1.1 INTRODUCTION

This chapter discusses the research methodology of the present study. The researcher conducted a literature review as the main data gathering tool and open coding and constant comparative analysis as data analysis method. The concept analysis followed Walker and Avant (1995:38), who stress that literature and thesaurus reviews, dictionary definitions, and discussions with colleagues be conducted.

2.2 APPROACHES USED TO STUDY CRITICAL THINKING

The literature indicates various research approaches used to study critical thinking. Table 2.1 represents a summary of these approaches. Qualitative methodologies seem to be paramount in studying critical thinking. This supports the researcher’s choice of the qualitative paradigm.

<table>
<thead>
<tr>
<th>APPROACHES USED TO STUDY CRITICAL THINKING</th>
<th>REFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Literature review</td>
<td>Hickman (1993); Dobrzykowski (1994); Bittner &amp; Tobin (1998) and Gordon (2000)</td>
</tr>
<tr>
<td>2 Reorganisation of content into predetermined categories</td>
<td>Facione and Facione (1990; 1996)</td>
</tr>
<tr>
<td>3 Content analysis</td>
<td>Kataoka-Yahiro and Saylor (1994); Scheffer &amp; Rubenfeld (2000)</td>
</tr>
<tr>
<td>4 Philosophical analysis</td>
<td>Bailin (1995); Facione (1990); Gordon (2000); Norris (1995); O'Hollaran &amp; Frederickson (1996); Siegel (1991)</td>
</tr>
<tr>
<td>5 Structural functional analysis</td>
<td>Kramer (1993); Mathews and Gaul (1979); Norris (1995); Paul and Heaslip (1995); Thornhill and Wafer (1997); Walters (1986)</td>
</tr>
<tr>
<td>6 Correlational studies</td>
<td>Bowles (2000); Daley, Shaw, Balistreiri, Glasennapp and Piacente (1999); Oerman (1997); Edwards (1998); Saucier (1995)</td>
</tr>
</tbody>
</table>
2.3 THE RESEARCH PARADIGM

The qualitative analysis of the concept *critical thinking* was done, using concept analysis as the research design.

2.3.1 Qualitative research

Qualitative research is a means of exploring the depth, richness and complexity inherent in phenomena (Burns & Grove 1999:339). It is concerned with the analysis of concepts and/or words rather than numbers. The qualitative research methodology was chosen to facilitate the systematic collection and analysis of more subjective and narrative material without compromising the researcher's unbiased position. Qualitative research is most appropriate for exploratory and descriptive studies. It elects to use researchers as instruments of data collection (Lincoln & Guba 1981:39).

The basic principles of qualitative research were adhered to in this study. The main reason is that concept analysis is implied by the background and the problem statement for this study, namely, a conceptual problem. This requires the use of words as data units rather than numbers in order to arrive at a coherent definition of the concept *critical thinking* (Streubert & Carpenter 1999:16).

2.3.1.1 General attributes of qualitative research

Qualitative research is concerned with the exploration of aspects that are difficult to quantify (Brink 1996:119). It requires self-prejudicial appraisal as an admission that research can be influenced by the researcher. Qualitative research is an emphatic experience and a self-reflective journey (Chenitz &
Swanson 1986:48). It is a systematic, subjective approach used to describe phenomena and give them meaning, and focuses on understanding within the holistic framework. It provides richness, depth and complexity in describing the aspect of interest (Burns & Grove 1993:27, 1999:339).

In general, qualitative research has significant characteristics that distinguish it from quantitative research, namely:

- commitment to discovery through the use of multiple ways of knowing
- commitment to the participants' views, thus using the language of participants (authors and theorists) to describe the aspects under study
- allowing extensive searching of documents and articles of importance to understand the context of what is under study
- acknowledgement of the researcher's participation in the research, thus he/she may be used as a data collection instrument
- conveyance of an understanding of aspects of interest by reporting in a literary style, thus allowing for a narrative approach to writing research findings (Streubert & Carpenter 1999:9)

All the above attributes of qualitative research guided the researcher in the present study.

2.3.1.2 Advantages of qualitative research

Polit and Hungler (1999:239) describe the qualitative research approach as one that generally

- collects information without formal structured instruments. For instance, this study did not use any formal, structured instrument to collect data, but rather relied on relevant literature as determined by the researcher based on the overall research question and developing construct.
- analyses narrative information in an organised but intuitive fashion. Analysis led to the emergence of themes and categories that helped the researcher to intuitively unravel the developing construct.
- attempts to understand the entirety of some phenomenon rather than to focus on specific concepts. The researcher had to read and reread literature sources to reveal the characteristics of
the concept critical thinking as it manifested itself in the various sources to capture the holistic nature of the concept, implicit and explicit from the academic disciplines mentioned above. The relevancy here is that critical thinking is an umbrella concept of which the attributes had to be uncovered (Walker & Avant :40).

- has few preconceived ideas and stresses the importance of people's interpretation of the events and circumstances rather than the researcher's interpretation. Thus, literature from various authors had to be explored, and opinions from colleagues were incorporated into discussions following data analysis.
- does not try to control the context of the research but rather attempts to capture it in its entirety (Polit, Beck & Hungler 2001:207). For example, there were no predetermined categories for this study. Not even the structure found in the literature was adhered to.

2.3.1.3 Rationale for use of qualitative research in the present study

In this study the qualitative research method was adhered to because the study

- could not be done experimentally
- delved into the complexities of the concept in depth to analyse the concept
- variables needed to be discovered and reevaluated through constant comparison and category development
- enhanced the accommodation of selective sampling of literature
- enhanced inductive analysis
- allowed the research design to emerge rather than be constructed from a prior theory (Lincoln & Guba 1981:39-40)
The qualitative approach was further seen to be appropriate in the sense that it created opportunities for the development of themes and categories regarding the concept *critical thinking*. The qualitative paradigm enhanced the comparison of themes and categories (Woods & Catanzaro 1988:505). This crystallised essential attributes of the concept *critical thinking*.

The approach also provided a means to leave an audit trail. An audit trail is a systematic collection of materials and documentation that allows an independent auditor to come to conclusions about data (Polit & Hungler 1999:430). In this regard, see appendix A for primary categorisation.

### 2.3.1.4 Dimensions

Several dimensions were identified and pursued during this study to facilitate unfolding of categories and themes. A discussion of these dimensions follows.

#### 2.3.1.4.1 Linguistic epistemology

Linguistic epistemology is a process by which knowledge is expressed in terms of language or words or communicated through language (Van der Wal 1999:595). Linguistic epistemology was used as a point of departure in this study as it

- concerns words or language to obtain meaning (Polit & Hungler 1999:10)
- is used (in philosophical research) to examine meanings and to develop theory
- uses philosophical inquiry to answer questions (Burns & Grove 1993:592)

In this study the approach was used to lead the inquiry in exploring the structure and function of critical thinking.

#### 2.3.1.4.2 Philosophical analysis

Philosophical analysis refers to the use of concept or linguistic analyses to examine meaning and
develop theories of meaning in an inquiry (Burns & Grove 1999:473). Philosophical enquiry is concerned with the examination of an idea from all perspectives through an extensive exploration of literature, examining conceptual meaning, raising questions, proposing answers and suggesting the implications of those answers (Burns & Grove 1993:79).

Philosophical enquiry

- allows data collection and analysis to occur simultaneously; that is, constant comparisons
- focuses on words
- is directed at ideas, meanings and abstractions, thus the content may be implied rather than clearly stated
- is accomplished through the use of concept analysis which helps clarify meaning (Burns & Grove 1993:86)

Philosophical analysis was accommodated by raising questions in relation to what critical thinking entails. Questions were raised to direct the examination to meanings and ideas of the concept as they emerged from literature, and to develop themes and categories that were used to build up a construct (Walker & Avant 1995:38).

2.3.1.4.3 Exploratory dimension

An exploratory study is aimed at uncovering/revealing the dimensions of a phenomenon, the manner in which it manifests itself and its related factors (Polit & Hungler 1999:17). Exploration is therefore suitable when exploring the elements of critical thinking as the structure and processes of critical thinking manifest from literature.

2.3.1.4.4 Descriptive dimension

Description relates to the logical relationship among categories and processes in the discussion of different categories. Descriptive studies are aimed at elucidating characteristics of phenomena (Polit &
Hungler 1999:16). The descriptive approach was chosen to clarify the concept *critical thinking*, its characteristic variables and describe them, and develop a qualitative conceptual definition.

### 2.4 RESEARCH DESIGN: CONCEPT ANALYSIS

Since the research question pertains to the clarity of the concept *critical thinking*, this study aimed at its analysis and clarification.

