CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

In this section of the study, I proffer the research design as well as the procedures I shall follow in conducting this study. I discuss the issues of rigour and trustworthiness, as well as detailing adherence to ethical requirements in the research. By rigour is meant reliability, validity, objectivity, credibility and transferability. There are several things I built into my research design to ensure the trustworthiness of the research. I used several methods of data collection and several sources of information, and I asked senior personnel from both the National Environmental Affairs Ministry and the Department of Education to serve as my peer debriefer, and regularly reviewed my data analysis. Lastly, I presented my outcomes to the actual participants in the research, asking them whether I had accurately captured some of the life experiences in Environmental Education (EE) teaching.

The preceding chapter presented the background to the investigation. The literature review conducted in chapter two provided a frame of reference for the research from an international and local perspective and, in addition, served to identify some of the ways schools can follow to include Environmental Education in the planning of their learning programmes. The researcher finds it necessary to assess the factors that might allow or prohibit the possibilities of educators to include EE topics or themes in their Learning Programmes.

The point of departure was to conduct empirical research, first by reviewing relevant literature to enhance the theoretical section, then, through a qualitative approach, observations, interviewing educators and analysis of their portfolios were also conducted to collect empirical data.
3.2 Research design

The topic I explored is best suited to a qualitative research approach, which most researchers prefer for its purpose of being able to accumulate sufficient knowledge to lead to understanding. This is an emergent research design whereby data collection and data analysis are done simultaneously. This type of research design also helps to discover ongoing activities that allow for important understandings. Researchers working in the qualitative research tradition argue that people’s subjective experiences are real and should be taken seriously by interacting with them. Hence, a qualitative approach focuses on a phenomenon that occurs in a natural setting - that is, in the “real world”. Furthermore, qualitative research involves studying those phenomena in their complexity. Qualitative research holds that the meaning of the social action or statement depends, in an important way, on the context in which it appears. When a researcher removes an event, social action, answers a question ignorant of the social context in which it appears, meaning and significance become distorted (Newman: 1997:240).

The research design of this study will best be characterised by a multiple case study design. Denzin and Lincoln (in De Vos et al, 2004: 268) argue that qualitative research uses a number of “strategies of enquiry, or tools that can be used to design qualitative research”. This use of multiple case study design they say, enables comparison and contrast between situations and thus elicits more robust findings, with understanding of similarities and differences across context and how these relate to the phenomenon being investigated.

Henning (2004: 2) posits that some qualitative researchers use hybrids or comparative case studies that are different in particular ways so as to enable comparison, build theory or propose generalization. She refers to this approach as using “multiple literacies theory as the agent and producing studies that are not only electronically mediated, but also contain texts that are enacted instead of written”.

This study used a multiple or collective case study, by collecting its data from more than one study site.
3.3 The research approach

The focus of this research will be on the systematic investigation of EE within learning programmes of schools. It will look into the assumptions about nature of knowledge, and about the kinds of entities that exist about the phenomenon under study. These assumptions are literally embodied in the practices of a scientific community, in what this community takes to be the exemplars of paradigm inquiry (Thorne, 2000:2). The study will not focus on the experimental methods and quantitative measures which test hypothetical generalizations.

This thesis is framed by a qualitative research approach which Henning (2004: 2) recommends for social science research, and cultural contexts within which people live. Newman (in De Vos, 2004: 41) states that “Social Sciences involve the study of people, beliefs, behaviour, interaction, institutions, and so forth” and thus this research has used qualitative research tools such as interviews, documents and participants’ observation to understand and explain social phenomena. Bogdan and Bilken (2003:261) postulate that this approach will help in the emphasis of using inductive thinking in “collection of descriptive data in natural setting”. Similarly Cronbach (in Hoepfl, 1997:1 of 16) avers that “the complex and dynamic quality of the social world in a naturalistic setting is easily accepted by qualitative inquiry”.

