

## CHAPTER 4

### Data analysis and presentation

#### 4.1 INTRODUCTION

This chapter presents themes and categories that emerged from the data, including the defining attributes, antecedents and consequences of the concept, and the different cases that illuminate the concept *critical thinking*. The data are presented from the most general (themes) to the most specific (data units/chunks). All data units are described in relation to the *critical thinking* construct. Alternative concise definitions of *critical thinking* are also given.

The following aspects should be taken into consideration when reading this chapter:

- In some situations the same data units were included in more than one category. The reason was that a statement might present two or more subjects.
- Data units are identified by numbers that can be used to locate data in the data supplement (see appendix D). For example the number 28 in the left hand column of a data display indicates data unit 28 in the data supplement (see appendix D). This leaves an audit trail that is essential for a data audit. The researcher took special caution in cutting and transferring data units from the literature context to the specific categories to which they belong. However, it was not always possible to include a pertinent indicator for the chosen category in the data unit. The researcher, however, took special precaution with the transference of lists of data units to the applicable categories. Nonetheless, data supplement is available should the reader wish to check on the relevance of any of the data units (see appendix D).
- A summary of the main themes and categories is presented in table 4.1.
- Discussions following data displays augment the developing construct of *critical thinking* as abstracted from data.

- This section should also be read in conjunction with the researcher's attempt at bracketing discussed in chapter 3. Thesaurus synonyms listed in chapter 3 should further illuminate the concept under analysis: *critical thinking*.

## 4.2 DATA STRUCTURING

Table 4.1 outlines the structure of data as it emerged during data analysis. Themes, categories and sub-categories are contained in this table.

Data are described at four levels of abstraction. The highest level (5) is the most general or abstract and the lowest level (1), the most specific or concrete data units.

**Level 5:** 2 themes

**Level 4:** 9 major categories

**Level 3:** 28 subcategories

**Level 2:** 38 sub-subcategories (contained in data displays)

**Level 1:** 174 data units (contained in data displays)

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**TABLE 4.1 STRUCTURE OF THE DATA**


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<b>DATA DISPLAY</b>	<b>THEMES AND CATEGORIES</b>
4.1	<b>THE ANTECEDENTS OF CRITICAL THINKING (OVERVIEW)</b>
4.1.1	<b>Disposition of the critical thinker</b>
4.1.1.1	Inquisitiveness
4.1.1.2	Knowing
4.1.1.3	Open-mindedness
4.1.1.4	Objectivity
4.1.1.5	Scepticism
4.1.1.6	Autonomy
4.1.1.7	Logic
4.1.1.8	Intuition
4.1.1.9	Habitual
4.1.1.10	Caring
4.1.2	<b>Conditions relating to the quality of information</b>
4.1.2.1	General indicators
4.1.2.2	Objectivity
4.1.2.3	Rationality
4.1.2.4	Contextual
4.1.3	<b>Situatedness in critical thinking</b>
4.2	<b>ATTRIBUTES OF CRITICAL THINKING</b>
4.2.1	<b>Domains</b>
4.2.2	<b>Reflective thinking as part of critical thinking</b>
4.2.2.1	Reflection
4.2.2.2	Strategies in reflection
4.2.2.3	Processes in reflective thinking
4.2.3	<b>Self-regulating thinking</b>
4.2.4	<b>Critical thinking versus problem-solving</b>
4.2.5	<b>Overview of critical thinking processes</b>
4.2.5.1	Object of intention in critical thinking
4.2.5.2	Aims of critical thinking
4.2.5.3	Becoming aware
4.2.5.4	Data collection
4.2.5.5	Focusing
4.2.5.6	Making judgments
4.2.5.7	Decision-making
4.2.5.8	Implementation
4.2.5.9	Cyclic nature of the process
4.2.5.10	Outcomes
4.2.5.11	Strategies in critical thinking
4.2.6	<b>The critical attribute of critical thinking: rationality</b>

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## 4.3 PRESENTATION OF THEMES AND CATEGORIES

### 4.3.1 Theme 1: Antecedents

Theme 1 is comprised of the general antecedents of critical thinking. These antecedents are events or incidents that occur prior to the occurrence of “critical thinking”. Antecedents are often referred to as causal conditions (Walker & Avant 1995:45). However, the relationship of these antecedents is not always that directly related to the process of critical thinking. Antecedents include categories such as *dispositions, conditions, requirements* and *prerequisites*, which were collapsed into two major categories: *the dispositions of the critical thinker* and *the conditions relating to the quality of information*. Data display 4.1 summarises these main antecedents of critical thinking.

DATA DISPLAY 4.1 THE ANTECEDENTS OF CRITICAL THINKING (OVERVIEW)
Category 1.1: Disposition of the critical thinker
Category 1.2: Conditions relating to the quality of information

#### 4.3.1.1 Dispositions of the critical thinker

It is by a specific nature of the thinker that he/she thinks critically. Data display 4.1.1 contains these dispositions.

DATA DISPLAY 4.1.1 THE ANTECEDENTS OF CRITICAL THINKING DISPOSITION OF THE CRITICAL THINKER
Category 1.1.1: Inquisitiveness
Category 1.1.2: Knowing
Category 1.1.3: Open-mindedness
Category 1.1.4: Objectivity
Category 1.1.5: Scepticism
Category 1.1.6: Autonomy
Category 1.1.7: Logic
Category 1.1.8: Intuition
Category 1.1.9: Habit
Category 1.1.10: Caring

These dispositions are further explicated in data displays 4.1.1.1 to 4.1.1.10.

#### 4.3.1.1.1 *Inquisitiveness*

To think critically, the thinker must be inquisitive as shown in data display 4.1.1.1.

<b>DATA DISPLAY 4.1.1.1</b>	
<b>THE ANTECEDENTS OF CRITICAL THINKING</b>	
<b>DISPOSITION OF THE CRITICAL THINKER</b>	
<b>INQUISITIVENESS</b>	
1	An inquiring mind acknowledges a person's ignorance and starts to engage in a dialogue with his/her experiences (Baker 1996:21; Bittner & Tobin 1998:268; Paul & Heaslip 1995:41; Sedlak 1997:12).
26	A sense of inquiring mind is basic to critical thinking (Bittner & Tobin 1998:262, Kurfiss 1988:2).
110	A critical thinker is disposed to inquisitiveness (Alfaro-Lefevre 1995:74; Dobryzkowski 1994:273).
112	Begins when a person starts asking questions (Colucciello 1997:239; Facione 1990:25).
118	Ability to ask appropriate clarifying questions (Baron & Sternberg 1987:17).
120	Inquisitiveness or curiosity is a characteristic of critical thinking (Smith-Blair & Neighbors 2000:253).
107	Emanates from eagerness to acquire knowledge (Mathews & Gaul 1979:19).
173	Critical thinking starts with an inquisitive mind (Facione & Facione 1996:131).
133	Truth-seeking is the motive behind inquisitiveness (Smith-Blair & Neighbors 2000:253).
99	Intellectual curiosity as an attribute of critical thinking involves wanting to know more and more about an object of intention (Colucciello 1997:239).
105	Questioning is a necessary ability for critical thinking (Sedlak 1997:14).

A critical thinker is one who is unduly curious and wants to know more and more about a situation, object, concepts, and the like. The critical thinker believes in tentativeness of knowledge and does not accept absolutes. On exploration of knowledge, the thinker asks appropriate clarifying questions to discover new aspects relating to that towards which thinking is directed. (Smith-Blair & Neighbors 2000:253). In this regard also see section 4.3.2.5.11 on strategies in critical thinking.

#### 4.3.1.1.2 *Knowing*

Knowing also emerged as an important disposition of the critical thinker. The important aspects of knowing are contained in data display 4.1.1.2.

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**DATA DISPLAY 4.1.1.2**  
**THE ANTECEDENTS OF CRITICAL THINKING**  
**DISPOSITION OF THE CRITICAL THINKER**  
**KNOWING**

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- 25 ... requiring multiple patterns of knowing (Bittner & Tobin 1998:269).
- 29 ... the skill to apply knowledge in an inquiry (Bittner & Tobin 1997:262; Kurfiss 1988:2).
- 111 ... to be informed on a wide range of issues (Alfaro- LeFevre 1995:74; Dobrzykowski 1994:273).
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Nursing science and practice are characterised by four fundamental patterns of knowing, namely empirical, ethical, personal and aesthetic knowing (McKena 1999:3). These give a complete perspective on nursing knowledge base.

*Empirical knowing* requires accurate observations through the use of all the senses, which demands alertness for cues that can be verified by facts. It is also descriptive and aims at developing abstract and theoretical explanations. *Empirical* refers to that which relates to the experiences regarding an object, such as that at which a person's critical thinking is directed. Curiosity, open-mindedness, sensitivity, eagerness, relevancy and diligence in making observations are vital to the attainment of empirical knowledge. Empirical knowledge requires logic and objectivity (Carr 1999:26; Streubert & Carpenter 1999:4).

The ethical aspect of knowing and critical thinking is associated with responsibility in selecting and prioritising activities based on rational assessment and best judgement, in itself critical thinking. Ethics is about truthfulness, about being unbiased, caring and open-minded. The logic and integrity of the critical thinker come into play at this point. Here, the emphasis is on the thinker who understands what is right and just and cares about how decisions are made (Carr 1999:26; Streubert & Carpenter 1999:5).

*Personal knowing* is concerned with knowledge of self through self-appraisal and knowing others. Personal knowing is about words that relate to the situatedness (contextuality) of the critical thinker. The thinker's own world and experiences are acknowledged. These predispose a person to *open-*

*mindfulness* and *objectivity* towards different world-views. The emphasis is on the *existence* of the critical thinker: that the critical thinker has the capacity for change and becoming. The authentic self is emphasised. Self-appraisal in an honest and unbiased manner in relation to world-views forms an important disposition to critical thinking.

*Aesthetic knowing* requires a person to go beyond what is seen, delving deeper to obtain richer meanings that can be shared with others. It leads to transformational actions. Appreciation is shown for the subjective abstract nature of knowledge obtained through exploration of phenomena. This pattern of knowing is critical as far as the existential element of critical thinking is concerned (Streubert & Carpenter 1999:5). As critical thinking is a creative process that requires the use of imagination to produce explicit meanings from experiences or phenomena, aesthetic knowing allows for movement to a higher level of knowing, avoiding absolutisms. The whole process of critical thinking can, in a way, be defined as aesthetic and artistic.

#### 4.3.1.1.3 *Open-mindedness*

Open-mindedness, which represents higher order thinking, allows access to complex levels of comprehension (Daniel 2001:54). This is indicated in data display 4.1.1.3.