#### 2.4.1 Concept analysis

Various steps may be followed to analyse concepts (Chinn & Kramer 1995; Morse, Hupcey, Mitchman & Lenz 1996; Rodgers & Knafl 1997; Walker & Avant 1995). The procedures followed in concept analysis seem suitable for incorporation into the qualitative paradigm. These include exploratory and descriptive designs.

Walker and Avant (1995:40) stress the centrality of literature review to concept analysis, therefore the researcher did extensive reading and kept a systematic record of the uses of the concept in literature, including thesaurus and dictionary definitions.

Wilson’s original concept analysis had eleven steps (Hupcey, Morse, Lenz & Tason 1996:186; Morse et al 1996:257). However, Walker and Avant (1995:55) modified them to eight steps, which will be used in this study. The researcher supplemented Walker and Avant’s approach with other authors.

##### 2.4.1.1 Definition

Kemp (1985:383) and Walker and Avant (1995:3) define concept analysis as a formal, linguistic procedure to determine the essential attributes of a concept. This type of research focuses on the use of words to explain phenomena. McKena (1997:58) defines the concept analysis process as a technique or mental activity that requires critical approaches to uncover subtle elements of meaning embedded in concepts.
Concept analysis also entails an assessment process that uses various techniques to explore the description of a concept from literature. It is a process of unfolding, exploring and understanding concepts for the purpose of concept development, delineation, comparison, clarification, identification, refinement and validation (Morse et al 1996:225).

Morse et al (1996:255) define concept analysis further as a process of inquiry that explores concepts for their level of development as revealed by their internal structure, use, representativeness and relations to other concepts. Concept analysis forms the basis for providing operational definitions of abstract concepts.

### 2.4.1.2 General principles of concept analysis

Concept analysis has the following principles (Morse et al 1996:257) that must be adhered to throughout:

- **The epistemological principle.** Concepts must be clearly defined and well differentiated from other concepts. This study aimed at differentiating critical thinking from other concepts, such as problem solving.

- **The logical principle.** Concepts must be systematically and coherently related to other concepts. In this instance, constant comparisons were used to analyse data.

- **The pragmatic principle.** Concepts should be operationalised so that they are applicable to the world. The concept was clarified through the study, which paved the way for the development of a descriptive theory, a step towards development of tools to assess the prevalence of critical thinking in practice.

- **The linguistic principle.** Concepts should be appropriate to the use in context. A comprehensive descriptive definition was developed through this study, which contributes to this principle (see chapter 4).
2.4.1.3 **Advantages and uses of concept analysis**

Concept analysis appealed to the present researcher as the linguistic nature of the data used in concept analysis makes it essential to the analysis and clarification of the concept under investigation. Concept analysis thus also provided for open and axial coding to enhance the development of categories that led to the identification and development of defining attributes, distinguishing characteristics and conditions under which critical thinking occurs.

For the purpose of this study, concept analysis was used to (Walker & Avant 1995:38):

- distinguish between defining attributes and irrelevant attributes of the concept
- clarify ambiguous concepts that are used synonymously with critical thinking so that the same understanding is given to the concept; for example, forms of reasoning such as decision-making
- enhance the development of an operational definition of critical thinking
- determine attributes and characteristics that can be used to develop tools of measurement for the concept critical thinking
- discover the uses of the concept critical thinking, thus helping to determine defining attributes
- enhance modelling of the concept, thus delineating contrary, borderline and illegitimate cases, as in explicating the types of thinking involved in critical thinking
- develop a critical thinking construct

Concept analysis uses an inductive approach to analyse and identify uses of concepts. It helps to analyse the concept of interest in terms of its critical attributes (referred to as essence) and to discover empirical referents, which by their presence demonstrate the occurrence of the concept (McKena 1997:60; Rodgers & Knafl 2000:62, 77; Walker & Avant 1995:38).

2.4.1.4 **Disadvantages of concept analysis**

Walker and Avant (1995:47) cite the following problems relating to concept analysis:
• Concept analysis has limitations in that it cannot help generate new operational definitions with construct validity that accurately reflects a theoretical base. However, this study sought to develop a descriptive definition of “critical thinking” with all the critical attributes incorporated.

• Concept analysis cannot help generate new concepts. The study sought to reveal the dimensions of the existing concept critical thinking and thus no new concepts were developed.

• It is a rigorous process that requires reading and rereading, including persistent focus on the concept of interest. This was duly experienced in this study by the researcher.

• It can create a lot of anxiety since there are no firm rules on how to go about the process of concept analysis therefore an individual may be unsure of how to go about the whole process. At some stage the researcher felt overwhelmed and uncertain as to how to deal with the large volumes of literature, even to the point of abandoning the whole process. However, the incorporation of qualitative research methods, such as comparative analysis, into the concept analysis procedures helped guide the research process towards explicating a definition and theory to describe critical thinking.

• It can create a feeling that it is too easy thus the work presented may not be of high quality since it will be lacking in rigor, which is a critical aspect of qualitative research. The researcher found that the process of analysing the concept demanded rigorous effort, which included the use of higher cognitive strategies in developing categories, code recode procedures, discussions with expert researchers, and patience.

• It may result in value attachment, thus moralising the concept under investigation if there is some value attached to it. Value attachment may cloud the analytic processes in the researcher and thus jeopardise the whole research process. However, the concept critical thinking does not hold a moral aspect and value attachment becomes irrelevant in the present study.

• It may create a feeling of wanting to analyse everything. However, researchers must focus persistently on the concept of interest and the emerging relationships. Critical thinking was found to be an umbrella concept, a factor that complicated the whole analysis since each related concept needed to be explored.

• Researchers may develop a tendency to protect themselves against criticism by restraining themselves in the discussion or failing to seek criticism from others. In the present study data
analysis was discussed with an experienced researcher to provide for criticism, and relevant corrections were made.

- It can give rise to the feeling that verbal facility equals thinking, causing researchers to engage in superficial fluency instead of a productive dialogue. Analysts may need to struggle with difficult and substantive problems in an effort to find solutions, thus persistence is needed to come up with the best results of the analysis. The researcher had to read and reread the literature. It took a lot of rigour to organise data in a manner that facilitated analysis and to develop rich descriptions from the literature.

- There is a temptation to add critical attributes for the sake of lengthening the list of attributes, instead of using only those that are supported by data, thus jeopardising the findings of concept analysis. In this study, no such fallacious additions were made. This is part of the researcher's commitment to the ethics of the research and science.

2.4.1.5  **Steps in concept analysis**

The study sought to explore the concept of critical thinking, following Walker and Avant's (1995) procedures which are discussed below.

2.4.1.5.1  **Concept selection**

Walker and Avant (1995:40) state that the concept selected should be significant and important to the research problem; that is, it should further theoretical development in the area of interest.

The concept *critical thinking* emerged when the researcher was involved in teaching senior students at a college of nursing. The students had difficulty answering questions that required argumentation. Critical thinking is the norm in nursing curricula and policies governing the education and training of professionals in this country. Critical thinking is also a significant concept in nursing. Its clarification would contribute much to improving nursing education and practice. A preliminary literature review was also used to identify the concept under study, namely, critical thinking. The researcher discovered that although the literature contains several definitions of critical thinking, operationalisation of the concept
is not yet fully realised as there is no consensus on its definition (Bittner & Tobin 1998:267).

McKena (1997:59) points out that the concept selected should be highly abstract to be able to retain its meaning when it is removed from specific situations, but also precise enough that its boundaries are identifiable. Critical thinking is an abstract construct.

Walker and Avant (1995:40), state that concept selection should be done with great care. The researcher should have an interest in the concept and the concept should be related to the area of the researcher's work. These were observed in the present study as indicated by the background to this study.

Walker and Avant (1995:41) maintain that the following should be avoided in concept selection:

- primitive terms that can only be defined by giving examples
- umbrella terms that are so broad that they encompass several meanings that can confuse the analyst

*Critical thinking* was found to be an umbrella concept and this complicated the study.

2.4.1.5.2 Determination of aims and purpose

With the above in mind, the concept *critical thinking* was selected for analysis for the following reasons:

- It reflects the greatest interest in the area of the researcher's work.
- Its analysis would further the theoretical development of this concept in nursing.
- It is an attempt to clarify poorly understood relationships and related issues.
The study was further aimed at exploring the concept *critical thinking* to identify the defining attributes through discovering existing variables. The guiding research question was, “What does critical thinking entail?” (see chapter 1, section 1.3.3). The following were the objectives of the study:

- Discover the essential elements of critical thinking from emerging categories during a literature review.
- Identify the defining attributes of the concept *critical thinking*.
- Determine antecedents of the concept of critical thinking.
- Identify causal conditions leading to critical thinking.
- Identify actions that manifest the presence of critical thinking.
- Identify the consequences of critical thinking.
- Identify the context in which critical thinking occurs (Strauss & Corbin 1990:99, Walker & Avant 1985:38).
- Develop a conceptual/operational definition of critical thinking.

