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 $\longrightarrow$ QUAN b. QUAL $\longrightarrow$ 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

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[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.

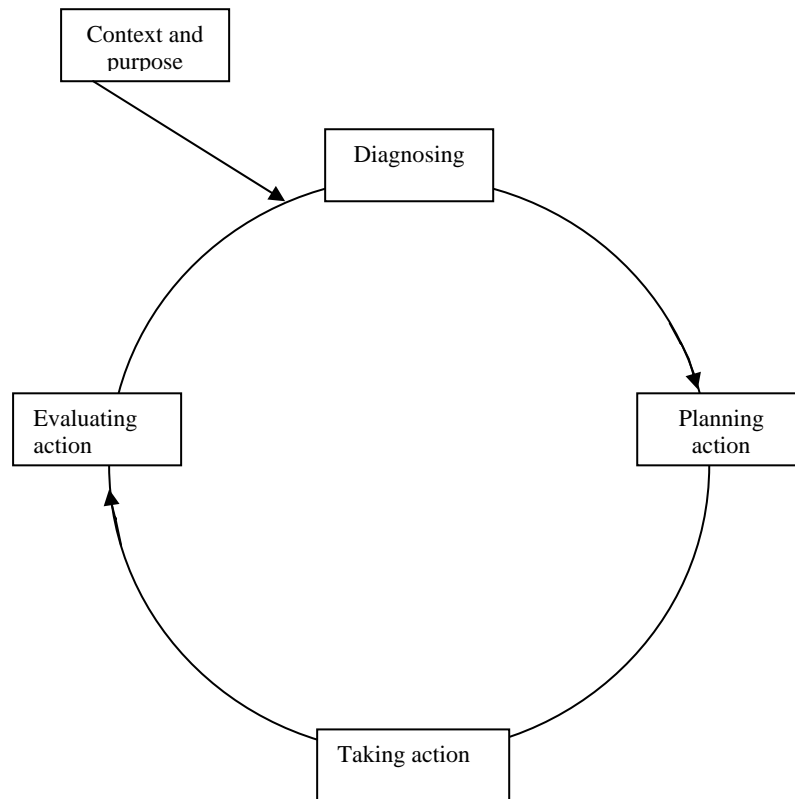### 3.4.3.5. Case Study Participatory Action Research Cycles
a. Designing the Case Study Participatory Action Research Cycle

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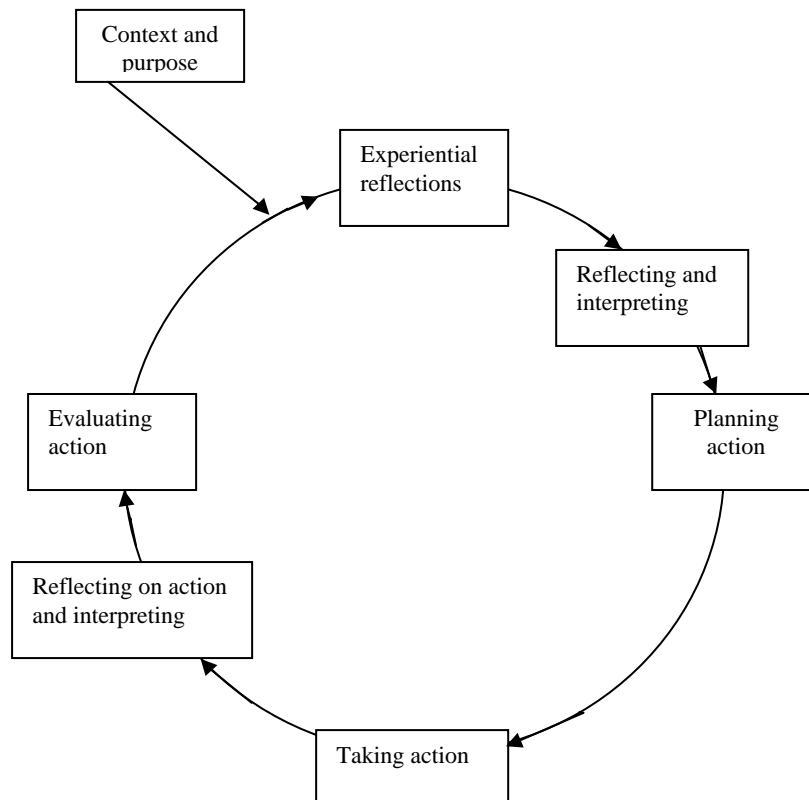
Figure 1: Coghlan & Brannick's (2001) model