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<b>DATA DISPLAY 4.1.1.3</b>	
<b>THE ANTECEDENTS OF CRITICAL THINKING</b>	
<b>DISPOSITION OF THE CRITICAL THINKER</b>	
<b>OPEN-MINDEDNESS</b>	
50	An ideal critical thinker is one who is habitually inquisitive, well informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing biases, prudent in making judgements willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in selection criteria, focused inquiry (Colucciello 1997:239).
53	Habits of mind attributed to critical thinking are confidence, contextual perspective, creativity, flexibility, inquisitiveness, intellectual integrity, intuition, open-mindedness, perseverance and reflection (Scheffer & Rubenfeld 2000:357).
127	Critical thinkers engage in a dialogue with their preconceived ideas (Siegel 1989:10).
130	Open-mindedness calls for sensitivity to alternative views (Smith-Blair & Neighbors 2000:253).
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- 134 Truth-seeking goes together with open-mindedness which allows one to have tolerance for divergent views and to be sensitive to the possibility of individual bias (Hasten 1999:40).
  - 135 Defines open-mindedness as the ability to listen and truly hear the possibility of an idea without any immediate judgement (Hasten & Washburn 1999:40).
  - 142 Flexibility of the mind and open-mindedness are the first steps towards critical thinking (Daley et al 1999:42; Jerkins 1999:11).
  - 146 Critical thinking is about being open-minded and fair-minded (Alfaro-LeFevre 1995:90).
  - 172 Critical thinking occurs when there is flexibility and open-mindedness (Facione & Facione 1996:13).
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*Open mindedness* is encompassed by the four patterns of knowing discussed in section 4.3.1.1.2, specifically personal knowing. The critical thinker in the case of open-mindedness exhibits tolerance for divergent views and ambiguity. The thinker transforms knowledge to provide new perspectives (Hamilton 1996:123). Open-mindedness is in line with postmodernism, a philosophical paradigm that takes the stance that objective knowledge is independent of time, place and the knower. It denies the position that only “true” knowledge is objective and universal. This is regarded as a limitation both in knowing and in what is known (Phillips 2000:365). Postmodernism is a rejection of modernism, basic assumptions, beliefs and values that are entrenched in social phenomena. It is an evolving understanding of the contemporary world that includes art, literature and cultural criticism (and science) (De Vos et al 2002:7).

#### 4.3.1.1.4 Objectivity

Objectivity is a principle that acknowledges the possibility of divergent world-views when dealing with answers to the perplexities one is faced with in daily living. Objectivity as a disposition of the critical thinker is illuminated by the contents of data display 4.1.1.4.

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**DATA DISPLAY 4.1.1.4**  
**THE ANTECEDENTS OF CRITICAL THINKING**  
**DISPOSITION OF THE CRITICAL THINKER**  
**OBJECTIVITY**

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- 51 Persistent in seeking results which are as precise as the subject and the circumstances of the inquiry permit (Colucciello 1997:239; May et al 1997:101).
  - 72.1 Reflection calls for a person to acknowledge intellectual ignorance (Bittner & Tobin 1998:268; Paul & Heaslip 1995:41).
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73	Committed to clear, precise, accurate action based on genuine knowledge (Paul & Heaslip 1995:41).
119	Linked to truth seeking where best knowledge is sought in an honest, unbiased fashion (Smith-Blair & Neighbors 2000:253).
124	The strong sense of critical thinking focuses on world-views (Smith-Blair & Neighbors 2000:253).
126	Committed to depersonalisation of a person's world-view (Leppa 1997:30).

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*Objectivity* is aligned with truth seeking and open-mindedness. One's imbedded preconceptions are put aside to establish facts for or against a case. The critical thinker has a built-in self-correcting system and is open to possibilities of meanings and understanding in relation to other's world-views. The thinker, in thinking critically, strives to obtain knowledge based on accurate, objective, unbiased assessment (Wilson 1989:9).

#### 4.3.1.1.5 *Scepticism*

Data supporting *scepticism* as a disposition of the thinker are exhibited in data display 4.1.1.5.

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<b>DATA DISPLAY 4.1.1.5</b>	
<b>THE ANTECEDENTS OF CRITICAL THINKING</b>	
<b>DISPOSITION OF THE CRITICAL THINKER</b>	
<b>SCEPTICISM</b>	
74	Requires the cultivation of reflective scepticism (Ford & Profetto-McGrath 1994:343; Kramer 1993:406; Thomson 1997:64).

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*Scepticism* requires people to avoid accepting things at face value but to go beyond the surface, examining issues and checking arguments for and against a case. Scepticism relates to open-mindedness and acknowledges that there is no *single* correct answer to the perplexities of life and also, people must be sensitive to their biases. The critical thinker should be tolerant of others' world-views. Scepticism also aligns with postmodernism that discourages absolutism. Again, knowledge is approached tentatively and contingently as one possible understanding among many other possibilities (Phillips 2000:367). Reflection is also implied by scepticism. Reflective scepticism is similar to doing a post-mortem to the premises that led to an action or decision. The aim is to reveal hidden meanings. It requires objectivity and open-mindedness. Reflective scepticism requires dialogue and a dialectical approach to reach for consensus - at least tentatively (Duscher 1999:20). This, again,

is linked to the existential essence of critical thinking, the potential for change and becoming. The latter is also discussed in section 4.3.2.5.9.

#### 4.3.1.1.6 *Autonomy*

*Autonomy* emerged as a disposition of the critical thinker as shown in data display 4.1.1.6.

DATA DISPLAY 4.1.1.6 THE ANTECEDENTS OF CRITICAL THINKING DISPOSITION OF THE CRITICAL THINKER AUTONOMY	
89	Autonomous thinking is a necessary condition for critical thinking (McPeck 1990:52).
143	Autonomy as a general ability to think critically (McPeck 1990:22).
<b>Autonomy</b>	
85	Autonomous thinking demonstrated by independent thinking (McPeck 1990:52).

*Autonomy* refers to the freedom that a person has over personal goals (Pedley & Arber 1997:408). Within critical thinkers' perspective, autonomy allows them to set personal goals, select and generate resources and to consider learning in terms of personal aims and feelings. It is a powerful motivator for learning and hence for critical thinking. Autonomy is also regarded as the ability to make independent decisions based on careful judgement (Pedley & Arber 1997:408). As discussed earlier, critical thinking is definitively characterised by these aspects. A notion of *independence* is at the core of autonomy. The critical thinker should strive for such independence and autonomy even if the context may be limiting. Autonomy is about self-determination and self-direction derived from knowledge and knowing (Wilkinson 1997:703).

#### 4.3.1.1.7 *Logical*

Being logical is a further disposition associated with the critical thinker. This is illustrated in data display 4.1.1.7.

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**DATA DISPLAY 4.1.1.7**  
**THE ANTECEDENTS OF CRITICAL THINKING**  
**DISPOSITION OF THE CRITICAL THINKER**  
**LOGIC**

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96	Critical thinking requires sound thinking (Paul & Heaslip 1995:40).
104	Uses internal logic to employ knowledge of inferences and abstracts to deal with intended objects (Alfaro-LeFevre1995:74; Dobrzykowski 1994:273).

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Soundness of thinking is about being connected and coherent as a person deliberates on issues of concern. Logic is indicated by the application of reason, being cohesive and internally consistent in a person's thinking. Logic and logical thinking attributes are also discussed in section 3.2.1.10 and include such aspects as *discernment, caution, reasonableness, judging strength of arguments, identifying structure and order, meta-cognition* and *sense making* (Hamilton 1996:122).

#### 4.3.1.1.8 *Intuition*

*Intuition* is both a condition and a requirement for critical thinking as indicated in data display 4.1.1.8.

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**DATA DISPLAY 4.1.1.8**  
**THE ANTECEDENTS OF CRITICAL THINKING**  
**DISPOSITION OF THE CRITICAL THINKER**  
**INTUITION**

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139	Intuition is an important attribute of critical thinking (Paul & Heaslip 1995:44).
141	Critical thinking requires intuition (Paul & Heaslip1995:44).

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*Intuition* is defined as "immediate insight or apprehension without the application of reason" (*The Concise Oxford Thesaurus* 1991:663). It is the intellectual technique of arriving at plausible, but tentative, formulations without consciously passing through all the steps of analysis and decision-making by which such formulations are usually validated or invalidated (Reilly & Oerman 1992:214). Intuition is associated with experience and is a human condition that allows the individual to resolve problems without necessarily explaining the processes linked to this. It also refers to "having a hunch" about something that results in appropriate actions (Paul & Heaslip 1995:45).

Intuition also relates to *insight* that the critical thinker uses to handle a *crisis* situation. *Insight* is defined as the "capacity to understand hidden truth, especially of character or situations" (*The Concise Oxford*

*Thesaurus* 1991:612). It also pertains to relating seemingly unrelated factors to one another. A further discussion on insight as a mental process and a strategy used in critical thinking follows in section 4.3.2.5.11.

Although the critical thinker should use intuitive knowing and knowledge according to the demands of the situation, intuitive knowledge should not be used as the only means to resolve problems.

#### 4.3.1.1.9 *Habitual*

Critical thinking is habitual to the critical thinker. The true critical thinker is *compelled* and *obsessed* to think critically (see data display 4.1.1.9).

DATA DISPLAY 4.1.1.9 THE ANTECEDENTS OF CRITICAL THINKING DISPOSITION OF THE CRITICAL THINKER HABIT	
158	The disposition to critical thinking is the consistent internal motivation to use the critical thinking skills of reflection, exploration, and analysis (Facione 2000:65).
160	Critical thinking is composed of two components, namely, the reason assessment and the critical spirit component (Siegel 1991:23).
161	The critical spirit/attitude component is described as a habit of thinking critically, disposition, compulsion or obsession to want to think critically (Siegel 1991:23.)
162	Critical thinking involves habits of mind, dispositions, skills and character traits. It involves a disposition to utilise appropriate criteria in the evaluation of statements and actions (Siegel 1991:23).
170	A disposition to critical thinking includes truth-seeking, open-mindedness, analyticity, systematisation, self-confidence, inquisitiveness and maturity (Facione & Facione 1996:131).
53	Habits of mind attributed to critical thinking include confidence, contextual creativity, flexibility, inquisitiveness, intellectual integrity, intuition, open-mindedness, perseverance and reflection (Scheffer & Rubenfeld 2000:357).
123	Critical thinking calls for critical spirit (Leppa 1997:30).

Critical thinking emanates from an individual's inner being and forms part of the temperament that builds character. A critical thinker is a person who values the application of intellectual processes in daily living (Scheffer & Rubenfeld 2000:357). Thinking critically could, and should, become the mode

of thinking of all individuals, especially in the work environment. According to Di Vito-Thomas (2000:176), people should be obsessed with and addicted to thinking critically.

#### 4.3.1.1.10 *Caring*

Caring involves being mindful about how people think, the reasons that go with their thinking and the manner in which they make judgements and take decisions. Data display 4.1.1.10 indicates the caring attribute of critical thinking.

DATA DISPLAY 4.1.1.10 THE ANTECEDENTS OF CRITICAL THINKING DISPOSITION OF THE CRITICAL THINKER CARING	
163	Critical thinking is comprised of the dimension of care (Bailin 1995:192).
164	Caring is a necessary condition for critical thinking (Norris 1995:206).

Based on the dispositions of the critical thinker and the conditions under which critical thinking occurs, the thinker exercises care in making judgements. The critical thinker ensures that all actions are supported by rational evidence (Alfaro-Lefevre 1995:9). According to Nyberg (cited in Van der Wal 1992:61) caring contains, among other aspects, a *moral, emotional, and cognitive* attribute as does critical thinking. Furthermore, in Nyberg's view, the five defining attributes of caring can be applied to critical thinking, namely *commitment, sense of self-worth, ability to prioritise, openness and the ability to bring out potential* in self and others.