### 2.4.1.5.3 Identification of uses of the concept

The identification of the uses of the concept was done through a literature review, including dictionary and thesaurus searches and comparison of emerging categories. Constant comparisons were used to enhance simultaneous data collection and analysis (De Vos 1998:254). Definitions were sought from the fields of nursing, general education, philosophy, psychology and the social sciences. These were used to enhance the identification of defining attributes in an effort to reduce the semantic space that the concept *critical thinking* shares with other concepts.

The test of sufficiency and necessity were observed throughout. *Sufficiency* refers to elements related to the true meaning of a concept; that is, assessment of the relevance, completeness, and amount of information attributed to critical thinking (McKena 1997:63; Streubert & Carpenter 1999:330). *Necessity* refers to the examination of attributes of the concept to check whether they apply to dissimilar concepts, in which case, they may not be regarded as defining attributes of the concept being studied and hence need to be discarded or sub-categorised (McKena 1997:63).
Substantive codes were reexamined to accommodate the fit, work and grab principle (see section 2.4.2 under sampling). Attributes were compared with other emerging categories to check whether the relationships still held. The researcher sought to obtain thick descriptions of the characteristics of critical thinking, by adhering to the linguistic principle, thus preventing data inadequacy (Morse et al 1996:272).

2.4.1.5.4 Determination of defining attributes

The definitions and descriptions of critical thinking in the literature were carefully explored to uncover defining attributes. Exploration was a rigorous exercise as it demanded the reading and rereading the literature, making notes and checking recurring themes and categories to grasp the essence of the concept. Open coding helped determine critical thinking antecedents, general and critical attributes, contrary, related, illegitimate and borderline cases. Thematic relational propositions were developed from data with regard to the critical attributes of critical thinking and the conditions, strategies, context, process and consequences of critical thinking. This was actualised through determining the fittingness of recurring themes while trying to obtain richer meanings of the concept. Axial coding was instrumental in validating the fittingness of data to constructed/emerged categories (Strauss & Corbin 1990:41).

2.4.1.5.5 Development of different cases of the concept

Different cases of the concept under scrutiny served to crystallise the demarcation of the concept of interest, including model, borderline, related, contrary and illegitimate/illegal cases as well as an invented case. However, not all the authors accommodate the different cases of concept development as part of the process of concept analysis. For example, Rodgers (1993) only recommends a model case, Schwartz-Barcott and Kim (1993) would only develop model cases if the concept remained unclear during the analysis. Walker and Avant (1995), Wilson (1969), and Chinn and Kramer (1991) advocate the construction of different cases. All fall within the Wilsonian method of concept analysis (Hupcey et al 1996:186). In this study, the researcher followed Walker and Avant’s procedures, thus, cases were developed once categories and themes had evolved.
2.4.1.5.5.1 Construction of a model case

A model case is a pure example of the concept with all the critical attributes; that is, an instance of the concept (Walker & Avant 1995:42). A model case must include all defining attributes (McKena 1997:64). The construction of a model case is given in chapter 4, section 4.4 after finalising the different categories.

2.4.1.5.5.2 Construction of borderline, related and contrary cases

Borderline cases are those that reflect some but not all of the attributes of the concept. They are somewhat inconsistent. They help clarify thought about the defining attributes of the concept under study (Walker & Avant 1995:43).

Related cases are related to the concept under study but do not contain critical attributes, though they may resemble or be connected to the concept. They help add insight into why the concept being studied fits into the network of concepts surrounding it (Walker & Avant 1995:45).

Contrary cases reflect attributes that are not an instance of the concept under investigation. A contrary case ultimately leads to the identification of critical attributes through explication of the contrary ones (McKena 1997:67; Walker & Avant 1995:44).

2.4.1.5.5.3 Invented case

An invented case is one that is constructed using ideas outside a person's own experience. It helps researchers to understand of critical defining attributes. It is used to examine familiar concepts that are usually taken for granted (Walker & Avant 1995:44).

The model case, contrary, borderline, related, illegal and invented cases are discussed fully in chapter 4, section 4.4.
2.4.1.5.6 Identification of antecedents and consequences

The identification of consequences and antecedents is an important outcome of concept analysis. This serves to identify the assumptions of the concept and enrich understanding of the context in which the concept is used (Strauss & Corbin 1990:106).

2.4.1.5.6.1 Antecedents

Antecedents are defined as the events or incidents that occur prior to the occurrence of the concept. They are usually referred to as the causal conditions. For example, conditions, requirements, and dispositions of critical thinking and the critical thinker, which are the critical factors in the occurrence of critical thinking. Antecedents are used to identify underlying assumptions of the concept of interest. The identification of these variables is done by tracking relationships back to data to validate the categories that led to the reconstruction of the concept (Walker & Avant 1995:45). Antecedents cannot be attributes of the concept since they are the determinants of the occurrence of concepts (Strauss & Corbin 1990:106). However, the researcher does not agree with these authors since this is not always the case in all instances. In the process of thinking critically, the strategies involved do not necessarily follow a predetermined sequence as a result of the cyclic nature of the concept critical thinking, but continually revolve between various modes of thinking such that antecedents can also be attributes as well as outcomes or necessary conditions. This is especially true in the human condition and concepts in the cadre of the human condition.

2.4.1.5.6.2 Consequences

Consequences are the events or incidents that occur as a result of the occurrence of the concept (Strauss & Corbin 1990:106; Walker & Avant 1995:45). Both antecedents and consequences help enrich an understanding of the context in which the concept is generally used, thus helping to refine critical attributes (Walker & Avant 1995:45).
2.4.1.5.7 Definition of empirical referents

Empirical referents are classes or categories of actual variables that, by their existence, demonstrate the presence of the concept. Empirical referents are significant in clarifying abstract concepts and their critical attributes. Empirical referents are linked to the theoretical base of the concept and contribute to both content and construct validity. These would also be categories that emerged from literature (Walker & Avant 1985:46). In this study, empirical referents refer to the outcomes of critical thinking, which should be specifically contextualised.

2.4.2 Sampling

The method of sampling has a profound effect on the quality of research. It should be appropriate and adequate for the research question. The quality of research depends on the appropriateness and adequacy of the sample and the quality of data obtained. Trustworthiness should be maintained during sampling as well (Polit & Hungler 1995:231).

Qualitative research does not strive for representativeness or the so-called adequate size of the sample. Qualitative research endeavours to establish trustworthiness by using a non-specified sample size as long as new information keeps coming in and until a state of perceived saturation is reached. The final measure is inherent coherence among the components of the phenomenon being described. At the conclusion of the study, the relationship between the attributes of critical thinking and other relational propositions should be clarified and substantiated by data. Through the analysis process, the researcher strove to actualise the potential of the data to express the original meaning of the construct critical thinking, in this instance, the clarity of unambiguous relationships among defining attributes of the concept critical thinking (Field & Morse 1994:94).

In this study, a literature review was used as the main data collection technique (see chapter 1, section 1.2.4). Chenitz and Swanson (1990:13) cite Glaser and Strauss (1967), who point out that the findings should be linked to data. Thus, the developed theory and definition must have “fit” and “grab”. “Fit” means that the categories that are generated must be indicated by the data and applied readily to
data. “Grab” means that the theory and definition are relevant to the social or practice worlds, and to persons in those worlds (Chenitz & Swanson 1986:13). In this study, categories were developed from data through open coding. The structure in the literature was deconstructed (open coding) and reconstructed (axial coding) to allow simultaneous collection and analysis of data.

2.4.2.1 Literature review

In qualitative research, literature is always approached as data in the form of written documents (Chenitz & Swanson 1986:44). This was also assumed during the present study. The main data collection method was a literature review. Literature was reviewed from various disciplines, as indicated earlier. The initial literature review also helped provide data for the development of substantive categories. Pertinent and available literature was used. Sampling concentrated on studies that defined and described critical thinking in the various disciplines. Literature on critical thinking in South Africa and abroad was consulted. The extent of literature sampling depended on the amount of information and the stage where saturation of categories was obtained. The key words “critical thinking, problem solving, clinical judgement and clinical decision-making” were used to download data from the computer at the University of South Africa (Unisa) library. A list of relevant abstracts and documents was also obtained from the subject specialist at the Unisa library and through purposeful browsing of the library stacks. The researcher selectively sampled sources that seemed more promising and more applicable to the study, as well as authors often referred to as exponents of critical thinking. Titles in which critical thinking and the term concept analysis appeared were especially favoured, that is purposively selected (Chenitz & Swanson 1986:189).

