentor programme but you are taking 40% of their programme – but the teachers also have to assess you
Just remember what you are going to experience in the school may be very different from what you have exp and learnt up to now. But you do see the doc and the policy with regard to what is expected. We have spoken about – even though obe 1997 – some schools are not there yet even today – transformation a very long process. I would also like you to in addition to what you need to

do at the schools - go to the lab and interview the lab manager - could that person give you in very broad terms what is where and why. Be diplomatic when you ask this - the teachers at schools are very busy - the
Look at what the laboratories look like - what can you learn from this how will you organize your laboratory
A - yes, looking at all the safety aspects as well
s - what we want you to learn what are the possibilities for a laboratory to be arranged. Look At the study guide - I will also give you information.
We will be using a number of labs very often - natural Science labs. We would like you to - so when you design a learning task you need to be able to do that before you get the learners to do it. You can then design the pracs in your own time. Go through the study guide - what it contains write down questions - study guide before the pgce programme - we will tell you what goes where Weare going to the labs next week -
M - what do we need for that
S- go through the study manual to get a feel of what it says - we are taking a different view pt and we need to organize our time
S- now the question I would like to ask - how much relevance could you detect from here and the work we have done in the rest - all the modules
M- are all inter-related,

B-1 also wanted to say ethics and law and assessment you need to know that no matter what C- the holistic viewing
S - have you been chatting to your peers and compared what you do in your programme and what they are doing.

11/03/04 ---- CASSETTE TWO

Prof - What are your concerns for this coming period and the way that you must prepare yourself etc. what are your concern?

C - going to school now, the unexpected, the unfamiliar, I do not know, I am going there --I do not have a clue - which standard or grade I am going to be at ..... .
Prof - Lots of these things will be cleared up, you will meet the learners you will be involved with. I would like you not to get involved in teaching when you are there next week. Do not set yourself up in the role of the teacher ... I do not want them to see you in a role that you are not supposed to be in - you must keep on tutoring ...
M- When we do, not next week, will we take one class or will we take teachers classes
Prof - We request that you take 40% of the mentor educators workload and you should not go into different grades ... stay in one grade - it will take up to much of your time - preparation time ..... we do not want to overload you with a lot of stuff - we want you to be experienced .... and start to become the best facilitator that you can become
C - we are basically going to be .. find out from the teacher observe what her class works like and spend the whole day with her

P - yes, on Monday you will basically what the teacher does you will basically shadow the teacher .... .it will be a good idea to get to grips with some class culture, also open up your senses so that you can get a sense of how you can approach the learners. You already have had a little glimpse of what a learning task looks like - so you know more or less about that ... We are talking about preparations for next week. When you come back on Monday see that you bring all the working knowledge and the documents - when I say working knowledge - that
you know what the documents contains ..... and you are able to work with them ..... .
You must go to the school and you will be allocated a teacher - they will allocate you a teacher .... The relationship between us and the school and although we have a kind of contract it is not really a binding contract we do not have that kind of authority. We are at the mercy of the schools, principals ... It is important that you understand that what is happening out there, can be the widest range of things that you can imagine ....
There are teachers out there doing excellent work .... they might intuitively be doing lots of facilitating learning, also do very good OBE some ofthem very consciously ... you may get that spectrum you may also get zero from teachers ... take whatever you get ...
. . .. When we ask the mentor educators to attend sessions - principals at school - what about kids that will be staying behind---we have to see the teachers for three mornings ..... Will the teacher do all the work of course we say that you will be doing the work ..... we have to say that - it is difficult with someone who has been in a relationship with kids .... after first school -based session the principals phone and ask ---could that student be coming - you are at selling value
We have to guarantee that the learners will learn and do the work that you have set out for them
Teachers get the sense that they can also learn something from what is happening her ... even if you have what you may call a poor teacher there is a lot that you can learn, if not from the content area .. but in another way the way in which the relationship in the class is handled .....

Reflections

Prof - I'm finished and now we can have a look at reflections
A - Who decides when you are finished, Prof Ask them who decides when he is finished ... ? C - He says that he I finished same as he did now I am finished - what you want to know, any questions, can we reflect, any insecurities ...
A - So does he have power over the situation right now ....
M - I think that he did just ended offby saying - we are finished now but I think before that he always asked us - is there any thing that we want to ask about the programme
A - are you comfortable with that situation
M - comfortable - yes ....
A - are you comfortable with that situation
P - I am always really looking for more, the more reaction from your side. The more we can learn from one another - so when I indicate something like we are at the end of something - perhaps what is more important to me for you at that point in time for you to reflect more deeply into what we have done. - what we have been saying. When you were talking about that I was thinking about this,- you know about this .... when will this come into play or things like that it will be good if you get into that mode - I know at the beginning it is really something that you are not thinking of - but to me it is always something - and you will also if you are facilitating learning much more, you will also need to get much more, need to get much more from you and eventually it does not really matter

what kind of thing, that comes from what facilitating learning comes from - you take whatever comes and you make of that what makes a learning situation.
A - Can I just carryon that angle and then we can start reflecting - the question came to me just when he said that - thought I had to ask it ..... you said I am finished - who was the person - who was talking - you were the person talking at that point and when you came to the end of that particular session - it is always the person that is speaking and when they say I am finished it is almost like the closure of the session is now in place. They have decided that the closure is going to be in place -if we are sitting with a group of people - do we not negotiate closure ..... do we assume now that closure is in place and we accept it ... I am also getting you to think of it in another way as well - that you as a student - can you not say , well at this point - there is something I still want to talk about .....
C and B - We know we can ask him something ... K . I also agree he said I am finished now but we can ask him anything - it is sort of saying I am finished - now go on .....
A- But you see it is important for us to work with those dynamics - we need to reveal the dynamics - it is good enough to say .... yes you know but did we understand that initially without you having stated it and saying it .... If he says that we know that we can ask him something afterwards even though he has said that I do not know if you want to say something.
P - No - I think what they were just saying - it is really important to ask them - from the beginning when we were working how did you feel about that - were you feeling that you were comfortable enough to say something else or have you just said - Mike were you cut off was it okay to carry
on ..... .
B-1 think if I still want to know something I would ask it even if you want to know it or not. You can say you are finished and I will still ask you - if you get up and walk off and I will run after you and still ask - so yes I did know, I will ask.
P - When you have been asked a question and you give a particular response and that response does not seem to have been taken in - how do you feel about that ----Bertha?
Bertha - response not taken in .....
A- I can share an instance with you - where that actually happened - you asked her about the policy document - and you were saying something, it was to do with the outcomes ---and you said something - Bertha started to give her response - to say developmental- you said already done
.... developmental is already done ... Slabbert said no; no; no.
B - Jah, I already attacked him about it last week.
A - Can we talk more about that - I need to write down the points - what did you attack him about last week.
B - What I do - I think aloud ..... most people do not understand I am sitting there
Last year in pharmacology I would sit there just before an oral examination and I would say do not listen to me -- I need a piece of paper... I think now I do not have a piece of paper .. maybe this is it ..... .I am not answering - I am just reasoning ... .I am reasoning out loud .....
P - What is important to me and I am glad that you are picking it up - just as clarity as information this is my personal deficiency in the sense of what we are doing and if you have been in this business for so long -what I am talking about - if you been in the business for so long - you basically to a large extent know exactly what the students will be asking you and it is not because you do not want the question to be asked - it is because you know that dealing with that question the effort and the labour and the sense of rather not going in there because of time that will elapse because of
that .... then this is my reaction ---.So when Bertha said - I immediately sensed what she was actually

reading -you were reading the correct thing and reasoning the correct thing .... .It remains important to me that I must be more conscious of having you ask the question because you haven't gotten to the reasoning of the question ..... 1 have not got you to the reasoning of the question - so it is a deficiency from my side which I need to pay attention to so you do not worry about that just remind me about that ... If you have a question or you are busy saying something and I am interrupting you, you have not really cleared your mind, just tell me

M - slap your hand on the table

P - Jah slap your hand - it is important to me - so help me in paying attention to that deficiency - so you need to go through the argumentation of the question - you need to go through that process and if I stop you going to that process then you going to that deficiency - once in that regard

A - How do we take that situation and turn it into more of a learning moment for everybody ..... B - Can I answer that?

A - Yes I was going to say let the student answer ...

B-1 do not know if it is wrong - lam used to I do not know if it is the way we were educated or whatever ..... but I am used to sort of you send your mind in a certain direction - knowing that there will be someone to say No that is not so ... so in an instance like that you will say no that is not it, that is not what I am looking for then immediately you start thinking about something else, but when you tell me No, I immediately do this I do not know the answer.

A - At the same time now take it further - no it is not that - take it more into a learning moment what could we do with those particular learners - and what could could have been done in this type of setting - Should we be exploring from you why you are thinking that way - how do you feel about it .....Carinne - are you confirming ..... .

C - Yes we can explore what you are thinking or then ask those questions like the clarification question -

B - Why are you saying that?

C - What about that and what about, we can come in and say what we are thinking

B-1 think that that will get more of a discussion going instead of just answering the questions that are shooting around ...

A-Ok

P - Very good

A- I do not think that the reflection should come from me essentially - I think that I have started it off and all of us must be part of it because it is participatory ..... and possibly what we should be doing and this is a change that possibly must come in for the next session is that as we are going through the afternoon session, ifthere is something that you need to say something, jot it down and then during the reflection session you say it and give the example - sometimes when you jot it down - you read it and then you say eeh what is this all about ..... so when you give the example

and you give the person who said it - then everybody has a sense of what it is that you are talking about ... the next time around - write reflection, have a page, have a pen, write the person and then write the comment the thing that you want to be elaborated on ..... .

right now we are asking you to reflect but at the same time it almost like saying mmmmh you know go back - to which part should I be going back to - sure you go back to probably the most important part for you ... at this moment in time .... but it was important - but something else was more important to you ten minutes ago - so what is the sense of strategy that we are going to be working with and how do we need to go forward. What are the burning issues for you that came through for your things that you would like to reflect on .... We started with the **response and the type of behaviour that Bertha has when she wants to give a response to a particular question ... .is** there

anything else that people would lik **- How are you understanding a reflection how do you understand it ...**

C - I think that the whole thing on reflection is kinda what you did and what you learnt about it how you feel about it, jah, that is what I understand about it. .. reflection
P -what else
B - Carinne said - What you have learnt P
- You have learnt something ...
M - going over all the important things that you think has been discussed and how you sort of assimilate that in your own life.
B - Sometimes I add something really important that I have learnt also into my reflections - like an important fact - before I forget
A- When you say you add an important fact - how do you do that -
B - Jah, I know the other day, I think it was - Prof ... classes - he was saying stuff that was not in the notes ... he was saying stuff that was really interesting, that I wanted to remember, so I added it to me reflection
A- So when you added it to your reflection are you saying that you added it to your journaL .... B- Jah under what Carienne said - the reflection to her and also to me is what you have learnt ... something interesting - I have learnt that I did not know and that I am not going to find anywhere else - I write it down.
A- So at this point do we take it that the reflective journals are turning pages - do you understand what I mean by that
B - it is a page
A ... so there is movement in your reflective journal if you had to take yourself through your reflective journal - do you see your own path from where you started your first snippet to where you are now ..... can you see yourself in what you have written .....
B - It is not me just - mine is just jah, but you can see from what I knew up to what I know now, so there is movement
K - in the feeling thing you can see yourself but not the fact that I have learnt this ... not the fact.. .....
P - Have you, have you learnt - has the lets be very crude - has the quantity of what you were writing - has that increased some what - not necessary ----
K - I have to think back ... .
M - She has got it here .....
B/C - mine is also the same ....
B - Well the first one ..... at Hammanskraal---was nothing like this .....
P - What is your perception - what should happen? What do you think is the value of reflection for you ..... perhaps to put it more crudely? Are you reflecting just because we asked you to reflect - in the sense of been part of this research or do you think there is value in doing it. .....
M - I think I am doing it because you said we should do it but I definitely think there is value in it ..... after doing it - I really realise it actually thinking deeply about what we had done in the session - actually - jah, has really made it clearer- jah.
P - So if I then can make a comment from my side and that is that - I think I did at sometime in Hammanskraal - somewhere - I talked about this honours student that I had - she had some personal problems and she had to write an exam and she - there was no way she would pass that

exam - she did not have the time to learn the material-that she was supposed to learn .... .1 told you what happened - I basically said go back home - because she had that afternoon to learn that is all she was writing the next morning - I said to her go sit down - without opening a book start constructing a concept map on everything that you have learnt - and she did. She started and I said you think that you have exhausted yourself - just think harder and carry on .. and she passed her exam with flying colours - because what did she do
M - reflect
P - she reflected so therefore what we might even expected this ...
Be aware of how important this could be for you - this reflection as opposed to or as part and parcel of what you need to know - but then also to help us - we need to learn from the process as a part of the research, so therefore not to be an add on .... but to be part and parcel of what you are doing ... and I think Carienne - you said a very important thing - in terms of your feelings it would be kind o interesting to somehow really reflect on your feelings even if you feel kind of mellow about them,
I, we expressed that feelings is really part and parcel of learning and how is that influencing us, so we kind of need to be a little more conscious also about ..
You know like Mike he is bored now
M - I always play with a pen- you must not pick on me
P - I was really bored when we had this, this - that is okay - do not make it artificial, it must be genume-
C - So we can say if we were bored
P - Of course - absolutely and especially not to say I was bored but from this point to this pint I was really bored .... But also then say why - you know it did not touch you .... .it was something that you knew or was it really important to us ..... that next time say in terms of reflection - comment - I was really bored with, I could not see the sense because I could not see that- could you just give us the sense, the meaning of what we are doing - I would like you to tell us when it is really becoming boring

C - No, it is just that I did not read this .....
A - Should you progress if only one student has read what has happened and the others have not because then you are only talking to one person and I think that is where that sense was picked up because just in watching you at the side of my eye - while I was writing - it was like you know
looking towards him ..... .it is almost like he was going to be the source, give it out .....He will be the source of whatever you were going to be requiring at that point ... .If I say things that sound, that you think are wacky, I am a bit wacky - but if I am putting too much into it - then you must say - no, no you must say that is not the way I thought, you must say that, because obviously I am sharing my interpretation, it is my interpretation ..... .it is not yours .....so I need to clarify that as well for all of us ..... .
P - Angela - what is also important is everything that we do - whether it is really material or we are working on the reflection - I think everything you also need to assess in terms of its value in other words let us take a very simple example ..... and you feel uncomfortable with asking me questions I am going back to the power issue- if you for instance feel that it is very high value in the fact that we need to look at the power relationship and you know that you are feeling uncomfortable with asking me questions or getting deeper into a thing - then do that - but if it is not an issue to you but you need to really be very conscious that it is not an issue and it is not because you know Slabbert is here and that is why you are doing it. So also validate everything that we are doing with u , is it really important, is it really meaningful to you - because one thing is for sure - that if the power

relationship me in terms of authority with you is too authoritative so that you do not feel participants in the situation then something must be done very seriously - but if u feel no it is not really, then we step up from the power thing and we do not even try to explore it. So when issues come up which u feel really oh yes this must be addressed - like for one thing I would like to say the thing I said earlier is when we give you some material the expectancy, he assumption is that will go through - not that you must learn it off by heart
but go through it so that you have a working knowledge of what it is really about ..... unless you say something else and then we work from there .....
A- At what point was that shared with the students.
B - it is just Prof - I do not know where or how I got the impression - but Prof said here is something for you to look through. Next year for the other students tell them directly so that they understand what is expected of them
C - we were not told that this is something important - I did not understand that it was something that was necessary to know.
P- This is very important - what you are saying now - it is very important because the way in which we handle this and the way in which you took your que more because I did not say enough you took your que real firm ..... it was indeed my mistake not to over elaborate from this - from my position then I want to make it quite clear- when I give you material it is expected that you go through it - but when I give you material and I say this is important to study - then you really need to study it ..... that means when you get in here you need to know what this is all about and when - so I will make a point of it then to be much more clearer in statement of what you need to do with material - although basically
A- I put down clarity about materials for sessions - these guidelines should be set out in the beginning - so that they understand the operational aspects as well to ....
B - if it was another week - I had so much to do - I would have done it - read through it

Side B videoooo

P - In this course you are required to improve your practice theory - you are required to build on through what you experience .....this is different from other courses - here you are required to build from this ---You have realized up to now that you needed to have your concept map (practice theory) ready for facilitating learning but we have not touched on that yet. .... the assumption is that it is ready - at anytime we can use it, it is not a question of now I must tell the students to get it ready. This makes it very difficult - you are not doing tests and exams - so the tendency would be to whom we must submit it - so it is dangerous not to keep up

A - Karien I kind of wonder why you did not challenge Slabbert more specifically on the whole issue of Indig knowledge and why could that IK not be used later - he started talking about western capitalism .....you stated if the mense were so good why did they go extinct.. ..... .
C - he clarified that
A- did he clarify
C - he did clarify it more ....
P - I think that was the whole thing I could see psychologically that she was going there and from the inter-relatedness of what she was talking about.. .. 1 think what Angela wants to say - do not at

first response just accept - keep challenging until you are really satisfied --- there may be points in time when I will say we cannot discuss in depth take a note of it and do bring it up

A- the whole thing of challenge and remember what you are looking at - if you can do it here, you will be open to this type of setting when you are in the classroom.
I was tightening up a bit - when you started to share the experience that they will meet up with in the classroom - I was thinking - no let them come back and tell you - But I can understand why you did it - you are somehow setting the boundaries and somehow or the other you are relaxing them because they are anxious - so you are trying to relax them
P - yes normally I would not have said - I am glad that you bring this up - it is kind of sad to say that sometimes it is so shocking - the reason being you have been in an environment of expectation- you think that you are going out there and to meet opportunities ..... this is what we are trying to protect you from -you might get into a situation that is wonderful but you could get into a situation that is bad ...

My experience - I went to a school here in Pretoria - one of the top schools to see a student - a cold day I was told to sit in an open passage where the wind was blowing - I waited for ½ hr - the principal came out of his office - did not greet meI want you to be aware of the experiences that you could have - you must not say that we did not tell you .....
Do you feel that you are progressing?
M - I feel that I have definitely progressed over these sessions - but definitely I do not know where we are going from here -
P - at least you have an idea of what the learning tasks look like what are the things that you need to be able to create, how that will really get to the ...
A - In terms of the whole essence and idea of progress when you are progressing is there an endpoint that you are looking towards
M- I see that we have done a lot of theory - base - of Life Sciences etc. I am looking towards finding out on how to facilitate Life Sciences in the classroom - get down to it in the lab
A - Last issue - school setting - reI between school and university
Remember you were told about the sensitive relationship bet univ and school --- you started ques about the grades- why can you not ask which grades you can take ..... How do you feel about that - knowing that you are going to the school and knowing that the relationship is such a sensitive one C - Now, I feel scared of screwing up because it is such a sensitive issue .. .ifI screw up then they will say you are not coming here again - no-one ... makes me kind of nervous ....
M - I have been nervous about it and also that the teacher has to give 40% of her time ..... - the responsibility - I was speaking to another teacher who said that is quite a lot of time .....
B - I feel responsible and will have to keep from trampling on peoples' toes.
P - Previous students would go for three weeks and in the first week no teaching ... then teach 2 lessons per day ..... what happened there is the students did what the teacher told them to do .. there was no time to do what they were trained to do - they learnt the opposite of what they were trained to do - they would just do what the teacher told them .....now you are in the situation you have to take responsibility .. a big one on your side a big step of courage that the mentor educator makes ..... .
P - just a reminder - we are saying this especially running for next week - hard work .... It is going to be hours and hours .... We will keep to a scheduled time ..

We need to have the learners exp ther material - the theoretical stuff ...

PREPARATION FOR THE SCHOOLS .....
P - yes normally I would not have said - I am glad that you bring this up - it is kind of sad to say that sometimes it is so shocking - the reason being you have been in an environment of expectation- you think that you are going out there and to meet opportunities ..... this is what we are trying to protect you from -you might get into a situation that is wonderful but you could get into a situation that is bad ...

My experience - I went to a school here in Pretoria - one of the top schools to see a student - a cold day I was told to sit in an open passage where the wind was blowing - I waited for 1f2 hr - the principal came out of his office - did not greet mel want you to be aware of the experiences that you could have - you must not say that we did not tell you .....
Do you feel like you are progressing ..... .

now you are in the situation you have to take responsibility .. a big one on your side a big step of courage that the mentor educator makes ..... .
P - Just a reminder - we are saying this especially running for next week - hard work .... It is going to be hours and hours .... We will keep to a scheduled time ..
We need to have the learners explore - what we need to do .... need to gather material - the theoretical stuff ...

<u>ACTION TO TAKE</u>
Prof
I just want to quickly talk about what will happen when you go to the schools. You will meet your mentors. The purpose of that week -is twofold - you are releasing the mentor to come to the course - you will be a tutor. The teacher will give you the work that needs to be done - you will have to see that they continue to work
S - we are expecting everyone -we are dealing with some new transformation learning - metlearning. The other function - you will collect the programme - the teacher needs to sit down with you and say from this point you will need to
We are going to ask them to supply you with tests and examinations so that you k now what will be expected. Remind the teachers - What do you need the learners to equip themselves for the learning - week programme - planning - all these things will help us then because in the afternoons we will be working on what you require to know. Establish from the teacher where do I need to start and where do I need to end. In the afternoons when you come back we can devise some means of how we are going to manage that. I hope that you are all in gr 11 - so that we can really support one another - get excellent work done.
The relationship between schools is a very sensitive thing. We need to be very careful- schools are running at a pace -
We do not want to interrupt the school programme - teachers willingly doing the mentor programme but you are taking 40% of their programme - but the teachers also have to assess you
Just remember what you are going to experience in the school may be very different from what you have exp and learnt up to now. But you do see the doc and the policy with regard to what is

expected. We have spoken about - even though obe 1997 - some schools are not there yet even today - transformation a very long process. I would also like you to in addition to what you need to do at the schools - go to the lab and interview the lab manager - could that person give you in very broad terms what is where and why. Be diplomatic when you ask this - the teachers at schools are very busy - the Look at what the laboratories look like - what can you learn from this how will you organize your laboratory
A - yes, looking at all the safety aspects as well
s - what we want you to learn what are the possibilities for a laboratory to be arranged. Look At the study guide - I will also give you information.
We will be using a number of labs very often - natural Science labs. We would like you to - so when you design a learning task you need to be able to do that before you get the learners to do it. You can then design the pracs in your own time. Go through the study guide - what it contains write down questions - study guide before the pgce programme - we will tell you what goes where Weare going to the labs next week -
M - what do we need for that
S- go through the study manual to get a feel of what it says - we are taking a different view pt and we need to organize our time
S- now the question I would like to ask - how much relevance could you detect from here and the work we have done in the rest - all the modules

Chapter 6 – Appendix IV - Bernice - Learning Task 1 & 2

APPENDIX IV: Chapter 6

6.4. Bernice – Learning task 1 – Human Skeleton

6.4.1. A. Step 3: Planning Action -

6.4.1.1. Learning task design (See Appendix for a copy of the learning task designed).

6.4.2.2. A. Learning task assessment

Learning task 2 – Human Circulatory System

Not in

6.4.1. B. Step 3: Planning Action -

6.4.1.1. B. Learning task design (See Appendix for a copy of the learning task designed).

6.4.2.2. B. Learning task assessment

Concept map

Leertaak ontwerp deur Be[redacted] vir uitvoering tydens die tweede kwartaal van Hoërskool [redacted]se gr 10 Biologie: Skelet van die mens.

Leerarea/dissepliene/vak: Lewenswetenskap: Biologie

Vlak of fase: VOO: Gr 10

Leeruitkomste en asseserings standaarde:

Soos uiteengesit in die "National Curriculum Statement Grades 10-12" vir lewenswetenskappe.

Leeruitkomste	Asseserings standaarde
Scientific inquiry and problem-solving skills	1. The learner identifies and questions phenomena and plans an investigation. 2. The learner conducts an investigation by collecting and manipulating data. 3. The learner analyses, synthesises and evaluates data and communicates findings.
Construction and application of life sciences knowledge	1. The learner accesses knowledge 2. The learner interprets and makes meaning of knowledge in life sciences 3. The learner shows understanding of how life sciences knowledge is applied in everyday life.
Life sciences, technology, environment and society	1. The learner explores and evaluates the scientific ideas of past and present cultures 2. The learner compares and evaluates the uses and development of resources and products and their impact on the environment and society. 3. The learner compares the influence of different beliefs, attitudes and values on scientific knowledge.

Probleem gestel aan leerders:

Agter in die klas is daar vir elke koöperatiewe leergroep 'n skets van die menslike skelet. Die skets mag vir julle vreemd lyk, omdat daar veranderings aangebring is deur 'n Ortopeet.

Jul taak as groep gaan wees om te bepaal of hierdie verandering tot voor- of nadeel van die mens sal wees, en wat die implikasie van hierdie verandering is.

Alle nodige inligting is op die uitdeelstuk.

Tyd toegeken:

Die leertaak word oor die bestek van vyf weke aangebied. Dit begin 19 April 2004, en eindig 21 Mei 2004, wanneer die verslae ingedien word.

Tydens klasperiodes word aanbiedings gedoen deur die betrokke groep en daarna word tyd gelaat vir vrae vanaf mede klasmaats. Gedurende die daaropvolgende periode word 'n toetsie geskryf.

Wanneer daar 'n dubbel periode is word twee groepe toegelaat om hul aanbiedings te doen, en die toetsies word in die daaropvolgende dae wel ingehaal, sodat daar tyd is waarin die leerders op hul eie, tuis deur die werk kan gaan.

Leertaak voorbereiding:

Ter voorbereiding van die uitvoer van die leertaak moet die klas verdeel word in koöperatiewe leergroepe (indien daar nie reeds groepe bestaan nie). Dit word gedoen deur die groepe saam te stel in terme van prestasie, geslag, kultuur, en heel laaste, deur vriendekringe te skei.