In conclusion, critical thinkers do not accept things at face value. An encounter with the object of intention triggers the curiosity and inquisitiveness in critical thinkers (Colucciello 1997:239). However, it is not possible to evoke the process of critical thinking without baseline knowledge. People should consider different world-views and have baseline knowledge of the issue of concern, whether experiential or domain-specific. Knowledge is instrumental in guiding people's thinking patterns and in raising questions of concern (Botes 2000:28; Smith-Blair & Neighbors 2000:253). Without knowledge, thinkers cannot think *critically*. Obtaining knowledge demands responsible action from thinkers relating to the four patterns of knowing.

Critical thinking does not occur automatically. People must be willing to think critically – to habituate critical thinking. People also need to show tolerance towards opposing world-views and should be open-minded and flexible. In this, there are no absolutes. Everything depends on personal choices being made – even during critical thinking. This is the essence of human existence and renders an existential flair to critical thinking. Fawcett (1989:410) points out that in existentialism, individuals in their existence are free and responsible agents who determine their own development. Individuals are faced with possibilities. The choices people make determine their direction and the meaning in their life. From an existentialist perspective, people are *responsible* for making the most of their existence by making responsible choices (Fawcett 1989:410; George 1990:280). In this, critical thinking is highly instrumental.

Accurate	Diligent	Orderly
Acknowledge ignorance	Eagerness	Perseverance
Application	Fair-minded	Precise
Autonomous	Flexible	Prudent
Caring	Genuine knowledge	Questioning
Clear	Honest	Reasonable
Committed	Informed	Reflection
Compulsion	Inquiring	Reflective
Confident	Integrity	Sceptic
Contextual	Intellectual	Sensitivity
Creative	Intuition	Soundness
Critical spirit	Listening	Tolerance
Curiosity	Multiple perspective	Truth seeking
Depersonalised	Obsession	Unbiased
Dialogical	Open-minded	

#### 4.3.1.2 *Conditions relating to the quality of information*

Despite the disposition of the critical thinker as discussed above, thinking will not attain a critical dimension if the information involved in the process of critical thinking is not of high quality, that is, specifically related to the situation at hand, with the necessary attention given to all relevant issues and perspectives. Data display 4.1.2 represents an overview of the sub-categories in this category on conditions relating to the quality of information as an antecedent to critical thinking.

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**DATA DISPLAY 4.1.2**  
**THE ANTECEDENTS OF CRITICAL THINKING**  
**CONDITIONS RELATING TO THE QUALITY OF INFORMATION**  
**(OVERVIEW)**

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Category 1.2.1: General indicators (knowledge)  
 Category 1.2.2: Objectivity and knowledge  
 Category 1.2.3: Rationality  
 Category 1.2.4: Contextuality

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The quality of information relates to the knowledge about a specific object/situation of intention towards which critical thinking is directed to ensure contextual utilisation of information. Conditions relating to the quality of information include knowledge, objectivity, rationality and contextuality. These are discussed in data displays 1.2.1 to 1.2.4 and associated paragraphs.

#### *4.3.1.2.1 General indicators*

General indicators are data units that mention aspects relating to the category, however, do not define the attributes of the subject in the category in any detail. It merely indicated the necessity to compile a certain category. Data display 4.1.2.1 contains such general indicator of knowledge as a synonym to information and as indicative of a more specific type of information.

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**DATA DISPLAY 4.1.2.1**  
**THE ANTECEDENTS OF CRITICAL THINKING**  
**CONDITIONS RELATING TO THE QUALITY OF INFORMATION**  
**GENERAL INDICATORS**

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7	All actions should be supported with evidence (Alfaro-LeFevre 1995:9).
28	Critical thinking requires a strong knowledge base (Bittner & Tobin 1998:262; Kurfiss 1988:2).
153	Domain-specific knowledge is required for successful critical thinking (Botes 2000:28).
156	Knowledge is a prerequisite for critical thinking (Botes 2000:28).

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Ausubel's assimilation theory of learning states that meaningful learning occurs when a person incorporates new information into an existing cognitive structure, that is, a person's existing knowledge on a particular subject matter should be considered if critical thinking is to be cultivated through the learning process (Mellish; Brink & Paton 1998:27).

Ausubel's theory of meaningful learning is especially applicable at this point. She distinguishes two dimensions of learning, namely from rote to meaningful learning and from reception to discovery learning. Learning independent and isolated facts (rote learning) will not lead to the integrated insightfulness evident of critical thinking. Still on cognitive learning theory and critical thinking, Bruner's discovery learning may be relevant as it leads to meaningful learning in the sense that information and knowledge is acquired "from the field" and is as such contextual. Bruner sees learning as involving three processes, namely:

- Acquisition of new information to build upon what is already known.
- Transformation of information through analysis and transfer to new situations.
- Evaluation of processes involved in processing information to see if they are correct – thus reflection (Quinn 1995:73).

As such, discovery learning may be adopted as a technique to be implemented during critical thinking. Discovery learning furthers open-mindedness that in turn allows for divergent, logical and reasonable thinking. Insight and intuition are accompanists in this regard (see also section 4.3.1.1.8). Discovery learning demands active involvement on the part of the learner/thinker to discover the structure of the phenomena involved (Quinn 1995:73). This couples with the dispositions of the critical thinker namely eagerness, curiosity, perseverance depersonalisation (considering different world-views) and diligence, all in the quest for truthful high quality information and knowledge which is *objective, rational* and *contextual*.

#### 4.3.1.2.2 Objectivity

Objective knowledge is necessary in critical thinking. Data display 4.1.2.2 indicates objectivity as a requirement for thinking critically and the way in which knowledge and information are handled.



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**DATA DISPLAY 4.1.2.2**  
**THE ANTECEDENTS OF CRITICAL THINKING**  
**CONDITIONS RELATING TO THE QUALITY OF INFORMATION**  
**OBJECTIVITY**

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40	Concentrates on factual information (Hamilton 1997:120; Malek 1986:20; Pardue 1987:355; Paul & Heaslip 1995:43; Videbeck 1997:6).
73	Commitment to clear, precise, accurate action based on genuine knowledge (Bittner & Tobin 1998:268; Paul & Heaslip 1995:41).
124	The strong sense of critical thinking focuses on world-views (Smith-Blair & Neighbors 2000:253).
94	Good reasons must be provided to support evidence (McPeck 1990:52).

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*Objectivity* is a critical aspect in critical thinking. Objectivity in knowledge generation considers different world-views and points of view. It requires explanations of reasons and views behind actions. The plural form of explanations and of views implies a multidimensional perspective that is characteristic of objectivity. Looking at whatever a person is looking at from a single point of view or world-view would thus constitute subjectivity (Alfaro-Lefevre 1995:9). Objectivity is aligned with self-correction. This results in rational knowledge and is critical to critical thinking (Wilson 1989:9).

#### 4.3.1.2.3 *Rationality*

*Rationality* is closely related to objectivity as indicated above and in the single datum in data display 4.1.2.3 below.

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**DATA DISPLAY 4.1.2.3**  
**THE ANTECEDENTS OF CRITICAL THINKING**  
**CONDITIONS RELATING TO THE QUALITY OF INFORMATION**  
**RATIONALITY**

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87	Reasonableness forms the basis of critical thinking (Bandman & Bandman 1992:5).
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Rationality is synonymous with *analysing*, *inferring*, *extrapolating* and *reasoning* (also see section 3.2.1.8). Rational thinking involves identifying structure and order, formulating hierarchies and rules, identifying, constructing and evaluating arguments, judging the strength of evidence and being aware of our thinking strategies (meta-cognition). Rationality involves critical reasoning and logical thinking. According to Hamilton (1996:122), reasonableness forms the basis for rationality. In this regard

reproductive imagination becomes important as this functions precisely where perception or experience is concerned - the essence of contextualised critical thinking (Olivier 2001:180). However, critical thinking might also require reproductive imagination where thinking functions relatively independent of perception, allowing the thinker to be creative and to find new ways of explaining experiences or phenomena. Thus, absolutism is again discouraged in critical thinking.

#### 4.3.1.2.4 Contextuality

As indicated, critical thinking considers context in dealing with objects of intention (see data display 4.1.2.4 below).

DATA DISPLAY 4.1.2.4	
THE ANTECEDENTS OF CRITICAL THINKING	
CONDITIONS RELATING TO THE QUALITY OF INFORMATION	
CONTEXTUALITY	
108	... when faced with a problem situation (Alfaro-LeFevre 1995:74; Dobryzkowski 1994:273)
41	... observes relevancy in using the information (Hamilton 1990:120, Malek 1986:20, Pardue 1987:355, Paul & Heaslip 1995:43, Videbeck1997:6).
21.1	... as will be determined contextually (Bittner & Tobin 1998:269).
65.1	... triggered by experience (Baker 1996:19).
123.2	... should be context neutral to allow transfer to other contexts (Leppa 1997:30).
124.1	... focuses on world-views (Leppa 1997:30).
153.1	... regulate thinking in accord with the context (Botes 2000:28).
174.1	...challenging the importance of context (Thornhill & Wafer 1997:54).

Individuals do not think *critically* all the time, however, the context determines the course of thinking. Critical thinking is only applied when the context demands it, as in a problem situation. The critical thinker therefore uses diagnostic skills to weigh the demands of the situation. The thinker's predisposition to critical thinking comes into play at this point. Since the *critical* in critical thinking implies words like *analytical*, *crucial*, *essential* and *pivotal* (see section 3.2.2), critical thinking is usually applied when there is a problem, with the critical being entered into when there is no solution to the problem. Thus, critical thinking is directed to the resolution of problems through a plausible solution, as in a crisis situation or when faced with ethical dilemmas (see also section 3.3.5).

Table 4.3 represents a summary of the conditions relating to the quality of information as antecedents to critical thinking.

**TABLE 4.3 SUMMARY OF THE CONDITIONS RELATING TO THE QUALITY OF INFORMATION**

Accurate	Domain specific	Perfect
Affirmation	Evidence	Precise
Aim	Exact	Proof
Allied	Firm	Rigorous
Appropriate	Fixed	Reasonableness
Association	Goal	Relevancy
Authentic	Ideal	Scrupulous
Authority	Indication	Stringent
Clear	Intent	Substantive
Confirmation	Interconnected	Supportive
Contextual	Interrelated	Similar
Careful	Knowledge	True
Corroboration	Linked	Truthful
Data	Objective	Verification
Defined	Painstaking	World-views

#### 4.3.1.3 *Situatedness in critical thinking*

Although categorised and discussed as an antecedent to critical thinking, *situatedness* does not fall strictly into either of the two main categories, namely *disposition* of the critical thinker and *quality* of information. Situatedness relates to the all-embracing “being-in-the-situation”. It is a necessary condition for critical thinking and existence is thus the essence of this category. This situatedness might be characterised momentarily by pivotal life experiences that often ignite the critical thinking process. Nursing and health care practice are loaded with such pivotal life experiences and decisions. Data display 4.1.3 illuminates this category.