Walker and Avant (1995) recommend the pursuit of different meanings of the concept through thesaurus reviews, dictionary searches and discussions with colleagues, thus, these were also conducted in this study. The thesaurus was consulted to obtain synonyms for the two parent words, “critical” and “thinking”. Dictionary searches were conducted to explain and describe the variables that were particularly sampled from the thesaurus and thus made provision for richer meanings which contributed to the construction of a model and definition of critical thinking. Reading and rereading of data enhanced the sampling of literature (Rodgers & Knafl 2000:90).
2.4.2.2 Sampling technique

The researcher reverted to grounded theory as a data analysis process and technique to assist during concept analysis to allow in-depth analysis and comprehensive description of the concept. As stated earlier, data analysis in grounded theory allows for the unique synthesis of literature into unique reconceptualisation of the concept under investigation. Sampling has a profound effect on the quality of research.

2.4.2.2.1 Selective literature review

A literature review was employed to sample materials relevant to the question of what critical thinking entails. Concepts that reflected the descriptions of critical thinking were abstracted from data and served to develop categories and themes. Only sources relevant to the question were included for the study. A selective literature review was instrumental in enhancing constant comparisons to build categories fundamental to the development of critical thinking construct and definition (Streubert & Carpenter 1999:329).

Selective sampling of literature

Selective sampling refers to the selection of data generated via a selective literature review of those critical pieces of information relevant to the uses of the word “critical thinking”. It avoids the incorporation of material not connected to the current investigation (Streubert & Carpenter 1999:332). Selective sampling of literature was followed by careful scrutiny and comparison of data units abstracted from data collected through a selective literature, thesaurus and dictionary review. In this instance, literature about descriptions of critical thinking was used and compared to emergent categories, themes and conceptualisations (Field & Morse 1994:116; Strauss & Corbin 1990:187). Selective sampling has an inductive aspect. Thus, data are collected to identify the properties of emerging variables once categories have emerged. Data saturation becomes important during selective data sampling, thus theoretical sampling is done to achieve this objective.
2.4.2.2 Theoretical sampling

Theoretical sampling refers to sampling on the basis of concepts that have proven theoretical relevance to the evolving construct (Strauss & Corbin 1990:176). It involves data collection for the generation of theories and definitions whereby the analyst jointly collects, codes and analyses data and decides what data to collect next and where to find such data in order to develop theory as it emerges (Chenitz & Swanson 1986:9). It also has different dimensions thus, it is always selective as far as literature is concerned.

Theoretical sampling may lead the researcher to a data collecting site different from the original so as to validate the emerging construct (Strauss & Corbin 1990:187). This was reflected in the present study through analysis of data collected from colleagues in relation to the five major themes, namely, defining attributes, antecedents, outcomes, object of intention and educational implications for the concept critical thinking. The themes are discussed in chapter 4 on presentation of categories.

Once categories had emerged, it became apparent that the researcher should revert to interviews to enrich categories. Selective coding of theoretical data helped to identify a core category and to systematically relate it to other categories, which ultimately led to the development of a construct of critical thinking and its definition (De Vos 1998:271).

Theoretical sampling enhanced the expansion of categories, as well as giving dimension and limiting them. During sampling, the researcher may pursue a number of emanating categories, some of which may appear to be less general. A full range and variation in category was sought to guide the emerging construct (Silverman 2000:108).

2.4.2.3 Informant selection

Non-probability purposive sampling design was used to select informants for the discussion of major themes (Polit & Hungler 1999:284). Informants were selected for their cognitive view of the concept as opposed to their existential experience with critical thinking, an additional reason for concept analysis.
instead of phenomenology. This aspect also relates to Mouton’s (2001:175) classification of concept analysis as non-empirical research. In addition, they were experienced nurse educators with more than five years in the teaching field and consented to the discussions.

2.4.2.2.4 Data collection technique

As mentioned, a literature review was used as the main data collection method and the guiding question was to explore what critical thinking entails. However, selective and theoretical data collection was also applied, using informants as data sources. The interview schedule with open-ended questions addressed five major areas that emanated from the literature analysis, namely:

- Antecedents of critical thinking
- Attributes of critical thinking
- Object of intention/directedness in critical thinking
- Outcomes of critical thinking
- Educational implications

These are discussed in chapter 3, section 3.4. Personal interviews were conducted with the informants outside the working environment at a time that was convenient to each of them (Polit & Hungler 1999:334). A full discussion of results follows in chapter 3.

2.4.2.2.5 Data saturation

Saturation of categories becomes important during theoretical sampling. Data saturation may be regarded as a myth since new information can be obtained beyond the perceived point of saturation. However, data collection should stop at some point (Chenitz & Swanson 1986:112). The problem in concept analysis is that once the research begins, the researcher may feel compelled to analyse everything and not know where to stop. New information that keeps coming in may excite the researcher. However, Walker and Avant (1995:47) advise guarding against this and bringing the
research to an end. The researcher had to stop data collection when information became redundant and repetitive.

2.4.2.3 Ascertaining themes and categories

Theoretical sampling is important in ascertaining themes and categories (see section 2.4.2.2). The result thereof is presented in chapter 4.

2.4.3 Trustworthiness

Evaluation of samples is an important methodological aspect. In qualitative research, evaluation includes both that of informants and the data units. Samples should be adequate for the type of study. Adequacy refers to the sufficiency and quality of data; that is, assessment of the relevance, completeness, and amount of information (Chenitz & Swanson 1986:10). In general, qualitative research strives for trustworthiness (Miles & Huberman 1994:247). Trustworthiness refers to the establishment of validity and reliability in qualitative research (Streubert & Carpenter 1999:333).

2.4.3.1 Threats to trustworthiness

Rigour is a critical factor in qualitative research. Various factors may threaten the trustworthiness of the research. McKena (1997:63) states that in isolating the defining attributes of the concept of interest, the rule of sufficiency and necessity should be observed. The defining attributes should be sufficient to exclude others in uncovering the meaning of the concept, in this instance, critical and thinking.

2.4.3.2 Measures taken to ascertain trustworthiness

The researcher strove for trustworthiness by incorporating Guba's model (Lincoln & Guba 1981:301-331) into the present research design.
2.4.3.2.1 Confirmability

Confirmability refers to the degree to which findings are a function solely of the study, thus free from bias in both procedures and results (Polit & Hungler 1999:428). Triangulation is important in ensuring confirmability of results. Triangulation refers to the use of multiple perspectives to collect and interpret data about some phenomenon, to converge on an accurate representation of reality (Polit & Hungler 1999:428). Accurate and rich descriptions should be provided to establish confirmability in qualitative research. The rigour in qualitative research analysis and literature provide for enhancement of confirmability.

In this study, methods and procedures were fully described. Reflexive analysis, bracketing and intuiting were applied to help approach data with an open mind. An audit trail was left for independent researchers to follow the procedures used by the researcher. The researcher made careful illustrations of the categories and how they were linked. To a lesser extent, triangulation was applied by using different data sources; for example, different types of literature and informants.

2.4.3.2.2 Dependability

Dependability refers to the stability of data over time and over conditions such that replication is possible (Polit & Hungler 1999:430). The criterion against which dependability is measured is consistency (Lincoln & Guba 1981:316). Dependability is referred to as a traceable variability; that is, that which can be ascribed to identified sources, in this instance, mostly literature.

The code/recode procedure was followed. The researcher had to recode the same data some time later. Data analysis was also discussed with an expert in qualitative research. Data source triangulation was instrumental in the confirmation of themes and categories (Lincoln & Guba 1981:317).
2.4.3.2.3 Credibility

Credibility refers to confidence in the truth of data (Polit & Hungler 1999:362). Credibility establishes how confident the researcher is about the truth of findings, based on the research design and data collection techniques. Chenitz and Swanson (1986:13) state that the emerging construct should have a fit, grab and work (see section 2.4). Triangulation enhances the credibility of findings by increasing the depth and breadth of the findings, thus reinforcing completeness. In this study, multiple sources of data were triangulated, namely, different types of literature and discussions with colleagues, with the objective of obtaining clear and complete descriptions from various perspectives (Lincoln & Guba 1981:323; Streubert & Carpenter 1999:301). A full description of procedures for data analysis is included in the next section (see appendix C, for initial data analysis). However, the following principles were also adhered to:

2.4.3.2.3.1 Prolonged engagement

Data collection and analysis were rigorous as they required persistent focus on the aspects emerging from data to help establish relationships among categories that describe the concept critical thinking. This required reading and rereading collected data text to establish emerging categories and to check their fittingness to the evolving construct. Theoretical sampling helped add density to categories, hence, validated the construct as it emerged (Lincoln & Guba 1981:302; Polit & Hungler 1999:427). The researcher also has seven years' experience in teaching professional nursing students, five of which were spent teaching senior students whereby theory should be correlated with practice, including the incorporation of critical thinking skills.