In elk van hierdie katagorië word gepoog om so 'n groot verskeidenheid as moontlik in een groep te plaas (heterogene groepe). Neem die vorige termynpunt wanneer daar na prestasie gekyk word.

Die klas word verdeel in min of meer agt groepe van vier elk, waar moontlik. Hierdie syfers mag verskil, afhangende van die grootte van die klas. Daar sal egter agt sketse beskikbaar wees. Indien daar minder groepe is kan die oortollige sketse aan van die sterker groepe gegee word. Gebruik eie diskresie in die verband.

Laastens moet daar tyd gelaat word waarin die groeplede mekaar kan leer ken. Gebruik die res van die periode, waartydens groepindeling plaasgevind het, hiervoor.
Terwyl die leerders onder mekaar gesels, gee u aan hul die opdrag om 'n verteenwoordiger aan te wys. Hierdie verteenwoordiger trek dan uit 'n hoed

die deel van die skelet wat hulle sal bestudeer. Op dié manier het alle groepe 'n gelyke voordeel wat betref die dele van die skelet wat behandel gaan word.

Klasorganisasie:

Leerders sit op hulle gewone plekke voor in die laboratorium, totdat hulle begin werk in hul leergroepe.

Wanneer hulle individuele werk verrig, word vereis dat hulle weer op hul normale sitplekke kom sit. Tydens hierdie sessie word geen kommunikasie toegelaat nie!

Die sketse wat deur die leergroepe bekyk gaan word, word agter in die laboratorium op die banke uitgesit. Merk duidelik watter groep waar moet gaan sit hiervoor.

Ware leeromstandighede:

Aangesien dit 'n ware lewensprobleem is, bly die leerders hulleself, en bly die fasiliteerder ook hom-/haarself. Daar is dus geen rolspel nie, en die oplossing van die probleem is tot voordeel van die leerders self.

Bronne:

- Sketse soos voorsien
- Bronne van enige aard wat in die klaskamer self is, of deur die leerders verskaf word, word toegelaat.

Finale resultate van leertaak:

Wat word verwag van elke leerder?

- Die finale produk uitkoms: Sien aageheg
- Proses gevolg om die probleem op te los, in die vorm van 'n geskrewe verslag, individueel ingedien vir assesering: Sien aangeheg vir voorbeeld
- Kennis bekom: Volledige kennis van die hele afdeling oor die skelet soos uiteengesit in die "Ken en Verstaan" vir Gr 10, Hoofstuk 9: Anatomie en Fisiologie van die Mens - Steun en Voortbeweging. Die volgende basiese konsepte word aangeraak, en word van leerders verwag om ten volle te verstaan en daarop te kan uitbrei:

Die skelet verdeel in die Asskelet en die Aanhangskelet. Die Asskelet bestaan uit die skedel, werwelkolom, sternum en ribbe. Die Aanhangskelet bestaan uit die skouer-en bekkengordel, en die boonste-en onderste ledemate.

Metodes van assesering:

- Leerders van elke groep stel 'n tien-punt toetsie op vir hul mede-klasmaats (10)
- Weeklikse klastoets, soos vasgestel deur die huidige sisteem
- Uitkomste bereik as probleem opgelos is
- Assesering van verslag soos ingedien deur elke leerder. Dit geskied volgens 'n rubriek soos hierby aangeheg.

Neem kennis: *verwys asb vir duidelikheid na "Spesifikasies".*

Instuksies, Spesifikasies en Vereistes

Die probleem soos in die klas gestel:

Agter in die klas is daar vir elke koöperatiewe leergroep 'n skets van die menslike skelet. Die skets mag vir julle vreemd lyk, omdat daar veranderings aangebring is deur 'n Ortopeet.

Jul taak as groep gaan wees om te bepaal of hierdie verandering tot voor- of nadeel van die mens sal wees, en wat die implikasie van hierdie verandering is.

Spring aan die werk!

Verdere instruksies

- Gedurende periode een word daar van elke leerder verwag om individueel aan 'n plan van aksie te werk oor hoe jy beoog om die probleem op te los. Dus gaan elkeen nadat jy die skets beskou het weer terug na jou plek en begin dan op jou eie werk aan 'n moontlike oplossing vir die probleem. Daar sal vir elkeen 'n skets beskikbaar wees om op jou eie na te kyk.
- Onthou: Hiervoor kry jy een periode kans
- Vanaf die volgende periode werk almal in hulle groepe saam aan die oplossing van die probleem. Onthou die volgende:
    1. Elke groep gaan 'n aanbieding kom doen voor in die klas sodra hulle gereed is met hulle uiteindelike bevindinge.
    2. Daar word van elke lid in die groep verwag om 'n spreekbeurt te kry.
    3. Daar moet 'n groot skets van julle deel van die skelet wees, met volledige byskrifte van al die dele wat daarop voorkom, sodat die res van die klas goed kan volg. Julle kan transpirante ook gebruik.
    4. Julle aanbieding mag met behulp van enige medium geskied, mits daar voor die tyd met my die nodige reëlings getref word.
    5. Daar sal gelet word op julle gebruik van wetenskaplike feite, asook op die gebruik van die korrekte biologiese terme.
    6. Onthou om na die verandering te kyk in terme van die implikasie wat dit op die hele liggaam sal hê, en nie net op 'n klein deeltjie daarvan nie.
    7. Daar word net die absoluute beste van elke groep verwag, en die fasiliteerder het die reg om op 'n verbeterde weergawe aan te dring.
    8. Aan die einde van 'n aanbieding kom die groepe bymekaar en skryf kommentaar neer oor die groep wat aangebied het.
    9. Stel 'n toets op.
    10. Dien 'n verslag in vir assessering.

Spesifikasies vir die toets aan mede-klasmaats

- Die toets tel uit 10
- Die vrae mag enige hoeveelheid tel
- Vrae mag slegs handel oor werk wat deur julle in die klas aangebied is, en mag geen "onmoontlike" vrae bevat wat julle in ander bronne raakgeloop het nie
- Alle toetse word deur my gemodereer die dag voor julle aanbieding. Dit is elke groep se verantwoordelikheid om die toetse asook die memorandum betyds aan my te besorg. Geen toets word sonder 'n memorandum aanvaar nie.
- Toetse oor 'n betrokke deel van die werk word geskryf in die direk daaropvolgende periode, en deur die betrokke groep nagesien.

Hoe word die toets gemerk?

Die toetse word geskryf aan die begin van 'n periode. Sodra almal klaar is, word die toetse opgeneem deur die groeplede wat die aanbieding behartig het, en weer uitgedeel in 'n geskommelde volgorde. Niemand mag dus sy eie toets merk nie!

Hierna hanteer die groep wat hul aanbieding gedoen het die merk van die toetse. Hulle moet die memorandum voorhou, vrae hanteer en ook verduidelik as iets onduidelik sou wees.

Riglyne wanneer die res van die groepe die aanbiedingsgroep evalueer:

1. Het hulle die nodige gedetaileerde inligting verskaf?
2. Is daar aan al die vereistes soos in hierdie dokument uiteengesit voldoen?
3. Het hulle hard genoeg gepraat?
4. Was hulle aanbieding leersaam?
5. Was die aanbieding kreatief en interessant?
6. Was alles verstaanbaar en kon hulle vrae beantwoord?

Hierdie punt uit ses sal deel uitmaak van elke leerder van die betrokke groep se finale punt vir die leertaak.

Spesifikasies vir die verslag

- Jou verslag word ingedien op 21 Mei 2004 tydens klastyd. Geen laat verlae word hoegenaamd aanvaar nie
- Jou verslag word individueel ingedien, geen saamwerk word toegelaat nie
- Die verslag word geasseseer mbv die aangehegde rubriek
- Jou verslag moet die volgende bevat:
    1. Jou naam, van en groep

2. 'n Volledige beskrywing van die proses wat jy gevolg het om die probleem op te los.
3. Die uiteindelike gevolgtrekking, in detail beskryf, waartoe jou groep gekom het. Hierby ingesluit is al die toetsies wat jy geskryf het, heg dit aan jou verslag.
4. Al jou toetse wat jy oor die ander se aanbiedings geskryf het
5. 'n Bronnelys

Geniet dit !!

Rubriek vir assessering van die finale verslag: Skelet van die mens

Opdrag ten volle uitgevoer: Die volgende is alles volledig en teenwoordig: • Portefeulje leêr of plastiese sakkie • Klein toetsies uit 10 • Probleemoplossingsproses • Gevolgtrekking, toesprake of enige ekstra inligting • Toets en Memorandum wat aan die res van die klas gegee is • Eie werk • Betyds ingehandig **Verdien 4/4**	**Opdrag voldoende uitgevoer:** SLEGS een van die volgende is afwesig of onvoldoende: • Portefeulje leêr of plastiese sakkie • Klein toetsies uit 10 • Probleemoplossingsproses • Gevolgtrekking, toesprake of enige ekstra inligting • Toets en Memorandum wat aan die res van die klas gegee is • Eie werk • Betyds ingehandig **Verdien 3/4**
Opdrag onvoldoende uitgevoer: 1. Twee of meer van die volgende is afwesig, of onvoldoende: • Portefeulje leêr of plastiese sakkie • Klein toetsies uit 10 • Probleemoplossingsproses • Gevolgtrekking, toesprake of enige ekstra inligting • Toets en Memorandum wat aan die res van die klas gegee is • Eie werk 2. Daar is inligting ingehandig wat nie deel was van die opdrag nie. 3. Die opdrag is op die meeste twee dae laat ingehandig **Verdien 2/4**	**Opdrag half of verkeerd uitgevoer:** 1. Daar is meer as drie van die volgende afwesig, of die dele wat ingehandig is, is onvoldoende of half: • Portefeulje leêr of plastiese sakkie • Klein toetsies uit 10 • Probleemoplossingsproses • Gevolgtrekking, toesprake of enige ekstra inligting • Toets en Memorandum wat aan die res van die klas gegee is 2. Die opdrag is meer as drie dae laat 3. Dit is duidelik nie die leerder se eie werk nie 4. Die inhoud is duidelik alles uit die klasnotas, of van iemand anders verkry. 5. Die betrokke leerder is deur sy/haar groeplede geraporteer as iemand wat nie sy/haar deel gedoen het nie. **Verdien 1/4**

Learning task developed by B[redacted] to be implemented during the second term at [redacted] High School in Grade 10 Biology.

The Human Skeleton

Learning Area/ Discipline/ Subject: Life Science: Biology

Level or Phase: FET: Gr 10

Learning Outcomes and Assessment Standards

As set out in the "National Curriculum Statement Grades 10-12" for the Life Sciences.

(See document)

Problem put to learners:

At the back of the classroom is a drawing of the human skeleton for each co-operative group. The drawing may look strange to you because certain changes have been made to it by an Orthopedic Surgeon.

Your task as a group is to determine if these changes are an advantage or a disadvantage to people and what the implications of these changes are.

All the necessary information is on the hand-out.

Time allocation:

This LT is taught over 5 weeks. It starts on the 19th of April 2004 and ends on the 21st of May 2004 when these reports are handed in.

Groups do presentations in class , after which their peers are allowed to question them. During the next period a short test is written.

During a double period two groups are allowed to present and the tests are taken during the following days to give them time to prepare for the tests at home.

Learning Task Preparation:
As preparation for implementing the Lt, the class should be divided into co-operative learning groups (if no such groups exist yet).The following criteria are taken into account when forming groups: performance, gender, culture, and finally, by separating friends.

In each of the above categories, an effort is made to include as wide a variety in each group (heterogenous groups). Consider the previous semester marks when grouping according to performance.

The class is divided into more or less eight groups of four each. These numbers could differ, depending on the size of the class. Eight diagrams will be made available. If there are fewer groups, the additional diagrams may be made available to some of the stronger groups. Use own discretion.

Finally, group leaders should be given time to get to know each other. Use the rest of the period for this purpose. While learners are talking to each other, instruct them to appoint a representative. The representative draws the part of the skeleton to be studied by the group from a hat. This approach will not favour any group.

Class Organisation:

Learners take up position in the front of the lab till they start to work in their groups. When individual work is done, they are required to return to these positions in front of the lab. During this session no communication is allowed!

The diagrams to be studied by each group, are arranged at the back of the lab on the lab tables. Indicate clearly where each group needs to go.

Authentic learning conditions:

As this is an authentic problem, the learners are themselves and the facilitator her-/ himself. No role play occurs and the solution to the problem is to the advantage of the learners themselves.

Sources:

- Diagrams
- Any resources from the classroom or provided by the learners, are allowed.

Final results of the Learning Task:

What is expected of each learner?

- The final product outcomes (see table)
- Process followed to solve the problem, in the form of a written report by each individual learner: see attached example.
- Knowledge gained : Sound knowledge of the complete section of the skeleton as set out in " Ken en Verstaan" for Grade 10, Chapter 9: Anatomie en Fisiologie van die mens – Steun en Voortbeweging, (Support and Movement). The following basic concepts are touched on and learners are expected to understand and to extend their knowledge:

The skeleton is divided into the Axial skeleton and the Appendicular skeleton. The axial skeleton consists of the skull, vertebral column, sternum and ribs. The

appendicular skeleton consists of the pectoral and pelvic girdle, as well as the upper and lower limbs.

Methods of assessment:

- Each group sets a 10mark test for the rest of the class members. (10)
- Weekly tests which are part of the school assessment plan.
- Outcomes achieved when problem is solved.
- Assessment of the written report handed in by each learner. This is assessed according to the attached rubric.

Please Note: ***Refer to 'specifications' for clarity.***

Instructions , Specifications and Requirements

The problem as presented to the class:

A diagram of the human skeleton has been placed at the back of the lab for each co-operative learning group. The diagram may look different because it has been changed by an Orthopaedic Surgeon.

Your task is to determine if these changes are advantageous or detrimental to humans and what the implications of such changes might be.

Get to work!

Further instructions:

- During the first period each individual learner is expected to work on an action plan to solve the problem. Each learner will therefore return to his or her seat once they have studied the diagram and started thinking about a solution. Each learner will be given an individual diagram to study.
- Remember you have one period for this activity.
- From the next period groups work together to solve the problem. Remember the following.
  1. Each group will present their findings to the rest of the class.
  2. Each group member will have an opportunity to present.
  3. You should have a large labeled drawing of the section of the skeleton you worked on to enable the rest of the class to follow your presentation. You may use transparencies.
  4. You may use other resources for your presentation, provided you make prior arrangements.
  5. Attention will be given to the use of scientific facts as well as the use of correct biological terms.
  6. Remember to view the change in the skeleton in terms of the effect it would have on the whole body, not only on a selected part.
  7. Only the best is expected of each group and the facilitator has the right to insist on an improved version.
  8. At the end of each presentation, the other groups will be required to write comments on the presentation.
  9. Set a test.
  10. Submit a report for assessment.

Specifications of the test for peers:

- It is out of 10.
- The questions may have any mark allocation.
- Questions should be set on work covered in class and not on information obtained from other sources.
- I will moderate each test the day before it is written. Ensure that the test and memo are submitted in time. No test without a memo will be accepted.
- Tests on a particular section of work will be written the day after this section is completed and marked by the group who set the test.

How will the test be marked?

The tests are written at the beginning of each period. The responsible group collects the tests and redistributes them. Nobody is allowed to mark her own test!

The responsible group manages the marking of the test. They present the memo, take questions and explain where necessary.

Guidelines for evaluating the groups presenting:

1. Did they provide the necessary detailed information?
2. Did they comply with all the requirements as spelt out in this document?
3. Did they speak clearly?
4. Was the presentation informative?
5. Was the presentation creative and interesting?
6. Could the audience understand everything and could they answer the questions put to them?

This mark out of 6 will form part of the overall LT mark for each learner.

Specifications for the report:

- Your report must be submitted on the 21st of May 2004 during class. Under no circumstances will late submissions will be accepted.
- Each report is an individual report; nobody is allowed to work together.
- The report will be assessed using the attached rubric.
- Your report should include the following:
  1. Your full name and group.
  2. A full description of the process you followed to solve the problem.
  3. A detailed description of your group's conclusion. Include all the tests written in this part of the report.
  4. All the tests you wrote on the other presentations.
  5. A reference list.

Enjoy!

Rubric of Assessment of the final report

Human skeleton

Task fully completed: The following is complete and present: • Portfolio file or plastic bags • Short tests out of 10 • Problem solving process • Conclusion, presentations or additional information • Test and Memorandum given to the rest of the class • Own work • Handed in on time **4/4**	**Task satisfactorily completed:** ONLY one of the following absent or incomplete: • Portfolio file or plastic bags • Short tests out of 10 • Problem solving process • Conclusion, presentations or additional information • Test and Memorandum given to the rest of the class • Own work • Handed in on time **3/4**
Task unsatisfactory: 1.Two or more of the following absent or unsatisfactory: • Portfolio file or plastic bags • Short tests out of 10 • Problem solving process • Conclusion, presentations or additional information • Test and Memorandum given to the rest of the class • Own work 2. Information included not part of the instruction. 3. The task is handed in late (not more than two days late) **2/4**	**Task incomplete and incorrectly done:** 1. More than three of the following absent or unsatisfactory: • Portfolio file or plastic bags • Short tests out of 10 • Problem solving process • Conclusion, presentations or additional information • Test and Memorandum given to the rest of the class 2. Task handed in more than three days late. 3. It is clear that it is not the learners own work. 4. Content only from class notes or from another learners 5. Learner reported by her group members as not contributing. **¼**

Pages 39 and 40 in original document cover peer assessment

Bernice
Human Skeleton

39

PORTUURASSESSERING SELFASSESSERING	PEER ASSESSMENT SELF ASSESSMENT	D
DATUM: DATE: 20 April 2004 NAAM/NAME: [redacted] LEERTAAKNOMMER LEARNING TASK NUMBER: 1 Menslike Skelet.	(Dui aan watter assessering jy doen/Indicate which assessment it is?) PORTUURASSESSERING PEER ASSESSMENT ◄ SELFASSESSERING SELF ASSESSMENT ◄X	

INISIËRING VAN LEER INITIATING LEARNING

INSTRUKSIE: Omkring syfer van die mees geskikte kommentaar
INSTRUCTION: Encircle number of most applicable comment

	KRITERIA/CRITERIA				
Leerklimaat Learning climate	1 Suiwer fokus, relevant en hou direk met leeruitkomste verband Highly focused, relevant, related to learning outcome 2 Aandag vasgevang /Captivates attention 3 Poging aangewend, genotvol maar irrelevant vir leeruitkomste Attempt made, pleasurable but irrelevant to learning outcome 4 Geen poging om 'n leerklimaat te skep nie No attempt to setting a learning climate	1	(2)	3	4
Probleemstelling Posing a problem	1 Uitnemende probleemstelling,helder,relevant, dringend en uitdagend An exceptional problem, clear, relevant, challenging and urgent 2 Probleem relevant, uitdagend, dringend maar is nie helder geformuleer nie Problem relevant, challenging, urgent but lacks clarity 3 Probleem helder geformuleer, irrelevant, nie-uitdagend of dringend nie / Problem clear but lacks relevance, challenge and urgency 4 Geen probleem nie of wollerig / No problem stated or fuzzy	1	(2)	3	4
Bestuur van leer Learning management	1 Uiters georganiseerd en absoluut relevant vir leerderaktiwiteite Highly organized, suitably relevant for learner activities 2 Goed georganiseer vir beperkte leerderaktiwiteite Well organized for limited learner activities 3 Organisasie kort meer ontwerp & beplanning vir leerderaktiwiteite Organisation needs more design & planning for learner activities 4 Min of geen organisasie of beplanning vir leederaktiwiteite nie Little or no organization, nor planned learner activities	1	2	(3)	4
Leermedia Learning media	1 Opwindende,kreatiewe, relevante, geïntegreerde gebruik van leermedia & ander bronne / Exciting,original,relevant, integrated use of learning media & other resources 2 Relevante gebruik van leermedia en ander bronne Relevant use of learning media and other resources 3 Min gebruik/beperkte gebruik van leermedia en ander bronne Little/some use of learning media and other resources 4 Geen gebruik van leermedia of ander bronne nie No use of learning media and other resources	1	(2)	3	4
Koöperatiewe leer Cooperative learning	1 Hoogs effektiewe, suksesvolle gebruik van koöperatiewe leer Highly effective, successful use of cooperative learning 2 Redelike effektiewe gebruik van koöperatiewe leer Partially effective use of cooperative learning 3 Hanteer groepwerk en/of paarwerk Managed group and /or pair work 4 Geen koöperatiewe leer/groepwerk/paarwerk probeer nie Attempted no cooperative learning/group work or pair work	(1)	2	3	4
Leerder-betrokkenheid Learner involvement	1 Hele groep is hoogs geïnteresseerd, gemotiveerd, neem verantwoordelikheid vir eie leer / Total group involved, highly interested, motivated, takes responsibility for own learning 2 Sommige is by tye geïnteresseerd, /At times a few show an interest 3 Meeste is verveeld, stil en onbetrokke Many bored, quiet and uninvolved 4 Die klas is verveeld, buite beheer en lawaaierig Class is bored, unruly, noisy	1	(2)	3	4
Tydsbestuur Time management	1 Uitstekende tydsbestuur, uiters sensitief t.o.v leerders se behoeftes Excellently paced, highly sensitive towards needs of learners 2 Goeie tydsbestuur, bewus van leerders se behoeftes Well paced, aware of learners' needs	1	2	(3)	4

	3 Laat toe dat aandag afgetrek word, fokus op individuele leerders Allows distraction, focus is on individual learners' needs 4 Mors tyd, te haastig, neem leerders se behoeftes glad nie in ag nie Wastes time, rushed, no awareness of learners' needs				
Kommunikasie **Communication**	1 Uitstekende taalgebruik, lewendig, entoesiasties, duidelik, hoorbaar, energiek Exceptional language usage, vivid, enthusiastic, energetic, clear, audible 2 Entoesiasties, energiek en duidelik verstaanbaar Enthusiastic, energetic, clear 3 Duidelik en hoorbaar Clear and audible 4 Oninspirerend, onduidelik, onseker, vervelig Inaudible,uninspiring,.boring,insecure	1	(2)	3	4

INSTANDHOUDING VAN LEER MAINTAINING LEARNING					
	KRITERIA / CRITERIA				
Moniteringsvaardighede **Monitering skills**	1 Daag leerders uit om met selfvertroue onafhanklik te dink / Challenges learners to be confident, independent thinkers 2 Fokus op leerderdenke / Focused on learner thinking 3 Geneig om antwoorde te gee / Tends to give solutions 4 Maak leerders afhanklik en onseker / Makes learners dependent and insecure	1	2	(3)	4
Hantering van terugvoer **Managing feedback**	1 Luister met aandag, verstaan, gee uitdagende en logiese insette / Attentive listening, understanding, offers challenging, logical inferences 2 Luister met aandag, gee erkenning, interpreteer die kernaspekte / Attentive listening, gives recognition, interprets main ideas 3 Luister halfhartig, gee min erkenning, min of geen terugvoer / Listens with little attention, little recognition given, little or no feedback 4 Bevooroordeelde, veroordelende, afbrekende terugvoer /Biased, judgmental, derogatory feedback	1	(2)	3	4
Skryf jou: **Ontwikkelingsdoelwitte** Write down your: **Development targets**	Ek moet tyd meer effektief gebruik!				

Kommentaar/Comments:

sien refleksies in die "Logbook" afdeling.