**DATA DISPLAY 4.1.3  
THE ANTECEDENTS OF CRITICAL THINKING  
SITUATEDNESS IN CRITICAL THINKING**

#### **Inquiry**

- 1.1 ... originates from a notion of an inquiring mind (Baker 1996:21; Bittner & Tobin 1998:268; Paul & Heaslip 1995:41; Sedlak 1997:12).
- 13.1 ... rational examination of arguments (Bandman & Bandman 1992:5; Hamilton 1996:119).
- 30.1 ... questions that come to mind when a person encounters a problem (Bittner & Tobin 1998:262; Kurfiss 1988:2).

---

67.1 ... discourse with self (Burton 2000:1012).

**Dilemma**

2.1 ... dialogue with own experience (Baker 1996:21; Bittner & Tobin 1998:268; Paul & Heaslip 1995:41; Sedlak 1997:12).

79 ... confronted with information to evaluate (Botes 2000:28).

84.2 ... critical thinking is about value judgement (McPeck 1990:52).

108 ... when faced with a problem situation (Alfaro-LeFevre 1995:74).

114 ... engage in a dialogue about experiences (Haffer & Raingruber 1998:68).

125 ... requires a dialectical approach where arguments should be appraised in relation to counter-arguments (Leppa 1999:30).

132.1 ... provide answers to perplexities (Duscher 1999:578; Hickman 1993:37; Siegel 1989:12; 1991:18; Walters 1986:235).

---

Critical thinking may be regarded as an ethical obligation in nursing practice and consequently should feature in nursing education as well. What is crucial at this point is the entrenchment of self in existence. From this “subjective” and “involved” position, within the numerous roles they take, individuals are required to maintain objectivity. This leaves individuals vulnerable to dilemmas (including ethical dilemmas), problems, and crises. Notwithstanding all this, the nurse is expected (as is the case with many role expectations) to render justified moral service. Critical thinking forms the basis to such moral practice (doing what a person strongly believes is right and good). It is only from such a “self-created” vantage point that people can successfully (morally) involve themselves in questions of life. Without personal involvement and investment in critical thinking, with the possible consequence of living a life of immorality and unreliability, critical thinking cannot become habitual. This would result in making a routine of nursing activities that might stifle the development of the profession altogether. It remains important to evoke the process of critical thinking by exposure to situatedness through open-mindedness amongst the situatedness of others. This will ultimately lead to expansion of knowledge (Fowler 1998:183).

Table 4.4 represents a summary of the attributes of *situatedness* as a necessary condition for critical thinking.

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**TABLE 4.4 SUMMARY OF THE SITUATEDNESS OF THE CRITICAL THINKER**

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Arguments	Dilemma	Problems
Calamity	Disagreement	Quandary
Catastrophe	Discussion	Problems
Confrontation	Impasse	Questioning
Crisis	Inquisitiveness	Value judgement
Curiosity	Perplexities	
Dialogue		

---

In summary, the following points are important with regard to the antecedents of critical thinking:

- Situatedness (“being-in-the-world”) attributing a critical quality to the subject-object relationship.
- Inquisitiveness in raising questions, engaging in a reflective sceptic manner.
- Contextualising knowledge and information to direct the inquiry towards reaching a resolution to a situation or alternative ways of acting within that situation.
- Cultivating (habitualising) a critical thinking spirit (Botes 2000:28; Bittner & Tobin 1998:262; Kurfiss 1988:2; Paul & Heaslip 1993:41; Siegel 1991:23).

The dispositions and position (situatedness) of the thinker and the quality of information are closely aligned. The position and dispositions are already there within which the *critical* is to be identified and corresponding thinking processes implemented

#### 4.3.2 Theme 2: Attributes of critical thinking

*Critical thinking* is a multifaceted and multidimensional construct that involves various strategies, processes, conditions and action–interaction strategies that should be contextualised (Jacobs et al 1997:20). It is a non-linear (cyclical or spiral) process characterised by several attributes. As an umbrella concept, *critical thinking* involves a number of thinking strategies and individually defined types of thinking. Critical thinking involves higher cognitive skills such as self-monitoring skills and meta-cognition, which are fundamental to innovative thinking (Facione 2000:251; Hasten & Washburn 2000:39; Smith-Blair & Neighbors 2000:258). Meta-cognition is an important attribute of critical thinking and refers to individuals’ thinking about their thinking, differentiating between mediocrity and excellence in their thinking (Duscher 1999:12). Jerkins (1999:11) refers to meta-cognition as the strategic management of thinking patterns, and the monitoring and assessment of a person’s own thinking. As it is a powerful tool for thinking critically, the aspiring critical thinker needs to develop meta-cognitive strategies, such as weighing evidence, looking for relationships among pieces of information and knowledge relating to the object of intention to develop stable hypotheses (Pitchers & Soden 2000:243).

The attributes of critical thinking include all the domains of learning as well as types of thinking such as reflective thinking, self-regulatory thinking and problem-solving. Data display 4.2 represents an overview of the major categories involved in the attributes of critical thinking.

<b>DATA DISPLAY 4.2</b>
<b>ATTRIBUTES OF CRITICAL THINKING</b>
<b>(OVERVIEW)</b>
Category 2.1: Domains of learning
Category 2.2: Reflective thinking
Category 2.3: Self regulatory thinking
Category 2.4: Critical thinking versus problem-solving
Category 2.5: Critical thinking process
Category 2.6: The critical attribute of critical thinking - <b>Rationality</b>

#### **4.3.2.1 Domains of learning**

Domains involved in critical thinking include cognitive, psychomotor and affective as illustrated in data display 4.2.1 below.

<b>DATA DISPLAY 4.2.1</b>
<b>ATTRIBUTES OF CRITICAL THINKING</b>
<b>DOMAINS OF LEARNING</b>
<b>Cognitive and affective</b>
35 ... involves cognitive and affective aspects (Hamilton 1996:120, Malek 1986:20, Pardue 1987:355, Paul & Heaslip 1995:43, Videbeck 1997:6).
<b>Cognitive</b>
167 The skills include interpretation, analysis, evaluation, application and self-regulation (Facione & Facione 1990:8).
166 ... comprised of interpretation, analysis, evaluation, inference, explanation and self-regulation (Facione & Facione 1990:8).
<b>Cognitive/Psychomotor/Affective</b>
46 ... involves various constructs such as attitudes, skills, knowledge and dispositions (May et al 1999:101).

Critical thinking involves cognitive, psychomotor and affective aspects. Bloom's taxonomy of the cognitive domain involves six levels of cognitive functioning, ranging from knowledge acquisition to comprehension, application, analysis, synthesis and evaluation (Quinn 1995:277). Knowledge and comprehension are concerned with recalling factual information, but are limited in the application of knowledge. Application, analysis, synthesis and evaluation/assessment require the transfer of

information to lived situations and the creative utilisation of information. Consequently, these levels of cognitive advancement are indispensable to the development and implementation of critical thinking in context.

However, analysis and synthesis (followed by application) are applicable to the present discussion.

*Analysis* is concerned with breaking down information into its component parts, which may entail elements or relationships among elements, and organising and structuring information (Edwards 1998:160). It is about differentiation, discrimination, and distinction. Analytical thinking also refers to critiquing, deducing, judging and being logical (see section 3.2.2.2 under synonyms for the parent word "critical").

*Synthesis* is concerned with combining various parts to make a new whole. Creativity is a requirement for synthesis. Facts must be combined with imagination to produce a unique outcome, plan or design, an important aspect of thinking critically to provide new perspectives on phenomena (Olivier 2001:180).

*Evaluation* refers to the ability to make judgement regarding the value of materials, using a criterion or criteria. In critical thinking, context is one criterion for evaluating or assessing the quality and applicability of information. Evaluation further involves self-regulation and being unbiased in dealing with objects of intention. It is concerned with contrasting, criticising, justifying, appraising and judging. Thinking becomes "critical" when the above variables form part of the thinking process. *Critical thinking* is thus essentially evaluative (see also section 3.3.2.3).

The affective component of critical thinking is important in nursing as it relates to the nurse client/patient relationship. This involves the emotional aspects in clinical decision-making as related to the caring aspect (see section 4.3.1.1.10) (Di Vito-Thomas 2000:176). Siegel (1991:23) maintains that critical thinking is composed of the critical spirit component whereby the thinker is emotionally attached to thinking critically.

The affective domain is composed of receiving, responding, valuing, organisation and characterisation by value (Slavin 1994:496). The act of receiving is characterised by willingness to receive information or other stimuli. This affective aspect aligns itself with open-mindedness and objectivity, which were discussed as dispositions of the thinker (see sections 4.3.1.1.3 and 4.3.1.1.4).

In responding, people are willing to participate actively, to engage the self in thinking critically. This is in line with Bruner's discovery learning, which aligns with inquisitiveness as a thinker disposition and a strategy to think critically (see sections 4.3.1.1.1 and 4.3.2.5.11). In this, the thinker is able to transfer information to other similar situations and to actualise transformation and thus oppose absolutism (Mwamwenda 1995:214).

Valuing is attributed to critical thinking affective domain in the sense that it is reflected in the commitment that one has towards thinking critically. This is aligned to the caring aspect of critical thinking. One must value critical thinking, show affection to, and care about it: a moral and ethical duty if justice is done to thinking (Slavin 1994:496).

The organisational aspect of the affective domain involves integration and development of value systems, in this instance critical thinking in its existential and experiential nature. See paragraph 4.3.2.5.9.

Characterisation by value in this instance involves making critical thinking a way of life, a habit. This disposition was discussed earlier in paragraph 4.3.1.1.9.

#### ***4.3.2.2 Reflective thinking as part of critical thinking***

Reflective thinking is a mental activity that emerged from the literature as comprising strategies and processes foundational to critical thinking. Thesaurus synonyms are incorporated to assist in clarifying this attribute of critical thinking. Data display 4.2.2 presents an overview of categories compiled in this regard.



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**DATA DISPLAY 4.2.2**  
**ATTRIBUTES OF CRITICAL THINKING**  
**REFLECTIVE THINKING AS PART OF CRITICAL THINKING**  
**(OVERVIEW)**

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2.2.2 Strategies of reflection

2.2.3 Process of reflection

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#### 4.3.2.2.1 Reflection

*Reflection* refers to “musing, resonating, pondering, meditating and contemplating” (see section 3.2.1.9). Reflection was also abstracted as an attribute in critical thinking and is indicated in data display 4.2.2.1.