2.4.3.2.3.2 Referential adequacy

All sources and authors are acknowledged. Data collection pertaining to literature and the procedures used to analyse data are included with complete references (Lincoln & Guba 1981:313) in the different categories (see also appendix C).
2.4.3.2.4 Transferability/applicability

Applicability refers to the degree to which findings can be applied to other contexts, settings or with groups (Polit & Hungler 1999:430). In qualitative research, generalisability is not the aim, thus applicability becomes irrelevant. However, fittingness or transferability is the criterion against which applicability is assessed. The research should provide rich descriptions and present sufficient descriptive data to allow comparison by independent researchers (Lincoln & Guba 1981:81, 316). In this study, non-empirical data supplement is provided to provide sufficient descriptive data for comparisons by independent researchers (see appendices C and D). Complete data chunks are also presented on data presentation and analysis with regard to themes, categories and sub-categories. Table 2.2 summarises the steps taken to establish trustworthiness during this study.

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<tr>
<th>TABLE 2.2</th>
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2.4.4 Data analysis

Qualitative data analysis is a search for general statements about relationships among categories of data towards construct development. Qualitative data analysis is concerned with organisation and interpretation of non-numeric data for the purpose of discovering important dimensions and patterns of relationships (Burns & Grove 2001:591; Polit & Hungler 1999:712; De Vos, Strydom, Fouche & Delport 2002:340).

Data analysis in this regard requires that the researcher revisit the linguistic epistemology underlying the study. Data analysis also required adequate management of data. In qualitative analysis, the flow of reasoning moves from concreteness to increasing abstraction. This involves organisation, reduction and clustering of findings and leads toward the development of theoretical explanations (Burns & Grove 2001: 591). De Vos (1998:336) states that qualitative data analysis requires several reasoning strategies that should be appropriately applied to the issue of interest. These strategies include analysis, synthesis, bracketing and intuiting.

**Analysis** refers to the breaking up of a complex whole into its constituent parts. The objective here is to discover the variables of interest in the concept being studied, to discover relationships or patterns between categories. This also relates to open coding (De Vos et al 2002:340).

**Synthesis** is a process of building up separate elements into a whole. The result of a synthesis is a unique whole indicating the cohesiveness of structures that make up a whole. Synthesis became important during the process of concept reconstruction. Synthesis also relates to axial coding (De Vos 1998:336; Strauss & Corbin 1998:124).

**Bracketing** helps in the identification of all facets of the aspect being studied, prevention of bias and formation of new constructs (De Vos 1998:336). To a great extent, thesaurus reviews and analysis helped achieve this (see chapter 1, section 1.2.6.1).
**Intuiting**, the immediate insight without the application of reason, requires complete concentration and absorption with the issue being studied, thus helps in the process of construct development (De Vos 1998:336). The researcher can truly attest to the importance of such “complete concentration”.

In this study, the researcher had to deconstruct existing constructs and reassemble the components of critical thinking construct as they emerged from data, observing patterns and relationships, using analytic (open coding) and synthesising (axial coding) strategies (Strauss & Corbin 1998:124). Questions were raised in relation to categories that emerged and were regarded as relevant to the explication of the elements of critical thinking. Intuiting required reading and rereading, coupled with complete concentration on the data; that is, the researcher had to be immersed in the data to explicate the explicit and implicit meaning from developing categories.

The analysis of data in qualitative research does not follow a predetermined format. Data analysis occurs simultaneously with data collection. Reading and rereading of data circumstantially led to the emergence of a construct to address the question of what critical thinking entails. The analysis was philosophic in nature and followed a thematic pattern to fit categories into themes. It was important that the researcher allow the characteristics of the concept to emerge from data (Burns & Grove 2001:591; Rodgers and Knafl 2000:94; Strauss & Corbin 1998:105). The researcher therefore guarded against premature closure by continuing data collection for as long as new information kept coming in. However, data collection was stopped at the stage of perceived saturation; that is, where there was repetition of information and confirmation of previously collected data (Chenitz & Swanson 1986:112; Streubert & Carpenter 1999:22).

### 2.4.4.1 Data analysis process

Qualitative data analysis refers to the organisation and interpretation of non-numeric data for the purpose of discovering important underlying dimensions and patterns of relationships (Polit & Hungler 1999:712). Qualitative analysis does not proceed in a linear fashion, but requires several intellectual processes that must be continuously and progressively integrated, including comprehension, analysis and synthesis (De Vos et al 2002:340). As mentioned, concept analysis should adhere to the logical
principle, which requires that concepts be systematically and coherently related to other concepts. Constant comparisons were instrumental in analysing data units and fitting them into categories. The objective was to identify the elements of critical thinking. There is a resemblance between the steps of concept analysis and those of the qualitative approach in general, thus, the researcher reverted to different qualitative research methodologies for guidance in the analysis of data.

2.4.4.1 Conditions that influence data analysis

Certain conditions influence data analysis. These are the research process, researcher training and general educational status and the experience that the researcher has gained both regarding qualitative data analysis and the field of study concerned. These determine researchers’ self-confidence and their tolerance for ambiguity and the feeling of being overwhelmed by data (Chenitz & Swanson 1986:92).

Conditions inherent in the research process include perspectives used by different researchers grounded in experience, theory and personal philosophy, type and amount of data collected and data sources, mode of thinking (that is, from inductive to deductive and returning to inductive), the level of abstraction the researcher wishes to attain and the type of analysis carried out. The researcher had to remember that the linguistic epistemology bears upon the research, hence stay within the limits of concept analysis methodology, which accommodates the qualitative paradigm.

In relation to training, education and experience, the researcher had background training in methods of research. The researcher was also involved in teaching students for seven years. This experience helped the researcher to use the reasoning strategies and apply critical thinking in dealing with the data.

2.4.4.2 Steps in data analysis

Constant comparative data analysis was used in this study. Constant comparative data analysis refers to simultaneous data collection and analysis where each unit of data is compared with every other unit
of data for the purpose of generating categories (Lincoln & Guba 1981:332). Initial coding of data was done to develop substantive codes. Theoretical sensitivity was very important during this process. Open coding, whereby data were broken down line by line and paragraph by paragraph to enhance conceptualisation, was also used. Analytical thinking became important during constant comparisons. This helped identify processes in data and ascribing codes (Chenitz & Swanson 1986:96; Walker & Avant 1995:100).

Memorandums were an important aspect in the preservation of emerging propositional statements or relationships, analytical schemes, hunches and abstractions (Chenitz & Swanson 1986:101). There were moments when it became necessary to preserve the researcher’s serendipitous thought process. Memos in the form of theoretical notes were kept throughout the process of analysis. In concept analysis, the research method requires analytical skills, which is basically the application of critical thinking skills, the object of interest of this study. The following steps were followed:

2.4.4.2.1   Data organisation

Data organisation was planned from the beginning since the methodology required simultaneous data collection and analysis. The approach to the literature and data facilitated constant comparisons as required by the methodology. In this study, the researcher had to read and reread the sampled literature to familiarise herself with data, and place data in emergent themes and categories. The process of reading and rereading was very rigorous and time consuming. This led to the development of organised data texts, which were to be subjected to open coding (Rodgers & Knafl 2000:95). Coded units are contained in the data supplements in chapter 4.

2.4.4.2.2   Concept formation

Concept formation was enhanced through open coding, writing theoretical notes to explain the researcher’s thought process and the use of schematic illustrations. The researcher generated generalised constructs relating to the concept being studied. Each piece of datum was compared with every other piece (Field & Morse 1994:111; Polit & Hungler 1999:583). Initial coding of data was done
and findings compared across the literature. The research process during the analysis of critical thinking was actually an exercise in critical thinking on the part of the researcher (Rodgers & Knaff 2000:95; Strauss & Corbin 1990:75).

### 2.4.4.2.3 Category development and saturation

Category development and saturation are partially discussed in section 2.4.2.2.5. The accumulation of elements from additional data and checking fittingness to identified categories was employed throughout the study. Comparisons were made at this stage of analysis. In this study, strategies used to develop categories included the researcher raising questions about defining characteristics, action/interaction strategies, antecedents, processes, nature, consequences and terms used synonymously with the concept under study (Miles & Huberman 1994:9, Strauss & Corbin 1990:63).

Theoretical sampling was also instrumental in adding density and enriching the categories as they emerged thus, adding density to the evolving construct. In this study, data were put back together after open coding to further the analysis through axial coding. Dispositions, antecedents and consequences were exploited and moved between categories to check their fittingness to established categories (Strauss & Corbin 1990:96). This followed category saturation based on properties inherent in the category. The researcher aimed at defining the attributes indicative of critical thinking as one category and situations that led to critical thinking as another; that is, conditions in which one could be said to be thinking critically (Field & Morse 1994:112).