The motivation for doing qualitative research as opposed to quantitative research is derived from Myers’ perception (1997:2) of viewing “the ability to talk” as the only thing that can distinguish humans from the natural world. It means that through talking, the researcher becomes engaged in abstract thinking and the mind is then opened to new theories emerging during the “personal experiences of the qualitative research process” (Burns & Grove, 1993:2).

Qualitative research methods are preferred for their several considerations, as cited by authors such as Gay (1987:209), Patton (1987:13) and Borg and Gall (1989:31). These authors proffer that qualitative methods are naturalistic, use a human instrument, provide data with full meaning, use inductive data analysis and their reports are descriptive. Hoepfl (1997:1) further avers that qualitative methods can be used to better understand any phenomenon about which little is known and
gain new perspectives on things about which much is known, or to “gain more in-depth information that may be difficult to convey quantitatively.”

Data for this thesis was gathered in the form of words and actions from people in their actual settings, because it is acknowledged according to Hoepfl (1997: 4) that “social reality is historically constituted and produced by people”. Although people can consciously act to change their social and economic circumstances, it is widely recognized that “their ability to do so is constrained by various forms of social, cultural and political domain”.

This research was interested in the complexities of human decision-making and behaviour, and concurs with the view that “all human life is experienced and indeed constructed from a subjective point of view and that it should seek to elicit the meaning of events and phenomena from the point of view of participants” (Myers, 1997:2). The above citations indicate that the researcher interacts with humans’ situational cues. It is perceived that qualitative inquiry will take full account of the human interactions and “accepts the complex and dynamic quality of the social world” (Hoepfl, 1997:3).

The main task of qualitative research is viewed by Myers (1997:4) as being one of social critique, whereby the “restrictive and alienating conditions of the status quo are brought to light”. It was used in this research to focus on the oppositions, conflicts, and contradictions educators as respondents are dealing with, and also to check how they interpreted their experiences with the phenomenon under study. Because meaning is essential to an inquiry, the qualitative approach used here also helped to understand how different people make sense of their lives.

Findings were not determined by means of statistical procedures or other means of quantification, but rather by means of qualitative research in order to seek instead illumination, understanding, and extrapolation to similar situations” (Hoepfl, 1997:2). They were developed or fixed into a text analogue with an increased insight and sensitivity to what goes on in ordinary human conversation and relationships that are mostly taken for granted. This necessitates the need for
collection and description of data not only from the researcher’s perspective, but also from the reader’s perspective.

3.4 Population

Mouton (2002:134) and Best and Kahn (2003:12) define population as “a collection or group of individuals having some characteristics that the researcher is interested in studying”. The population of this research was ninety educators from the three Middle schools in the Temba Township, north of Tshwane, implementing the OBE curriculum approach with an interdisciplinary focus of EE. The selection of participants in qualitative case study must follow a theoretical logic. The participants selected amplified the key questions being addressed by the research. It was believed that educators from the three Middle schools in the Temba Township, within the Temba District of the Bojanala East Region in the North West Province, would display characteristics related to the aspects influencing the values and attitudes of educators with regard to the implementation of EE. However, this number was too large to be investigated in its totality, so it was important that “the researcher select participants who can shed optimal light on the issue that she is investigating” (Henning, 2004:71).

A sample in this case is necessary. The purpose of sampling is to draw conclusions about populations from samples. It was therefore important to use “inferential statistics which enables us to determine a population’s characteristics by directly observing only a portion (or sample) of the population. Participants of this research were selected using the systematic random sampling, which depends on a random and representative sample from the larger population. This is data collection in which every person in the population has a chance of being selected, which is known in advance. We obtain a sample rather than a complete enumeration (a census) of the population. This sampling method was selected because it was cost-effective and helped to deal with frustrations of inaccessibility of some of the population.