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**DATA DISPLAY 4.2.2.1**  
**ATTRIBUTES OF CRITICAL THINKING**  
**REFLECTIVE THINKING AS PART OF CRITICAL THINKING**  
**REFLECTION**

---

16	... reasonable and reflective thinking (Adams 1999:112).
37	... the ability to monitor what we are thinking (Hamilton 1996:120; Malek 1986:20; Pardue 1987:355; Paul & Heaslip 1995:43; Videbeck 1997:6).
58	... a necessary condition to critical thinking (Sedlak 1997:16).
59	... judging in a reflective way what to do or believe (Facione 2000:61).
52	... analysis refers to judging in a reflective way (Facione 2000:61).
63	... skill and propensity to engage in an activity with reflective scepticism (Smith-Blair & Neighbors 2000:251, 258).
69	... doing a post-mortem on the process and premises that led to a particular action (Burton 2000:1012).
75	... reflection is fundamental to critical thinking (Ford & Proffeto-McGrath 1994:343; Kramer 1993:400; Thompson 1997:64).
77	... a reflective and reasonable process (Smith-Blair & Neighbors 2000:251).
78	... is reflective in nature (Botes 2000:28).
79	... is retrospective in that the person is confronted with information and evaluates it in an unbiased, open-minded way (Botes 2000:28).
169	... paying attention to thoughts (Facione & Facione 1996:131).
14	... is reasonable and reflective thinking (Adams 1999:112; Bandman & Bandman 1992:5; Hamilton 1996:119; Norris & Ennis 1989:10).
174	... components of critical thinking include reflective scepticism (Thornhill & Wafers 1997:54).

---

Reflection occurs when a person challenges the validity of something. It involves skills such as *motivation for decisions, critical analysis, self-awareness, synthesis* and *evaluation* (Burton

2000:1012). Reflection is about *looking back* with the purpose of evaluating the worth of actions or decisions and to improve these, should the situation demand it. Reflective thinking results in disruption of prior habitual functioning and thinking. By this disposition of the critical thinker, a crisis is perceived. Reflection is thus a pertinent orientation to existence. Critical thinking is only complete once processes, strategies and resolutions involved have been reflected upon (Facione 1996:131). Reflection provides a means to guard against improper actions in the present (Burton 2000:1013).

#### 4.3.2.2.2 *Strategies of reflection*

As indicated in data display 4.2.2.2, the strategies involved in reflection include comparing, reasoning and questioning. These should be considered in conjunction with section 3.2.1.9.

DATA DISPLAY 4.2.2.2 ATTRIBUTES OF CRITICAL THINKING REFLECTIVE THINKING AS PART OF CRITICAL THINKING STRATEGIES FOR REFLECTION	
<b>Comparing</b>	
67	Reflective thinking is concerned with comparing, contrasting, pattern recognition, perceptual categorization, framing and discourse with self (Burton 2000:1012).
<b>Reasoning</b>	
70.1	Employing intellectual values, namely, honesty, tolerance to opposing ideas, attentive to reasons/implications, systematisation and trustful of reasons (Facione 2000:74).
<b>Questioning</b>	
72	Involves questioning, continually answering and evaluating how much a person knows about the phenomenon (Sedlak 1997:16).

Higher cognitive skills are important in fostering reflective abilities. Reflective thinking is a highly adaptive and individualised response to a "gap-producing" situation that requires individuals to engage in discourse with themselves and others, to make sense of the situation, and to act appropriately in the situation. The process of reflection produces contextual understanding and influences future behaviour (Teekman 2000:1133). Reflection is thus self-empowering and adds to personal understanding or knowing, an important aspect of knowledge acquisition in nursing (see section 4.3.1.1.2). In addition, Burton (2000:1013) and Di Vito-Thomas (2000:179) point out that critical thinking involves self-awareness, making comparisons, synthesising knowledge and evaluating actions - reflection.

#### 4.3.2.2.3 Processes of reflective thinking

Processes involved in reflection as these emerged from the data include *inferring, reasoning, cognition, creativity and judging*. These are represented in data display 4.2.2.3 below.

DATA DISPLAY 4.2.2.3 ATTRIBUTES OF CRITICAL THINKING REFLECTIVE THINKING AS PART OF CRITICAL THINKING PROCESSES OF REFLECTIVE THINKING	
<b>Inferring</b>	
60	... involves making inferences, analogies, discrimination, and evaluation (Gordon 2000:341).
<b>Reasoning</b>	
62	... pondering, calling to mind, forming a mental picture and reasoning about a problem (Hamilton 1996:119).
<b>Cognition</b>	
65	... concerned with comparing, contrasting, pattern recognition, perceptual categorization, framing and discourse with self (Burton 2000:1012).
<b>Creativity</b>	
68	... the modification and development of ideas (Burton 2000:1012).
<b>Judging</b>	
70	... reflectively making sound judgements by employing intellectual values, namely, honesty, tolerance to opposing ideas, attentive to reasons/implications, systematisation and trustful of reason (Facione 2000:74).

As discussed in section 3.2.9, *reflective thinking* also involves meditation, contemplation, pondering, resonating and musing. It is also a process that helps evaluate whether the thinking process is, in fact, critical. The process of reflection also involves higher order thinking in the exploration of issues (Baker 1996:19).

#### 4.3.2.3 Self-regulatory thinking as part of critical thinking

Self-regulatory thinking is a critical attribute of critical thinking. As indicated, thinkers must be able to monitor their thinking process to contribute to the quality of information, creativity and applicability and appropriateness of decisions. Self-regulatory thinking is mainly a function of meta-cognition. Self-regulatory thinking in critical thinking is illustrated in data display 4.2.3.

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**DATA DISPLAY 4.2.3**  
**ATTRIBUTES OF CRITICAL THINKING**  
**SELF-REGULATORY THINKING**

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**Meta-cognition**

- 169 Paying attention to thoughts (Facione & Facione 1996:131).  
 145 Self-regulated thinking is a cognitive strategy that helps one to regulate or balance one's thinking (Jerkins 1999:11).

**Monitor**

- 148 ... self-regulated thinking is accepted as an attribute that help define critical thinking (Alfaro-LeFevre 1995:9).
- 

Self-regulatory thinking is a cognitive skill that helps individuals to balance their own thinking (Alfaro-LeFevre 1995:9). Self-regulatory thinking is about paying attention to a person's own thinking (Facione & Facione 1996:131). It allows flexibility and open-mindedness. These are the first steps towards critical thinking (Daley et al 1999:42; Jerkins 1999:11). Self-regulation involves tuning and managing a person's own thinking (see also section 3.3.4.6).

Processes in self-regulatory thinking include self-examination, self-correction and self-improvement (Ignatavicius 2001:30). Alternatively, self-regulation comprises three processes: representation, evaluation and action. As the least discussed up to this point, during *representation* individuals experience, without any conscious effort, a cognitive and/or emotional reaction to change within themselves (Rosenbaum 1988; Strümpher 1990 cited in Van der Wal 1999:132).

#### 4.3.2.4 *Critical thinking versus problem-solving*

Critical thinking emerged as a process that does not follow linear steps and as a cyclical process due to the tentativeness of solutions or resolutions. As indicated earlier, problem-solving and critical thinking are not synonymous. Data display 4.2.4 indicates this.

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**DATA DISPLAY 4.2.4**  
**ATTRIBUTES OF CRITICAL THINKING**  
**CRITICAL THINKING VERSUS PROBLEM-SOLVING**

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- 20 Critical thinking surpasses the steps of linear thinking, thus differs from problem-solving (Bittner & Tobin 1998:269).  
 32 Involves more than problem-solving (Jacobs et al 1997: 20; Vaughan-Wrobel et al 1997:485).
-

Problem-solving is a component of critical thinking (Kataoka-Yahiro & Saylor 1994:353) (see section 3.3.5). Critical thinking goes beyond problem-solving. It is broader in scope, deals with ill-structured problems and involves larger and higher mental processes that encompass justification. Thus, it is a mental operation that evaluates the adequacy of data. It is directed at maximising potential and preventing problems. In contrast, problem-solving is associated with a crisis situation where actions are geared to obtaining a correct solution for the problem at hand. Problem-solving deals with well-structured problems. It is narrower in scope and involves logical reasoning and inference. In critical thinking, the result may not necessarily be a correct answer but an acceptable tentative solution (Jacobs et al 1997:20; Kamin, O'Sullivan, Younger & Deterding 2001:28).

#### 4.3.2.5 *Critical thinking process*

Unlike problem-solving, the critical thinking process is not linear. It alternates between deductive and inductive reasoning. The "steps" of critical thinking discussed below are distinguished for theoretical and descriptive reasons only. These steps are often essentially a case of "all-at-once". The process is thus not necessarily sequential. The formal arrangement helps attribute logic to the explanation of the process of critical thinking. Generally, the thinker is herewith regarded as the process in critical thinking since critical thinking takes place in the thinker's mental operations.

As a process, a series of stages in an operation, progress or course of something (*The Concise Oxford Dictionary* 1991:951), critical thinking follows the rules of logic, reflection and rationality, and uses meta-cognitive strategies to separate relevant from irrelevant information. The process resides within the thinker, who must provide rational explanations for the result in the process of critical thinking (Duscher 1999:580; Adams 1999:111; Gordon 2000:341; Smith-Blair & Neighbors 200:253).

To return to a more structured discussion of the process of critical thinking, eleven phases involved in this process are presented in data display 4.2.5.

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**DATA DISPLAY 4.2.5**  
**ATTRIBUTES OF CRITICAL THINKING**  
**CRITICAL THINKING PROCESSES**  
**(OVERVIEW)**

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Category 2.5.1: Object of intention  
 Category 2.5.2: Aims of critical thinking  
 Category 2.5.3: Becoming aware  
 Category 2.5.4: Data collection  
 Category 2.5.5: Focusing  
 Category 2.5.6: Making judgement  
 Category 2.5.7: Decision-making  
 Category 2.5.8: Implementation of decisions  
 Category 2.5.9: Cyclical nature of the process  
 Category 2.5.10: Outcomes of critical thinking  
 Category 2.5.11: Strategies in critical thinking

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#### 4.3.2.5.1 *Object of intention*

The object of intention in critical thinking is not merely the situation, problem or argument to which the critical thinking is directed, but the knowledge and information that constitute the critical thinking act. Data display 4.2.5 below represents the objects of intention in critical thinking.

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**DATA DISPLAY 4.2.5.1**  
**ATTRIBUTES OF CRITICAL THINKING**  
**CRITICAL THINKING PROCESSES**  
**OBJECT OF INTENTION**

---

**Information**

13 ... ideas, inferences, assumptions, principles, arguments, conclusions, issues, statements, beliefs and actions (Bandman & Bandman 192:5; Norris & Ennis 1989:10; Hamilton 1996:13).

**Knowledge**

106 ... an attitude of inquiry which involves the use of facts, theories, abstraction, deduction, interpretation and evaluation of arguments (Mathews & Gaul 1979:27).

---

These objects of intention involve aspects such as facts, arguments, inferences, principles, theories and abstractions. These relate to antecedents such as problems, crisis situations and pivotal life experiences (see section 4.3.1.3). Domain-specific knowledge is critical to critical thinking (Di Vito-Thomas 2000:176)

#### 4.3.2.5.2 *Aims of critical thinking*

The aims of critical thinking include cognition, discovery, decision-making, problem resolution, making sense and evaluation. Data display 4.2.5.2 indicates the aims of critical thinking.