Geteken/ Signed

[redacted] (Self-assessment)

Bernice 60

Human Circulatory System

PORTUURASSESSERING / SELFASSESSERING	PEER ASSESSMENT / SELF ASSESSMENT	D

DATUM: 24 Mei 2004
DATE:
NAAM/NAME: [redacted]
LEERTAAKNOMMER
LEARNING TASK NUMBER: 2

Simulasie + Hart

(Dui aan watter assessering jy doen/Indicate which assessment it is?)
PORTUURASSESSERING / PEER ASSESSMENT ◄
SELFASSESSERING / SELF ASSESSMENT ◄X

INISIËRING VAN LEER INITIATING LEARNING

INSTRUKSIE: Omkring syfer van die mees geskikte kommentaar
INSTRUCTION: Encircle number of most applicable comment

	KRITERIA/CRITERIA				
Leerklimaat Learning climate	1	Suiwer fokus, relevant en hou direk met leeruitkomste verband Highly focused, relevant, related to learning outcome	1	(2)	3	4
	2	Aandag vasgevang /Captivates attention				
	3	Poging aangewend, genotvol maar irrelevant vir leeruitkomste Attempt made, pleasurable but irrelevant to learning outcome				
	4	Geen poging om 'n leerklimaat te skep nie No attempt to setting a learning climate				
Probleemstelling Posing a problem	1	Uitnemende probleemstelling,helder,relevant, dringend en uitdagend An exceptional problem, clear, relevant, challenging and urgent	1	(2)	3	4
	2	Probleem relevant, uitdagend, dringend maar is nie helder geformuleer nie Problem relevant, challenging, urgent but lacks clarity				
	3	Probleem helder geformuleer, irrelevant, nie-uitdagend of dringend nie / Problem clear but lacks relevance, challenge and urgency				
	4	Geen probleem nie of wollerig / No problem stated or fuzzy				
Bestuur van leer Learning management	1	Uiters georganiseerd en absoluut relevant vir leerderaktiwiteite Highly organized, suitably relevant for learner activities	1	2	(3)	4
	2	Goed georganiseer vir beperkte leerderaktiwiteite Well organized for limited learner activities				
	3	Organisasie kort meer ontwerp & beplanning vir leerderaktiwiteite Organisation needs more design & planning for learner activities				
	4	Min of geen organisasie of beplanning vir leederaktiwiteite nie Little or no organization, nor planned learner activities				
Leermedia Learning media	1	Opwindende,kreatiewe, relevante, geïntegreerde gebruik van leermedia & ander bronne / Exciting,original,relevant, integrated use of learning media & other resources	1	(2)	3	4
	2	Relevante gebruik van leermedia en ander bronne Relevant use of learning media and other resources				
	3	Min gebruik/beperkte gebruik van leermedia en ander bronne Little/some use of learning media and other resources				
	4	Geen gebruik van leermedia of ander bronne nie No use of learning media and other resources				
Koöperatiewe leer Cooperative learning	1	Hoogs effektiewe, suksesvolle gebruik van koöperatiewe leer Highly effective, successful use of cooperative learning	1	(2)	3	4
	2	Redelike effektiewe gebruik van koöperatiewe leer Partially effective use of cooperative learning				
	3	Hanteer groepwerk en/of paarwerk Managed group and /or pair work				
	4	Geen koöperatiewe leer/groepwerk/paarwerk probeer nie Attempted no cooperative learning/group work or pair work				
Leerder-betrokkenheid Learner involvement	1	Hele groep is hoogs geïnteresseerd, gemotiveerd, neem verantwoordelikheid vir eie leer / Total group involved, highly interested, motivated, takes responsibility for own learning	(1)	2	3	4
	2	Sommige is by tye geïnteresseerd, /At times a few show an interest				
	3	Meeste is verveeld, stil en onbetrokke Many bored, quiet and uninvolved				
	4	Die klas is verveeld, buite beheer en lawaaierig Class is bored, unruly, noisy				
Tydsbestuur Time management	1	Uitstekende tydsbestuur, uiters sensitief t.o.v leerders se behoeftes Excellently paced, highly sensitive towards needs of learners	1	(2)	3	4
	2	Goeie tydsbestuur, bewus van leerders se behoeftes Well paced, aware of learners' needs				

	3 Laat toe dat aandag afgetrek word, fokus op individuele leerders Allows distraction. focus is on individual learners' needs 4 Mors tyd, te haastig, neem leerders se behoeftes glad nie in ag nie Wastes time, rushed. no awareness of learners' needs				
Kommunikasie **Communication**	1 Uitstekende taalgebruik, lewendig, entoesiasties, duidelik, hoorbaar, energiek Exceptional language usage, vivid, enthusiastic, energetic, clear, audible 2 Entoesiasties, energiek en duidelik verstaanbaar Enthusiastic, energetic, clear 3 Duidelik en hoorbaar Clear and audible 4 Oninspirerend, onduidelik, onseker, vervelig Inaudible,uninspiring,.boring,insecure	1	(2)	3	4

INSTANDHOUDING VAN LEER MAINTAINING LEARNING					
	KRITERIA / CRITERIA				
Moniteringsvaardighede **Monitering skills**	1 Daag leerders uit om met selfvertroue onafhanklik te dink / Challenges learners to be confident, independent thinkers 2 Fokus op leerderdenke / Focused on learner thinking 3 Geneig om antwoorde te gee / Tends to give solutions 4 Maak leerders afhanklik en onseker / Makes learners dependent and insecure	(1)	2	3	4
Hantering van terugvoer **Managing feedback**	1 Luister met aandag, verstaan, gee uitdagende en logiese insette / Attentive listening, understanding, offers challenging, logical inferences 2 Luister met aandag, gee erkenning, interpreteer die kernaspekte / Attentive listening, gives recognition, interprets main ideas 3 Luister halfhartig, gee min erkenning, min of geen terugvoer / Listens with little attention, little recognition given, little or no feedback 4 Bevooroordeelde, veroordelende, afbrekende terugvoer /Biased, judgmental, derogatory feedback	1	(2)	3	4
Skryf jou: **Ontwikkelingsdoelwitte** Write down your: **Development targets**	Ek wens ek hoef nie op ander mense staat te maak om alles gereed te kry nie! Alles was laat! Ek sal in die vervolg wéke vooruit begin!				

Kommentaar/Comments:

Sien refleksies in "Logboek" afdeling

Geteken/ Signed

[redacted] (Self-assessment)

Bernice (Mentor)

University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
ONDERWYS- EN OPLEIDINGSPRAKTYK
EDUCATION AND TRAINING PRACTICE

KONSEP
58 | A

KURSUS COURSE	PGCE

Mnr/Mej/Mev
Mr/Miss/Mrs .
Plek
Venue .....
Handtekening
Signature.....

Studentenommer
Student Number.... .....
Tema
Theme Die Hart
Datum
Date ~~21~~ Mei 2004 Punt
Mark allocated 65%

ONDERWYS- EN OPLEIDINGSPRAKTYK
EDUCATION AND TRAINING PRACTICE

Mnr/Mej/Mev
Mr/Miss/Mrs .....
Studentenommer
Student Number.....

Guidelines for observations:

DESIGN	FACILITATING LEARNING		
Does the written submission reflect adequate planning i.t.o.: Design? Cross-curricular integration? References? Learning outcomes specified	Initiating learning Are the actions successful? Which actions are successful in challenging learners to learn? Why? Is the stated problem a challenge? How was the learning climate created? Is there evidence of energy, enthusiasm?	Learning Involvement in learning. Are all the learners involved, interested and keen to participate? If not why not? How is it visible?	Maintaining learning How is learning sustained and managed? How does the facilitator support learning? How are special learning needs being dealt with? How does the educator react to behaviour?

(Use the above criteria)

Beplanning → goeie LTO
→ Alle uitkomste + assesseringskriteria goed uiteengesit.

1. FAL entoesiasties → leerders nogal rasserig gewees totdat probleem gegee is.
2. Goeie inleidende vrae aan hulle gegee
3. Goeie interaksie tussen FAL + leerders
4. leerders nie heeltemal seker wat hul moet doen nie.
5. Gee bietjie meer aandag aan dissipline → maak leerders stil en sorg dat almal luister.
6. Kyk mooi dat alle leerders werk en nie gesels oor ander dinge nie.
7. Kyk dat leerders eers self die probleem oplos - maw daar moet doodse stilte wees
8. Probleem is goed en ook uitdagend → leerders word gedwing om navorsing te doen

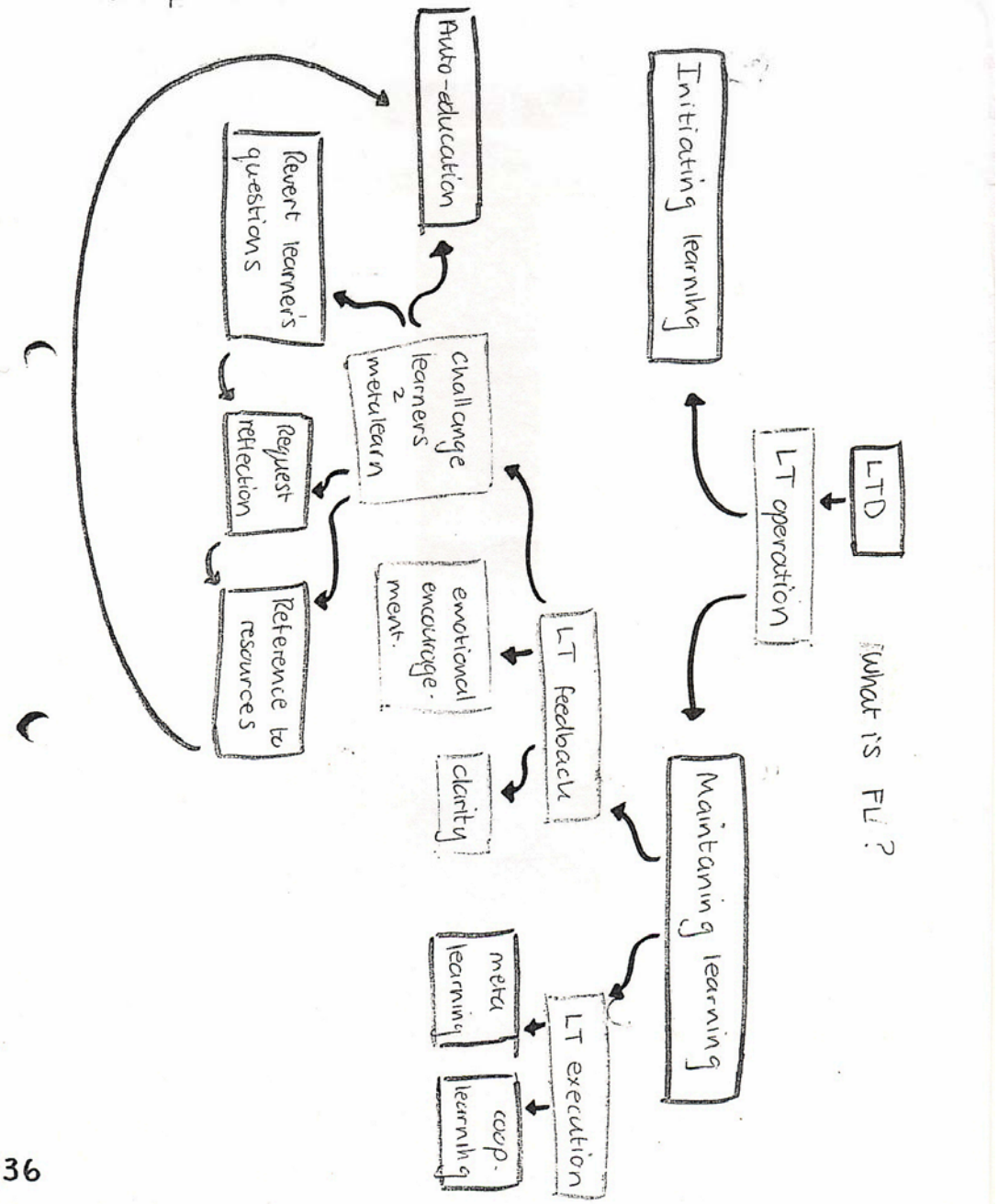
Summary statement: Indicate your assessment of the quality of the learning opportunity							
1 75+	Very good with out-standing features	2 68+	Good, with no significant weaknesses	3 60+	Adequate, but requires significant improvement	4 -55	Poor quality. Does not meet standards

Matters that require particular attention
Dissipline

Handtekening
Signature.....
Datum
Date 24/05/2004
Punt
Mark allocated

B[redacted] 21094332 FCL 1

konsep kaart



Chapter 6 – Appendix IV – Carol

6.5. Carol - Learning task 1 – Human Skeleton

6.5.1. Step 3: Planning Action

6.5.1.1.A *Learning task design (See appendix for the plan)*

6.5.2.2.A. Learning task assessment

Reflection on School-based Practice 1

Card L.T (1)

Learning Task Design 1:The human Skeleton

(Wednesday 21 April - Monday 3 May 2004)

Learning Subject	Biology
Learning phase	FET
Grade	10
Learning area	Human Skeleton
Time allocated	8 Periods (8 x 35min)

Programme Organisation
Problem statement
What is the best, most economical materials that can be used to build different parts of the human skeleton. By using these materials what would be the most efficient and fictional improvements that can be made on the existing part and how does these improved parts fit together to form an complete human skeleton. Substantiate and motivate the build of the improved part of the skeleton in a report.
Recourses
Text on the human skeleton
* Study and Master Biology Grade 10 (Van Resburg, Netshiomvani, Strydom and Van Wyk)
* Mind Action Series:Biology Textbook and Workbook 10 (Kuun and Rortje)
* Fisiologie van die mens. (Meyer en Meij)
Materials (for example paper, wood etc) for building of the specific part of the skeleton
Meta-learning
Each individual must first generate a list of material that can be used to build this specific part of the skeleton.
Individually a list must be generated of ideas how this part of the skeleton can be improved on.
Cooperative-learning
Together in their cooperative groups they have to discuss and make a decision on which part of the skeleton they what to improve on. They then have to decide which materials they will use to build this improved part of the skeleton. The members of the groups must then ensure that they bring all the necessary materials to class in order to build their improved part of the skeleton.
The cooperative group will present the part of the skeleton they improved on to the class
An report that substantiate all decision and actions in order to produce an improved part of the skeleton must be handed in.

LTP
What is the best, most economical materials that can be used to build different parts of the human skeleton. By using these materials what would be the most efficient and fuctional improvements that can be made on the existing part and how does these improved parts fit together to form an complete human skeleton. Substantiate and motivate the build of the improved part of the skeleton in a report.
In your cooperative groups quickly decide which part of the skeleton you would like to improve on. It will work on a first come first serve basis. No group can pick the same part of the skeleton to improve on.
Then individually generate a list of materials u think can be used to build this part of the skeleton also think about how this part of the skeleton can be improved on.
In your cooperative groups you then have to decide how you will improve this part of the skeleton in the most effective and fuctional way possible and which material you will use in order to achieve this and generate solutions to the rest of the problem.

Class organisation
Class are divided into their cooperative groups (four members per group) (heterogenous groups are generated thouhgt taking into consideration: marks, culture, gender etc)
Posters of human skeleton are put up on walls.
Different parts/bones of the human skeleton.

Product
Individual lists
The representation of the part of the skeleton the group improved on
The written report on the process of building the skeleton
Presentation of the part of the skeleton the cooperative group improved on.

Critical Outcomes			
Problem identifying & solving skills		Effective use of science and technology	*
Effective cooperative-group work	*	Self-organisation skills	*
Communication skills	*	Cultural and aesthetically sensitive	
Collect, analyse, organise and evaluate information effectively	*	An understanding of the world as a set of related problems	
Education and career exploring		Explore strategies to learn more effectively	*
Responsible citizen participation		Entrepreneurial skills	*

Learning outcomes	Assessment Standards
Scientific Inquiry and Problem solving skills	When learners use appropriate materials for the build of the skeleton. which materials could be used and how the improvement can be made
Construction and Application of life Sciences knowledge	When learners identified structures of the skeleton and how they fit together Why is the improved part an improvement and give an substantial report on it.
Life Sciences, Technology, Environment and Society	

Specific outcomes
Knowledge of the anatomy and physiology of the human skeleton
The importance and function of the human skeleton
Understanding of the different tissues the human skeleton consist of
Exploring of the different types of bones (classification) of the human skeleton

Re-link with this

Assessment Criteria
Continual assessment during the project
Improved part of the skeleton (rubric)
Written report (rubric)
Test on the human skeleton

Assessment Method	
Self assessment	*
Cooperative-group assessment	*
Peer assessment	
Facilitator assessment	*

The Human Skeleton
Grade 10: Biology

Can the human skeleton be improved on??

What are the most appropriate and economical materials that can be used to build different parts of the human skeleton? By using these materials what would be the most efficient and functional improvements that can be made on the existing part. How do these improved parts fit together to form a complete human skeleton. Substantiate and motivate the build of the improved part of the skeleton in a report.

- In your cooperative-groups decide which part of the skeleton you would like to improve on. It will work on a first come first serve basis. No group in the class can pick the same part of the skeleton to improve on. The part of the skeleton what the group choose to improve on must be indicated on a sketch of the complete human skeleton. This sketch must be handed in (21 April).

- **Meta-learning**:
  - Individually generate a list of materials you think can be used to build this part of the skeleton.
  - Individually generate a list of possible improvements that can be made on this part of the skeleton, which will enhance the efficiency and functionality (21 April).

- **Cooperative-learning:**
  - After all the individual lists were consulted decide together in your cooperative-group how will you improve this part of the skeleton in the most effective ways possible and which materials will be used to achieve this (21 April).
  - This part of the skeleton will be built in class (your progress will be assessed during the week). So all necessary materials must be brought to class.
  - An exhibition of all the cooperative-groups improved parts will be held, where the group then must explain to peers what they have done.
  - A substantial and detailed report - where you motivate the materials used, the process you followed in deciding how to improve on the part of the skeleton and the effects of these improvements - must be handed in.
  - Can you make a complete skeleton out of all the cooperative-groups in the class?

NB Dates

- **29 April: Improved part of the skeleton must be completed.**
- **30 April: Exhibition of the different cooperative-groups improved part of the skeleton**
- **30 April: Completed report must be handed in.**
- **3 May: Test**

Die Menslike Skelet
Graad 10: Biologie

Kan daar op die menslike skelet verbeter word?

Wat is die geskikste en mees ekonomiese materiale wat gebruik kan word om verskillende dele van die menslike skelet te bou. Deur van hierdie materiale gebruik te maak wat sou die mees effektiefste en funksionele verbeteringe wees op 'n gedeelte van die skelet? Hoe pas hierdie verbeterde dele in mekaar om 'n volledige menslike skelet te vorm? Bewys en motiveer jou verbeterde skelet-deel in 'n verslag.

- In julle koöperatiewe-groep besluit watter deel van die skelet julle wil verbeter. Dit sal op 'n 'first come, first serve' basis werk. Geen groep sal die selfde deel van die skelet verbeter nie. Die deel wat die groep kies moet op 'n volledige skets van die menslike skelet aangedui word en ingehandig word (21 April).

- **Meta-leer**
  - Stel, individueel 'n lys saam van die materiale wat gebruik kan word om die deel van die skelet te bou waaraan jou koöperatiewe groep gaan werk.
  - Genereer, individueel idees om die deel van die skelet te verbeter (21 April).

- **Koöperatiewe-leer**
  - Na al die individuele lyste gekonsulteer is, besluit in die koöperatiewe-groep wat die mees gepasste materiale sal wees om die deel van die skelet te bou en wat die mees effektiefste verbeteringe is wat aan die deel van die skelet aangebring kan word (21 April).
  - Die deel van die skelet moet dan in klastyd gebou word (vordering sal geassesseer word deur die loop van die week). Alle benodighede moet dus klas toe gebring word.
  - 'n Tentoonstelling van die verbeterde dele van al die koöperatiewe-groepe sal gehou word, waar aan mede-leerders verduidelik moet word wat gedoen is.
  - 'n Volledige, gedetailleerde verslag moet ingehandig word waar motivering gebied word vir die materiale wat gebruik is, die verbeteringe wat aan gebring is en die effekte van die verbeteringe op die skelet.
  - Kan daar 'n volledige skelet uit die koöperatiewe-groepe se verbeterde dele gemaak word?

NB Datums:
- **29 April: Verbeterde-deel van die skelet moet klaar wees.**
- **30 April: Tentoonstelling van die koöperatiewe-groepe se verbeterde dele.**
- **30 April: Inhandiging van verslag.**
- **3 Mei: Toets**

Hoërskool SP C R Swart

Group:_____

Biology: Grade10 Human Skeleton **21-30 April 2004**
Biologie: Graad 10 Menslike Skelet **21-30 April 2004**

Exhibition Assessment
Tentoonstelling Assessering

Criteria	1	2	3	4	5
Quality of information/ideas Provided	No knowledge of part of skeleton; give no significant scientific information; no explanation of material used and improvement made	Little knowledge of the skeleton; give little scientific information; little indication of materials used and improvements made	Some knowledge of the skeleton, scientific knowledge are given; inadequate explanation of materials used and improvement made	Thorough knowledge of the skeleton, gives significant scientific information; adequate explanation and motivation of materials used and improvements made	Broad understanding and knowledge of the skeleton, give scientific information and concepts; superb explanation, motivation and effects of materials and improvements
Presentation	No organisation, no content	Little organisation or composition of content	Muddled, no clear links to content	Good organisation with links to content	Stimulating, clear links to content
Effective use of time			Too fast/slow	Good use of time	Excellent use of time
Enthusiasm/effort	No effort or enthusiasm	Little effort or enthusiasm	Some effort/some enthusiasm	Good effort and enthusiasm	Great effort and enthusiasm
Questions	Not able to answer any questions	Able to answer some questions	Able to answer questions	Respond to questions sufficiently	Respond to questions insightfully and effectively
Creativity of exhibition	No creativity, lacking stimulating impact	Lacks creativity, interest are not captured	Elements of creativity visible, some interest are captured	Good creativity and ideas; audience attention is captured	Exceptional creativity and ideas; audience are captured

Hoërskool SP C R Swart

Group:_____

Biology: Grade10
Biologie: Graad 10

Human Skeleton
Menslike Skelet

21-30 April 2004
21-30 April 2004

Report
Verslag

Quality of information/ideas Provided	No knowledge of part of skeleton; give no significant scientific information; no explanation of material used and improvement made	Little knowledge of the skeleton; give little scientific information; little indication of materials used and improvements made	Some knowledge of the skeleton, scientific knowledge are given; inadequate explanation of materials used and improvement made	Thorough knowledge of the skeleton, gives significant scientific information; adequate explanation and motivation of materials used and improvements made	Broad understanding and knowledge of the skeleton, give scientific information and concepts; superb explanation, motivation and effects of materials and improvements
Discussion and motivation of improvement on skeleton	No improvements are evident	Improvement are evident, without motivation	Improvements are evident with inadequate motivation	Improvements are evident with adequate motivation and description of improvements; effects of improvement are given	Improvement are evident, motivation are insightful and significant; effects of improvement are given in detail
Discussion and motivation of materials used	No correlation with specific characteristics of the part of the skeleton, no motivation given	Little correlation with specific characteristics of the part of the skeleton; no motivation given	Some correlation with characteristic of specific part of the skeleton and meagre motivation is given	Correlation with specific characteristics of the part of the skeleton; adequate motivation is given	Correlates with characteristic of specific part; motivation is insightful and significant
Layout and neatness			No layout; cramped; untidy; difficult to read	Good layout; tidy; difficult to read	Excellent quality; tidy; easy to read
Writing skills, use of paragraphs, grammar, spelling	No paragraphs, many grammatical and spelling errors	Attempt at writing paragraphs, less grammatical and spelling errors	Paragraph usage found. Few grammatical and spelling errors	Effective use of paragraphs. Facts are organised. Little grammatical and spelling errors	Report of exceptional standard. Facts clearly expressed.
Effort	No effort	Little effort	Some effort	Good effort	Great effort

GACLEBALE N INSELA

Hoërskool SP C R Swart

Biology: Grade10
Biologie: Graad 10

Human Skeleton
Menslike Skelet

21-30 April 2004
21-30 April 2004

Cooperative-group assessment
Koöperatiewe-groep assessering

Assess the cooperation, participation and the amount of work put in by the individual members in your cooperative-group and of yourself.

Assesseer die samewerking, deelname en hoeveelheid werk ingesit deur die individuele lede van jou koöperatiewe-groep en deur jouself.