Gay (1987:552) defines systematic sampling as “sampling in which individuals are selected from a list by taking every $k$th name where $k$ equals the number of
individuals on the list divided by the number of the subjects desired for the sample.”
It can be obtained by selecting one unit on a random basis and choosing additional
elementary units at evenly spaced intervals until the desired number is obtained
(http://www.socialresearchmethods.net (tutorial/Mogo/tutorial.htm). This notion is
simplified by the following indication:

- The researcher numbers the units in the population from 1 to N
- She/he decides on the n(sample size) that he/she wants or needs
- \( K = \frac{N}{n} \) = the interval size
- An integer between 1 to K is randomly selected
- The Kth unit is taken

In this research, a total population of 90 educators were identified, whom it was
believed were implementing EE in their teaching of Learning Areas, according to
Outcomes Based Education and Training approach. The sample size for this
research was targeted at 18. The researcher made a list of all the 90 educators in a
random order. The 90 educators was then divided by the number of the sample
require, which is 18 to get the interval size (K), like this: \( 90/18 = 5 \).

5 is the Kth number and to come up with a sample, the researcher started from 0
and took every fifth name on the list until the desired sample of 18 was reached.
The names taken were in relation to the following numbers: 5, 10, 15, 20, 25, 30,
35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, and 90.

Given the time constraints, financial resources and the limitations of a mini-
dissertation, research was limited to three schools, particularly Middle schools
offering tuition to Grade 7 to Grade 9 learners in the Temba District in the North
West Province.

3.5 Techniques for data collection

In my study, I used a variety of methods of data collection to achieve a better
understanding of the participants, and to increase the validity of my findings. This
was in consonant with qualitative research that called for the use of multiple forms
of data in any single study. The use of multiple forms of data in a single study was referred to by many authors; *inter alia* Henning (2004:104), as ‘triangulation’. They argue that triangulation entails collecting materials in as many different ways and forms as many diverse sources as possible. Thus, as stated, an emergent research design was employed as backed up by the above mentioned qualities.

Qualitative research tools were used because the researcher wanted to obtain insight into the participants’ minds. The researcher talked with participants and got to know their thoughts and feelings about these underlying aspects with regards to the implementation of EE within their Learning Areas. In-depth interviews, observations and document analysis were found to be the relevant tools to assist the researcher to explore educators’ attitudes and feelings about the phenomenon under study.

### 3.5.1 Interviews

Interviews are the most rewarding component of a well established tool in qualitative research. They were an act of communication which provides rich and substantive data for the researcher. The main aim of interviews in research, according to Henning (2004:52), is “to bring to our attention, what individuals think, feel do and what they have to say about it in an interview, giving us their subjective reality in a “formatted” discussion, which is guided and managed by an interviewer and later integrated into a research report”. She further calls this tool “talk-in-interaction” because it focuses on the analysis of conversation in everyday settings, the aim being to check “the underlying structures of such talk”. This tool was found to be relevant in this study because it could create time for the respondents to reflect on the questions they were being asked, with opportunities of also encouraging them to elaborate and “explain in more detail the subtleties and complexities of their feelings” (Moore, 2001:122).

Britten (1995:1) and Dooley (1995:350) viewed this technique as being helpful in discovering the interviewee’s framework of meaning as far as possible without imposing the researcher’s assumptions. They further see it to be more interactive
and sensitive to the language and concepts used by the interviewee and, hence, it gives the interviewer an opportunity to keep the agenda flexible.

In interviews, the respondents are allowed to state their own views, opinions, thoughts and ideas without manipulation or interference, and without imposing the researcher's structures and assumptions. Participants can share their own experiences in a relaxed mood and are given a chance to say whatever they want to say. The researcher has to always be alert to record or notice “the context in which some of this experience has been played out” (Henning 2004:37).

An interview guide was used to ensure good use of time in a systematic and comprehensive interview sessions. An interview guide is defined by Hoepfl (1997:6) as a list of questions or generated topics in the form of a checklist that the interviewer wants to explore during each interview. He views it to be a tool prepared to ensure that basically the same information is obtained from each person and there are no predetermined responses. In semi-structured interviews the interviewer is free “to probe and explore within these predetermined inquiry areas” (Hoepfl:1997:6).

