

A Knowledge Analysis of Grade 12 Geography Textbooks Used in South African Schools

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DECLARATION

I hereby declare that this dissertation represents my original work and has not been submitted in any form or text for any degree or examination at any university. Where use has been made of the work of the other researchers or authors, it is duly acknowledged in the text.

T.D. Ngubeni

As the Supervisor, I have agreed that this dissertation may be submitted

Dr Carol Bertram

Abstract

Textbooks play an integral role in every teaching and learning process and they are the most essential tools used to transmit knowledge, skills and values to the learners. The purpose of this study was to examine if there is any change in knowledge representation and cognitive demands in the old curriculum and new curriculum grade 12 Geography textbooks.

The study was informed by Bernstein's concept of knowledge structures. The data were chapters from four grade 12 Geography textbooks. It employs a quantitative document analysis and an adapted analytical tool from Green and Naidoo (2008) was used to analyse data. The findings show that all the four texts contain more formal knowledge and more geographical images and definitions rather than everyday knowledge. The study also shows a noticeable change in the new curriculum textbooks regarding the number of tasks and questions used as a form of assessment. The new texts have a number of tasks and more questions in each task given but they show a minimal change in terms of cognitive levels, since across all the sampled textbooks most questions require understanding of factual knowledge. There are only few questions that engage learners in the other higher cognitive levels of reasoning other than understanding.

In the old curriculum texts there is more geographic content and subject specific images whereas in the new curriculum texts there is less content and more space is taken by assessment tasks and images. The study concludes that in terms of content knowledge there is no substantial change in the new textbooks. There is little integration in terms of knowledge within the subject, between geography and other subjects, and between subject knowledge and everyday knowledge. There is some change in the kinds of knowledge assessed in the tasks.

DEDICATION

This piece of work is dedicated to my 2008 CS Class, my colleagues at Congco High School especially Mr. NP Xaba who has been so selfless, generous and supportive throughout my studies.

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LIST OF ACCRONYMS USED

AS	Assessment Standards
C2005	Curriculum 2005
DoE	Department of Education
ECD	Early Child development
FET	Further Education and Training (Gr. 10-12)
GET	General Education and Training (Gr. 0-9)
Gr.	Grade
HSS	Human and Social Sciences
LO	Learning Outcome
LTSM	Learning and Teaching Support Material
NCS	National Curriculum Statement
NQF	National Qualification Framework
NS	Natural Sciences
OBE	Outcomes Based Education
RNCS	Revised National Curriculum Statement
SMT	School Management Team
SO	Specific Outcome
SS	Social Sciences
UK	United Kingdom
US	United States (of America)

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Chapter 1 Introduction to the study

1. Introduction

This study provides a knowledge perspective on four Grade 12 Geography textbooks. In this chapter I will introduce my study, describe the purpose, rationale, key research questions, and outline the structure of the thesis. Throughout the entire study the use of the term ‘old curriculum’ refers to the NATED Report 550 whereas the use of the term ‘new curriculum’ refers to the National Curriculum Statement (NCS).

1.1 Introduction to study

Unbanning of political parties and the release of political leaders in 1990, which was soon followed by the general non-racial democratic elections in 1994, marked a change in the history of South Africa. Such political change stimulated numerous social, economic and educational changes. In the light of educational change, a noticeably new and workable education policy was inevitable. The old oppressive and discriminating apartheid curriculum was initially overhauled and substituted by the Interim Core Syllabus (NATED 550) in 1996. Then Curriculum 2005 was introduced in 1997, followed by the Revised National Curriculum Statement in 2002 in the General Education and Training (GET) band and the current National Curriculum Statement for the Further Education and Training (FET) band which was finally introduced in Grade 12 in 2008.

A number of educational innovations surfaced and were geared towards addressing the challenges and demands of the new education policy. A vast number of subject specific textbooks per grade were published in order to provide a rather more relevant context and content to the daily classroom demands. These were aligned to the nine curriculum statement principles of social transformation, outcomes-based education, high levels of knowledge and skills for all, integration and applied competence, progression, articulation and portability, human rights (inclusivity, environmental and social justice), valuing indigenous knowledge systems, credibility (quality and efficiency) (Department of Education, 2003:1).

Authors such as Jansen (1995:133) describe the political influence in education system. He argues that the school curriculum in the South African context embodies important symbolism about politics in a society... 'it holds not only literal meaning (content to be covered) but also symbolic significance (power to be demonstrated)'. Similarly, in the US context, Sleeter and Grant (1991:280) argue that debates about curriculum content can be understood broadly as the struggle for power to define the symbolic representation of the world and society that will be transmitted to the young for the purpose of either gaining or holding onto power. They also say that symbolic representations in books and other media are often used to confer legitimacy on the dominant status of particular social groups that such representations in the curriculum render socially constructed relations as natural and subjective interpretations of reality and value judgements are projected as facts.