1 = None 2 = Seldom 3 = usually 4 = most of the time 5 = all the time

Group: 4	Brought materials	Assisted with the building of the improved part of the skeleton	Helped with report and exhibition composition	Over all Cooperation and participation	Over all worked put in to achieve success in this project	
Name	1 2 (3) 4 (5)	1 (2) 3 4 (5)	1 2 (3) 4 (5)	1 2 (3) 4 (5)	1 (2) 3 4 (5)	
JERNITA	5	5	4	5	5	24
CAROLINE	3	2	2	3	2	12
HEINDRIG	3	2	2	2	3	12
GACLEBALE	4 5	4	4	4	4	21

Cooperative-groups mark for improved part of the skeleton: 5 /5
Koöperatiewe-groep se punt vir verbeterde deel van die skelet: _____ /5

				made ✓	✓ improvements
Presentation	No organisation, no content	Little organisation or composition of content	Muddled, no clear links to content	Good organisation with links to content ✓	Stimulating, clear links to content
Effective use of time			Too fast/slow	Good use of time ✓	Excellent use of time
Enthusiasm/effort	No effort or enthusiasm	Little effort or enthusiasm	Some effort/some enthusiasm ✓	Good effort and enthusiasm	Great effort and enthusiasm
Questions	Not able to answer any questions	Able to answer some questions	Able to answer questions ✓	Respond to questions sufficiently	Respond to questions insightfully and effectively
Creativity of exhibition	No creativity, lacking stimulating impact	Lacks creativity, interest are not captured	Elements of creativity visible, some interest are captured ✓	Good creativity and ideas; audience attention is captured	Exceptional creativity and ideas; audience are captured

20/30

PORTUURASSESSERING SELFASSESSERING	PEER ASSESSMENT SELF ASSESSMENT	D
DATUM: 21 April DATE: NAAM/NAME: [redacted] LEERTAAKNOMMER LEARNING TASK NUMBER: 1 Die skelet	(Dui aan watter assessering jy doen/Indicate which assessment it is?) PORTUURASSESSERING PEER ASSESSMENT ◄ SELFASSESSERING X SELF ASSESSMENT ◄	

INISIËRING VAN LEER INITIATING LEARNING

INSTRUKSIE: Omkring syfer van die mees geskikte kommentaar
INSTRUCTION: Encircle number of most applicable comment

	KRITERIA/CRITERIA				
Leerklimaat Learning climate	1 Suiwer fokus, relevant en hou direk met leeruitkomste verband Highly focused, relevant, related to learning outcome 2 Aandag vasgevang /Captivates attention 3 Poging aangewend, genotvol maar irrelevant vir leeruitkomste Attempt made, pleasurable but irrelevant to learning outcome 4 Geen poging om 'n leerklimaat te skep nie No attempt to setting a learning climate	1	2	(3)	4
Probleemstelling Posing a problem	1 Uitnemende probleemstelling,helder,relevant, dringend en uitdagend An exceptional problem, clear, relevant, challenging and urgent 2 Probleem relevant, uitdagend, dringend maar is nie helder geformuleer nie Problem relevant, challenging, urgent but lacks clarity 3 Probleem helder geformuleer, irrelevant, nie-uitdagend of dringend nie / Problem clear but lacks relevance, challenge and urgency 4 Geen probleem nie of wollerig / No problem stated or fuzzy	1	2	(3)	4
Bestuur van leer Learning management	1 Uiters georganiseerd en absoluut relevant vir leerderaktiwiteite Highly organized, suitably relevant for learner activities 2 Goed georganiseer vir beperkte leerderaktiwiteite Well organized for limited learner activities 3 Organisasie kort meer ontwerp & beplanning vir leerderaktiwiteite Organisation needs more design & planning for learner activities 4 Min of geen organisasie of beplanning vir leederaktiwiteite nie Little or no organization, nor planned learner activities	1	2	(3)	4
Leermedia Learning media	1 Opwindende,kreatiewe, relevante, geïntegreerde gebruik van leermedia & ander bronne / Exciting,original,relevant, integrated use of learning media & other resources 2 Relevante gebruik van leermedia en ander bronne Relevant use of learning media and other resources 3 Min gebruik/beperkte gebruik van leermedia en ander bronne Little/some use of learning media and other resources 4 Geen gebruik van leermedia of ander bronne nie No use of learning media and other resources	1	2	(3)	4
Koöperatiewe leer Cooperative learning	1 Hoogs effektiewe, suksesvolle gebruik van koöperatiewe leer Highly effective, successful use of cooperative learning 2 Redelike effektiewe gebruik van koöperatiewe leer Partially effective use of cooperative learning 3 Hanteer groepwerk en/of paarwerk Managed group and /or pair work 4 Geen koöperatiewe leer/groepwerk/paarwerk probeer nie Attempted no cooperative learning/group work or pair work	1	2	(3)	4
Leerder-betrokkenheid Learner involvement	1 Hele groep is hoogs geïnteresseerd, gemotiveerd, neem verantwoordelikheid vir eie leer / Total group involved, highly interested, motivated, takes responsibility for own learning 2 Sommige is by tye geïnteresseerd, /At times a few show an interest 3 Meeste is verveeld, stil en onbetrokke Many bored, quiet and uninvolved 4 Die klas is verveeld, buite beheer en lawaaierig Class is bored, unruly, noisy	1	(2)	3	4
Tydsbestuur Time management	1 Uitstekende tydsbestuur, uiters sensitief t.o.v leerders se behoeftes Excellently paced, highly sensitive towards needs of learners 2 Goeie tydsbestuur, bewus van leerders se behoeftes Well paced, aware of learners' needs	1	2	(3)	4

	3 Laat toe dat aandag afgetrek word, fokus op individuele leerders Allows distraction, focus is on individual learners' needs 4 Mors tyd, te haastig, neem leerders se behoeftes glad nie in ag nie Wastes time, rushed, no awareness of learners' needs				
Kommunikasie Communication	1 Uitstekende taalgebruik, lewendig, entoesiasties, duidelik, hoorbaar, energiek Exceptional language usage, vivid, enthusiastic, energetic, clear, audible 2 Entoesiasties, energiek en duidelik verstaanbaar Enthusiastic, energetic, clear 3 Duidelik en hoorbaar Clear and audible 4 Oninspirerend, onduidelik, onseker, vervelig Inaudible,uninspiring,.boring,insecure	1	2	(3)	4

INSTANDHOUDING VAN LEER MAINTAINING LEARNING	KRITERIA / CRITERIA				
Moniteringsvaardighede Monitering skills	1 Daag leerders uit om met selfvertroue onafhanklik te dink / Challenges learners to be confident, independent thinkers 2 Fokus op leerderdenke / Focused on learner thinking 3 Geneig om antwoorde te gee / Tends to give solutions 4 Maak leerders afhanklik en onseker / Makes learners dependent and insecure	1	2	(3)	4
Hantering van terugvoer Managing feedback	1 Luister met aandag, verstaan, gee uitdagende en logiese insette / Attentive listening, understanding, offers challenging, logical inferences 2 Luister met aandag, gee erkenning, interpreteer die kernaspekte / Attentive listening, gives recognition, interprets main ideas 3 Luister halfhartig, gee min erkenning, min of geen terugvoer / Listens with little attention, little recognition given, little or no feedback 4 Bevooroordeelde, veroordelende, afbrekende terugvoer /Biased, judgmental, derogatory feedback	1	(2)	3	4
Skryf jou: Ontwikkelingsdoelwitte Write down your: Development targets	• Beter beheer uit oefen in klas • Strenger • Skep beter leer atmosfeer • Wil leerders laat luister, omdat hulle nie anders kan (hulle wil!)				

Kommentaar/Comments:

Geteken/ Signed

PORTUURASSESSERING SELFASSESSERING	PEER ASSESSMENT SELF ASSESSMENT	D

DATUM: DATE: NAAM/NAME: C[illegible] LEERTAAKNOMMER LEARNING TASK NUMBER: Learning Task Presentation of the Human Skeleton	(Dui aan watter assessering jy doen/Indicate which assessment it is?) PORTUURASSESSERING PEER ASSESSMENT X ◄ SELFASSESSERING SELF ASSESSMENT ◄

INISIËRING VAN LEER INITIATING LEARNING

INSTRUKSIE: Omkring syfer van die mees geskikte kommentaar
INSTRUCTION: Encircle number of most applicable comment

	KRITERIA/CRITERIA				
Leerklimaat Learning climate	1 Suiwer fokus, relevant en hou direk met leeruitkomste verband Highly focused, relevant, related to learning outcome 2 Aandag vasgevang /Captivates attention 3 Poging aangewend, genotvol maar irrelevant vir leeruitkomste Attempt made, pleasurable but irrelevant to learning outcome 4 Geen poging om 'n leerklimaat te skep nie No attempt to setting a learning climate	1	(2)	3	4
Probleemstelling Posing a problem	1 Uitnemende probleemstelling,helder,relevant, dringend en uitdagend An exceptional problem, clear, relevant, challenging and urgent 2 Probleem relevant, uitdagend, dringend maar is nie helder geformuleer nie Problem relevant, challenging, urgent but lacks clarity 3 Probleem helder geformuleer, irrelevant, nie-uitdagend of dringend nie / Problem clear but lacks relevance, challenge and urgency 4 Geen probleem nie of wollerig / No problem stated or fuzzy	(1)	2	3	4
Bestuur van leer Learning management	1 Uiters georganiseerd en absoluut relevant vir leerderaktiwiteite Highly organized, suitably relevant for learner activities 2 Goed georganiseer vir beperkte leerderaktiwiteite Well organized for limited learner activities 3 Organisasie kort meer ontwerp & beplanning vir leerderaktiwiteite Organisation needs more design & planning for learner activities 4 Min of geen organisasie of beplanning vir leederaktiwiteite nie Little or no organization, nor planned learner activities	1	(2)	3	4
Leermedia Learning media	1 Opwindende,kreatiewe, relevante, geïntegreerde gebruik van leermedia & ander bronne / Exciting,original,relevant, integrated use of learning media & other resources 2 Relevante gebruik van leermedia en ander bronne Relevant use of learning media and other resources 3 Min gebruik/beperkte gebruik van leermedia en ander bronne Little/some use of learning media and other resources 4 Geen gebruik van leermedia of ander bronne nie No use of learning media and other resources	1	2	(3)	4
Koöperatiewe leer Cooperative learning	1 Hoogs effektiewe, suksesvolle gebruik van koöperatiewe leer Highly effective, successful use of cooperative learning 2 Redelike effektiewe gebruik van koöperatiewe leer Partially effective use of cooperative learning 3 Hanteer groepwerk en/of paarwerk Managed group and /or pair work 4 Geen koöperatiewe leer/groepwerk/paarwerk probeer nie Attempted no cooperative learning/group work or pair work	(1)	2	3	4
Leerder-betrokkenheid Learner involvement	1 Hele groep is hoogs geïnteresseerd, gemotiveerd, neem verantwoordelikheid vir eie leer / Total group involved, highly interested, motivated, takes responsibility for own learning 2 Sommige is by tye geïnteresseerd, /At times a few show an interest 3 Meeste is verveeld, stil en onbetrokke Many bored, quiet and uninvolved 4 Die klas is verveeld, buite beheer en lawaaierig Class is bored, unruly, noisy	1	(2)	3	4
Tydsbestuur Time management	1 Uitstekende tydsbestuur, uiters sensitief t.o.v leerders se behoeftes Excellently paced, highly sensitive towards needs of learners 2 Goeie tydsbestuur, bewus van leerders se behoeftes Well paced, aware of learners' needs	1	(2)	3	4

	3 Laat toe dat aandag afgetrek word, fokus op individuele leerders Allows distraction. focus is on individual learners' needs 4 Mors tyd, te haastig, neem leerders se behoeftes glad nie in ag nie Wastes time, rushed, no awareness of learners' needs				
Kommunikasie **Communication**	1 Uitstekende taalgebruik, lewendig, entoesiasties, duidelik, hoorbaar, energiek Exceptional language usage, vivid, enthusiastic, energetic, clear, audible 2 Entoesiasties, energiek en duidelik verstaanbaar Enthusiastic, energetic, clear 3 Duidelik en hoorbaar Clear and audible 4 Oninspirerend, onduidelik, onseker, vervelig Inaudible,uninspiring,.boring,insecure	1	(2)	3	4

INSTANDHOUDING VAN LEER MAINTAINING LEARNING					
	KRITERIA / CRITERIA				
Moniteringsvaardighede **Monitering skills**	1 Daag leerders uit om met selfvertroue onafhanklik te dink / Challenges learners to be confident, independent thinkers 2 Fokus op leerderdenke / Focused on learner thinking 3 Geneig om antwoorde te gee / Tends to give solutions 4 Maak leerders afhanklik en onseker / Makes learners dependent and insecure	(1)	2	3	4
Hantering van terugvoer **Managing feedback**	1 Luister met aandag, verstaan, gee uitdagende en logiese insette / Attentive listening, understanding, offers challenging, logical inferences 2 Luister met aandag, gee erkenning, interpreteer die kernaspekte / Attentive listening, gives recognition, interprets main ideas 3 Luister halfhartig, gee min erkenning, min of geen terugvoer / Listens with little attention, little recognition given, little or no feedback 4 Bevooroordeelde, veroordelende, afbrekende terugvoer /Biased, judgmental, derogatory feedback	(1)	2	3	4
Skryf jou: **Ontwikkelingsdoelwitte** Write down your: **Development targets** ▶					

Kommentaar/Comments:
Die leertaak was baie ouliik, uitdagend en goed uiteengesit.
Sekere leerders neem nie deel in die klas nie en ek dink dit is 'n uitdaging vir jou om ook hulle
Geteken/ Signed betrokke te kry. Jy het die leerders goed uitgedaag om met selfvertroue onafhanklik te d

UNIVERSITEIT VAN PRETORIA

ONDERWYS- EN OPLEIDINGSPRAKTYK

A

Universiteit van Pretoria

KURSUS	PGCE

Mnr/Mej/Mev . ..... Studentenommer .. ..

Plek .... Tema ... Human Skeleton

Handtekening . ..... Datum 21/Apr/ ..... Punt 55 %

ONDERWYS- EN OPLEIDINGSPRAKTYK

Mnr/Mej/Mev ..... Studentenommer .....

Riglyne vir waarneming:

ONTWERP	LEERFASILITERING		
	Inisiëring van leer	Leer	Instandhouding van leer
Weerspieël die geskrewe *voorlegging* voldoende beplanning tov: Ontwerp Kruiskurrikulêre integrering Bronverwysing Leeruitkomste gespesifiseer	Watter handelinge dra by/nie by tot suksesvolle uitdaging van leer? Is die probleemstelling uitdagend? Hoe is die leerklimaat geskep? Is daar energie? Entoesiasme?	Leerbetrokkenheid Is al die leerders betrokke geïnteresseerd, gretig om aan die leer *deel te neem*? Hoe is dit sigbaar?	Hoe word leer instand gehou, bestuur? Hoe ondersteun die fasiliteerder leer? Hoe word besondere onderwysbehoeftes gehanteer? Hoe reageer die opvoeder op gedrag?

(Gebruik die bogenoemde kriteria)

- Leertaak beplanning volledige en leertaak innoverend. Die probleemstelling is uitdagend, maar daar is tog leerders wat se aandag gerang moet word.

- Goeie leerklimaat geskep, maar dit kan verbeter deur meer bronne aan die leerders beskikbaar te stel of hulle aanmoedig om hul eie te bring.

- Dissipline is baie goed. Kyk net of al die leerders se aandag kan kry voor leertaak aanbieding.

Opsommend: Merk u assessering van die kwaliteit van die leergeleentheid

1 75+	Baie goed met uitstaande kenmerke	2 68+	Goed met geen noemenswaardige tekortkominge nie	3 60+	Aanvaarbaar, maar vereis baie meer insette	4 -55	Onaanvaarbaar. Voldoen glad nie aan gestelde standaard nie

Aspekte wat besondere aandag vra

Handtekening Teacher Mentor ..... Datum 21/04/2004 Punt 55 %

2.2 Reflection on SBEP 1

Thinking back on my SBEP 1 there will never again be a situation I will learn more from, in such a short time. I definitely had my most challenging school based education programme first.

I learned that a facilitator's job is definitely not 7:00 to 14:00. There was not one day that I got home and could do nothing and I burned the mid night oil more that once.

My professional growth can be seen in my learning task. My learning task design improved, my confidence in presenting my learning tasks improved and my maintaining of learning improved. I also improved my English allot during this time. When under pressure you must sink or swim. My head was sometimes just above the water, but I swam.

After my SBEP 1 I also realized that there was a lot I must improve on to become an excellent facilitator of learning. I knew my learning task could be improved on especially my real life problems as well as my clarity with which I presented the problem and the instruction to the learners. My discipline and 'consequences' for my learners had to be of a higher standard.

In a short amount of time I went from a 'teacher' to a beginner facilitator. One of the mistakes I made is that I got to attached to my learners. I made a promise to myself that I wouldn't do this again, because it was very difficult to say good buy to my learners on the last day.

Chapter 6 – Appendix IV – Mack

6.6. Mack - Learning Task 1 - Kingdom Monera

6.6.1. Step 3: Planning Action

6.6.1.1. A. Learning task design

6.6.2.2.A. Learning task assessment

Learning Task 2 - Kingdom Monera

6.6.1.1. B. Learning task design

6.6.2.2.B. Learning task assessment

Concept map

Mack (LT 1)

Learning Task Design

Date: 10 May 2004
Learning Area: Life Science
Learning Phase: 11

Specific Outcomes:

LO1: Confidently explore & investigate phenomena related to Life Science by using inquiry, problem solving, critical thinking and other skills

LO2: Access, interpret, construct & use Life Sciences concepts to explain phenomena relevant to Life Sciences

---

Assessment Standards:

LO1:

AS 1: Identifying & questioning phenomena & planning an investigation
AS 2: Conducting an investigation by collecting & manipulating data
AS 3: Analyzing, synthesizing, evaluating data & communicating findings

LO2:

AS 1: Accessing knowledge

The Problem:

What is the best possible way of eradicating the bacteria that you have grown on your agar plates and how can you relate this to your own life?

Resources:

Agar plates from previous learning task
Assessment Rubric
Overhead transparency: Example of a data sheet
Pens & Paper
Scalpel / scissors for opening agar plates

Class Organization:

- The class will be seat at the front of the lab at their desks for the beginning of the lesson while the facilitator presents the learning task

  The class will then move to the back of the lab will they will sit with their groups at one desk (i.e. four people at a desk, facing each other)

Time Allocated:

5 min	Morning and settle down
20 min	Presentation of learning task
25 min	Work in group and begin to write up the report
Next lesson:	
50 min	Finish group report
Homework:	
4 days	Individual report to be done at home

PORTUURASSESSERING SELFASSESSERING	PEER ASSESSMENT SELF ASSESSMENT	D

DATUM:
DATE: 10/05/04.
NAAM/NAME:
LEERTAAKNOMMER
LEARNING TASK NUMBER: (1)

(Dui aan watter assessering jy doen/Indicate which assessment it is?)
PORTUURASSESSERING
PEER ASSESSMENT ✓
SELFASSESSERING
SELF ASSESSMENT

INISIËRING VAN LEER INITIATING LEARNING

INSTRUKSIE: Omkring syfer van die mees geskikte kommentaar
INSTRUCTION: Encircle number of most applicable comment

	KRITERIA/CRITERIA				
Leerklimaat **Learning climate**	1 Suiwer fokus, relevant en hou direk met leeruitkomste verband Highly focused, relevant, related to learning outcome 2 Aandag vasgevang /Captivates attention 3 Poging aangewend, genotvol maar irrelevant vir leeruitkomste Attempt made, pleasurable but irrelevant to learning outcome 4 Geen poging om 'n leerklimaat te skep nie No attempt to setting a learning climate	1	2	(3)	4
Probleemstelling **Posing a problem**	1 Uitnemende probleemstelling,helder,relevant, dringend en uitdagend An exceptional problem, clear, relevant, challenging and urgent 2 Probleem relevant, uitdagend, dringend maar is nie helder geformuleer nie Problem relevant, challenging, urgent but lacks clarity 3 Probleem helder geformuleer, irrelevant, nie-uitdagend of dringend nie / Problem clear but lacks relevance, challenge and urgency 4 Geen probleem nie of wollerig / No problem stated or fuzzy	1	(2)	3	4
Bestuur van leer **Learning management**	1 Uiters georganiseerd en absoluut relevant vir leerderaktiwiteite Highly organized, suitably relevant for learner activities 2 Goed georganiseer vir beperkte leerderaktiwiteite Well organized for limited learner activities 3 Organisasie kort meer ontwerp & beplanning vir leerderaktiwiteite Organisation needs more design & planning for learner activities 4 Min of geen organisasie of beplanning vir leederaktiwiteite nie Little or no organization, nor planned learner activities	1	(2)	3	4
Leermedia **Learning media**	1 Opwindende,kreatiewe, relevante, geïntegreerde gebruik van leermedia & ander bronne / Exciting,original,relevant, integrated use of learning media & other resources 2 Relevante gebruik van leermedia en ander bronne Relevant use of learning media and other resources 3 Min gebruik/beperkte gebruik van leermedia en ander bronne Little/some use of learning media and other resources 4 Geen gebruik van leermedia of ander bronne nie No use of learning media and other resources	1	2	(3)	4
Koöperatiewe leer **Cooperative learning**	1 Hoogs effektiewe, suksesvolle gebruik van koöperatiewe leer Highly effective, successful use of cooperative learning 2 Redelike effektiewe gebruik van koöperatiewe leer Partially effective use of cooperative learning 3 Hanteer groepwerk en/of paarwerk Managed group and /or pair work 4 Geen koöperatiewe leer/groepwerk/paarwerk probeer nie Attempted no cooperative learning/group work or pair work	(1)	2	3	4
Leerder-betrokkenheid **Learner involvement**	1 Hele groep is hoogs geïnteresseerd, gemotiveerd, neem verantwoordelikheid vir eie leer / Total group involved, highly interested, motivated, takes responsibility for own learning 2 Sommige is by tye geïnteresseerd, /At times a few show an interest 3 Meeste is verveeld, stil en onbetrokke Many bored, quiet and uninvolved 4 Die klas is verveeld, buite beheer en lawaaierig Class is bored, unruly, noisy	1	(2)	3	4
Tydsbestuur **Time management**	1 Uitstekende tydsbestuur, uiters sensitief t.o.v leerders se behoeftes Excellently paced, highly sensitive towards needs of learners 2 Goeie tydsbestuur, bewus van leerders se behoeftes Well paced, aware of learners' needs	1	2	(3)	4

	3 Laat toe dat aandag afgetrek word, fokus op individuele leerders Allows distraction, focus is on individual learners' needs 4 Mors tyd, te haastig, neem leerders se behoeftes glad nie in ag nie Wastes time, rushed, no awareness of learners' needs				
Kommunikasie **Communication**	1 Uitstekende taalgebruik, lewendig, entoesiasties, duidelik, hoorbaar, energiek Exceptional language usage, vivid, enthusiastic, energetic. clear, audible 2 Entoesiasties, energiek en duidelik verstaanbaar Enthusiastic, energetic. clear 3 Duidelik en hoorbaar Clear and audible 4 Oninspirerend, onduidelik, onseker, vervelig Inaudible,uninspiring,.boring,insecure	1	2	(3)	4

INSTANDHOUDING VAN LEER MAINTAINING LEARNING					
	KRITERIA / CRITERIA				
Moniteringsvaardighede **Monitering skills**	1 Daag leerders uit om met selfvertroue onafhanklik te dink / Challenges learners to be confident, independent thinkers 2 Fokus op leerderdenke / Focused on learner thinking 3 Geneig om antwoorde te gee / Tends to give solutions 4 Maak leerders afhanklik en onseker / Makes learners dependent and insecure	1	2	(3)	4
Hantering van terugvoer **Managing feedback**	1 Luister met aandag, verstaan, gee uitdagende en logiese insette / Attentive listening, understanding, offers challenging, logical inferences 2 Luister met aandag, gee erkenning, interpreteer die kernaspekte / Attentive listening, gives recognition, interprets main ideas 3 Luister halfhartig, gee min erkenning, min of geen terugvoer / Listens with little attention, little recognition given, little or no feedback 4 Bevooroordeelde, veroordelende, afbrekende terugvoer /Biased, judgmental, derogatory feedback	1	(2)	3	4

Skryf jou:
Ontwikkelingsdoelwitte

Write down your:
Development targets

Focus your attention on one side – answering the ind. question ⇒ ☺ lose out! Try involve the whole class. If they don't respond = pick on them.
You have excellent content knowledge.
Very little discipline = WATCH out or they'd lose out their chance in ☺.
Having to explain some things over & over again ⇒ ~~not~~ Needs to get ☺ immediate attention.
* Need more structure – eg. lesson plans.
Established good rapport with the class.
Class are engaged more in group activity ⇒ attentive learning.

Kommentaar/Comments:

Geteken/ Signed

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
ONDERWYS- EN OPLEIDINGSPRAKTYK
EDUCATION AND TRAINING PRACTICE

KONSEP
A

KURSUS COURSE	

Mnr/Mej/Mev
Mr/Miss
Plek
Venue .....

Studentenommer
.... Student Number .....
Tema
Theme Bacteria eradication

Handtekening
Signature .....

Datum
Date 10 May 2004

Punt
Mark allocated 72%

ONDERWYS- EN OPLEIDINGSPRAKTYK
EDUCATION AND TRAINING PRACTICE

Mnr/Mej/Mev
Mr/Miss/Mrs .....

Studentenommer
Student Number .....

Guidelines for observations:

DESIGN	FACILITATING LEARNING		
	Initiating learning	Learning	Maintaining learning
Does the written submission reflect adequate planning i.t.o.: Design? Cross-curricular integration? References? Learning outcomes specified	Are the actions successful? Which actions are successful in challenging learners to learn? Why? Is the stated problem a challenge? How was the learning climate created? Is there evidence of energy, enthusiasm?	Involvement in learning. Are all the learners involved, interested and keen to participate? If not why not? How is it visible?	How is learning sustained and managed? How does the facilitator support learning? How are special learning needs being dealt with? How does the educator react to behaviour?

(Use the above criteria)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Summary statement: Indicate your assessment of the quality of the learning opportunity

1 75+	Very good with out-standin	2	Good, with no significant sses	3 60+	Adequate, but requires significant improvement	4 -55	Poor quality. Does not meet standards

Matters that r

.....

.....

Handtekening
Signature .....

Datum
Date 10/5

Punt
Mark allocated 72%

Mack LT (2)

LEARNING TASK DESIGN:

DATE: 14 June 2004

LEARNING AREA: Life Sciences

LEARNING GRADE: 11

CONTENT AREA AND THEME:

Content Areas	LO	Themes	
Environmental Studies		Investigation of human influences on the environment	
	LO_1	Management & maintenance of natural resources	
		Investigation of a local environmental issue	
	LO_2	Human influences on the environment	
		Sustaining our environment	
		Air, land & water-borne diseases	
	LO_3	Historical developments	
		Exploitation vs. sustainability	
		Industrialization & the impact of industry	
		Management of resources	
		Eco-tourism	
		Air	
Diversity, Change and Continuity	LO_1	Planning, conducting & investigating plants & animals	
		Analysis of given data / findings to evaluate growth	
		Measurement of population growth	
		Collection & analysis of data on community diseases	
		Analysis & evaluation of a specific human behavior	
		Collection & analysis of data on evolutionary trends	
	LO_2	Population studies	
		Social behavior	
		Managing populations	
	LO_3	Historical developments	
		Adaptation and survival	
		Sustainable development	
		History and the nature of science	
		Extinction of species	
		Fossil records, museums, zoos	
		Population changes over time	
		Beliefs about creation and evolution	
		Changes of knowledge	

Content Areas	LO	Themes		
Tissues, Cells and Molecular Studies	LO_1	Research in the field of biotechnology		
		Microscopic skills		
		Investigation of (community) diseases		X
		Collection of latest research information on diseases		
	LO_2	Micro-organisms	Diseases	X
			Immunity	
	LO_3	Ethics and Legislation		
		Indigenous knowledge systems		
		Beliefs, attitudes and values		
Structure, control and processes in basic life systems of plants and humans	LO_1	Structure of systems		
		Experimental investigation		X
		Designing a model		
		Microscope work		
		Conducting research on any latest medical practices		
		Structure of systems		
	LO_2	Support (structural)		
		Transport		
		Excretion		
		Nervous and endocrine systems		
		Related diseases of the above		
		Medical conditions		
	LO_3	Historical developments		
		Food manufacturing and preservation		
		Blood transfusion		
		Life support systems and ethics		
		Sperm banks, surrogate motherhood, test tube babies		
		Sexuality, ethics and beliefs		

Learning Task Design | Date: 14 / 06/ 2004 | Theme: Microorganisms

LEARNING OUTCOMES AND ASSESSMENT STANDARDS:

Learning Outcomes:		Assessment Standards:		Learner is able to:	
LO_1: Confidently explore & investigate phenomena related to Life Science by using inquiry, problem solving, critical thinking and other skills	X	$AS_{1/1}$: Identifying & questioning phenomena & planning an investigation	X	Identify phenomena involving one variable to be tested	
				Design simple tests to measure the effect of this variable	
				Identify advantages and limitations of experimental design	X
		$AS_{2/1}$: Conducting an investigation by collecting & manipulating data	X	Systematically & accurately collect data using selected instruments and/or techniques	
				Select a type of display that communicates the data effectively	X
		$AS_{3/1}$: Analyzing, synthesizing, evaluating data & communicating findings	X	Compare data & construct meaning to explain findings	
				Draw conclusions and recognize inconsistencies in the data	X
				Assess the value of the experimental process & communicate findings	X
LO_2: Access, interpret, construct & use Life Sciences concepts to explain phenomena relevant to Life Sciences	X	$AS_{1/2}$: Accessing knowledge	X	Use various methods & sources to access information	X
		$AS_{2/2}$: Interpreting and making meaning of knowledge in the Life Sciences		Identify, describe & explain concepts, principals, laws, theories and models by illustrating relationships	
				Evaluate concepts, principals, laws, theories & models	
		$AS_{3/2}$: Showing an understanding of application of Life Sciences knowledge in everyday life	X	Analyze & evaluate the costs & benefits of applies Life Sciences knowledge	X
LO_3: Able to demonstrate an understanding of the nature of science, the influence of ethics & biases in the Life Sciences, & the interrelationship of science, technology, indigenous knowledge, the environment & society		$AS_{1/3}$: Exploring & evaluating scientific ideas of the past and present cultures		Compare scientific ideas & indigenous knowledge of past & present cultures	
		$AS_{2/3}$: Comparing and evaluating the use & development of resources and products and their impact on the environment		Compare the different ways in which resources are used to in the development of biotechnological products, & analyze the impacts on the environment	
		$AS_{3/3}$: Compare the influence of the different beliefs, attitudes & values on scientific knowledge		Compare scientific ideas &indigenous knowledge of the past & present cultures	

PROBLEM STATEMENT:

- What is the ***best possible*** way that you can go about ***recording your observations*** from the agar plates which you have infected with microorganisms and disinfected with various substances?
- What then is the ***most concise, comprehensive and visually appealing*** way that you can ***communicate*** this data?
- What are ***all the possible*** ways that you can use the knowledge that you have gained to affect your ***everyday life*** in the ***most positive*** way?