Questions in an interview schedule were open-ended, neutral, sensitive and clear, so that the respondents were able to formulate their responses. Britten (1995:4) avers that “the researcher needs to remain open to the possibility that the concepts and variables that emerge may be very different from those that might have been predicted”. Educators as respondents were allowed to state their ideas and reasons for choosing specific ways from the lists suggested in chapter two, of incorporating EE topics in their Learning Programmes. The researcher used schools as the concrete natural settings to elicit educators’ daily experiences, which were then turned into a concrete and valid text. The participants spoke for themselves, without interference from the interviewer, leading to a rich stream data, and building on the understanding of why things happen in the ways they do.

The interview guide or schedule included questions on aspects such as attitudes of educators towards the phenomenon, schools’ EE policies, educators’ knowledge of EE, Educators’ teaching experience, examinations, communities’ socio-economic,
political and cultural backgrounds, community involvement in the schools’ environmental activities, and the schools’ resources. More questions were introduced during the interview process as the interviewer became more familiar with the topic being discussed.

In order to facilitate record keeping, to provide for an authentic verbal account and to improve accuracy and objectivity of the data collected, all the interviews were tape-recorded and transcribed.

Despite the advantages mentioned above, the researcher was still aware that the interview technique had its shortcomings, the most serious of which was that respondents in most instances had a tendency to give inaccurate or incorrect information. They may have distorted information through recall error, selective perceptions, or the desire to please the interviewer (Frechtling, 1997:93-97). This supposes that what people say in an interview may be prone to subjectivity and bias on the part of the interview. However, the disadvantage mentioned here did not create an impression that the findings were slanted in favour of the researcher’s beliefs and values. Indeed, the researcher endeavoured to conduct a fair and balanced inquiry, not allowing personal, political or ideological convictions to affect what was discovered and reported.

3.5.2 Observations

Observation was also be used to reveal more about data acquired through interviews, to gain a deeper understanding and to provide more knowledge of the context in which events occur. Observational techniques are defined as “methods by which an individual or individuals gather firsthand data on programs, processes, or behaviours being studied” (Frechtling, 1997:93-97). It means they can provide data collection opportunities in a wide range of behaviours and interactions. They make it easy to explore the phenomenon under study.

Janesik (2004:71) writes that observations enable the researcher to go to an extent of learning about things the participants may be unaware of, even if they may be unwilling to discuss in an interview. In addition, because observation takes place
while things are happening, it enables one to get closer to the action. This tool was used to observe the environment in which interviews were conducted, to see if there were signs that confirmed or contradicted what the respondents were saying. It is used to uncover, describe and analyse the ways in which “social order is ongoingly produced, achieved and made recognizable in and through the practical actions of members of a society” (Psathas, in Henning, 2004:92).

Verbal and non-verbal cues were monitored with the observation tool. Actual behaviour and not what people said was recorded. Educators’ activities were observed naturally and not in a controlled environment by the researchers’ conditions. This was compared to their interview statements, to check for validity of their interview responses, and whether the teaching of EE was delivered and operated as they said it in the materials they used for planning.

Observation in this research was guided by an observation schedule or protocol within which the researcher located what was observed. Aspects such as the physical setting within which teaching takes place, the social environment of the educators and the learners (interactions) and learners’ participation, resource allocation and use, project implementation activities, the native language of the phenomenon (how do various schools perceive EE), what are the problems they are encountering and how do they deal with them, what are educators’ experiences regarding the subject, notable non-occurrences (determining what is not occurring although the expectation is that it should occur as it might appear in educators’ portfolios of planning or noting the absence of some particular activity/factor that is noteworthy and would serve as added information) and the non-verbal communication about what is happening in the project.