### 2.4.4.2.4 Linking categories and testing links

Linking categories is a critical factor and a means to develop conceptual order in a mass of data (Chenitz & Swanson 1986:96). Chinn and Kramer (1999:73) refer to this as the stage of structuring and contextualising theory, which involves the formation of systematic linkages among concepts resulting in a formal theoretic structure. Concepts should be defined to suit the purpose of the research and should be defined as they influence the developing construct. The linking of categories occurs during the stage of concept synthesis. Concept synthesis involves careful examination of literature for
the purpose of acquiring new insight into the concept (Walker and Avant 1995:57). Initial specifications are made regarding the conditions under which the relationships hold true. It is important that linking of categories be delayed until categories/themes have fully evolved to prevent premature closure of themes (Chenitz & Swanson 1986:96). The steps in concept analysis are iterative to enhance theoretical saturation of categories and themes as they guide the emerging construct (Walker & Avant 1995:58). According to Walker and Avant (1995:58), procedures for concept synthesis include the following:

- Each category should be compared to every other category, using visual inspection and clustering or aggregating them.
- The comparison of clusters for hierarchical structure and subsequently subsume clusters that appear very similar to one higher order cluster.
- Empirical verification of the emerging construct by returning to the literature.
- Development of a new definition of the concept.
- Fitting the new concept to the existing theory.

These steps of concept synthesis were applied throughout the study.

Making of linkages further resembles axial coding. Strategies for making linkages included

- moving a category from a lower to a higher level of abstraction
- posing questions about relationships
- making hypotheses and testing them

Categories were linked late after emerging categories were believed to have fully evolved. Questions were raised with regard to the relationship between categories. Theoretical sampling and memoing helped to integrate and delimit the emerging construct (Chinn & Kramer 1999:77). A full description of the critical thinking construct follows in chapter 5.
2.4.4.2.5 Using definitions and exploiting categories

Following the development of initial categories, the researcher should continue to search for new emerging categories, or even reduce them (Strauss & Corbin 1990:109). At the same time, the researcher searches for negative cases and outliers, that is, units that were not easy to include in developed categories. The methodology requires the development of different cases of the concept. Different cases that serve to crystallise the concept are explained under discussions of findings during concept reconstruction. The objective here is to add variation and depth of understanding of the evolving construct. Definitions were used to test the evolving construct, checking categories for their fittingness to the construct.

2.4.4.2.6 Data reduction

Data reduction is an important step towards construct development. Categories were compared to check whether they were clustered, connected or linked. Data reduction ultimately led to a theoretical construct, which pointed to the model case “thinking critically”. Where categories did not fit, they were discarded or subsumed to other existing categories. Categories were compared for hierarchical structure and those that appeared similar were subsumed to one higher order cluster (Rodgers & Knalf 2000:95; Walker & Avant 1995:58). Subcategories of each category evolved as the researcher searched for similarities and differences. Questions were raised to validate the emerging relationships to the evolving construct, thus adding density. Variables of identified categories were traced back through data to locate the phenomenon to which each pertains (Field & Morse 1994:112, Strauss & Corbin 1990:109).

2.4.4.3 Concept modification

Concept modification requires that the researcher become responsible for the integration of categories and variables to form a complete whole. The emergent construct is still loosely structured at this stage. The emergent construct forms the pivot around which all other categories revolve. Concept modification forms part of category saturation. Theoretical sampling and data reduction, as discussed
earlier, enhance modification of the developing construct. These procedures were incorporated throughout the present study (Chenitz & Swanson 1986:94; Walker & Avant 1995:100).

2.4.4.3.1 Concept reconstruction

The process requires that the theoretical construct be synthesised and systematically related to categories, validating those relationships and filling in those that need further development through selective coding, a grounded theory technique toward development of a core category (Polit et al 2001:39), which was also applied during this study. Variables that best describe the developing construct are identified to build up its conceptual framework (De Vos 1998:274; Walker & Avant 1995:100). Data were fitted together to develop a conceptual scheme to which all other categories pointed, thus identifying a theoretical construct, which in this instance refers to aspects relating to the model case (Strauss & Corbin 1990:99).

Questioning is an important technique in the identification of a theoretical construct and a definition. Walker and Avant's procedures were iteratively applied to build up a construct. A question was raised as to what featured mostly in all categories. Categories were revised. Data were used to verify the categories. These were validated by checking the properties of such categories and subcategories, and the dimensions of data indicative of them. Theoretical coding enhanced the presentation of data, while descriptive analytic schemes were applied to data to enhance their abstraction (De Vos 1998:274; Polit & Hungler 1999:583; Strauss & Corbin 1990:107; Walker & Avant 1995:58).

2.4.4.3.2 Refinement of a construct

At this stage the construct has rough edges that need refining.Trimming is the technique used to examine categories and their relationships to each other and to the developing theoretical construct. Categories that did not fit were subsumed under a higher level category or if they did not add anything to the evolving construct were discarded (see section 2.4.4.2.6). Comparisons, reduction and subsuming of categories throughout helped collapse categories to higher levels of abstraction, which aided the refinement of a construct. The impertinent categories were omitted altogether (Chinn &
Kramer 1999:138; Silverman 2000:143). Refinement of the construct ultimately led to the development of a conceptual definition that includes all the defining attributes of the concept. A conceptual definition is cited in chapter 4 under concept reconstruction.

2.4.4.3.3 Connecting the concept with existing theory

Connection of the concept with existing theory is regarded as the final stage of concept synthesis, but this is not always possible (Walker & Avant 1995:58). The theory is based on the relationships between categories/subcategories and existing data. The emerging relationships were tested by checking their fittingness to the evolving construct, especially during axial coding. Key variables were developed and tested to see whether the relationships held within and between categories when extreme cases were compared (Strauss & Corbin 1990:112). The theoretical structure was refined during construct reconstruction.

A developing construct, critical thinking was used to link subcategories to a category in a set of relationships. It denotes causal conditions, context, intervening conditions, action-interaction strategies, and consequences of the concept under study (Strauss & Corbin 1990:99). As variables became apparent, they were compared with data to determine under what conditions they occur and whether they were central to the emergent construct.

2.5 KEY ELEMENTS IN CONCEPT ANALYSIS

Key elements of concept analysis are discussed next. These key elements form part of the theory of concept analysis and, as such, are applicable to a discussion of the research design of a concept analysis study.

2.5.1 Concepts
The term “concept” is central to this study due to the methodology of concept analysis. It is therefore necessary to explain the meaning of the term “concept”.

### 2.5.1.1 Definition of concepts

Concepts are the building blocks of a theory. The study focused on the clarification of the concept critical thinking with the intention of developing a critical thinking construct and a conceptual definition of critical thinking. Concepts are symbols for objective elements. The following explanations of concepts were cited by various authors and extracted from Rodgers and Knafl (2000:9) and Walker and Avant (1995:37). These include concepts as

- words that describe objects, properties, events and relations among them
- labels, categories or selected properties of objects to be studied
- dimensions, aspects or attributes of reality which interest the scientist
- the subject matter of a theory
- symbolic representations of things or events of reality that can be quantified

Concepts are symbols of meaning. They are symbolic constructions by means of which people classify or categorise reality (Mouton & Marais 1990:126).

For the purpose of this study, concepts are considered words that describe properties, events, and relations among them or labels, categories and selected properties of objects and lastly the subject matter of the construct, “critical thinking”. Rodgers and Knafl (2000:10) indicate two views on concepts:

- **Cognition**: emphasis is placed on the mind and human thought. A concept is defined as a mental image. It is a word that symbolises ideas and meanings and expresses an abstraction. In this instance critical thinking symbolizes ideas and is an abstract concept (Rodgers & Knafl 2000:10).
- **Language**: a concept is related to a particular world. It is a word to which meaning has been attached through formal definition or common usage. The social aspect of concepts is important as
meanings are shared. Personal interaction is a significant factor in concept development (Rodgers & Knafl 2000:10). By implication, critical thinking construct derives its meaning from the epistemology of different disciplines as understood by different authors.

This study aimed at exploring critical thinking from formal definitions and common language usage that describe the concept, as well as the processes that take place in the mind; that is, cognitive activities of the mind during critical thinking.

2.5.1.2 Philosophical views of concepts

The definitions of concepts presented by nurse authors complement views found in philosophical literature. The two principal philosophical schools of thought in relation to the nature and forms of concepts are the entity and dispositional theories of concepts (Rodgers & Knafl 2000:11).

*Entity theories* emphasise concepts as specified things or entities. In these theories, concepts are described as universal essences, abstract ideas in the mind, or words and their meanings, which match directly with elements of reality (Burns & Grove 2001:132). This description qualifies the use of linguistic epistemology to study critical thinking.

*Dispositional theories* present concepts as habits or capacities of certain behaviours. The behaviours include the ability to use language effectively and the performance of specific mental or physical acts relevant to the concept. In view of dispositional theories, one can only demonstrate language, physical or mental acts of the concept if one is conversant with it. Thus the use of the concept is emphasized. This too, is applicable to the study as far as the dispositions of critical thinking process and the critical thinker are concerned. By implication, the thinker can only think critically and enhance critical thinking if he/she has a grasp of the concept *critical thinking* (Rodgers & Knafl 2000:11).