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.
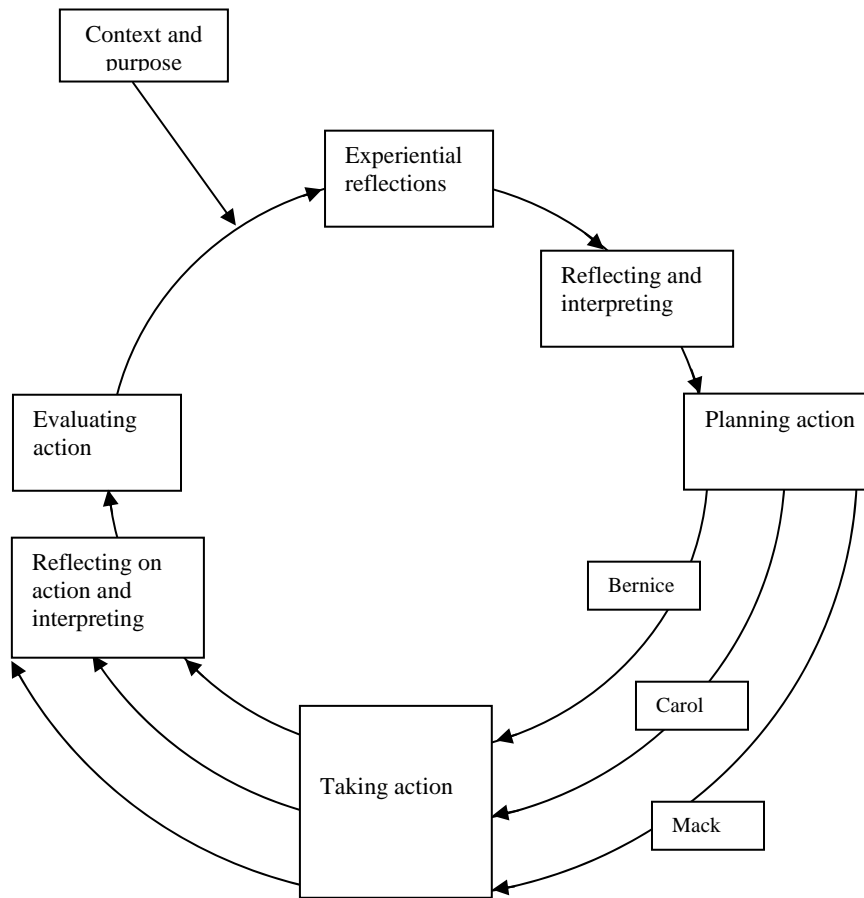
The fourth step in the cycle will be the taking action step. During this step taking action will be concerned with the intervention that the student teachers experience. The focus of this step will be on the learning in action as each student teacher is expected to construct and use his/her phronesis. 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

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Context and
purpose

        Experiential
        reflections

                    Reflecting and
                    interpreting

Evaluating                          Planning action
action

Reflecting on                Bernice
action and
interpreting
                        Carol

        Taking action
                             Mack
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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.

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[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

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

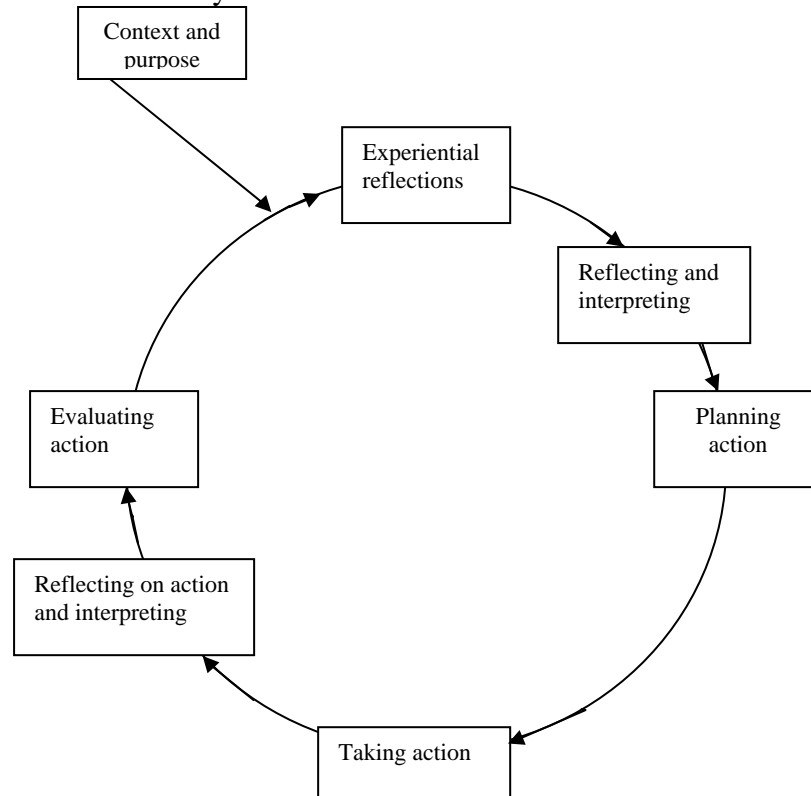# CASE STUDY PARTICIPATORY ACTION RESEARCH CYCLE ONE

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).

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[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 al*, 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

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[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.