PRESENTATION OF LEARNING TASK:

CLARITY:

- Placement of groups
- Use of assessment rubric
- Recording of scientific data
- Observing of colonies
- Everyone needs to hand in an individual and group report

IMPORTANCE:

- Why they should study disinfection
- Why write a scientific report
- Why accuracy and precision are important when writing methods and materials
- Why accuracy and precision are important when doing observations

URGENCY:

- Explain that there are only two school periods for group report
- Explain that they have four days to do individual report and must be handed in

THE LEARNING TASK:

This LT is designed to get learners to think about the various different disinfectants and bacteria that they come into contact in their daily lives. They are therefore able to realize that the world consists of more than what they can observe with their naked eye.

- Before the learners are given the agar plates to observe they need to state what they think would have happened in there experiment in the form of a hypothesis.
- They must also state exactly how they when about doing the experiment by providing exact methods and materials
- The learners then need to make observations from there agar plates.
- Next they need to work out how best they can record their observation / data.
- Once they have recorded their observations they need to translate the data into a more informative result (e.g. a graph)
- They now need to work individually in order to discuss why they obtained they results that they did and how they could improve on this next time
- Lastly they will have a consolidation session in which they discuss various questions such as why it was important to be very precise in recording their methods and materials.

Learning Task Design **Date:** 14 / 06/ 2004 **Theme:** Microorganisms

AUTHENTIC LEARNING CONTEXT:

The authenticity of this LT comes from the fact that they are dealing with bacteria that they come into contact in their daily lives as well as disinfectants which they use in their daily lives. They are also asked, in their reports, to relate what they have discovered to their daily lives and how this will help them improve their lives.

Two other things that will help to create this context are:

- Overhead: SA Centre for Microbiology
- Group names placed at each desk at the back of the class (i.e. lab 1-6)

TIME ALLOCATED:

Cumulative Time	Time per Activity	Activity
2 min	2 min	Welcome and focus
12 min	10 min	LTP
13 min	1 min	Move to back
18 min	5 min	Read through assessment rubric and ask questions for clarity
20 min	2 min	Agar plates handed out
45 min	25 min	Observe and record data in your group
50 min	5 min	Determine rate and quality of learning and where to start next lesson

RESOURCES:

Equipment / Apparatus / Materials	Quantity	Cost
Overhead: SA Centre for Microbiology	1	R 2-00
Group names (lab 1 to 6)	6	R 1-00
Assessment rubrics and info sheets	25	R 5-00
Agar plates from previous LT	6	
Scalpel for opening agar plates	6	

ASSESSMENT METHOD:

- Assessment carried out according to the assessment rubric
- Recorded in a mark sheet as a portfolio assignment

Urgent Request From HQ

The ***South African Center of Microbiology*** (HQ) requires an urgent report so that they can take necessary steps to eradicate the present bacterial threat. Before we run out of time and the bacterial infection becomes uncontrollable, your team of microbiologists is required to write a report on the best possible means of eradicating this particular bacteria.

HQ however also requires that they get as many possible solutions and have therefore requested that all the microbiologists in your team supply their individual opinion / solutions to the problem.

Your Team's Assessment Rubric

Bacterial Identification:

No description of colonies	0
Description incomplete	1-4
Description complete but not detailed	5-6
Comprehensive description, includes drawings	7-9
Excellent use of descriptive terminology / precise, neat drawings	**10**

Bacterial Eradication:

Hypothesis	
No hypothesis made	0
Hypothesis made but irrelevant or incomplete	1-2
Informative and relevant hypothesis	**3**
Material	
No materials listed	0
Materials listed but incomplete	1
Complete material list but lacks detail	2
Complete, detailed list of materials	**3**
Method	
No method included	0
Method lacks crucial steps	1
All curial steps included but lacks detail	2
Detailed description of all steps	**3-4**
Results	
Table	
No table included	0
Table drawn but incomplete	1
Comprehensive table drawn	**2**
Graph	
No graph drawn	0
Graph drawn but irrelevant	1-2
Precise, neat graph drawn	**3**

TOTAL	**25**

Individual Assessment Rubric

Bacterial Eradication:

Discussion	
No discussion written	0
Inadequate explanation of findings / no references or life application	1-3
Logical explanation but not detailed / life application irrelevant	4-6
Detailed explanation / good references / a few relevant applications	7-9
Detailed explanation & references / unique/ numerous relevant applications	**10-12**
Conclusion	
No conclusion made	0
Irrelevant conclusion	1
Uninformative conclusion	2
Informative and relevant conclusion	**3**

TOTAL	**15**

Report format

Hypothesis: States your predication of what will happen once the experiment has been carried out. Must be in an "if…… then ……" format. Make sure that your hypothesis is not an aim or a question.

Materials: States very accurately and precisely the equipment and apparatus that you used for the investigation

Method: States accurate and precise details of how you carried out your investigation. Should be written so that someone else can exactly reproduce your experiment to obtain the exact results that you obtained

Raw data: States the data that you obtained from the direct observations of your investigation / agar plates.

Results: The information that is obtained after the data has been analyzed. This information should relate your data in the most concise, comprehensive and visually appealing manner possible. E.g. use of graphs

Discussion: The results that you obtained are explained in this section. If results are not what you expected in your hypothesis then this is where you give reasons. Use relevant references from books, articles, internet, ect, to help discuss your observations. You must also include how you or someone else can use the information gathered in your investigation in their daily lives.

Conclusion: Concludes your argument in a short, concise and powerful way.

Operation of a Learning Task

This LT is the third part of a three part series. During the first LT they infected some agar plates by streaking various objects over the surface of the agar. The next part was when they had to observe the growth on their agar plates and to draw what they had observed using a "key" that had been provided. Also during the second part, they transferred a bacterial colony to a fresh agar plate and placed various disinfectant substances onto the surface of the agar.

During this LT they will therefore be required to make observations from their disinfected agar plates and to record these in the most appropriate manner. They will then have to write up the whole experiment into a scientific report format and write an individual discussion at home.

Description of occurrences during the Lesson:

Learning Task Presentation: (labelled ***"LTP_10_May"*** on CD)

- Rubrics have been placed at the desks at the back of the lab, therefore they do not have anything in front of them yet. Explanation that this is not like a usual practical report because the leaner will do half in groups and the other half individually.
- Learner's agar plates are at the front of the lab. Statement, "some came out well and others did not come out as well because of the way you spread your colonies"
- Explanation that they need to write down their hypothesis
- Record your methods and materials and why it is important to have an accurate method and material section.
- Learners are asked why the different results where obtained: streaking / different bacteria isolated / different amounts of disinfectant
- Discussing how to write up results and overhead of an example of a data sheet is provided to the learners. Learners provided with the option to use their own method of recording.
- Class asked to move to back but stopped by a question fro one of the learners, "what is the individual and what is the group work?"
- Question from student "When must it be finished?" Students have four days to finish and must therefore be handed in on Friday.
- Learners asked to go to back and read though the rubric for five minutes or so and to

collect their agar plates from the front of the classroom.

Learning Task Execution: (labelled ***"LTE_10_May"*** on CD)

I unfortunately did not have someone in the classroom to record my LTE and therefore I placed the video recorder on the top of a desk. It was therefore stationary and therefore did not pick up much of the action.

- The learners are now sitting in their groups at the back of the class and some are reading through the rubric but many are already looking at the agar plates.
- I walk around checking to see that everyone is clear on what they have to do.
- Learners then begin to write a hypothesis for their experiment but many have trouble in understanding what a hypothesis is and it is not well documented on their sheet.
- Problems arise as to how accurate they should be in their methods and materials section. I explain that it must be as accurate as possible.
- Most groups use the table provided to record their results.
- Some groups work fast enough to start transferring their data on a more informative graph. Most groups however do this in the next lesson.
- No LTC is carried out

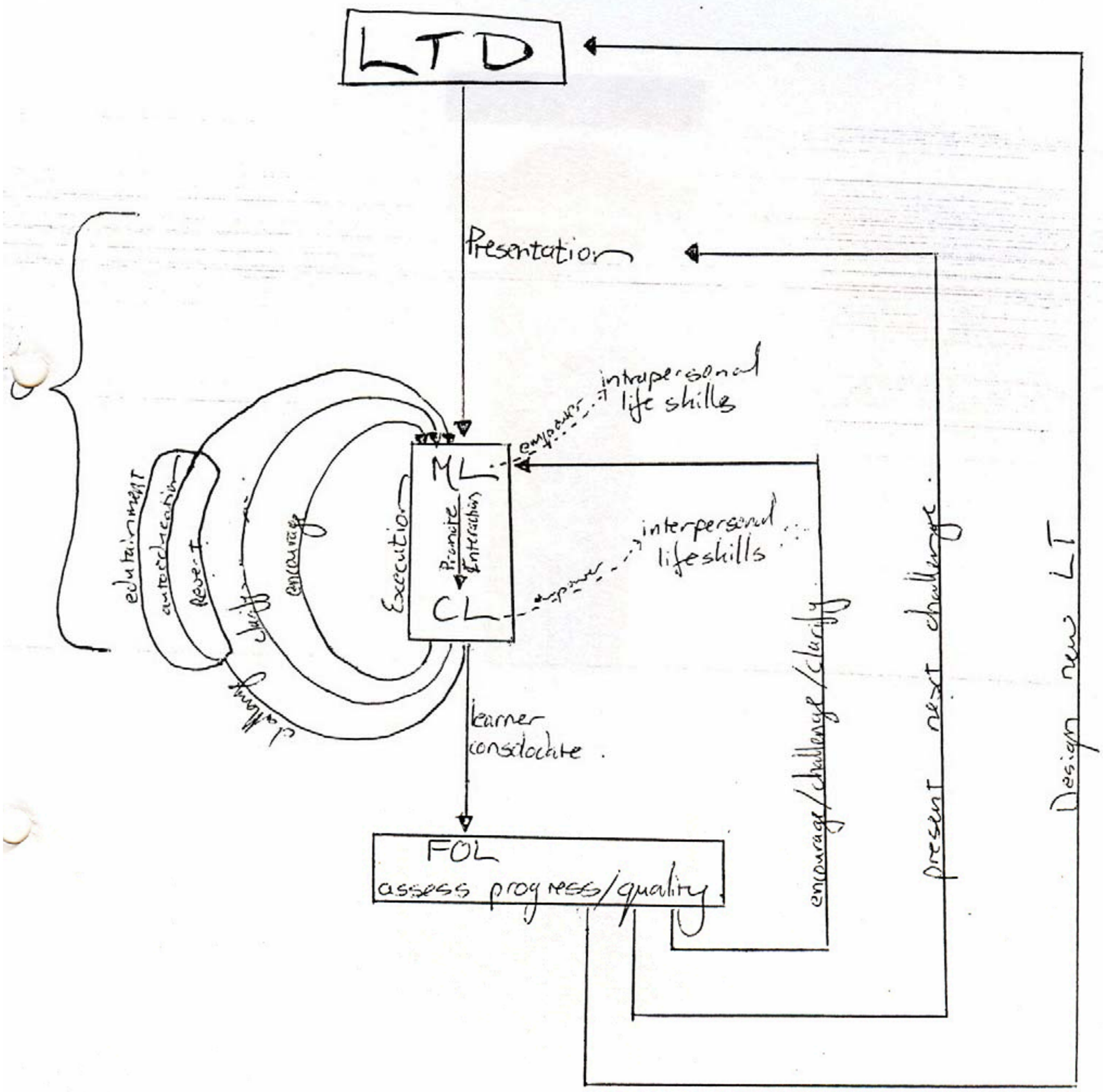
Reflection and improvement on occurrences:

Learning Task Presentation: (labelled ***"LTP_10_May"*** on CD)

- The fact that I put the rubrics that the will be assessed at the back of the class got me wondering whether this was actually the best possible way to do this. They seemed quite confused when I was explaining to them what was in the rubrics because they did not have it in front of them. It may have been more productive to have a short introduction at the beginning of the class and then to provided them with the rubrics, which they could have 5 minutes to read through. I would then give them a time to discuss it and I could clarify anything that they did not understand when reading the rubric sheet.
- I make the statement that some of the groups did not streak their plates well enough, however I should not be making this statement as it should be up to the learner to discover why their plate did not perform as it should have. I could therefore leave them with a question but I should not provided them with the answers
- They where now told that they would need to write down their hypothesis, however this is teaching them wrong scientific method because they should have created a hypothesis

before the investigation and not after they have seen the results. They should therefore have written their hypothesis before I provided them with the plates or during the previous lesson.

- I feel that once again I could have left them with a question relating to why it is important to record your methods and material accurately. They could have then talked about it in their groups and it would have been best if during the LTC the class had discussed the importance of accurately recording methods and material during scientific investigation.
- Once again it was discussed why there were discrepancies between the different groups results, however the LTP is not the time for this to take place and learners should once again be left with the question but not the answer.
- The learners where provided with an overhead of an example of a data sheet, however this is defiantly limiting them because all they have to do is to copy it off the board and record their data in it. It however they were not provided with this example, they would have to think about how they are going to record there data. This exercise will stand them in good stead for the next time that they have to do a similar thing and they do not have an example to copy.
- The question that was asked by the learner after I asked them to move to the back means that there was not complete clarity on what they had to do. I should have therefore set out my LTP in a more structured and clear manner, making sure to make it clear, important and urgent for the learners. I defiantly did not make this LT have any importance to the learner even though it does have a lot of real life significance, I merely failed to present it to them.
- The next question was "When must it be finished?" This question would not have been asked if had not made the LT had been presented with an urgency about it, I should therefore have explained that they only had a sort time to finish the report. I did however explain this but only after the question had been asked. Therefore if the question was not asked, I would not have explained it.
- I then asked the learners to go to there group desks at the back of the class and read through the rubric so that they fully understood what to do. Where I went wrong here was that I also provided them with their agar plates and therefore they were all looking at the agar plates and only a limited few where concentrating on reading the rubric. I should have enforced that they read first, then ask questions for clarity and once everyone understood what they needed to do, I would only then provide them with their agar plates.


LTD
Presentation
intrapersonal life skills
ML
Promote interaction
Execution
CL
interpersonal lifeskills
learner consolidate
FOL
assess progress/quality
encourage/challenge/clarify
present next challenge
Design new LT
edutainment
encourage

Chapter 7 – Appendix V – Bernice

APPENDIX V: Chapter 7

7.4. Bernice Learning task – Human Blood Circulatory system- Blood Transfusion

7.4.1. Step 3: Planning Action -

7.4.1.1. Learning task design (See Appendix for a copy of the learning task designed).

7.4.2.1. b. Learning task assessment

(i) Specialisation lecturer

(ii) Researcher

7.4. Concept map

Leertaak ontwerp deu[redacted] vir uitvoering tydens die derde kwartaal van Hoërskool Silwerton se gr 11 Biologie: Bloedoortappings.

Leerarea/dissepliene/vak: Lewenswetenskap: Biologie

Vlak of fase: VOO: Gr 11

Leeruitkomste en asseserings standaarde:

Soos uiteengesit in die "National Curriculum Statement Grades 10-12" vir lewenswetenskappe.

Leeruitkomste	**Asseserings standaarde**
Scientific inquiry and problem-solving skills	1. The learner identifies and questions phenomena and plans an investigation. 2. The learner conducts an investigation by collecting and manipulating data. 3. The learner analyses, synthesizes and evaluates data and communicates findings.
Construction and application of life sciences knowledge	1. The learner accesses knowledge 2. The learner interprets and makes meaning of knowledge in life sciences 3. The learner shows understanding of how life sciences knowledge is applied in everyday life.
Life sciences, technology, environment and society	1. The learner explores and evaluates the scientific ideas of past and present cultures 2. The learner compares and evaluates the uses and development of resources and products and their impact on the environment and society. 3. The learner compares the influence of different beliefs, attitudes and values on scientific knowledge.

Probleem gestel aan leerders:

(Leerders ontvang hierdie probleemstelling skriftelik)

Almal van ons is bewus van die toenemende gevaar wat gepaardgaan met die oordrag van MIV VIGS en ook ander bloedverwante siektes.

Jou taak (en jul taak as groep) gaan wees om na die beste van jou vermoë en van die hoogste moontlike standaard, aan 'n oplossing te werk vir die krisis wat gepaardgaan met VIGS oordrag tydens bloedoortappings.

Hoe gaan jy verseker dat JY skoon bloed kry?

Dink nou op jou eie aan die beste opslossing en daarna sal ek geleentheid gee vir julle om in groepe julle idees te deel, die beste een te kies en dit te vervolmaak.

Tyd toegeken:

Die leertaak word geïnisieer op 30 Augustus 2004 en eindig die dag daarna met die inhandiging van die finale produk aan die einde van die periode. Leerders behoort slegs een periode aan die leertaak te spandeer, aangesien bloedsiektes 'n baie klein deel van die sillabus uitmaak.

Leerders kry 10 minute kans vir metaleer en daarna die res van die periode om die leertaak in hul leergroepe af te handel.

Leertaak voorbereiding:

Ter voorbereiding van die uitvoer van die leertaak moet die klas verdeel word in koöperatiewe leergroepe (indien daar nie reeds groepe bestaan nie). Dit word gedoen deur die groepe saam te stel in terme van prestasie, geslag, kultuur, en heel laaste, deur vriendekringe te skei.

In elk van hierdie katagorië word gepoog om so 'n groot verskeidenheid as moontlik in een groep te plaas (heterogene groepe). Neem die vorige termynpunt wanneer daar na prestasie gekyk word.

Daar moet te alle tye gestreef word na 'n idiale groepgrootte van slegs vier leerders.

Klasorganisasie:

Leerders sit op hulle gewone plekke voor in die laboratorium totdat hulle in hul leergroepe verdeel, waarna hulle mag sit waar hulle as groep gemaklik voel in die klas.

Wanneer die leerders individuele werk verrig, word daar geen kommunikasie toegelaat nie.

Ware leeromstandighede:

Aangesien dit 'n ware lewensprobleem is, bly die leerders hulleself, en bly die fasiliteerder ook hom-/haarself. Daar is dus geen rolspel nie, en die oplossing van die probleem is tot voordeel van die leerders self.

Bronne en benodighede vir die leertaak:

- Bronne van enige aard wat in die klaskamer is of deur die leerders self verskaf word, word toegelaat.

Finale resultate van die leertaak:

Wat word verwag van elke leerder?

- Die finale produk uitkoms: Sien aageheg
- Kennis bekom: Leerders moet besef dat daar 'n toenemende gevaar bestaan rondom die kwessie van "skoon bloed". Hulle moet besef dat dit elkeen van ons raak en dat ons netsowel self daarvoor verantwoordelikheid kan meen om te verseker dat ons skoon bloed gaan ontvang wanneer ons dit sou benodig!

Metodes van assesering:

Elke groep se finale produk word aan die volgende kriteria gemeet:

• Is die oplossing realisties?	2
• Is die oplossing uitvoerbaar?	2
• Is die oplossing in detail beskryf?	2
• Is die oplossing sistematies uiteengesit?	2
• Het alle groeplede 'n bydrae tot die oplossing gelewer? (Groeplede ontvang die geleentheid om te sê of almal in die groep hul deel gedoen het. Wanneer daar iemand was wat nie 'n bydrae gelewer het nie, verloor hy/sy dienooreenkomstig punte.)	2

Elke leerder ontvang 'n punt uit 10 vir die opdrag, asook die terugvoer op hierdie kriteria.

Proses gevolg om die probleem op te los

Leerders moet eers op hulle eie besluit wat volgens hulle die heel beste manier is om die probleem op te los.

Hulle moet die logieka en uitvoerbaarheid van hulle besluit deeglik in oorweging neem.

Daarna kom hulle in leergroepe byeen en deel hulle idees. Hulle kan of besluit om 'n samestelling van idees te maak of om die beste idee te kies en dit te vervolmaak tot in die fynste detail.

Finale produk uitkoms

Leerders kan by voorbeeld besluit om van hulle eie bloed in 'n bloedbank te laat bewaar.

Hulle sal dus sê dat hulle sal hospitaal toe gaan op 'n gereelde basis, van hulle eie bloed laat trek (as hulle bloed skoon is, dit sal eers getoets moet word), dit duidelik laat merk en in die hospitaal se bloedbank laat bewaar vir wanneer hulle dit mag benodig. Hulle kan dalk dieselfde doen met 'n familielid se bloed as hulle nie self kan of mag skenk nie.

Laastens moet die leerders noem dat hulle sal laat aanteken dat slegs hulle eie bloed aan hulle oorgetap mag word in geval van nood. Dit sal in 'n pasiëente leêr aangeteken moet word deur die hospitaal asook die huisdokter en enige ander betrokke partye.

Learning Task developed by . to be implemented during the third term at Silverton High School in Grade 11 Biology.

Blood Transfusions

Learning Area/ Discipline/ Subject: Life Science: Biology

Level or Phase: FET: Gr 11

Learning Outcomes and Assessment Standards

As set out in the "National Curriculum Statement Grades 10-12" for the Life Sciences.

(See document)

Problem put to learners:

(Learners receive the problem statement in writing)

We are all aware of the increasing danger of the transmission of HIV/AIDS, as well as other blood related diseases.

Your task as a group, is to find a solution, to the best of your ability and of the highest quality, to the problem associated with the transmission of HIV during blood transfusions.

How will you ensure that you get uncontaminated blood?

On your own, think about the best solution. This will be followed by an opportunity to share your ideas in groups; select the best idea and develop it fully.

Time allocation:

This LT was initiated on 30th August 2004 and ended the next day when the final product was submitted when the lesson ended. Learners spent only one period on the learning task as blood related diseases constitutes a very small section of the syllabus.

Learners are given 10 minutes for meta-cognition and the rest of the lesson to complete the learning task in their groups.

Learning Task Preparation:

As preparation for implementing the LT, the class should be divided into co-operative learning groups (if no such groups exist yet).The following criteria are taken into account when forming groups: performance, gender, culture, and finally, by separating friends.

In each of the above categories, an effort is made to include as wide a variety in each group (heterogenous groups). Consider the previous semester marks when grouping according to performance.

Avoid forming groups larger than four learners

Class Organisation:

Learners take up position in the front of the lab,till they start to work in their groups. They may work wherever the group feels comfortable.

When learners are busy with individual work, no communication is allowed.

Authentic learning conditions:

As this is an authentic problem, the learners are themselves and the facilitator her-/himself. No role play occurs and the solution to the problem is to the advantage of the learners themselves.

Sources:

- Any resources from the classroom or provided by the learners, are allowed.

Final results of the Learning Task:

What is expected of each learner?

- The final product outcomes (see table)
- Knowledge gained: Learners should realize that it has become increasingly difficult to ensure that all blood is uncontaminated. They should be aware of the fact that this affects all of us and we may as well take responsibility to ensure that we receive uncontaminated blood should we require it.

Methods of assessment:

The final product should meet the following criteria:

Is the solution realistic?	2
Is the solution practical ?	2
Is the solution described in detail?	2
Is the solution set out systematically?	2
Did all group members contribute? (Group members get an opportunity to say if all members contributed. If someone has not contributed, the marks will not be allocated to this person)	2

Each learner may be allocated 10 marks for the task, as well as feedback on the criteria.

Process followed to solve the problem:

Learners decide individually what the best solution to the problem is.

They should consider the logic and practicality of their solution thoroughly.

Then they meet in groups and pool their ideas. They may decide to present a composite of ideas or to select the best idea and to refine it to the last detail.

Final product outcome

Learners may decide to store their own blood in a blood bank.

They would explain that they would visit a hospital regularly, have blood extracted (it would have to be tested first) , mark it clearly and have it stored in the hospital blood bank till they need it. They may do the same with the blood of a family member if they cannot donate blood themselves.

They would then stipulate that only their own blood be given to them in an emergency. This will be entered in a patient register by the hospital and family doctor.