DATA DISPLAY 4.2.5.2 ATTRIBUTES OF CRITICAL THINKING CRITICAL THINKING PROCESSES AIMS	
<b>Discover</b>	
31	... an investigation to explore a phenomenon (Bittner & Tobin 1998:262; Kurfiss 1988:2).
<b>Decision-making</b>	
6	aimed at making judgement based on evidence rather than conjecture (Alfaro-LeFevre 1995:9).
17	that is focused on deciding what to believe or do (Adams 1999:112).
56	an investigation whose purpose is to explore a situation, phenomenon, question or problem to arrive at a hypothesis or conclusion (Adams 1999:111).
64	... a process of deciding what to do after some reflective thinking (Smith-Blair & Neighbors 2000:251, 281).
<b>Problem resolution</b>	
11	... to make sense of information which results in problem resolution (Hasten & Washburn 1999:39).
24	... to reach a resolution ( Bittner & Tobin 1998:269).
34	... prevention of problems and maximization of potential and efficiency to avoid problems (Jacobs et al 1997:20; Vaughan-Wrobel et al 1997:485).
132	... providing answers to perplexities (Duscher 1999:578; Hickman 1993:37; Siegel 1989:12; 1991:18; Walters 1986:235).
147	... self-regulated thinking enhances purposeful engagement of deductive and inductive analysis of data (Alfaro-Lefevre 1995:9).
101	... to evaluate the depth and breadth of a person's own knowledge about the phenomenon (Colucciello 1997:239).

From data display 4.2.5.2, it is evident that critical thinking does not manifest without observable and specifically directed behaviour or actions. Critical thinking is concerned with gaining an understanding of an experience or a situation. It is therefore concerned with employing different thinking strategies (reflection, logic, deduction, induction) and types of thinking, such as self-regulated thinking and meta-cognition (Baker 1996:21; Alfaro-LeFevre 1995:9; Norris & Ennis 1989:10). Unravelling perplexities,

situations, experiences or ideas and coming to a better understanding thereof is an indication that critical thinking has taken place.

Critical thinking is purposeful and goal-directed. It culminates in the resolution of a problem through making informed judgements and decisions (Adams 1999:111; Hasten & Washburn 1999:39) or, whenever such a resolution is not achieved, alternative options are made available. Outcomes are not end outcomes, however, as reflection on actions, behaviour and turning the process upon itself manifest, giving it its distinctive non-linear attribute. Outcomes per se are discussed in section 4.3.2.5.10 and the cyclical nature of critical thinking in section 4.3.2.5.9.

#### 4.3.2.5.3 *Becoming aware*

*Becoming aware* can be regarded as the first event in the process of critical thinking. Data display 4.2.5.3 illustrates this.

DATA DISPLAY 4.2.5.3 ATTRIBUTES OF CRITICAL THINKING CRITICAL THINKING PROCESSES BECOMING AWARE	
2	... starts to reflect on these experiences (Baker 1996:21; Bittner & Tobin 1998:268; Paul 1995:41; Sedlak 1997:12).
18	... starts as individuals explore the mental faculties (Bandman & Bandman 1992:5; Norris & Ennis 1989:10; Hamilton 1996:119).

"Gap-producing" situations and pivotal life experiences, both referred to previously, are in their multidimensional representation the entry point into critical thinking. Identifying a disequilibrium or trigger factor defines *becoming aware* in the critical thinking process.

#### 4.3.2.5.4 *Data collection*

Data collection, as indicated in data display 4.2.5.4, is the second event in the process of critical thinking.



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**DATA DISPLAY 4.2.5.4**  
**ATTRIBUTES OF CRITICAL THINKING**  
**CRITICAL THINKING PROCESSES**  
**DATA COLLECTION**

---

22 ... reframing, collaborating and collecting relevant information (Bittner & Tobin 1998:269).

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Collection of data helps explore the phenomenon under scrutiny. This event relates directly to the disposition of inquisitiveness of the critical thinker and the quality of the data discussed in sections 4.3.1.1 and 4.3.1.2, respectively.

#### 4.3.5.2.5 *Focusing*

As data collection progresses, focus on the issue at hand increases. Through focusing, the data collected become more pertinent and the quality thereof is thus enhanced. Data display 4.2.5.5 represents these issues.

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**DATA DISPLAY 4.2.5.5**  
**ATTRIBUTES OF CRITICAL THINKING**  
**CRITICAL THINKING PROCESSES**  
**FOCUSING**

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38 focusing on critical points (Hamilton 1996:120, Malek 1986:20; Pardue 1987:355, Paul & Heaslip 1995:43, Videbeck 1997:6).  
 51 persistent in seeking results which are as precise as the subject and circumstances of the inquiry permit (Colucciello 1997:239; May et al 1997:101).

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In addition to the above, focusing is guided by questioning. Reciprocity exists between these two aspects. As focusing becomes more pertinent, questions asked become more specific and, as appropriate questions are successfully resolved or answered, focus is enhanced. Overall cohesiveness is cultivated through questioning strategies as facts, relevant to dealing with the issue at hand, are established (Paul & Heaslip 1995:43).

#### 4.3.2.5.6 Making judgement

Judgement is made as one collects data. It further ensures that the critical thinker focuses on relevant information. Judgement in this instance is similar to hypothesis formulation and testing (see data display 4.2.5.6 below on making judgements).

<b>DATA DISPLAY 4.2.5.6</b> <b>ATTRIBUTES OF CRITICAL THINKING</b> <b>CRITICAL THINKING PROCESSES</b> <b>MAKING JUDGMENTS</b>	
39	... checking to see if one is really on target and accurate in assessment (Hamilton 1996:120; Malek 1986:20; Pardue1987:355; Paul & Heaslip 1995:43; Videbeck 197:6).
45	... recognizing the values underlying and affecting decisions taken (Hamilton 1996:120; Malek 1986:20; Pardue1987:355; Paul & Heaslip 1995:43; Videbeck 1997:6).
55	... critical thinking is an exploratory process (Adams 1999:111).
59	... judging in a reflective way (Facione 2000:61).
60	... involves making inferences, analogies, discrimination and evaluation (Gordon 2000:341).
61	... is about pondering, recalling to mind, forming a mental picture, and reasoning about a problem (Hamilton 1996:119).
70	... critical thinking is about reflectively making sound judgements (Facione 2000:74).
71	... careful judgement and thinking based on reflection, pondering and calling to mind, remembering, forming a mental picture and reasoning(Hamilton 1996:119).
109	... critical thinkers will explore the situation to establish facts for or against arguments in an open-minded approach, and use meta-cognitive strategies to separate relevant from irrelevant (Alfaro-Lefevre 1995:74, Dobrzykowski 1994:273).
113	... continually answer them again and again to evaluate the depth of their own knowledge about a phenomenon (Colucciello 1998:239; Facione 1990:25).
174	... components of critical thinking as identification and challenging of assumptions challenging the importance of context, imagining and exploring alternatives, and reflective skepticism, further affirming the above cognitive aspects (Thornhill & Wafer 1997:54).
115	... aimed at the selection of relevant from irrelevant data, normal from abnormal, as well as missing data (Colucciello 1997:239, Facione 1990:25).

From the data it is clear that making judgements is related to establishing and maintaining focus. Judging involves analysing, appraising, concluding and examining issues. It is associated with reasoning, creativity and logic. Finally, like critical thinking, judging is turned upon itself through reflection (see section 3.2.1.7).

#### 4.3.2.5.7 *Decision-making*

Decision-making follows careful judgement as data display 4.2.5.7 indicates.

<b>DATA DISPLAY 4.2.5.7</b> <b>ATTRIBUTES OF CRITICAL THINKING</b> <b>CRITICAL THINKING PROCESSES</b> <b>DECISION-MAKING</b>	
43	... a variety of possible alternatives are explored to reach a resolution (Hamilton 1996:120; Malek 1986:20; Pardue 1987:355; Paul & Heaslip 1995:43; Videbeck 1997:6).
64	... a process of deciding what to do after some reflective thinking (Smith-Blair & Neighbors 2000:251, 281).
76	... a process of reflective decision-making mediated through dialectic and dialogical interaction, grounded in critical inquiry (Duscher 1999:580).
87	... reasonableness forms the basis of critical thinking (Bandman & Bandman 1992:5).
125	... it requires a dialectical approach where arguments should be appraised in relation to counter-arguments (Siegel 1989:10).
127	... to engage in a dialogue with a person's own preconceived ideas (Siegel 1989:10).
129	... development of alternatives through insightful thinking and in so doing, repositioning oneself accurately (Hasten & Washburn 1999:39).

Decision-making is based on careful judgement. Alternatives are perused and weighed, and the selection justified to represent a plausible solution. This leads to the element of moral reasoning in critical thinking where a person selects the "best solution" from a number of alternatives (Bandman & Bandman 1990:60). A critical thinker should be able to substantiate the reasons that led to a specific decision. This is an ethical/moral obligation on the critical thinker.

#### 4.3.2.5.8 *Implementation*

Once a decision has been made, the decision must be implemented. This implementation is indicated in data display 4.2.5.8.

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<b>DATA DISPLAY 4.2.5.8</b>	
<b>ATTRIBUTES OF CRITICAL THINKING</b>	
<b>CRITICAL THINKING PROCESSES</b>	
<b>IMPLEMENTATION</b>	
57	... integrates all available information that can be convincingly justified (Adams 1999:111).
72	... involves questioning, continually answering and evaluating how much one knows (Sedlak 1997:16).
95	... in critical thinking, ideas should flow logically and be supported by reasons (Jacobs et al 1997:19; Sedlak 1997:17; Walsh 1997:9).

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Implementation should be done with the necessary scepticism (see section 4.3.1.1.5). During implementation the plausibility of the decision is confirmed, which opens up ways for reflection and reconsideration of importance to context and existence.

#### 4.3.2.5.9 *The cyclical nature of critical thinking process*

The cyclical nature of critical thinking, referred to previously, will now be considered (see data display 4.2.5.9 below).

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<b>DATA DISPLAY 4.2.5.9</b>	
<b>ATTRIBUTES OF CRITICAL THINKING</b>	
<b>CRITICAL THINKING PROCESSES</b>	
<b>CYCLICAL NATURE</b>	
102	... use of meta-cognition to evaluate thinking (Alfaro-LeFevre 1995:74; Dobrzykowski 1994:273).
21	... an umbrella under which other forms of thinking flow, as will be determined contextually (Bittner & Tobin 1998:269).
39	... checking to see if we are really on target and accurate in our process (Hamilton 1997:120; Malek 1986:20; Pardue 1987:355; Paul & Heaslip 1995:43; Videbeck 1997:6)
56	... an investigation whose purpose is to explore a phenomenon to arrive at a hypothesis or conclusion (Adams 1999:111).

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- 
- 56.1 ... use of meta-cognitive strategies to evaluate thinking and arrive at a conclusion (Adams 1999:111).
- 140 ... intuition does not just happen, but requires critical thinking (Paul & Heaslip 1999:39).
- 141 ... critical thinking requires intuition (Paul & Heaslip 1995:44).
- 116 ... questioning creates awareness of diverse values and meaning in a variety of settings, thus augmenting the process of critical thinking to tackle the problem (Alfaro-LeFevre 1995:74; Dobrzykowski 1994:273).
- 

The cyclical nature of critical thinking referred to is by itself multi-dimensional. Mutuality and reciprocity among different elements, strategies and cognitive processes, in different combinations and at different times during the critical thinking process, collectively establish the cyclical and the all-at-once nature of critical thinking. In addition, and at a more concrete level, conclusions drawn and decisions taken are hypothetical and tentative in nature. There is always room for reconsideration (Phillips 2000:366). These aspects are also discussed in section 4.3.2.4.