The researcher jotted down fieldnotes and recorded as much as possible the events, the actions, and the behaviours of all participants. The notes included the responses of the individuals, and the pattern of interaction between individuals. This served as an aide-memoire when full fieldnotes were constructed. Date and time of observation was also recorded.
3.5.3 Documents

My research focus indicates that documents may be combined with observations in the field of in-depth interviews. Documents in the form of educators’ portfolios, school policies (environmental) and examination papers were used for content value. The collection of documents is seen by Henning (2004:94) to be a valuable source of information to be used or included in the design. They provide information describing institutional characteristics, in terms of strengths and weaknesses with regards to the topic.

Portfolios were also be used as they reveal the ways in which educators plan and include aspects of the environment in their planning. School policies provided information on the schools’ compliance with the following policies: The National Policy for Environmental Education of 1986, Curriculum 2005, the National Policy on Education: Revised National Curriculum Statement Grades R-9 (Schools) of 2002 and the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996).

All the policies and legislation mentioned suggest that EE must be given a priority through a new curriculum, where all learning programmes must be aimed at achieving outcomes. They say schools must use eight Learning Areas to drive curriculum which addresses the relationship between human rights, a healthy environment and social justice. The policies suggest that teachers must be able to use teaching activities which take learners’ surroundings (contexts) into consideration.

Portfolios will be checked as to whether they do include learning which encourages the development of a range of competencies, which includes knowledge, understanding, skills and attitudes, while at the same time they are sensitive to issues of poverty, inequality, race, gender, disability and other challenges, such as HIV/AIDS.
3.6 Data analytic strategies

Bogdan and Biklen (2003:145) define qualitative data analysis as “working with data, organizing, breaking it into manageable units, synthesizing it, searching for patterns, discovering what is important and what is to be learned, and deciding what you will tell others”. According to Henning (2004:101), the true test of a complete qualitative research comes in the analysis of data, a process that requires analytical craftsmanship and the ability to capture understanding of the data in writing. She further says that to be able to come up with a truthful story line or product, the researcher must be able to fit the analysis procedures with the methodological position of the study and consistently and coherently manage the analysis (and interpretation) process according to the principles of the study design. In the same light, Morse (in Thorne, 2000:5), believes that all qualitative analysis, regardless of the specific approach, involves comprehending the phenomenon under study, synthesizing a portrait of the phenomenon that accounts for relations and linkages within its aspects, theorizing about how and why these relations appear as they do, and recontextualising or putting the new knowledge about phenomena and relations back into the context of how others have articulated the evolving knowledge. These are the steps Thorne (2000:5) believes can help to depict a series of intellectual processes by which data in their raw form are considered, examined, and reformulated to become a research product.

This research also used the same qualitative route of data analysis to interpret and structure the meaning that can be derived from data. Data was divided into small units of meaning, which were then systematically named per unit. It meant that data was coded according to what a unit of meaning signifies for the researcher and then grouped together in categories that contained related codes: “Each category will therefore contain codes that are semantically related” (Henning, 2004:104). The process started with all the interviews being transcribed and then read entirely to get the global impression of the context. Once this was done, data was broken down into segments and an order imposed on them so that the critical themes could emerge.
The process is referred to as “open coding” by Strauss and Corbin (in Hoepfl, 1997:8). They view it as the process whereby the researcher must “identify and tentatively name the conceptual categories into which the phenomenon observed will be grouped”. The process then proceeded to a stage of determining how these categories were linked, by comparing and combining to assemble the big picture. Hoepfl (1997:9) contends that this is the easiest way of identifying and exploring “causal events contributing to the phenomenon, descriptive details of the phenomenon itself, and the ramifications of the phenomenon under study, to be used to build a conceptual model which can then be translated into the story line that will be read by others”.

In this research the breaking of data was done with reference to the aim and objectives. It was important to be able to identify the issues that were set out for exploration in the research, and the themes that informed these issues. This process of data analysis was not only important for conducting qualitative research, but also for reading, understanding and interpreting the findings thereof.