2.5.1.2.1 Philosophical approaches to the study of concepts
Two approaches were identified in this regard, namely, essentialism and idealism (Rodgers & Knafl 2000:12).

2.5.1.2.1.1 Essentialism

Essentialism is the root of concept analysis as a method of concept development. It is based on the work and writings of Aristotle. The emphasis is on identifying and demonstrating the essence of things; that is, the attributes fundamental to their individual natures, and that set each thing apart from all others. According to Schwartz, Barcott and Kim (cited in Hupcey et al 1996:196), the focus of the analysis should be on the essential elements of the research question.

The Wilsonian methods of concept analysis are based on the works of Aristotle. Aristotle demonstrated that concepts are abstractions comprised of unchanging and essential features of elements in the world. Wilsonian methods of concept analysis follow designated steps in order to move categories from lower to higher levels of abstraction. The process helps uncover the defining characteristics of the concept of interest, that is, its essence.

The present study also employed the principles of essentialism to uncover the essential attributes of critical thinking through constant comparisons and abstraction of the concept to a higher level.

2.5.1.2.1.2 Idealism

Descartes argued the duality of the mind and the body. He regarded these two as separate entities. Descartes advocated the rational method of inquiry whereby knowledge should be distinguished from opinion or belief (Rodgers & Knafl 2000:13). The application of rationality to the study of critical thinking is of paramount importance. This is in line with Wilson, who places emphasis on internal rigour, internal dialogue and reanalysis to explicate attributes of the concepts (Hupcey et al 1996:194).

John Locke, in turn, focused on the inner reality. To him, ideas were derived exclusively from experience; that is, external experience through the use of senses or internal experience through the
internal operations of the mind or reflection. Abstraction becomes important towards generalisation of a single experience or aspect of reality. Abstraction is only possible if the person has insight into the experience (Rodgers & Knafl 2000:14). To develop critical thinking into a higher level of abstraction required insight into its structural characteristics, and the dimensions and relationships among categories. To a certain extent, this relates to metacognition. Also thinking critically about critical thinking.

Immanuel Kant described concepts as ideas that develop in the mind, even prior to any experience. He argued that knowledge results partly from the combination of experience with the pre-existing content and capabilities of the human mind (Rodgers & Knalf 2000:15). In this regard, during the analysis of critical thinking, emphasis was placed on knowledge and the dispositions of the critical thinker as antecedents for critical thinking.

2.5.1.3 Concepts and logic

Realism forms the basis of logic in concept development. Frege (1848-1945) used the realist approach to solve the confusion between concepts and objects. He looked at the denotative expressions that corresponded with concepts to distinguish between proper names and predicates. Proper names are said to represent specific objects. Predicates are concepts that represent the existence of a property, and should be absolutely clear (Rodgers & Knafl 2000:18). This implies that there should be a clear distinction between connotative and denotative meanings of the same concept to facilitate its operationalisation (De Vos et al 2002:31; Mouton 2002:66, 118). Clarity provides potential for the concept to yield indicators from the outcome of its careful analysis (Mouton 2002:186).

Concepts are associated with language to allow accessibility of concepts for inquiry and development of effective concepts. Concepts emanate from the process of conceptualisation – the thought process that goes on in the mind when impressions or perceptions are gathered, their similarities observed and put together to make up a new single thought that express them, giving a new name (concept). Frege advocated that the definition of a concept be expressed as a set of necessary and sufficient conditions; that is, defining attributes necessary to define the concept and which are by themselves
sufficient to distinguish it clearly from all other concepts. There should be valid information about a concept to describe and explain it. Conceptual relativity is an important aspect in interpreting meaning of concepts. Thus, it is subject to rules of logical consistency and adequacy. Logical consistency warrants the objective validity of the thought process and compatibility with constructs of everyday life. Adequacy warrants that the actions implied by the object of intention must be interpreted the same way by the actors involved (De Vos et al 2002:30; McKena 1997:63; Mouton 2002:185). As indicated earlier, this study aimed at defining the construct critical thinking, by explicating its defining characteristics that help in clarifying it.

2.5.1.4 Dispositional theories

Wittgenstein rejected Aristotle’s notions that concepts have rigid and distinct boundaries, that definitions be stated in terms of necessary and sufficient conditions and that there be strict correspondence between concepts and empirical reality. He held that conceptualisations are based on resemblances or commonalities in the use of a word or concept (Hupcey et al 1996:196; Rodgers & Knafl 2000:23).

In this study, the common uses of the concept of interest were explored to enhance the development of a conceptual definition of critical thinking. The aim was not necessarily to set boundaries between critical thinking and other forms of thinking, but to explicate the dimensions and properties of critical thinking. This may seem contradictory. However, seen from the perspectives of different philosophers (not absolute truths), all of this finds place in the analysis of this study.

2.5.1.5 Uses of concepts

Ryle adopted the idea about uses of a concept as the central focus in development of the concepts. He advocated that philosophical analysis should be used to produce standards or guides needed to enable appropriate use of a concept. He agreed that concepts are cognitive in nature, a mental entity and that concepts are expressed through words. In his view, a concept is an abstracted feature of the
world and is directly related to the ability to perform certain tasks, one of which is the effective use of language (Rodgers & Knafl 2000:25).

Ryle contributed to the study of concept development when he stated that the use of a word may be an outward manifestation of an individual’s grasp of the concept. Words help in accessing mental processes and analysing concepts as mental abstractions. Concepts also have a social aspect. They help understand social phenomena, actions and interactions, giving meaning to social reality. Concepts contain variables that help in measurement of the concept (Walker & Avant 1995:24; Rodgers & Knafl 2000:25-26). The purpose of concept analysis is to identify the word label or phenomenon represented by the label such as values, attitudes associated with the concept and the context in which it is used (Chinn & Kramer 1999:54). These became apparent during the present study.

2.5.1.6 Knowledge synthesis and concept development in nursing

Knowledge of concepts and concept development can be achieved in nursing in various ways. Of importance are the strategies, purposes and sources of data. Strategies involve literature review, that is, integrative, meta-analytic and meta-ethnographic. Other strategies include conceptual mapping and concept analysis. The purposes of concept development generally include knowledge synthesis and aggregation. It is important to be explicit with the methods and procedures with regard to sampling, data collection methods aggregation and knowledge synthesis and integration of findings. Sources of data, in general, include literature, empirical data and constructed cases (Rodgers & Knafl 2000:39) (see section 2.4).

2.5.1.7 Problems with concept development

The methodology may be affected by context, that is to say, relevant contexts are required, namely, culture, ethnic background, social groups and different disciplines. Time is an important aspect. Conceptual change or variations are critical. History has an effect on the meaning and use of the concept (Chinn & Kramer 1999:62; Rodgers & Knafl 2000:27; Walker & Avant 1995:40).
In this regard, the present study used relevant literature from the various disciplines, thesaurus reviews, dictionary meanings and opinions from colleagues to describe the meaning of critical thinking within the broader academic context at this specific time.

2.5.1.8 Evolution of concepts

Emphasis is placed on the social aspects of concepts. The context and the socialisation process play a role in concept development. There is a relationship between concepts and advancement of knowledge. Concepts are continually changed and refined as knowledge advances. Concept development plays a role in solving the problems relevant to science and results in growth and development of knowledge of a discipline (Rodgers & Knafl 2000:28; Walker & Avant 1995:38). The purpose in the present study was also geared towards advancing the knowledge of critical thinking as applied to nursing and advance growth of the discipline.

2.5.1.9 Implications for concept development in nursing

There is very little guidance to assist researchers in identifying appropriate designs and procedures for concept development. What is important is to ensure that procedures followed are based on the concept and purpose of the study. As discussed earlier, concept selection must be based on the sound philosophical rationale and appropriateness for purpose of the study (Rodgers & Knafl 2000:31).

The purpose of the present study was to explore the concept of critical thinking, uncover the defining attributes and their dimensions, and develop a conceptual definition thereof. As stated, concept analysis was used as the method of enquiry and supplemented with the qualitative research for guidance in the development of categories and abstraction of the construct (see section 2.4.1.3).

2.5.1.10 Statements
The Oxford Dictionary (1991:1191) defines a statement as an expression in words. Statements or propositions depict relationships between concepts, written in the form of propositions. The development of relational propositions is a step towards the generation of a theory.