#### 4.3.2.5.10 *Outcomes of critical thinking*

*The Concise Oxford Dictionary* (1991:843) defines outcomes as the visible effects or result of an activity. The extent to which outcomes have been achieved is determined through evaluation. The implementation of decisions that is not followed by evaluation is deprived of the *critical* element of critical thinking. In fact, evaluation of outcomes is a continuous process that must be employed throughout the process of critical thinking. Data display 4.2.5.10 represents data on outcomes in critical thinking.

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**DATA DISPLAY 4.2.5.10**  
**ATTRIBUTES OF CRITICAL THINKING**  
**CRITICAL THINKING PROCESSES**  
**OUTCOMES**

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**Participation**

- 4 ... to understand experiences, phenomena, and to engage in an activity (Baker 1996:21; Bittner & Tobin 1998:268; Paul 1995:41; Sedlak 1997:12).

**Discover**

- 23 ... to obtain new perspectives, ideas and options as necessary (Bittner & Tobin 1998:269).

- 66 ... to make meaning/sense out of the experience (Baker 1996:19).

**Decision-making**

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15 ... geared to decision-making on high level of cognition (Bandman & Bandman 1992:5; Norris & Ennis 1989:10).

**Problem resolution**

84.2 ... resolving disagreements by means of further inquiry (Walters 1986:235).

45 ... recognizing the values underlying and affecting decisions taken (Hamilton 1996:120; Malek 1986:20; Pardue 1987:355; Paul & Heaslip 1995:43; Videbeck 1997:6).

113 ... continually answers them again and again to evaluate the depth of own knowledge about a phenomenon (Colucciello 1998:239, Facione 1990:25).

121 ... motivates people to expand on their knowledge bases (Smith-Blair & Neighbors 2000:253).

128 ... evaluating their worth in the light of reasons/arguments for or against (Smith-Blair & Neighbors 2000:253).

132 ... providing answers to the perplexities (Duscher 1999:578, Hickman 1993:37; Siegel 1989:12; Siegel 1991:18; Walters 1986:235).

144 ... Autonomy strengthens people's confidence since it requires them to define a problem, select pertinent information and recognize unstated assumptions from which to draw inferences (McPeck 1990:22).

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The outcomes are regarded as the empirical referents of critical thinking construct, namely

- Understanding, which is self-impregnating and sustains the intellectual and critical thinking ability of the individual.
- Transformation of ideas, options and perspectives, leading to the reduction of problems and optimisation of potential as the individual makes sense and meaning of the experiences.
- Illuminations of perplexities, and the subsequent progress of the critical thinker beyond the level of self-actualisation (Duscher 1999:578; Hickman 1993:37; Siegel 1989:12; Siegel 1991:18; Walters 1986:235).

Evaluation is pivotal in establishing the cyclical nature of critical thinking.

#### *4.3.2.5.11 Strategies in critical thinking*

Critical thinking involves many strategies, some of which have been discussed above. These strategies involve a multi-faceted combination of mental operations, dispositions, cognitive processes and types of thinking. Data display 4.2.5.11 illustrates these strategies.

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**DATA DISPLAY 4.2.5.11**  
**ATTRIBUTES OF CRITICAL THINKING**  
**CRITICAL THINKING PROCESSES**  
**STRATEGIES**

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**General indicator: Multi-faceted**

- 19 ... the critical thinking process is multifaceted (Bittner & Tobin 1998:269).
- 13.3 ... dialogic and dialectical reasoning (Duscher 1999:578; Hickman 1993:37; Siegel 1989:12; Siegel 1991:18; Walters 1986:235).

**Mental operations**

- 10 ... uses creative, logical, intuitive and analytical mental processes (Hasten & Washburn 1999:39).
- 42 ... is concerned with insightful thinking (Hamilton 1996:120; Malek 1986:20; Pardue 1987:355; Paul & Heaslip 1995:43; Videbeck 1997:6).

**Nature: Scientific process**

- 9 ... is a scientific process (Smith-Blair & Neighbors 2000:252).

**Assessment**

- 83 ... critical thinking is only complete if the aspect of reason assessment is included (Siegel 1991:18).

**Analysis**

- 137 ... analysis is an important skill of critical thinking (Colucciello 1997:243; Hamilton 1996:123; Facione 1990:19).

**Judging**

- 93 ... critical thinking is about value judgement or critical analysis (McPeck 1990:52).

**Questioning**

- 97 ... a questioning attribute is an important attribute of critical thinking (Mathews & Gaul 1979:19).
- 98 ... questioning is a necessary condition and an attribute of the development of critical thinking (Dobrzykowski 1994:275; Haffer & Raingruber 1998:68).
- 30 ... probing, asking and answering questions that come to mind (Bittner & Tobin 1998:262; Kurfiss 1988:2).
- 117 ... ability attributed to critical thinking questioning is clarity (Dobrzykowski 1994:273; Haffer & Raingruber 1998:68).

**Curiosity**

- 99 ... intellectual curiosity as an attribute to critical thinking involves wanting to know more and more about the object of intention (Colucciello 1997:239).

**Logical reasoning**

- 81 ... logic is an inherent factor in critical thinking (Hamilton 1996:121).
- 82 Involves the weighing of logic in evidence (Abegglen 1997:453; Vaughan-Wrobel et al 1997:485).

**Meta-cognitive strategies**

- 54 ... cognitive skills which are analysis, application of standards, discrimination, information seeking, logical reasoning, prediction and transformation of knowledge (Scheffer & Rubenfeld 2000:357).
- 103 ... critical thinking the individual employs metacognitive strategies (Alfaro-LeFevre 1995:74; Dobrzykowski 1994:273).
-

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**Cognitive processes**

- 149 ... includes cognitive competencies that involve hypothesis generation, problem-solving and decision-making (Kataoka-Yahiro & Saylor 1994:353).
- 168 ... critical thinking involves cognitive skills of reflection, challenging assumptions, self-regulated thinking, induction, deduction, analysis and careful evaluation (Fowler 1998:184).

**Gestalt**

- 67 ... concerned with comparing, contrasting, pattern recognition, perceptual categorization, framing and discourse with self (Burton 2000:1012).

**Logical reasoning**

- 44 ... uses logical reasoning in the process of developing a solution to the problem (Hamilton 1997:21; Malek 1986:20; Pardue 1987:355; Paul & Heaslip 1995:43; Videbeck 1997:6,8).
- 81 ... logic is an inherent factor in critical thinking (Hamilton 1996:112, 121).

**Relevancy**

- 81 ... logical connection among facts and the relevance to the problem (Hamilton 1996:121).

**Reflection**

- 3 ... critical thinking makes use of reflective thinking strategies (Baker 1996:21; Bittner & Tobin 1998:268; Paul 1995:41; Sedlak 1997:12).

**Reflective scepticism**

- 174 ... identifying and challenging the importance of context, exploring alternatives, and reflective skepticism (Thornhill & Wafer 1997:54).

**Self-regulation**

- 138 ... paying attention to one's thought patterns is a strategy that enhances critical thinking (Edwards 1998:161).
- 169 ... paying attention to thoughts (Facione & Facione 1996:131).
- 

The diversity of strategies employed during critical thinking can be ascribed to the umbrella nature of *critical thinking* as a concept (Bittner & Tobin 1998:269). A sub-category emerging from this category not previously labelled or mentioned is *gestalt*, which refers to form or pattern. The essence of gestalt is reflected in the identification of similar patterns or categories and their relationship to obtain insight directed at problem resolution (Seaman 1987:69). Burton (2000:1012) indicates that critical thinking is concerned with comparing, contrasting, pattern recognition, perceptual categorisation, framing, discourse with self, transforming the issues at hand into foreground against the background of everything else that is happening. The gestalt principle of the whole being more than its constituting parts is reflected in the alternative choices made available in a situation, not changing the situation as it is at that moment. A person must examine all aspects of the phenomenon to identify patterns. In



critical thinking, pattern recognition is a critical factor and a step towards understanding the object of intention (Mwamwenda 1995:227).

With regard to the other strategies in data display 4.2.5.11, it is reiterated that critical thinking manifests only when there is an interplay of these various thinking strategies (Duscher 1999:578; Hickman 1993:37; Siegel 1989:12; 1991:18; Walters 1986:235).

As a strategy in critical thinking, *logical reasoning* relates to a number of other strategies to ascertain relevancy, cohesiveness and rationality regarding the object at which attention is directed. Critical thinking manifests in logical connection among facts relevant to the problem at hand. The logic involved in critical thinking further demonstrates sense and sensibility in using information, applying analytic strategies and exercising caution during the utilisation of information (Hamilton 1996:112).

As a strategy in critical thinking, *critical reasoning* consists of rationality and analytic thinking. The weighing of reasons involved in critical reasoning is a *critical* factor in critical thinking. Critical reasoning emphasises the rational basis for belief and provides supportive evidence, which is a necessary condition for critical thinking (Walters 1986:235).

*Dialogic* and *dialectical reasoning* are also essential to critical thinking. These involve the incorporation and integration of opposing views in an argumentative manner to reach consensus that would allow for development of a more accurate interpretation and resolution of contradictions and ambiguities (Duscher 1999:12). Dialectical reasoning in critical thinking is founded on critical thinkers' unbiased and open-minded attitude of laying aside their presuppositions and assumptions. Such reasoning further demands recognition of contextual variables. Through the dialectical process, complex levels of reflection and comprehension are accessed during critical thinking (Daniel 2001:52).

The incorporation of the *scientific process* in critical thinking again relates to the quality of data, objectivity and rationality. *Science* as an organised body of knowledge relating to specific disciplines relates to critical thinking more specifically in the critical thinker's professional field of endeavour, such as to a nurse practitioner. The practice of *science* is a skilful investigation into a situation according to

rules laid down for making observations and testing the soundness of conclusions (Fitzpatrick & Whall 1989:430). These conclusions are used for prediction and control of aspects of phenomena and in this way also relate to the aim of critical thinking.

Critical thinking is also described as comprising *insightful thinking*. According to Hamilton (1996:122), effective thinking necessitates insightful thinking. Insightful thinking requires the effective use of mind and mental operations, based on knowledge, to create an understanding of the problem at hand. As critical thinking involves the consideration of multiple perspectives to deal with the problem at hand and to contextualise it, insight, as detecting relationships among seemingly unrelated variables in a situation, applies. This could be imperative in explaining how an aspect of concern fits into the larger context (Smith-Blair & Neighbors 200:253).

#### 4.3.2.6 *Rationality: a critical attribute of critical thinking*

*Rationality* refers to the provision of reasons to justify assumptions (Greenwood 2000:249). It is also regarded as a rational examination of ideas (Bandman & Bandman 1992:5). In thinking critically, reasons must be stated to support the outcomes of such thinking. These reasons justify the course of decision-making and action. To consider outcomes that are not arrived at by rational thinking and rationality equates with *ignorance*. Rationality is crucial to critical thinking (Smith-Blair & Neighbors 2000:251). As an attribute, rationality forms the backbone of critical thinking (see section 3.3.4.1.2.3).