3.7 Measures of validity and reliability

Validity of the study is regarded by many writers \textit{inter alia}, Hoepfl, (1997:12) and Henning (2004:147) as a means of determining whether the research truly measures that which it was intended to measure or how truthful the research results are. In other words, the research instrument used must allow the researcher to achieve the research objective. Reliability is described by the same authors cited above as the extent to which results are consistent over time and an accurate representation of the total population under study. It means if the research results can be reproduced under a similar methodology, then the research instrument is considered to be reliable.

The findings of this research were made truthful, applicable, consistent, and neutral, in the sense that they were related to the participants and the context in which the study was undertaken. There was a correlation between the verbal accounts of the participants and the analysis of the study. As Bogdan and Biklen
(2003:190) indicate, the verbatim accounts of the participants allow the researcher to acquire an understanding of the responses in totality.

Applicability of the findings can be assessed by its transferability to other contexts or settings. The researcher presented sufficient descriptive data to allow for comparison and to ensure applicability. However, it is noted in this study that each participant was unique and their views divergent. Thus, the researcher focused on describing the phenomenon to be studied and the need to generalize was not relevant.

The researcher contends that the results were found to be consistent, should the investigation be replicated with the same subject and also in a similar context without alterations, due to the declaration and documentation of the research steps. This notion is supported by Henning (2004:151) when she alludes that declaration and documentation of research steps make the research to be potentially replicable and someone may then assess by doing it all in the same way in a similar setting and with similar participants. According to Henning (2004:15), the consistency will be found in the “internal logic and cohesion- the systematic processes of rationalizing the social world into social science formats”.

The researcher was neutral in the sense that the research procedure and results were free from bias. The researcher was objective throughout, and gave no indication during the interview of verbal or non-verbal gestures, that she was surprised, agreed or disagreed with the responses given by the participants. Focusing solely on the data helped the researcher to be free of any bias when she analysed and presented the findings.

3.8 Ethical considerations

Strict adherence to ethical standards in planning and conducting research was most important. Researchers were viewed to be professionals with “obligations both to their subjects and to their profession” (Arvy et al, 1990:476). It is said in the quoted text that they were also supposed to have a responsibility towards the participants who would be interviewed. Ethical considerations were undertaken by
gaining participants’ informed consent, taking their confidentiality into consideration, making sure that they (participants) remained anonymous and were given feedback once the study was completed.

Informed consent suggests that “respondents enter research projects voluntarily, understanding the nature of the study and the dangers and obligations that are involved” (Bogdan & Biklen, 2003:43). This implies that the participants must be fully informed about the purposes and the procedures of the investigation, and be given a completely free choice in participation. The researcher informed all the participants in the form of letters, about the research, in which she explained what was involved and the likely duration of the interview, with assurances about confidentiality. Informed consent from them was obtained before gathering data.

Confidentiality implies that the identity of the participants, as well as the information divulged will be held confidential. Strydom (in De Vos, 1998:67) and Bogdan and Biklen, (2003:45) contend that it is important for the researcher to note that once the study is completed, there should be no divulgence of any specific information about individuals to others and it is important also to “be watchful of sharing information with other people at the research site, who could use the information for political or personal ways”.

The researcher ensured that once data had been collected, no one had access to it, except the researcher. No one would be able to identify the participants once the study was completed. Moreover, the names of the participants were not mentioned in the study and nobody had access to the tape recordings made during the interviews.

The researcher assured the participants about the availability of the findings of the study, if they were interested.
3.9 Conclusion

The focus of this chapter has been on the research design, research approach and methods to be employed in this study. Consideration was also given to the trustworthiness and ethical consideration, to give credibility to this study. Qualitative research design has been selected for this study and it is embedded within the multiple case study design focusing on one phenomenon. Interviews, observations and documents were explained as the preferred tools for data collection, from a population that has been systematically and randomly sampled. The overall population of this study has been selected from three Middle schools in the Temba District of the North West Province.

The researcher is confident that the methods employed in this study managed to capture some of the life experiences in Environmental Education teaching.