Propositions may be relational or non-relational (McKena 1997:77; Walker & Avant 1995:81). Relational statements assert either association or causality, which may be negative or positive between variables (Walker & Avant 1995:25). Non-relational statements are those that assert the existence of a concept, thus provide a way for a theorist to clarify meaning in a theory (Walker & Avant 1995:25). Non-relational propositions include the following, referred to as definitional propositions:

- Theoretical definitions, for example, dictionary definitions.
- Operational definitions, which ensure researchability of the area of interest.
- Empirical indicators, requiring the use of an assessment tool.

Definitional propositions enable the reader to understand the concept without relating it to other concepts. The relevance to the present study is that definitional propositions, that is theoretical, thesaurus and dictionary definitions, were used to clarify the concept of interest, critical thinking, explicating variables that are critical to concept synthesis. Without relational statements and propositions, the researcher could not have arrived at the conceptualisation of the term “critical thinking”. Without these, critical thinking would have remained a mere term or word. Statements from analysed data are discussed in chapter 5 after construct reconstruction, herein referred to as plausible hypothesis.

2.5.2 Creating conceptual meaning and theory

Two processes are involved in (measurable) knowledge development, namely the creation of conceptual meaning and structuring and contextualising of theory.

2.5.2.1 Creation of conceptual meaning
The creation of conceptual meaning is a theory-building approach that depends on mental processes in which the mental constructions or ideas are used to represent experience. A rigorous process is involved in the analysis of information. The process of creating conceptual meaning brings dimensions of meaning to a conscious, communicable awareness and makes it possible to identify the limits of conveying empirical meaning. Conceptual meaning is something that is deliberately created from data (Chinn & Kramer 1999:52). This study required the purposeful, deliberate, conscious and rigorous utilisation of the researcher’s mental processes to identify variables that describe critical thinking. The processes involved in concept synthesis are discussed under concept modification (see section 2.6.3).

2.5.2.2 Methods for creating conceptual meaning

The creation of conceptual meaning produces a tentative definition of the concept and tentative criteria for determining whether the concept exists in a particular situation. The aim of this study was to develop a conceptual definition and explicate dimensions and properties of the concept critical thinking. The basic steps were discussed in section 2.4.4.3 and the definition is cited in chapter 4.

There are various sources of evidence for the development of conceptual meaning, including literature. Of relevance here was the use of professional literature, thesaurus and dictionary meanings (Chinn & Kramer 1999:64).

2.5.2.3 Formulation of criteria for concepts

According to Chinn and Kramer (1999:69), criteria are used to express conceptual meaning. Narratives, diagrams, and symbols can express meaning beyond the limits of empirics alone. Criteria

- are derived from the various sources of conceptual meaning; in this instance, descriptions from literature
- are tentative and directed towards the purpose of conceptual development
- express both quantitative and qualitative aspects of meaning and should suggest the definition of a concept
Criteria formulation for more abstract concepts is a more complex process and criteria are often abstract.

The adequacy of conceptual meaning is judged by the process used to create meaning, that is, trustworthiness of procedures and methods, sampling technique and data analysis and interpretative stages (see section 2.4.3). The essential structure of the concept should be understood from criteria.

Problems may arise during selection of direct and indirect empiric indicators. The challenge therefore lies in the creation of evolving, useful and adequate meaning from a range of possibilities. The challenge was a reality in this research since this study required a lot of rigour and interplay of various mental processes, especially during data analysis and concept reconstruction.

The above processes continually evolved during data analysis stage.

2.5.2.4 Definition of a theory

Depending on the number of variables involved, especially in an umbrella concept such as critical thinking, researchers inevitably find themselves on the way to theory development. A theory is the more highly structured of empiric knowledge forms as compared to conceptual frameworks and models (Chinn & Kramer 1999:49). Theory has a descriptive, explanatory, predictive and control function (Walker & Avant 1995:26).

Chinn and Kramer (1999:49) define a theory as follows:

- A logically connected set of confirmed and tested hypothesis.
- A conceptual system or framework invented for some purpose which requires some form of creativity.
• An imaginative grouping of knowledge, ideas, and experience that are represented symbolically and seek to illuminate a given phenomenon through the creative use of knowledge and aim at enhancing understanding of a given phenomenon.

• Conceptual and pragmatic principles forming a general frame of reference for a field of inquiry. It is a philosophic view that guides the inquiry in a discipline and a pragmatic purpose for the discipline.

Mouton and Marais (1990:143) define a theory as a set of interrelated concepts or constructs, definitions and propositions that present a systematic view of phenomena by specifying relationships between variables with the purpose of explaining and predicting phenomena.

For the purpose of the present study, a theory is defined as a creative and rigorous grouping and structuring of knowledge and ideas to enhance the understanding of critical thinking.

Theory identifies specific causes of the phenomenon of interest. The relationship between theory and the phenomenon it explains is specific. A theory postulates real relationships and must be empirically testable. A theory is concerned with high levels of abstraction. Constructs are used to build up a theory and should be explicated and eventually operationalised (Mouton & Marais 1990:143).

According to Chinn and Kramer (1999:51), a theory is characterised by the following attributes:

• Rigorous and creative structuring of ideas, in this instance categories of critical thinking as abstracted from data.

• Systematic demonstration of relationships between concepts.

• Purposefulness.

• Tentativeness. Concepts change over time, thus the meaning of the concept of interest is not absolute but subject to the knowledge development and advances in the sciences that have a pragmatic purpose for the discipline.
The cyclic nature of critical thinking and the hypothetical relationships between variables are discussed in chapter 5. The creative process required for construct reconstruction and development is also rigorous, systematic and disciplined.

2.6 CONCEPTS AND THE USES FOR DEFINITIONS

Definitions are built from concepts. As a result, concepts should be well defined to avoid problems, including ambiguity, vagueness, unfamiliarity and emotiveness. A discussion of each of these problems follows.

2.6.1 Ambiguity

Concepts should reflect the accurate theoretical base from which they originate. It is important to clarify the defining characteristics of a concept to enhance its definition. Emphasis is placed on the establishment of construct validity. The different possibilities of the meaning of the concept should be separated from specific meaning of the word, that is, its defining attributes (Bandman & Bandman 1988:15; Rossouw 2001:7; Walker & Avant 1995:38). In addition, it is important to distinguish defining characteristics from critical attributes and also irrelevant attributes (Walker & Avant 1995:37). The different potential meanings of the concept and its measurement that will enhance its clarification should be explored (Kemp 1985:384). The general attributes of critical thinking are discussed in chapter 4, section 4.3.2.5 and will be incorporated into the definition of critical thinking.

2.6.2 Vagueness

A concept is vague if its meaning is known but there is no clear boundary of its perimeters. There is no precision on what it includes or excludes. To avoid vagueness, definitions are used to clearly outline boundaries of meaning (Bandman & Bandman 1988:14; Rossouw 2001:8). Generally, the function of critical thinking is to distinguish vague from ambiguous terms, which aims at developing a clear definition to explain concepts of interest (Bandman & Bandman 1988:15). The critical attributes of critical thinking are discussed in chapter 4, section 4.3.2.6.
2.6.3 Unfamiliarity

New concepts that are encountered should be well defined to prevent the problem of unfamiliarity. In addition, it is crucial to be specific about definitions. Thus, definitions should be discipline related or contextual to enhance understanding of discipline-specific knowledge. The use of dictionary meanings only may not be beneficial (Rossouw 2001:8). The concept *critical thinking* is also contextual, hence its definition will be derived from the specific disciplines from which data were obtained, mainly nursing education and clinical practice, supplemented by related disciplines as discussed in this chapter.

2.6.4 Emotiveness

Emotiveness pertains to those words that elicit feelings. These are not acceptable in the academic fields. The reason is that rationality is an important requirement for appealing to the sobriety of mental judgement to evaluate an argument. Sound reasons are important to support or oppose the argument (Rossouw 2001:12).

2.7 DEFINITION: CONCEPTUAL PERIMETERS

A definition composes the critical attributes or unique characteristics of the concept being defined. The defining attributes exclude all others and include all that must be there to distinguish the concept from other concepts. A good definition states the essential attributes so that the defining characteristics are equivalent to the term being described. In general, a definition should

- indicate key characteristics or defining characteristics, not be circular
- not be too broad or too narrow
- be straightforward with no figurative language
- not be formulated negatively (Bandman & Bandman 1988:21; Rossouw 2001:9)
2.8 ETHICAL ASPECTS

The ethical aspects pertinent to this study are bracketing, non-plagiarism, scientific honesty and publication (see section 2.4.3).

2.9 SUMMARY

This chapter discussed the research approach. The discussion centred on the concept analysis method. Walker and Avant's methodology steps, the uses, advantages and disadvantages of concept analysis were discussed. Qualitative research and its dimensions, including its relevance to the study, were explained.

The research design was non-experimental and the data collection techniques, procedures for data analysis and to ensure trustworthiness were explained. The term “concept” and its implication for theory development were discussed fully.

Chapter 3 deals with identifying the use of the concept and the data collection, including the literature review.