Data display 4.2.6 illustrates rationality in critical thinking.

DATA DISPLAY 4.2.6 THE CRITICAL ATTRIBUTE OF CRITICAL THINKING RATIONALITY	
8	... reasonable thinking (Smith-Blair & Neighbors 2000:252).
12	... rational examination (Bandman & Bandman 1992:5; Norris & Ennis 1989:10; Hamilton 1996:119).
16	... reasonable and reflective thinking (Adams 1999:112).
80	... a process that requires rationality and logic (Maynard 1996:13).
151	... diagnostic reasoning (Kataoka-Yahiro & Saylor 1994:353).
77	... a reflective and reasonable process (Smith-Blair & Neighbors 2000:251) .

As indicated above, *rationality* requires that reasons be provided for decisions taken. Reasons are means of justifying actions and a result of reasoning. Rationality further involves critical reasoning, logical thinking and creative thinking. In turn, creative thinking is made up of rationality and imagination (Duscher 1999:12; Hickman 1993:37; Siegel 1989:12; 1999:18; Walters 1986:235). Creativity is a process and a product of rationality and forms a necessary component of critical thinking. Rationality is contextual and involves creative actions to transform a situation (Garrison 1999:215, 219). As such, it is instrumental in the transformation of a critical thinker through gaining a new understanding of, and insight into, a continuously changing and becoming existence.

In addition to creativity, four types of reasoning strengthen rationality during critical thinking: deductive, inductive, informal and practical reasoning. In themselves, each of these types is a process of critical thinking (Bandman & Bandman cited by Di Vito-Thomas 2000:175).

Rational thinking is used to analyse the logical connection among facts relevant to the problem and to evaluate the consequences (Hamilton 1996:120; Kamin et al 2001:28). Logic thus also features in rational thinking for managing haphazard and incoherent thought processes that are a hindrance to critical thinking. Logical reasoning is a component of rationality and a tool that can be used to justify decisions in critical thinking (Botes 2000:28).

To sum up, the attributes of critical thinking involve various thinking processes and strategies, learning domains, aims, outcomes, objects of intention and rationality. These should be continually employed as the thinker exercises critical thinking. Table 4.5 below represents a summary of the attributes of critical thinking from the data.

**TABLE 4.5 SUMMARY OF THE ATTRIBUTES OF CRITICAL THINKING**

Accuracy	Deliberation	Pattern recognition
Affective skills	Diagnostic reasoning	Perceptual categorisation
Analogy	Dialectic	Pondering
Analysis	Dialogic	Prediction
Analytic	Discourse	Probing
Application	Discovery	Psychomotor skills
Attention	Discrimination	Questioning
Attentiveness	Evaluation	Rational examination
Autonomy	Exploration	Rationality
Balanced thinking	Framing	Reasonable thinking
Care	Honesty	Reasoning
Caring	Hypothesising	Recalling
Categorisation	Independence	Reflection
Challenging	Induction	Reflective scepticism
Clarity	Inferring	Reflective thinking
Cognition	Inquiry	Reflectivity
Cognitive skills	Insight	Resolution
Comparing	Interpretation	Retrospection
Comprehension	Intuition	Scepticism
Conceptualising	Judging	Scientific process
Concluding	Justification	Self-regulation
Contemplation	Logical	Sense making
Contextuality	Meaningful	Supportive evidence
Contrasting	Meditation	Tolerance
Creative	Meta-cognition	Transformation
Critical analysis	Modification	Unbiased
Curiosity	Monitoring	Understanding
Deciding	Multifaceted	Value judgement
Decision-making	Participation	Values clarification
		Weighing

## 4.4 DEVELOPMENT OF DIFFERENT CASES

According to Walker and Avant (1995:42), the development of different cases of the concept is crucial to the clarification and illumination of the concept under scrutiny. The different cases were developed in this section to facilitate a better understanding of the concept *critical thinking*.

### 4.4.1 Model case

A model case is a real-life example of the use of a concept that includes all the critical attributes of the concept (McKena 1997:64; Walker & Avant 1995:42).

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### A Model Case of Critical Thinking

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A 32 weeks' pregnant woman arrives at the Primary Health care unit presenting with acute abdominal pain, and light per vagina bleeding. There is no doctor available. The nurse suspects placenta abruptio. The nurse then places the woman in bed, reassures her and inserts a drip to keep intravenous lines open. She requests an ambulance at the same time. While waiting for help, the nurse collects history on the characteristics of pain, colour of blood, amount of bleeding and foetal movements. She then examines the woman for the following:

- Height of fundus in relation to last normal menstrual period.
  - Foetal heart rate and rhythm and audibility of heart tones.
  - Pain on palpation.
  - Colour and consistency of blood on the sanitary pad.
- 

### Discussion

The above example contains the elements of *intuition, logic, higher levels of cognition, reflection, self-regulation, scepticism, rationality, scientific approach, autonomous thinking* and *insightful thinking* as depicted in table 4.4 to resolve the client's problem and avoid further problems.

#### 4.4.2 Borderline case

A borderline case contains some, but not all, of the critical attributes (Walker & Avant 1995:43; McKena 1997:67).

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### A Borderline Case of Critical Thinking

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Given the previous example, the midwife decides to perform a vaginal examination in addition to the above assessment with the intention to confirm her suspicions.

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### Discussion

In this case the nurse's actions may prove detrimental to the foetus and the mother as this may exacerbate vaginal bleeding. The nurse's suspicion is rational and her initial interventions are logical.

Critical thinking attributes are aborted on the way since the midwife did not act on her intuition and shows a lack of insight in performing a vaginal examination, which is contraindicated when there is vaginal bleeding, as in this instance. The nurse did not reflect on her actions and was irrational. Reflection as a form of post-mortem on the process and premises that lead to an action would make the nurse reconsider her actions. Alternatively, the nurse should have evaluated the reasons for actions decided upon before carrying them out, that is, reflective scepticism. These would have led her to reconsider. In this instance, her actions may prove fatal.

#### 4.4.3 Contrary case

This refers to a case that is not the concept being studied (; McKena 1997:65; Walker & Avant 1995:44). It is critical in determining the critical attributes although it does not meet the critical attributes of the concept being studied.

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#### **A Contrary Case of Critical Thinking**

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In the same situation as the model case, the midwife does a routine assessment of the fundal height, foetal heart tones, weight, urine tests and checks on vaginal discharge. The results of the routine tests seem normal and, as a result, the midwife decides to send the woman home.

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#### **Discussion**

In the above example, none of the critical attributes are found. The nurse failed to realise that once a woman complains, there is sufficient reason to warrant a thorough assessment of common problems in the second half of pregnancy. Thus, she has no insight. In addition, she lacks intuitive knowledge. Irrational and illogical action is evidenced by her incomplete assessment of the client. The midwife's intervention is therefore wrong, with none of the critical attributes of critical thinking, except routine management. Her actions lack reflection and rationality and, consequently, logic, intuition, analyticity, and what would have been triggered by these are lacking. This could be fatal for the mother and foetus.

#### 4.4.4 Illegitimate case/illegal case

An illegitimate case contains one or two critical attributes but most of the attributes will be missing (Walker & Avant 1995:44). It is a real-life example of the concept being used inappropriately (McKena 1997:68).

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##### **A Illegitimate Case of Critical Thinking**

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In the same situation as the model case, the midwife assesses the gestational age, listens to the foetal heart tones and sends the woman to hospital by ambulance.

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#### Discussion

The actions of the midwife are acceptable and, to some extent, rational since she used her intuition to refer the woman for further management. However, her assessment actions are incomplete as they demonstrate a lack of logical coherence and reflection on her actions, which should have guided her interventions. All other attributes of critical thinking are lacking.

#### 4.4.5 Related cases

Related cases are instances of concepts that are related to the concept but do not contain the critical attributes (Walker & Avant 1995:44). In this instance, all the defining attributes of the concept are missing but the concept is still seen as similar to the concept being analysed (McKena 1997:66).

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##### **A Related Case of Critical Thinking**

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The midwife in the situation described in the model case, in the presence of the client, stands quietly, seemingly deep in thought and contemplation. She just looks at the woman without saying a word or doing anything that relates to the woman's condition.

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## Discussion

In this instance, for the uninformed observing the midwife, it might appear that she is, at least, thinking. However, because she does not have knowledge of the woman's condition and complaint, she cannot *critically* reflect on the client's condition. However, her contemplation might relate to recollections of experience she has gathered over years of clinical practice. None of the attributes of critical thinking seems to be involved in this case.

### 4.4.6 Invented case

An invented case is one that is constructed using ideas outside our own experience (Walker & Avant 1995:44). It is a case that takes the concept out of its normal context and places it out of the ordinary situation (McKena 1997:67). In the example that follows, *critical thinking* has also been removed from the exemplar context, situation and situatedness.

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#### **An Invented Case of Critical Thinking Illegal computer operation**

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While working on a computer, an individual receives a message "Illegal operation" on screen. The computer automatically shuts down to reboot.

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## Discussion

In this example, the computer "thought critically" taking into consideration the configuration of the system (context) at that point and gave an "illegal operation" signal (rational decision), after which it shut down (decision and action). This was the only logical (rational) thing for the computer to do. Had the computer not shut down for a reboot, the program could have gone haywire, resulting in software damage. This would have been an immoral decision for the computer, given the fact that it knows what to do in the situation.



#### 4.5 DEFINITION OF THE CONCEPT *CRITICAL THINKING*

The purpose of this study was to clarify the concept *critical thinking* and, among other things, to develop a descriptive definition. Having explored the uses in education, nursing education, clinical nursing and other disciplines through linguistic analysis, a tentative descriptive definition of the concept *critical thinking* will be attempted. In general, according to Rossouw (2001:9), such a definition should

- indicate key characteristics and not be circular
- not be too broad or too narrow
- be straightforward with no figurative language
- not be formulated in a negative or non-affirmative style

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##### **Operational definition of *critical thinking***

Critical thinking is an existential cognitive process that involves rationality, self-regulation and reflective scepticism as the habitually inquisitive mind employs a variety of thinking strategies in responding to gap-producing situations through the rational, logical, and morally bound application of relevant quality information to arrive at plausible and tentative solutions.

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##### **Concise definition of *critical thinking***

Critical thinking involves higher cognitive processes of reasoning and reflection, with an existential orientation that is triggered by gap-producing situations in a habitually inquisitive and sceptic mind, directed to generating alternative courses of action, based on verified, relevant, quality information relating to the thinker's situatedness.

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These definitions of the concept *critical thinking* are, tentative, and provisional. In chapter 5, through the process of axial coding and reassembling of categories, the concept will be finally restructured.

## 4.6 CONCLUSION

This chapter presented and discussed the outcomes of the data analysis, mainly themes categories and subcategories. Different cases of the concept *critical thinking* were developed and discussed. The result of the analysis culminated in the formulation of a concise, though tentative, definition of *critical thinking*.

Chapter 5 concludes the study and discusses the theory and implications of the critical thinking process and makes recommendations.