(See Angela's TP report on p 111)

SKOOLGEBASEERDE ONDEWRWYSASSESSERING
SCHOOL BASED EDUCATION ASSESSMENT
Fasilitering van Leer / Facilitating Learning

Punt toegeken / *Grade awarded*
60 %

Beginneronderwyser / *Beginner Educator:* ______ Student No: / *Student Nu:* ______
Skool: / *School:* ______ Graad: / *Grade:* 11 Datum: / *Date:* 30/08/04
Spesialiseringsarea: / *Specialising area:* Biologie Tema: / *Theme:* Bloedoortappings

LEERTAAKONTWERP / *LEARNING TASK DESIGN*

LEVEL / VLAK — *CRITERION* / **KRITERIUM**	Alle items teenwoordig maar die verband daartussen nie aangredui of irrelevant / *All items present but relationship between them not indicated or irrelevant*	Alle items teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA en LT aangredui en relevant / *All items present and the relationship between the LO's, AS's, Challenge, LTP and LT indicated and relevant*	Alle items teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA, LT, Outentieke Leeromgewing, Materiale en Toerusting/ Apparaat en Leeraksie-organisasie aangredui en relevant / *All items present and the relationship between the LO's, AS's, Challenge, LTP LT, Authentic Learning Environment, Materials and Equipment/ apparatus, and Learning Action Organisation indicated and relevant*	Alle items teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA, LT, Outentieke Leeromgewing, Materiale en Toerusting/ Apparaat, Leeraksie-organisasie en Resultaat van LT aangredui en relevant / *All items present and the relationship between the LO's, AS's, Challenge, LTP LT, Authentic Learning Environment, Materials and Equipment/ apparatus, Learning action organisation, and Result of LT indicated and relevant*
Ontwerp/ *Design*			✓	

ADDISIONELE KOMMENTAAR / *ADDITTIONAL COMMENTARY*

You have some wonderful innovative ideas — great asset. Great – you presented the learners with a problem. Use it more extensively relevant & personal. Have they experienced any relatives or friends dying from mismanaged blood donations. The individual task — good idea — it is important that each learner thinks about the problem and writes down his/her idea. The group session later was good — could you manage your time management & be clear about the output for each group — what about the biological aspects? – draw blood & regulations, as well as storage. A general group discussion was lacking – this could really place a good cap on this experience.

We discussed these ideas.

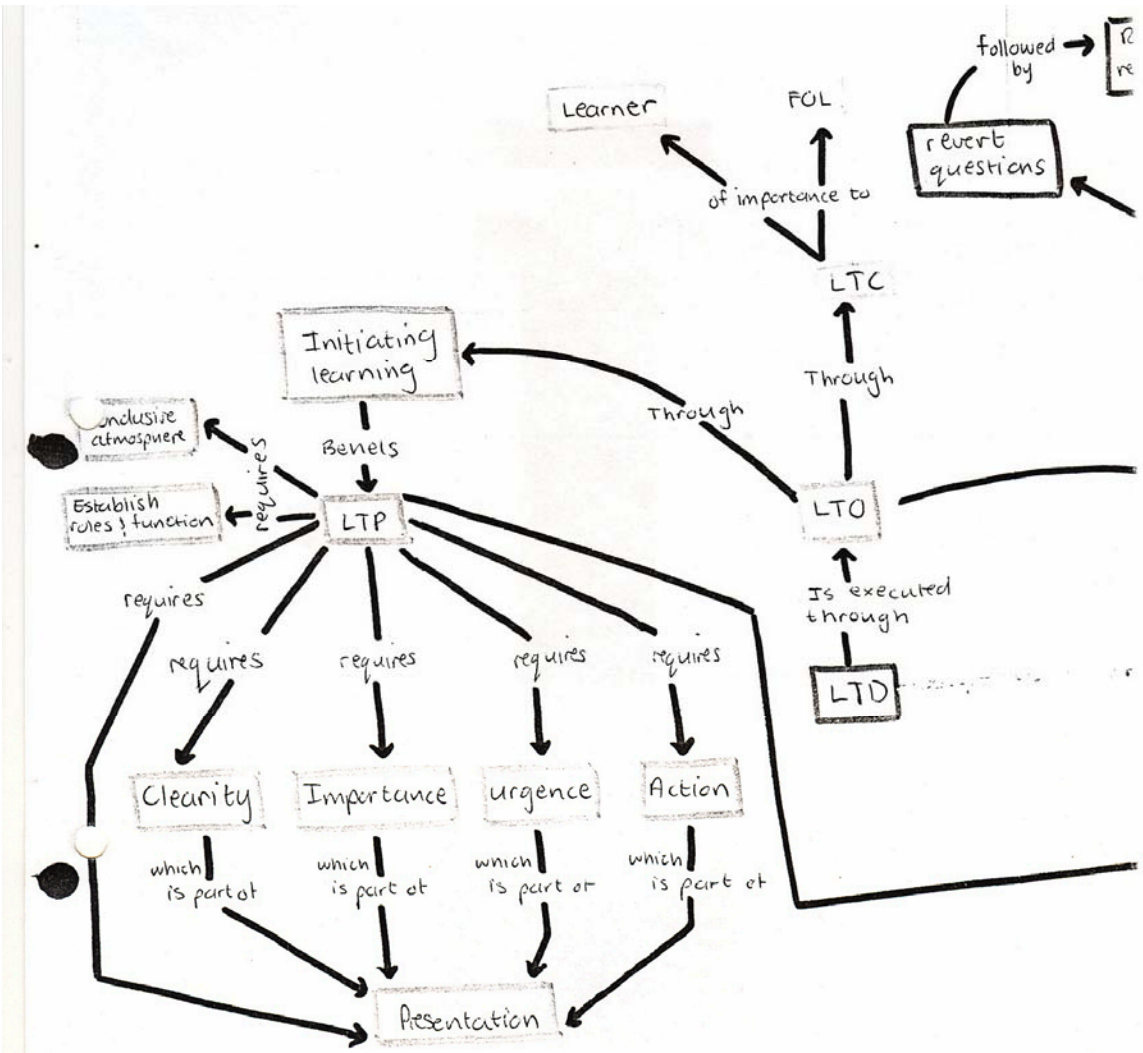
Assessor:

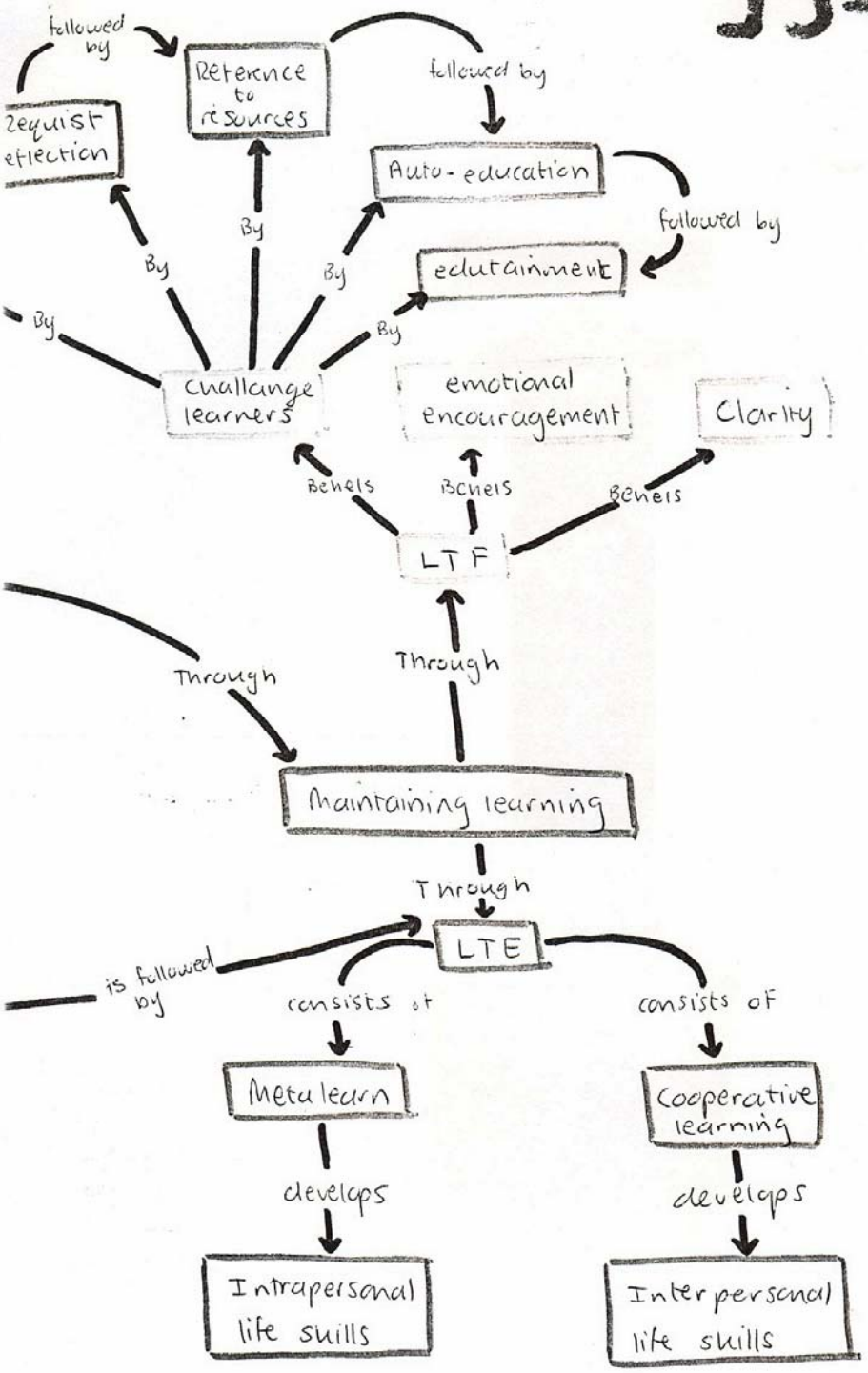
Self	Mede BO/*Peer BE*	Mentor	Dosent/*Lecturer* ✗
			✗

Naam: / *Name:* A A James Handtekening: / *Signature:* James

LEERTAAKOPERASIONERING (LTOP) / *LEARNING TASK OPERATION (LTOP)*

		Onaanvaarbaar/ *Unacceptable*	Ontoereikend / *Inadequate*	Goed / *Good*	Uitstekend/ Excellent
LTA / LTP	Uitdaging / Challenge	Die uitdaging is nie 'n probleem in werkliheidskonteks (werklike of realistiese probleem) nie / *The challenge is not a problem in real life context (real life or realistic problem)*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem), maar voldoen aan slegs enkele **probleem en LTO** kriteria / *The challenge is a problem in real life context (real life or realistic problem) but adheres to only singular problem **and LTD** criteria*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem) en voldoen aan die meeste **probleem en LTO** kriteria / *The challenge is a problem in real life context (real life or realistic problem) and adheres to most **problem and LTD** criteria*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem) en voldoen al die **probleem en LTO** kriteria / *The challenge is a problem in real life context (real life or realistic problem) and adheres to all **problem and LTD** criteria*
	Aanbied / Present	Aanbieding is duidelik / *Presentation is clear*	Aanbieding is duidelik en spel belangrikheid uit / *Presentation is clear and explicates importance*	Aanbieding is duidelik, spel belangrikheid uit en beklemtoon dringendheid / Presentation is clear, explicates importance and emphasises urgency	Aanbieding is duidelik, spel belangrikheid uit, beklemtoon dringendheid en vereis onmiddelike leerderaksie / *Presentation is clear, explicates importance, emphasises urgency and demands immediate learner action*
LTU / LTE	Metaleer / Metalearn	Leerders beplan hulle eie individuele leer / *Learners plan their own individual learning*	Leerders beplan en monitor hulle eie individuele leer / *Learners plan and monitor their own individual learning*	Leerders beplan, monitor en assesseer hulle eie individuele leer / *Learners plan, monitor and assess their own individual learning*	Leerders beplan, monitor en assesseer hulle eie individuele leer en verwerf vanselfsprekend spesifieke intrapersoonlike lewensvaardighede / *Learners plan, monitor and assess their own individual learning and obviously acquires particular intrapersonal life skills*
	Koop leer / Coop learn	Groepe bestaan uit heterogene groepe van optimale grootte / *Groups consist of heterogeneous groups of optimal size*	Groepe bestaan uit heterogene groepe van optimale grootte en lede is individueel aanspreeklik / *Groups consist of heterogeneous groups of optimal size and members are individually accountable*	Groepe bestaan uit heterogene groepe van optimale grootte, lede is individueel aanspreeklik en positief interafhanklik / *Groups consist of heterogeneous groups of optimal size and members are individually accountable and positively interdependent*	Groepe bestaan uit heterogene groepe van optimale grootte, lede is individueel aanspreeklik en positief interafhanklik en verwef vanselfsprekend spesifieke interpersoonlike lewensvaardighede / *Groups consist of heterogeneous groups of optimal size and members are individually accountable and positively interdependent and obviously acquires particular interpersonal life skills*
LTT / LTF		Voorsien kognitiewe ondersteuning deur die beantwoording van leerders se vrae/ *Providing cognitive support by answering learner's questions*	Daag kognitiewe ontwikkeling uit deur die vra van hoëerorde vrae as realksie op leerdervrae/ *Challenging cognitive development by asking higher order thinking questions as reaction to learners' questions*	Voorsien emosionele ondersteuning en vra leerders se vrae terug aan hulle om self te antwoord / *Providing emotional support to learners and reverting their questions back to them*	Voorsien emosionele ondersteuning en vra leerders se vrae terug aan hulle om self te antwoord en die vra van metaleervrae by die beste en mees geskikte geleentheid / Providing emotional support, reverting learners' questions back to them and asking metalearning questions at the most opportune and appropriate moments
LTK / LTC		KLG'e voorsien terugvoer met slegs sommige lede wat bydra / *CLG's provide feedback with only some members contributing*	KLG'e voorsien terugvoer met al die lede wat bydra / *CLG's provide feedback with all members contributing*	KLG'e voorsien terugvoer met al die lede wat bydra en word geasseesseer sonder die eis op kwaliteit / *CLG's provide feedback with all members contributing and is assessed without a demand for quality*	KLG'e voorsien terugvoer met al die lede wat bydra en word krities geasseesseer op die kwaliteit van hulle produk en aanbieding deur eweknieë en BE / *CLG's provide feedback with all members contributing and is critically assessed on the quality of their product and presentation by peers and BE*
PUNT/ GRADE		0-24	25-49	50-74	75-100
Toeken Award				60	





Chapter 7 – Appendix V Carol

7.5. Carol

7.5.1. Step 3: Planning Action

7.5.1.1. Learning task design

7.5.2.1. b. Learning task assessment

(i) Self-assessment

(ii) Peers

(iii) Teacher educator

(iv) Specialisation lecturer

7.5. Concept map

Learning Task Design 2:The human Skeleton

(3 Aug - 17 Aug)

Learning Subject	Biology
Learning phase	FET
Grade	10
Learning area	Human Skeleton
Time allocated	8 Periods (8 x 40min)

Programme Organisation
Problem statement
What is the most economical and effective prosthetic that can be produced for persons thatuman
that don't have enough funds for professional prosthetics?
Recourses
Text on the human skeleton
* Ken en verstaan Biologie Grade 10 (Van Resburg, Netshiomvani, Strydom and Van Wyk)
* Mind Action Series:Biology Textbook and Workbook 10 (Kuun and Rortje)
* Fisiologie van die mens. (Meyer en Meij)
* Verken Biologie:graad 10. Dilley, Doidge et al.
Websites
*www.reachoutmichigan.org
*www.body.com
Meta-learning
Each individual (in the cooperative-group) receive a page with parts of the skeleton. These sketches
has been changed or altered. Individually the learners must identify the part of the skeleton and then the
alteration. They must think about the effects these changes have on the function of this part of the
skeleton.
Cooperative-learning
The sketches of the changes must be discussed in the cooperative-groups. Do all the cooperative-group
members agree with the changes and effects on the skeleton?
The cooperative groups must bring materials and equipment to school and build the most effective and
cost-effective prosthetic possible
The prosthetics will be on exhibition and the other cooperative-groups will assess the prosthetics

LTP
What is the most economical and effective prosthetic that can be produced for persons that don't have enough funds for professional prosthetics?
In your cooperative groups you must decide on a part of the skeleton you would like to simulate in a prosthesis. The prosthesis must be economical but of high standard with the same characteristics and functions of the part of the skeleton.
Materials and equipment that is needed must be collective and brought to class. You will build the prostheses in class time.
An exhibition of all the cooperative-groups prosthesis will be held and assessment will take place.

Class organisation
Class are divided into their cooperative groups (heterogeneous groups are generated thought taking into consideration: marks, culture, gender etc)
Posters of human skeleton are put up on walls.
Different parts/bones of the human skeleton are on display

Product
Meta-learn identification and answers of modified sketches.
The prosthesis

Critical Outcomes			
Problem identifying & solving skills	*	Effective use of science and technology	*
Effective cooperative-group work	*	Self-organisation skills	*
Communication skills	*	Cultural and aesthetically sensitive	
Collect, analyse, organise and evaluate information effectively	*	An understanding of the world as a set of related problems	
Education and career exploring	*	Explore strategies to learn more effectively	*
Responsible citizen participation	*	Entrepreneurial skills	*

Learning outcomes	Assessment Standards
Scientific Inquiry and Problem solving skills	When learners use appropriate materials for the building of the prostheses. Prostheses must be economically, but effective with the same functions as its counterpart
Construction and Application of life Sciences knowledge	Learners must have in-depth knowledge of the part of the skeleton they are making a prosthesis off in order to make it realistic and functional
Life Sciences, Technology, Environment and Society	Prostheses must be designed and build by learners for persons that cannot afford professional prosthesis

Specific outcomes
Knowledge of the anatomy and physiology of the human skeleton
The importance and function of the human skeleton
Knowledge of the appendicular and axial skeleton
Exploring of the different types of bones (classification) of the human skeleton

Assessment Criteria
Continual assessment during the project
Prosthesis (economical and effectiveness) (rubric)

Assessment Method	
Self assessment	*
Cooperative-group assessment	*
Peer assessment	*
Facilitator assessment	*

Gr.10 Biologie
Die Skelet

Wat is die mees ekonomiese en effektiese prostese wat vervaardig kan word?

Meta-leer

Sketse van ortopetiese gemodifieerde dele van die menslike skelet.

Beantwoord die volgende vrae individueel en handig in.

- Identifiseer die gedeeltes (a en b) van die skelet.
- Wat is die funksies van die dele (a en b) van die skelet?
- Watter verandering is aan die gedeelte (a en b) van die skelet aangebring?
- Is die verandering tot voordeel of tot nadeel van die skelet?
- Watter invloed het die veranderinge op die funksie van die deel van die skelet (a en b)

Koöperatiewe Leer

Elke lid van die kooperatieiwe groep kry die geleetheid om sy bevindgie met die res van die lede te deel. Stem die kooperatiewe groep saam met die bevindeg? Is daar nog verandering wat raaks gesien word? Bespreek dit breefvoerig in die kooperatiewe groep.

Besluit in die kooperatiewe groep watter deel van die skelet gebou gaan word as 'n prostese? Materiale en toerusting moet bymekaar gemaak word en skool toe gebring word..

'n Uitstalling en assesseirng van kooperatiewe groeps-lede se prostese sal plaasvind.

Gr.10 Biologie
Die Skelet

Wat is die mees ekonomiese en effektiese prostese wat vervaardig kan word vir persone wat nie noodwendig die nodige fondse het vir proffesionele prosteses nie?

Meta-leer

- Identifisering van ortopediese veranderinge wat aan die skelet aangebring is.

Koöperatiewe Leer

- ❖ Elke koöperatiewe-groep kry die geleetheid om 'n prostese te ontwerp en te bou. Dit moet ekonomies wees, maar van hoogstaande gehalte en met dieselfde kenmerke en funksies van die werklike deel van die skelet.
- ❖ Besluit in die koöperatiewe-groep watter deel van die skelet gebou gaan word as 'n prostese? Materiale en toerusting moet bymekaar gemaak word en skool toe gebring word.
- ❖ Kooperatiewe-groepe moet die prostese self-bou.
- ❖ 'n Uitstalling en assessering van koöperatiewe-groepe se prostese sal plaasvind.

Datums

6 Aug: Materiale wat gebruik gaan word vir die bou van die prostese moet saam gebring word.

17 Aug: Uitstalling van alle koöperatiewe-groepe se prosteses.

Meta-leer

Sketse van ortopediese gemodifieerde dele van die menslike skelet. Lede van die koöperatiewe-groep ontvang verskillende gemodifieerde sketse van die skelet.

Beantwoord die volgende vrae oor die skets **individueel!!!** Handig die antwoordstel en die sketse aan die einde van die periode in.

- Identifiseer die gedeeltes (a en b) van die skelet.
- Wat is die funksies van die dele (a en b) van die skelet?
- Watter veranderinge is aan die gedeelte (a en b) van die skelet aangebring?
- Is die verandering tot voordeel of tot nadeel van die skelet?
- Watter invloed het die veranderinge op die funksie van die deel van die skelet (a en b).

Koöperatiewe-Leer

- ❖ Elke lid van die koöperatieiwe-groep lê sy bevindinge aan die res van die lede voor.
- ❖ Stem die kooperatiewe groep saam met die bevindinge? Is daar nog veranderinge wat raaks gesien word?
- ❖ Bespreek dit breedvoerig in die koöperatiewe-groep.

SKOOLGEBASEERDE ONDEWRWYSASSESSERING
SCHOOL BASED EDUCATION ASSESSMENT
Fasilitering van Leer / Facilitating Learning

Grade awarded

Beginneronderwyser: _____ Student No: _____
Beginner Educator: _____ *Student Nu:* _____
Skool: _____ Graad: _____ Datum: _____
School: _____ *Grade:* 10 *Date:* 5 Aug
Spesialiseringsarea: _____ Tema: _____
Specialising area: FET Biologie *Theme:* Menslike Skelet

LEERTAAKONTWERP / *LEARNING TASK DESIGN*

LEVEL VLAK CRITERION KRITERIUM	Alle items teenwoordig maar die verband daartussen nie aangredui of irrelevant / *All items present but relationship between them not indicated or irrelevant*	Alle items teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA en LT aangredui en relevant / *All items present and the relationship between the LO's, AS's, Challenge, LTP and LT indicated and relevant*	Alle items teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA, LT, Outentieke Leeromgewing, Materiale en Toerusting/ Apparaat en Leeraksie-organisasie aangredui en relevant / *All items present and the relationship between the LO's, AS's, Challenge, LTP LT, Authentic Learning Environment, Materials and Equipment/ apparatus, and Learning Action Organisation indicated and relevant*	Alle items teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA, LT, Outentieke Leeromgewing, Materiale en Toerusting/ Apparaat, Leeraksie-organisasie en Resultaat van LT aangredui en relevant / *All items present and the relationship between the LO's, AS's, Challenge, LTP LT, Authentic Learning Environment, Materials and Equipment/ apparatus, Learning action organisation, and Result of LT indicated and relevant*
Ontwerp/ *Design*				✱

ADDISIONELE KOMMENTAAR / *ADDITTIONAL COMMENTARY*

• Ek dink dit het goed gegaan In die een klas het meta-leer verander in biologie meer "va-en-onwoord" van my af → Let op na Meta-leer vae!

Assessor:

Self	Mede BO/*Peer BE*	Mentor	Dosent/*Lecturer*

Naam: _____ Handtekening: _____
Name: _____ *Signature:* _____ _____

LEERTAAKOPERASIONERING (LTOP) / *LEARNING TASK OPERATION (LTOP)*

		Onaanvaarbaar/ *Unacceptable*	Ontoereikend / *Inadequate*	Goed / *Good*	Uitstekend/ Excellent
LTA / LTP	Uitdaging / Challenge	Die uitdaging is nie 'n probleem in werkliheidskonteks (werklike of realistiese probleem) nie / *The challenge is not a problem in real life context (real life or realistic problem)*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem), maar voldoen aan slegs enkele **probleem en LTO** kriteria / *The challenge is a problem in real life context (real life or realistic problem) but adheres to only singular problem **and LTD** criteria*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem) en voldoen aan die meeste **probleem en LTO** kriteria / *The challenge is a problem in real life context (real life or realistic problem) and adheres to most **problem and LTD** criteria* ✓	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem) en voldoen al die **probleem en LTO** kriteria / *The challenge is a problem in real life context (real life or realistic problem) and adheres to all **problem and LTD** criteria*
	Aanbied / Present	Aanbieding is duidelik / *Presentation is clear*	Aanbieding is duidelik en spel belangrikheid uit / *Presentation is clear and explicates importance* ✓	Aanbieding is duidelik, spel belangrikheid uit en beklemtoon dringendheid / Presentation is clear, explicates importance and emphasises urgency	Aanbieding is duidelik, spel belangrikheid uit, beklemtoon dringendheid en vereis onmiddelike leerderaksie / *Presentation is clear, explicates importance, emphasises urgency and demands immediate learner action*
LTU / LTE	Metaleer / Metalearn	Leerders beplan hulle eie individuele leer / *Learners plan their own individual learning*	Leerders beplan en monitor hulle eie individuele leer / *Learners plan and monitor their own individual learning*	Leerders beplan, monitor en assesseer hulle eie individuele leer / *Learners plan, monitor and assess their own individual learning* ✓	Leerders beplan, monitor en assesseer hulle eie individuele leer en verwerf vanselfsprekend spesifieke intrapersoonlike lewensvaardighede / *Learners plan, monitor and assess their own individual learning and obviously acquires particular intrapersonal life skills*
	Koop leer / Coop learn	Groepe bestaan uit heterogene groepe van optimale grootte / *Groups consist of heterogeneous groups of optimal size*	Groepe bestaan uit heterogene groepe van optimale grootte en lede is individueel aanspreeklik / *Groups consist of heterogeneous groups of optimal size and members are individually accountable*	Groepe bestaan uit heterogene groepe van optimale grootte, lede is individueel aanspreeklik en positief interafhanklik / *Groups consist of heterogeneous groups of optimal size and members are individually accountable and positively interdependent* ✓	Groepe bestaan uit heterogene groepe van optimale grootte, lede is individueel aanspreeklik en positief interafhanklik en verwef vanselfsprekend spesifieke interpersoonlike lewensvaardighede / *Groups consist of heterogeneous groups of optimal size and members are individually accountable and positively interdependent and obviously acquires particular interpersonal life skills*
LTT / LTF		Voorsien kognitiewe ondersteuning deur die beantwoording van leerders se vrae/ *Providing cognitive support by answering learner's questions*	Daag kognitiewe ontwikkeling uit deur die vra van hoëerorde vrae as realksie op leerdervrae/ *Challenging cognitive development by asking higher order thinking questions as reaction to learners' questions*	Voorsien emosionele ondersteuning en vra leerders se vrae terug aan hulle om self te antwoord / *Providing emotional support to learners and reverting their questions back to them* ✓	Voorsien emosionele ondersteuning en vra leerders se vrae terug aan hulle om self te antwoord en die vra van metaleervrae by die beste en mees geskikte geleentheid / Providing emotional support, reverting learners' questions back to them and asking metalearning questions at the most opportune and appropriate moments
LTK / LTC		KLG'e voorsien terugvoer met slegs sommige lede wat bydra / *CLG's provide feedback with only some members contributing*	KLG'e voorsien terugvoer met al die lede wat bydra / *CLG's provide feedback with all members contributing*	KLG'e voorsien terugvoer met al die lede wat bydra en word geasseesseer sonder die eis op kwaliteit / *CLG's provide feedback with all members contributing and is assessed without a demand for quality*	KLG'e voorsien terugvoer met al die lede wat bydra en word krities geasseesseer op die kwaliteit van hulle produk en aanbieding deur eweknieë en BE / *CLG's provide feedback with all members contributing and is critically assessed on the quality of their product and presentation by peers and BE* ✓
PUNT/ GRADE		0-24	25-49	50-74	75-100
Toeken Award					

SKOOLGEBASEERDE ONDEWRWYSASSESSERING
SCHOOL BASED EDUCATION ASSESSMENT
Tradisioneel / *Traditional*

Punt toegeken *Grade awarded*
78%

Beginneronderwyser: *Beginner Educator:* __
Student No: *Student Nu:* _____
Skool: *School:* _____
Graad: *Grade:* 10 Datum: *Date:* 5 Aug
Spesialiseringsarea: *Specialising area:* Biologie
Tema: *Theme:* Skelet

LEERTAAKONTWERP / *LEARNING TASK DESIGN*

LEVEL VLAK *CRITERION* KRITERIUM	Alle items teenwoordig maar die verband daartussen nie aangredui of irrelevant / *All items present but relationship between them not indicated or irrelevant*	Alle items teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA en LT aangredui en relevant / *All items present and the relationship between the LO's, AS's, Challenge, LTP and LT indicated and relevant*	Alle items teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA, LT, Outentieke Leeromgewing, Materiale en Toerusting/ Apparaat en Leeraksie-organisasie aangredui en relevant / *All items present and the relationship between the LO's, AS's, Challenge, LTP LT, Authentic Learning Environment, Materials and Equipment/ apparatus, and Learning Action Organisation indicated and relevant*	Alle items teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA, LT, Outentieke Leeromgewing, Materiale en Toerusting/ Apparaat, Leeraksie-organisasie en Resultaat van LT aangredui en relevant / *All items present and the relationship between the LO's, AS's, Challenge, LTP LT, Authentic Learning Environment, Materials and Equipment/ apparatus, Learning action organisation, and Result of LT indicated and relevant*
Design				X

ADDISIONELE KOMMENTAAR / *ADDITTIONAL COMMENTARY*

Jou LT was oorspronklik en baie goed beplan.
Jou metaleer was veral goed. Dit was uitdaagend!
Ek hou van die feit dat jy die LTP en veral die real life problem verander het teen opsigte daarvan dat die leerders eerder 'n prostese moet maak.
Jou metaleer vrae was weereens baie goed.
Dis altyd lekker om jou klasse by te woon, en ek leer ook altyd iets by jou.

Assessor:

Self	Mede BO/*Peer BO*	Mentor	Dosent/*Lecturer*

Naam: *Name:* _
Handtekening: *Signature:* ____

LEERTAAKOPERASIONERING / *LEARNING TASK OPERATION*

VLAK / *LEVEL* KRITERIUM / *CRITERION*	Onaanvaarbare uitvoering met ernstige tekortkominge/ *Unacceptable performance with major weaknesses*	Ontoereikende uitvoering met geringe tekortkominge/ *Inadequate performance with minor weaknesses*	Goeie uitvoering met geen tekortkominge/ *Good performance with no weaknesses*	Uitstekende uitvoering van hoogstaande kwaliteit/ *Excellent performance of outstanding quality*
Leerkonteks / Learning context (Skepping en instandhouding van die mees bevorderlike leeratmosfeer / *Creating and maintaining the most conducive learning atmosphere*)				X
Verbale kommunikasie / Vebal communication (Is alle verbale kommunikasie hoorbaar, duidelik en met die mees geskikte stemintonasie / Is all verbal communication audible, clear and with the most appropriate voice intonation)			X	
Nie-verbale kommunikasie / **Non-verbal communication** (Is alle nie-verbale kommunikasie gevul met entoesiasme en 'n positiewe houding/ Is all non-verbal communication filled with enthusiasm and a positive attitude)				X
Mediagebruik / Use of media (Word die media wat gebruik word korrek gebruik en is dit die mees geskikte om leer ten beste te ondersteun / Is the media being used, used correctly and is it the most appropriate to best support learning)			X	
Demonstrasie, illustrasie, vertelling, verduideliking **Demonstration, illustration, narrative, explanation** (Kan alles deur almal duidelik gesien word, is die ordening logies, die kommentaar besonder ondersteunend en die tempo die mees geskikte / Is everything clearly visible to everyone, is the sequence logical, the commentary particularly supportive and the tempo the most appropriate)			X	
Leerder aksie / Learner action (Is die leerders voortdurend besig met aktiewe leer – metaleer voor kooperatiewe leer / Are the learners continually busy with active learning – metalearning before cooperative learning)				X
Leerkwaliteit / Learning quality (Word die mees geskikte interaksiedeur die FOL bewerkstellig met effektiewe vraagstelling veral deur the metaleervrae / Is the most appropriate interaction accomplished by effective questioning especially through the metalearning questions				X
Dissipliene / *Discipline* (Instandhouding van gefokusde aandag en betrokkenhied by leeraktiwiteiete alleenlik – een waarskuwing dan konsekwensie / *Maintaining focused attention and involvement with learning activities only – one warning then a consequence*)				X
Konsolodasie / Consolodation (Word leerders se terugvoer deur almal geasssesseer vir kwaliteit en tel dit / Are learners' feedback assessed by all for quality and does it count)				X
OORKOEPELEND / *OVER ALL*	**0-24**	**25-49**	**50-74**	**75-100**
Punt toegeken - dra oor na bladsy 1 ***Grade awarded – transfer to page 1***				

SKOOLGEBASEERDE ONDEWRWYSASSESSERING
SCHOOL BASED EDUCATION ASSESSMENT
Fasilitering van Leer / Facilitating Learning

Punt toegeken *Grade awarded*
80

Beginneronderwyser:
Beginner Educator:
Skool:
School:
Spesialiseringsarea: FET Bich
Specialising area:

Student No:
Student Nu:
Graad: 10 Datum: 5 Aug
Grade: *Date:*
Tema: LTz Skedet
Theme:

LEERTAAKONTWERP / *LEARNING TASK DESIGN*

LEVEL / VLAK *CRITERION* / KRITERIUM	Minimum vereistes teenwoordig maar die verband daartussen nie aangredui of irrelevant / *Minimum requirements present but relationship between them not indicated or irrelevant*	Minimum vereistes teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA en LT aangredui en relevant / *Minimum requirements present and the relationship between the LO's, AS's, Challenge, LTP and LT indicated and relevant*	Minimum vereistes teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA, LT, Outentieke Leeromgewing, Materiale en Toerusting/ Apparaat en Leeraksie-organisasie aangredui en relevant / *Minimum requirements present and the relationship between the LO's, AS's, Challenge, LTP, LT, Authentic Learning Environment, Materials and Equipment/ apparatus, and Learning Action Organisation indicated and relevant*	Minimum vereistes teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA, LT, Outentieke Leeromgewing, Materiale en Toerusting/ Apparaat, Leeraksie-organisasie en Resultaat van LT aangredui en relevant / *Minimum requirements present and the relationship between the LO's, AS's, Challenge, LTP, LT, Authentic Learning Environment, Materials and Equipment/ apparatus, Learning Action Organisation, and Result of LT indicated and relevant*
ntwerp/ *esign*				

ADDISIONELE KOMMENTAAR / *ADDITTIONAL COMMENTARY*

Eksel en die leerders het die leertaak geruldig gehiet
Die leerders se vaardigheide is goed getoets en hau
mooi Modelle het navore gekom.

Assessor:

Self	Mede BO/*Peer BE*	Mentor	Dosent/*Lecturer*

Naam:
Name:
Handtekening:
Signature:

LEERTAAKOPERASIONERING (LTOP) / *LEARNING TASK OPERATION (LTOP)*

		Onaanvaarbaar/ ***Unacceptable***	**Ontoereikend /** ***Inadequate***	**Goed /** ***Good***	**Uitstekend/** ***Excellent***
LTA / *LTP*	**Uitdaging / *Challenge***	Die uitdaging is nie 'n probleem in werkliheidskonteks (werklike of realistiese probleem) nie / *The challenge is not a problem in real life context (real life or realistic problem)*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem), maar voldoen aan slegs enkele **probleem en LTO** kriteria/ *The challenge is a problem in real life context (real life or realistic problem) but adheres to only singular **problem and LTD** criteria*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem) en voldoen aan die meeste **probleem en LTO** kriteria / *The challenge is a problem in real life context (real life or realistic problem) and adheres to most **problem and LTD** criteria*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem) en voldoen al die **probleem en LTO** kriteria / *The challenge is a problem in real life context (real life or realistic problem) and adheres to all **problem and LTD** criteria*
	Aanbied / *Present*	Voldoen slegs aan **een** van die 4 vereistes (duidelikheid, belangrikheid, dringendheid, aksie) / *Adheres to only **one** of the 4 requirements (clarity, importance, urgency, action)*	Voldoen slegs aan **twee** van die 4 vereistes (duidelikheid, belangrikheid, dringendheid, aksie) / *Adheres to only **two** of the 4 requirements (clarity, importance, urgency, action)*	Voldoen slegs aan **drie** van die 4 vereistes (duidelikheid, belangrikheid, dringendheid, aksie) / *Adheres to only **three** of the 4 requirements (clarity, importance, urgency, action)*	Voldoen slegs aan al 4 vereistes (duidelikheid, belangrikheid, dringendheid, aksie) / *Adheres to all 4 requirements (clarity, importance, urgency, action)*
LTU / *LTE*	**Metaleer / *Metalearn***	Leerders beplan hulle eie individuele leer / *Learners plan their own individual learning*	Leerders beplan en monitor hulle eie individuele leer / *Learners plan and monitor their own individual learning*	Leerders beplan, monitor en assesseer hulle eie individuele leer / *Learners plan, monitor and assess their own individual learning*	Leerders beplan, monitor en assesseer hulle eie individuele leer en verwerf intensioneel spesifieke intrapersoonlike lewensvaardighede / *Learners plan, monitor and assess their own individual learning and intentionally acquires particular intrapersonal life skills*
	Koop leer / *Coop learn*	Groepe bestaan uit heterogene groepe van optimale grootte (4) / *Groups consist of heterogeneous groups of optimal size (4)*	Groepe bestaan uit heterogene groepe van optimale grootte en lede is individueel aanspreeklik / *Groups consist of heterogeneous groups of optimal size and members are individually accountable*	Groepe bestaan uit heterogene groepe van optimale grootte, lede is individueel aanspreeklik en positief interafhanklik / *Groups consist of heterogeneous groups of optimal size and members are individually accountable and positively interdependent*	Groepe bestaan uit heterogene groepe van optimale grootte, lede is individueel aanspreeklik en positief interafhanklik en verwef intensioneel spesifieke interpersoonlike lewensvaardighede / *Groups consist of heterogeneous groups of optimal size and members are individually accountable and positively interdependent and intentionally acquires particular interpersonal life skills*
LTT / *LTF*		Voorsien kognitiewe ondersteuning deur die beantwoording van leerders se vrae/ *Providing cognitive support by answering learner's questions*	Daag kognitiewe ontwikkeling uit deur die vra van hoëerorde vrae as realksie op leerdervrae/ *Challenging cognitive development by asking higher order thinking questions as reaction to learners' questions*	Voorsien emosionele ondersteuning en vra leerders se vrae terug aan hulle om self te antwoord / *Providing emotional support to learners and reverting their questions back to them*	Voorsien emosionele ondersteuning en vra leerders se vrae terug aan hulle om self te antwoord en die vra van metaleervrae by die beste en mees geskikte geleentheid / Providing emotional support, reverting learners' questions back to them and asking metalearning questions at the most opportune and appropriate moments
LTK / *LTC*		KLG'e voorsien terugvoer met slegs sommige lede wat bydra / *CLG's provide feedback with only some members contributing*	KLG'e voorsien terugvoer met al die lede wat bydra / *CLG's provide feedback with all members contributing*	KLG'e voorsien terugvoer met al die lede wat bydra en word geasseesseer sonder die eis op kwaliteit / *CLG's provide feedback with all members contributing and is assessed without a demand for quality*	KLG'e voorsien terugvoer met al die lede wat bydra en word krities geasseesseer op die kwaliteit van hulle produk en aanbieding deur portuurgroep en BE / *CLG's provide feedback with all members contributing and is critically assessed on the quality of their product and presentation by peers and BE*
PUNT/ GRADE		**0-24**	**25-49**	**50-74**	**75-100**
Toeken Award					X

...OOLGEBASEERDE ONDEWRWYSASSESSERING
...HOOL BASED EDUCATION ASSESSMENT
...siliteriing van Leer / Facilitating Learning

Grade awa...: 70

Beginneronderwyser: / *Beginner Educator:*

Student No: / *Student Nu:* ____

Skool: / *School:* ____

Graad: / *Grade:* ____

Datum: / *Date:* 5 Aug 2004

Spesialiseringsarea: / *Specialising area:* Biologie

Tema: / *Theme:* Skelet

LEERTAAKONTWERP / *LEARNING TASK DESIGN*

LEVEL / VLAK — CRITERION / KRITERIUM	Minimum vereistes teenwoordig maar die verband daartussen nie aangredui of irrelevant / *Minimum requirements present but relationship between them not indicated or irrelevant*	Minimum vereistes teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA en LT aangredui en relevant / *Minimum requirements present and the relationship between the LO's, AS's, Challenge, LTP and LT indicated and relevant*	Minimum vereistes teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA, LT, Outentieke Leeromgewing, Materiale en Toerusting/ Apparaat en Leeraksie-organisasie aangredui en relevant / *Minimum requirements present and the relationship between the LO's, AS's, Challenge, LTP, LT, Authentic Learning Environment, Materials and Equipment/ apparatus, and Learning Action Organisation indicated and relevant*	Minimum vereistes teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA, LT, Outentieke Leeromgewing, Materiale en Toerusting/ Apparaat, Leeraksie-organisasie en Resultaat van LT aangredui en relevant / *Minimum requirements present and the relationship between the LO's, AS's, Challenge, LTP, LT, Authentic Learning Environment, Materials and Equipment/ apparatus, Learning Action Organisation, and Result of LT indicated and relevant*
Ontwerp/ *Design*				

ADDISIONELE KOMMENTAAR / *ADDITTIONAL COMMENTARY*

Ek hou baie van jou idee. Die begin en jou instruksies is die belangrikste en die summiere daarvan is kort. Kyk hoe jy dit sal kan verbeter. Individuele werk – [illegible]: daar is veranderinge aangebring – die rede hoekom daar individue is – elke individu moet ontdek [illegible] kyk – Probeer inhoudsvrae vermy.

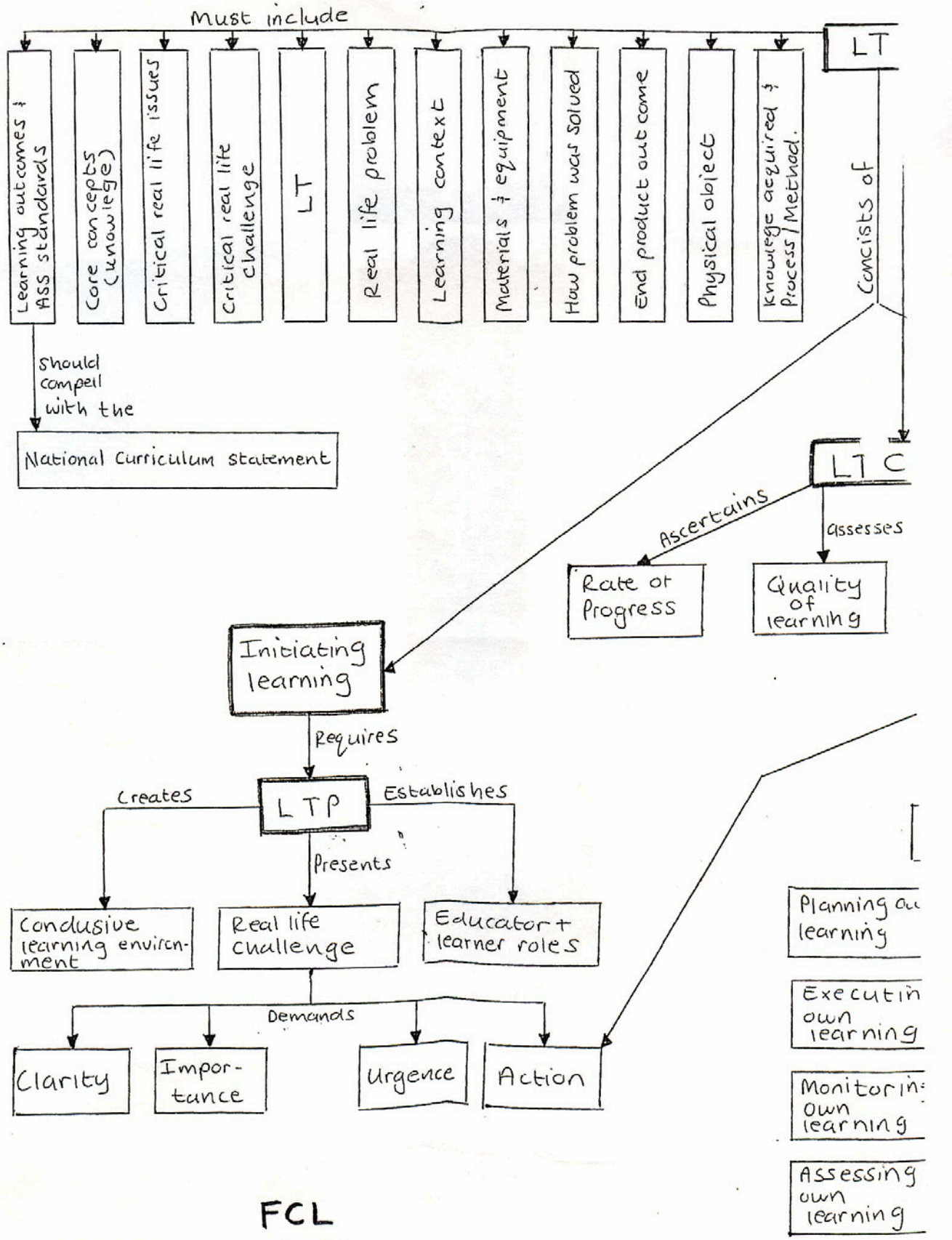
Assessor:

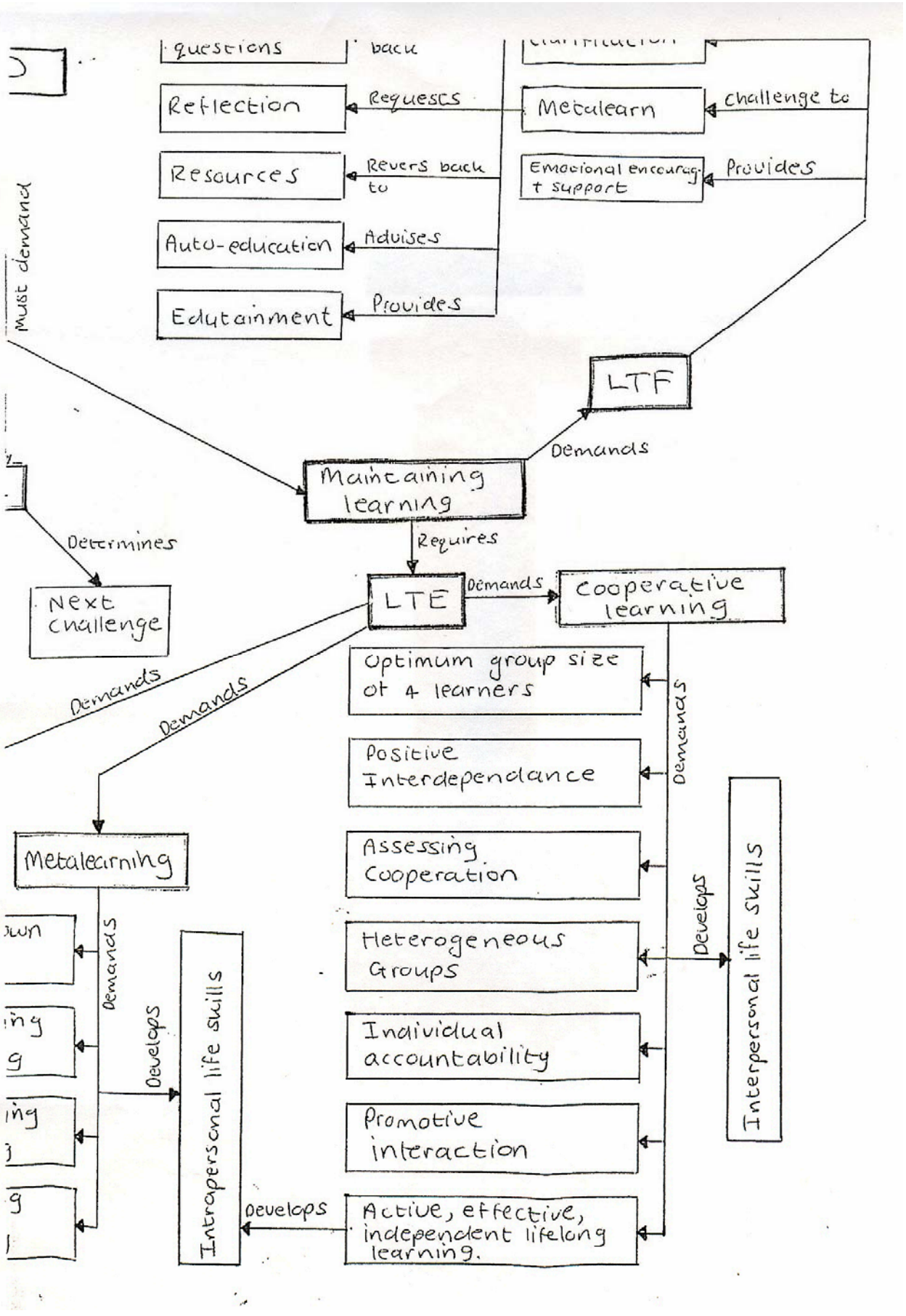
Self	Mede BO/*Peer BE*	Mentor	Dosent/ ✓

Naam: / *Name:* ____ Handtekening / *Signature:* ____

LEERTAAKOPERASIONERING (LTOP) / *LEARNING TASK OPERATION (LTOP)*

		Onaanvaarbaar/ *Unacceptable*	Ontoereikend / *Inadequate*	Goed / *Good*	Uitstekend/ *Excellent*
LTA / *LTP*	Uitdaging / *Challenge*	Die uitdaging is nie 'n probleem in werkliheidskonteks (werklike of realistiese probleem) nie / *The challenge is not a problem in real life context (real life or realistic problem)*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem), maar voldoen aan slegs enkele **probleem en LTO** kriteria/ *The challenge is a problem in real life context (real life or realistic problem) but adheres to only singular **problem and LTD** criteria*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem) en voldoen aan die meeste **probleem en LTO** kriteria / *The challenge is a problem in real life context (real life or realistic problem) and adheres to most **problem and LTD** criteria*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem) en voldoen al die **probleem en LTO** kriteria / *The challenge is a problem in real life context (real life or realistic problem) and adheres to all **problem and LTD** criteria*
	Aanbied / *Present*	Voldoen slegs aan ***een*** van die 4 vereistes (duidelikheid, belangrikheid, dringendheid, aksie) / *Adheres to only **one** of the 4 requirements (clarity, importance, urgency, action)*	Voldoen slegs aan ***twee*** van die 4 vereistes (duidelikheid, belangrikheid, dringendheid, aksie) / *Adheres to only **two** of the 4 requirements (clarity, importance, urgency, action)*	Voldoen slegs aan ***drie*** van die 4 vereistes (duidelikheid, belangrikheid, dringendheid, aksie) / *Adheres to only **three** of the 4 requirements (clarity, importance, urgency, action)*	Voldoen slegs aan al 4 vereistes (duidelikheid, belangrikheid, dringendheid, aksie) / *Adheres to all 4 requirements (clarity, importance, urgency, action)*
LTU / *LTE*	Metaleer / *Metalearn*	Leerders beplan hulle eie individuele leer / *Learners plan their own individual learning*	Leerders beplan en monitor hulle eie individuele leer / *Learners plan and monitor their own individual learning*	Leerders beplan, monitor en assesseer hulle eie individuele leer / *Learners plan, monitor and assess their own individual learning*	Leerders beplan, monitor en assesseer hulle eie individuele leer en verwerf intensioneel spesifieke intrapersoonlike lewensvaardighede / *Learners plan, monitor and assess their own individual learning and intentionally acquires particular intrepersonal life skills*
	Koop leer / *Coop learn*	Groepe bestaan uit heterogene groepe van optimale grootte (4) / *Groups consist of heterogeneous groups of optimal size (4)*	Groepe bestaan uit heterogene groepe van optimale grootte en lede is individueel aanspreeklik / *Groups consist of heterogeneous groups of optimal size and members are individually accountable*	Groepe bestaan uit heterogene groepe van optimale grootte, lede is individueel aanspreeklik en positief interafhanklik / *Groups consist of heterogeneous groups of optimal size and members are individually accountable and positively interdependent*	Groepe bestaan uit heterogene groepe van optimale grootte, lede is individueel aanspreeklik en positief interafhanklik en verwef intensioneel spesifieke interpersoonlike lewensvaardighede / *Groups consist of heterogeneous groups of optimal size and members are individually accountable and positively interdependent and intentionally acquires particular interpersonal life skills*
LTT / *LTF*		Voorsien kognitiewe ondersteuning deur die beantwoording van leerders se vrae/ *Providing cognitive support by answering learner's questions*	Daag kognitiewe ontwikkeling uit deur die vra van hoëerorde vrae as realksie op leerdervrae/ *Challenging cognitive development by asking higher order thinking questions as reaction to learners' questions*	Voorsien emosionele ondersteuning en vra leerders se vrae terug aan hulle om self te antwoord / *Providing emotional support to learners and reverting their questions back to them*	Voorsien emosionele ondersteuning en vra leerders se vrae terug aan hulle om self te antwoord en die vra van metaleervrae by die beste en mees geskikte geleentheid / Providing emotional support, reverting learners' questions back to them and asking metalearning questions at the most opportune and appropriate moments
LTK / *LTC*		KLG'e voorsien terugvoer met slegs sommige lede wat bydra / *CLG's provide feedback with only some members contributing*	KLG'e voorsien terugvoer met al die lede wat bydra / *CLG's provide feedback with all members contributing*	KLG'e voorsien terugvoer met al die lede wat bydra en word geasseesseer sonder die eis op kwaliteit / *CLG's provide feedback with all members contributing and is assessed without a demand for quality*	KLG'e voorsien terugvoer met al die lede wat bydra en word kritiies geasseesseer op die kwaliteit van hulle produk en aanbieding deur portuurgroep en BE / *CLG's provide feedback with all members contributing and is critically assessed on the quality of their product and presentation by peers and BE*
PUNT/ GRADE		**0-24**	**25-49**	**50-74**	**75-100**
Toeken Award				70	


Must include
LT
Learning outcomes & ASS standards
Core concepts (knowledge)
Critical real life issues
Critical real life challenge
LT
Real life problem
Learning context
Materials & equipment
How problem was solved
End product outcome
Physical object
Knowledge acquired & Process / Method.
Consists of
should compell with the
National Curriculum statement
LTC
Ascertains
assesses
Rate of Progress
Quality of learning
Initiating learning
Requires
LTP
Creates
Establishes
Presents
Conclusive learning environment
Real life challenge
Educator + learner roles
Demands
Clarity
Importance
Urgence
Action
Planning
learning
Executing
own learning
Monitoring
own learning
Assessing
own learning
FCL
Final


questions
back
Reflection
Requests
Metalearn
challenge to
Resources
Revers back to
Emotional encourag. t support
Provides
Auto-education
Advises
Edutainment
Provides
Must demand
LTF
Demands
Maintaining learning
Requires
Determines
Next challenge
LTE
Demands
Cooperative learning
Demands
Demands
Optimum group size of 4 learners
Positive Interdependance
Demands
Metalearning
Assessing Cooperation
Heterogeneous Groups
Develops
Interpersonal life skills
Demands
Develops
Intrapersonal life skills
Individual accountability
Promotive interaction
Develops
Active, effective, independent lifelong learning.

Chapter 7 – Appendix V – Mack

7.6. Mack - Learning task – Blood Groupings

7.6.1. Step 3: Planning Action

7.6.1.1. Learning task design

7.6.2.1. b. Learning task assessment

(i) Self-assessment

(ii) Peers

(iii) Teacher educator

(iv) Specialisation lecturer

7.6.3. Concept map

Learning Task Design

Date of Design: July 2004
Learning Area: Biology
Learning Grade: 11
Content Area: Tissues, Cells and Molecular Studies

Learning Outcomes and Assessment Standards:

Learning Outcomes:		Assessment Standards:		Competency:	
LO_1: Confidently explore & investigate phenomena related to Life Science by using inquiry, problem solving, critical thinking and other skills	☒	**$AS_{1/1}$:** Identifying & questioning phenomena & planning an investigation	☐	Identify and question phenomena	☐
				Plan an investigation using instructions	☐
				Consider implications of the investigate procedures in a safe environment	☐
		$AS_{2/1}$: Conducting an investigation by collecting & manipulating data	☒	Systematically and accurately collect data using selected instruments and/or techniques and following instructions	☒
				Display and summarise the data collected	☒
		$AS_{3/1}$: Analyzing, synthesizing, evaluating data & communicating findings	☒	Analyse, synthesise, evaluate data and communicate findings	☒
LO_2: Access, interpret, construct & use Life Sciences concepts to explain phenomena relevant to Life Sciences	☐	**$AS_{1/2}$:** Accessing knowledge	☐	Use a prescribed method to access information	☐
		$AS_{2/2}$: Interpreting and making meaning of knowledge in the Life Sciences	☐	Identify concepts, principals, laws, theories and models of life science in the context of everyday life	☐
				Describe and explain concepts, principals, laws, theories & models	☐
		$AS_{3/2}$: Showing an understanding of application of Life Sciences knowledge in everyday life	☐	Organise, analyze & interpret concepts, principals, laws, theories & models of life science in the context of everyday life	☐
LO_3: Able to demonstrate an understanding of the nature of science, the influence of ethics & biases in the Life sciences, & the interrelationship of science, technology, indigenous knowledge, the environment & society	☐	**$AS_{1/3}$:** Exploring & evaluating scientific ideas of the past and present cultures	☐	Identify and investigate scientific ideas & indigenous knowledge of past & present cultures	☐
		$AS_{2/3}$: Comparing and evaluating the use & development of resources and products and their impact on the environment	☐	Describe different ways in which resources are used and applied to the development of products, & report on their impacts on the environment & society	☐
		$AS_{3/3}$: Compare the influence of the different beliefs, attitudes & values on scientific knowledge	☐	Analyze and describe the influence of different beliefs, attitudes and values on scientific knowledge and its application to society.	☐

The Learning Task:

Problem Statement:

What is the blood group composition of you class?

Category of Learning Task: World of Work

Format of Learning Task: Research _____

Subtasks of Learning task:	
Group member 1:	Test whether blood type is A+, A-, B+, B-, AB+, AB-, O+ and O-. Also determine whether blood is Rh positive or negative
Group member 2:	no cooperative groups
Group member 3:	no cooperative groups
Group member 4:	no cooperative groups

End Product Outcome: Decision

Specify: Able to decide which blood type can be donated to which individuala dn which blood type the learner can receive

Authentic Learning Context:

Authentic Resource List:	**Quantity**	**Cost**
A, B, AB tesing kit	**1 of each**	**0**
RH testing kit	**1**	**0**

Authentic Apparatus / Materials	**Quantity**	**Cost**
paper towl	**1**	**R2-00**
matchsticks	**10 boxes**	**R5-00**
glass microscope slides	**70**	

Class Organization: Cooperative Learning Groups		
Group 1	**Group 2**	**Group 3**
no cooperative groups	**no cooperative groups**	**no cooperative groups**
Group 4	**Group 5**	**Group 6**
no cooperative groups	**no cooperative groups**	**no cooperative groups**

Assessment:

Method of Assessment:	Performance _____
Tools of Assessment:	Obserevation sheet _____
Techniques of Assessment:	Other: Graph

Learning Task Presentation:

Clarity: ▪ List all aspects which need clarity
Importance: ▪ State all reasons of importance to learners
Urgency: ▪ List all reasons for urgency

[Attach final presentation format]

Individual Assessment

Name of student: _____

Grade 10_____

Criteria	Not Achieved(1)	Partially Achieved(2)	Achieved (3)	Beyond Achieved (4)		
Neatness & decorum expressed	Very untidy with no sense of pride	Tidy and legible presentation	Well structured and neat presentation	Extremely neat presentation, table of contents, no spelling or grammatical mistakes	2	
Content (Daily food intake)	No daily food intake shown	Inaccurate daily food intake shown	Accurate daily food intake with quantities shown	Extremely accurate daily food intake with quantities shown	3	
Content (Daily Iron Intake)	No daily iron intake shown	Inaccurate daily iron intake shown	Accurate daily iron intake with calculations shown	Extremely accurate daily iron intake with calculations shown	4	
Content (Recommended Daily Allowance)	No RDA shown	RDA given without reasons	Appropriate RDA given with rationale for choice	Accurate RDA given including extensive rationale for choice	4	
References	No references listed	Inadequate reference listed	Appropriate References listed	Extensive & systematic list	2	
						60

Individual Assessment

Name of student: _____

Grade 10_____

Criteria	Not Achieved(1)	Partially Achieved(2)	Achieved (3)	Beyond Achieved (4)		
Neatness & decorum expressed	Very untidy with no sense of pride	Tidy and legible presentation	Well structured and neat presentation	Extremely neat presentation, table of contents, no spelling or grammatical mistakes	2	
Content (Daily food intake)	No daily food intake shown	Inaccurate daily food intake shown	Accurate daily food intake with quantities shown	Extremely accurate daily food intake with quantities shown	3	
Content (Daily Iron Intake)	No daily iron intake shown	Inaccurate daily iron intake shown	Accurate daily iron intake with calculations shown	Extremely accurate daily iron intake with calculations shown	4	
Content (Recommended Daily Allowance)	No RDA shown	RDA given without reasons	Appropriate RDA given with rationale for choice	Accurate RDA given including extensive rationale for choice	4	
References	No references listed	Inadequate reference listed	Appropriate References listed	Extensive & systematic list	2	
						60

Group Assessment

Name of student: _____

Grade 10_____

Criteria	Performance Indicator						
	1	2	3	4			Comments
Introduction	Not included	Shows partial understanding of topic	Relevant, shows understanding of topic & its importance	Relevant, shows in depth understanding of topic, its importance & effects on societies	1		
Content (Recommended Daily Allowance)	No RDA shown	RDA given without reasons	Appropriate RDA given with rationale for choice	Accurate, appropriate RDA given including extensive rationale for choice	2		
Content (Proposed diet)	No diet indicated	Inappropriate diet with quantities	Appropriate diet with quantities shown & reason for choice	Extremely accurate, balanced diet with quantities & reason for choice	5		
Conclusion	Not included	Partially expresses what has been learnt	Expresses what has been learnt	Extensively expresses what has been learnt in a conclusive manner	1		
References	No references listed	Inadequate reference listed	Appropriate References listed	Extensive & systematic list	1		
						40	

Peer Assessment

(to be filled in by your group)

Criteria	Performance Indicator					
	0	1	2			Comments
Control within the group	Lack of discipline	Some members disciplined	All members disciplined	1		
Motivation of the group	Unmotivated	Some members motivated	All members motivated	1		
Mutual respect	Some disrespect towards other people	Some members show respect	All members show respect	1		
Individual participation	Individual did not participate	Some participation	Actively involved	2		
					10	

SKOOLGEBASEERDE ONDEWRWYSASSESSERING
SCHOOL BASED EDUCATION ASSESSMENT
Fasilitering van Leer / Facilitating Learning

Punt toegeken
Grade awarded
75-100

Beginneronderwyser: _____ Student No: _____
Beginner Educator: *Student Nu:*
Skool: Graad: 10 Datum: 28/07
School: *Grade:* *Date:*
Spesialiseringsarea: Biology Tema: Blood Groups.
Specialising area: *Theme:*

LEERTAAKONTWERP / *LEARNING TASK DESIGN*

LEVEL VLAK / *CRITERION* KRITERIUM	Minimum vereistes teenwoordig maar die verband daartussen nie aangredui of irrelevant / *Minimum requirements present but relationship between them not indicated or irrelevant*	Minimum vereistes teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA en LT aangredui en relevant / *Minimum requirements present and the relationship between the LO's, AS's, Challenge, LTP and LT indicated and relevant*	Minimum vereistes teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA, LT, Outentieke Leeromgewing, Materiale en Toerusting/ Apparaat en Leeraksie-organisasie aangredui en relevant / *Minimum requirements present and the relationship between the LO's, AS's, Challenge, LTP, LT, Authentic Learning Environment, Materials and Equipment/ apparatus, and Learning Action Organisation indicated and relevant*	Minimum vereistes teenwoordig en die verband tussen LU'e, AS'e, Uitdaging, LTA, LT, Outentieke Leeromgewing, Materiale en Toerusting/ Apparaat, Leeraksie-organisasie en Resultaat van LT aangredui en relevant / *Minimum requirements present and the relationship between the LO's, AS's, Challenge, LTP, LT, Authentic Learning Environment, Materials and Equipment/ apparatus, Learning Action Organisation, and Result of LT indicated and relevant*
Ontwerp/ *Design*				X

ADDISIONELE KOMMENTAAR / *ADDITTIONAL COMMENTARY*

- He made the effort to go to the Pretoria Academic Hospital, to the blood bank to obtain the chemicals needed to test blood groups.
- Followed strict safety precautions while the learners were working with blood.
- This was a very worthwhile learning task design, the learners enjoyed it thoroughly.

Assessor:

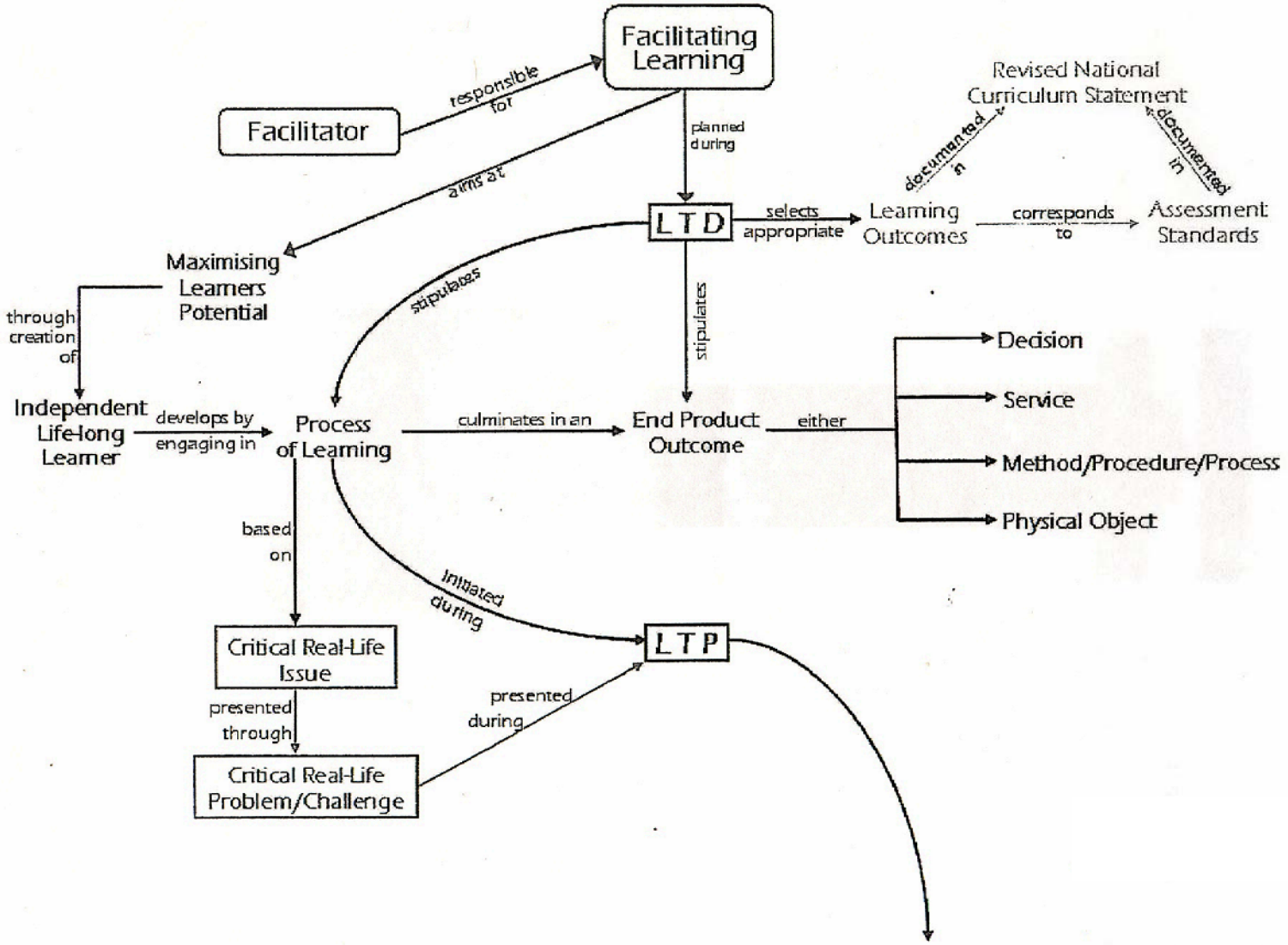
Self	Mede BO/*Peer BE*	✓ Mentor	Dosent/*Lecturer*

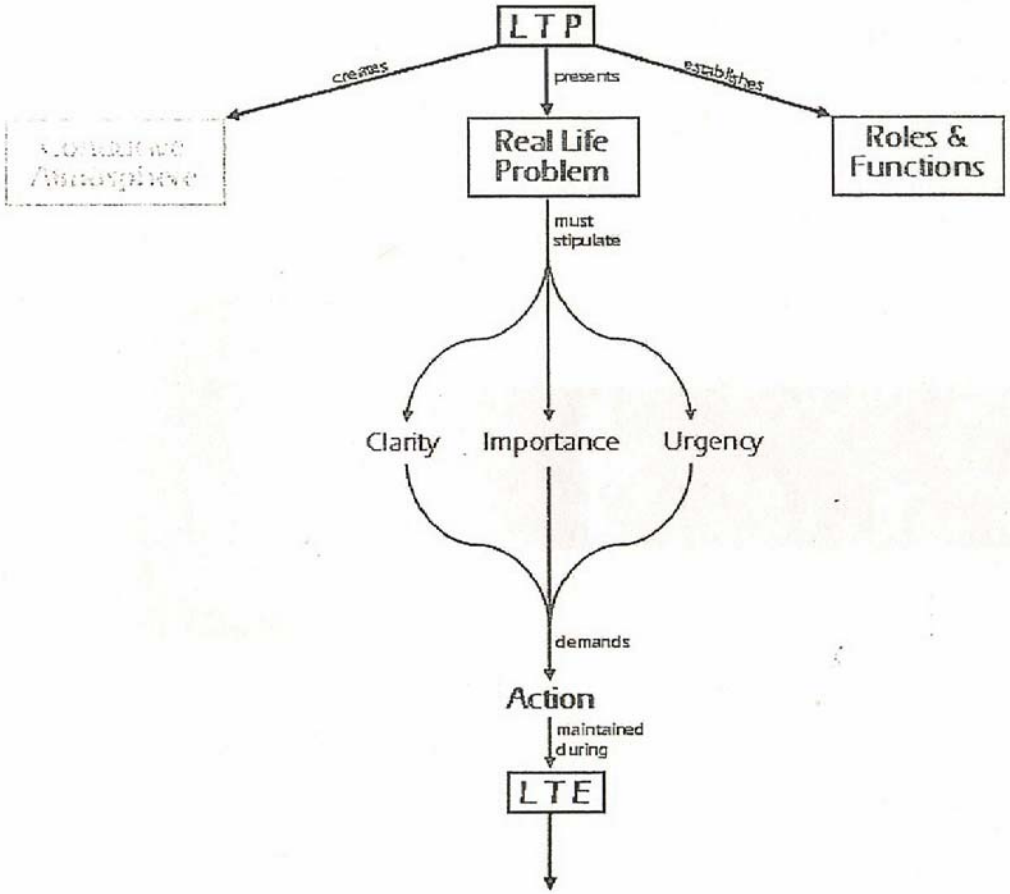
Naam: Handtekening:
Name: *Signature:*

LEERTAAKOPERASIONERING (LTOP) / *LEARNING TASK OPERATION (LTOP)*

		Onaanvaarbaar/ *Unacceptable*	Ontoereikend / *Inadequate*	Goed / *Good*	Uitstekend/ *Excellent*
LTA / *LTP*	Uitdaging / *Challenge*	Die uitdaging is nie 'n probleem in werkliheidskonteks (werklike of realistiese probleem) nie / *The challenge is not a problem in real life context (real life or realistic problem)*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem), maar voldoen aan slegs enkele **probleem en LTO** kriteria/ *The challenge is a problem in real life context (real life or realistic problem) but adheres to only singular **problem and LTD** criteria*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem) en voldoen aan die meeste **probleem en LTO** kriteria / *The challenge is a problem in real life context (real life or realistic problem) and adheres to most **problem and LTD** criteria*	Die uitdaging is 'n probleem in werkliheidskonteks (werklike of realistiese probleem) en voldoen al die **probleem en LTO** kriteria / *The challenge is a problem in real life context (real life or realistic problem) and adheres to all **problem and LTD** criteria* X
	Aanbied / *Present*	*Voldoen slegs aan **een** van die 4 vereistes (duidelikheid, belangrikheid, dringendheid, aksie) / Adheres to only **one** of the 4 requirements (clarity, importance, urgency, action)*	Voldoen slegs aan ***twee*** van die 4 vereistes (duidelikheid, belangrikheid, dringendheid, aksie) / *Adheres to only **two** of the 4 requirements (clarity, importance, urgency, action)*	Voldoen slegs aan ***drie*** van die 4 vereistes (duidelikheid, belangrikheid, dringendheid, aksie) / *Adheres to only **three** of the 4 requirements (clarity, importance, urgency, action)*	Voldoen slegs aan al 4 vereistes (duidelikheid, belangrikheid, dringendheid, aksie) / *Adheres to all 4 requirements (clarity, importance, urgency, action)* X
LTU / *LTE*	Metaleer / *Metalearn*	Leerders beplan hulle eie individuele leer / *Learners plan their own individual learning*	Leerders beplan en monitor hulle eie individuele leer / *Learners plan and monitor their own individual learning*	Leerders beplan, monitor en assesseer hulle eie individuele leer / *Learners plan, monitor and assess their own individual learning*	Leerders beplan, monitor en assesseer hulle eie individuele leer en verwerf intensioneel spesifieke intrapersoonlike lewensvaardighede / *Learners plan, monitor and assess their own individual learning and intentionally acquires particular intrapersonal life skills* X
	Koop leer / *Coop learn*	Groepe bestaan uit *heterogene groepe van optimale grootte (4) / Groups consist of heterogeneous groups of optimal size (4)*	Groepe bestaan uit heterogene groepe van optimale grootte en lede is individueel aanspreeklik / *Groups consist of heterogeneous groups of optimal size and members are individually accountable*	Groepe bestaan uit heterogene groepe van optimale grootte, lede is individueel aanspreeklik en positief interafhanklik / *Groups consist of heterogeneous groups of optimal size and members are individually accountable and positively interdependent*	Groepe bestaan uit heterogene groepe van optimale grootte, lede is individueel aanspreeklik en positief interafhanklik en verwef intensioneel spesifieke interpersoonlike lewensvaardighede / *Groups consist of heterogeneous groups of optimal size and members are individually accountable and positively interdependent and intentionally acquires particular interpersonel life skills* X
LTT / *LTF*		Voorsien kognitiewe ondersteuning deur die beantwoording van leerders se vrae/ *Providing cognitive support by answering learner's questions*	Daag kognitiewe ontwikkeling uit deur die vra van hoëorde vrae as realksie op leerdervrae/ *Challenging cognitive development by asking higher order thinking questions as reaction to learners' questions*	Voorsien emosionele ondersteuning en vra leerders se vrae terug aan hulle om self te antwoord / *Providing emotional support to learners and reverting their questions back to them*	Voorsien emosionele ondersteuning en vra leerders se vrae terug aan hulle om self te antwoord en die vra van metaleervrae by die beste en mees geskikte geleentheid / Providing emotional support, reverting learners' questions back to them and asking metalearning questions at the most opportune and appropriate moments X
LTK / *LTC*		KLG'e voorsien terugvoer met slegs sommige lede wat bydra / *CLG's provide feedback with only some members contributing*	KLG'e voorsien terugvoer met al die lede wat bydra / *CLG's provide feedback with all members contributing*	KLG'e voorsien terugvoer met al die lede wat bydra en word geasseesseer sonder die eis op kwaliteit / *CLG's provide feedback with all members contributing and is assessed without a demand for quality*	KLG'e voorsien terugvoer met al die lede wat bydra en word krities geasseesseer op die kwaliteit van hulle produk en aanbieding deur portuurgroep en BE / *CLG's provide feedback with all members contributing and is critically assessed on the quality of their product and presentation by peers and BE* X
PUNT/ GRADE		0-24	25-49	50-74	76-100
Toeken Award					75-100

CONCEPT MAP FOR FACILITATING LEARNING (FCL)





CONCEPT MAP FOR FACILITATING LEARNING (FCL)