These authors argue the fact that the education system becomes a tool to uphold the ideologies of a particular powerful group in the society and these are transmitted through curriculum content in textbooks. They also highlight that (school) curriculum may not literally represent what it seems, since it may hold symbolic meaning. It is these arguments, which relate to representation of content knowledge in texts that encouraged me to examine how content knowledge is represented in the old and the new Geography textbooks.

In line with the above-mentioned authors, considering the issue of power relations and political symbolism portrayed in the school curriculum content, Christie (1992) as cited in McKinney (2005) maintains that a curriculum can never be free of political influence. In South Africa it contributed to socio-economic inequality across the racial diversity. Moreover, she further highlights that teaching methods, curriculum content as well as textbooks in particular played a central or a key role in justifying and promoting an apartheid ideology which was racist, sexist and classist.

Based on these perceptions one may conclude that lack of neutrality in the school curriculum content has a great influence on the kinds of knowledge used in classrooms by teachers and learners during teaching-learning situations since what is

being learnt as disciplinary knowledge is from various published material such as textbooks.

Taking into account what has been outlined in the previous paragraphs, it is evident that the greatest challenge faced by the South African government during the emerging of the new democratic era was to bring about immediate political, economic and social transformation. Apparently, with political change a curriculum change was inevitable. Moreover, the Department of Education (2003:1) National Curriculum Statement for Geography (like the generic curriculum policy) emphasises democratic values such as redress, non-sexism, non-racism, and equity and it also stipulates the nine NCS key principles as outlined in the previous paragraphs.

Above all, it also outlines the seven critical cross-field outcomes that require a learner to go beyond recall, recognition and reproduction of information and to critically evaluate, analyse, synthesise, produce and apply knowledge. Such a provision was made in order to bury the ills of the past brought about by the oppressive Bantu Education under Apartheid Regime, and to portray the kind of change Jansen (1995) argues for, and finally to advantage the previously disadvantaged South African communities in various contexts.

Given the changes in the country politically and in the curriculum policy it was of great interest to see whether textbooks have changed accordingly. Subsequent to the factors illustrated above, using a comparative analysis in this study I was able to gather substantial data to answer all my research questions for this study. I was able to analyse how the content knowledge and cognitive demands of activities are represented in two old and two new Geography textbooks used in SA schools classrooms.

1.2 Purpose of the study

This study provides an analysis of knowledge representation in Grade 12 Geography textbooks used in South African schools. It is similar to studies done by Green and Naidoo (2008) in Science, and Beets and Le Grange (2008) in Geography.

The study is informed by Bernstein's (1999, 2000) theory of knowledge and also uses revised Bloom's taxonomy (Anderson, Krathwohl, Airasian, Cruikshank, Mayer, Pintrich 2001) to analyse cognitive demand of assessment tasks. The Revised Taxonomy also describes four different kinds of knowledge such as factual, conceptual, procedural, and metacognitive knowledge. I analysed the tasks in order to check the nature of questions posed in each task, or the kind of knowledge the assessor (author of the textbook) requires from the learner in order to see how content knowledge and cognitive demands changed in the old and new curriculum Grade 12 Geography textbooks.

It purposively sampled two pre- 1994 Grade 12 Geography textbooks and two Geography textbooks written for the National Curriculum Statements. These were coded and analysed using an analytical tool, which was adapted from Green and Naidoo (2008).

The actual purpose of this study was to examine if there is any change in the knowledge representation and cognitive demands in the old and new Grade 12 Geography curriculum textbooks. It is a small study of the Grade 12 Geography textbooks analysis and it looks at only twenty percent of each the purposively sampled two sets of old and new textbooks. The results of this study cannot be generalised however they can be used to add to the existing body of knowledge and they can be taken as a milestone or yardstick for the extent to which change in the new textbooks has occurred in relation to the demands of the NCS (Geography) policy.

1.3 Rationale

I conducted this kind of study with an aim of exploring the change that may have happened between the old and the new Grade 12 curriculum textbooks in terms of knowledge representation and cognitive demands.

This study introduces another dimension of textbooks analysis as it focuses only in epistemological representation of knowledge and cognitive demands rather than on social representation in school textbooks. It explores critical issues relating

Geography. It also acknowledges and values the existing findings of the previous researchers and as well as the debates and perceptions which among other issues inspired the emergence of this study.

Furthermore, I have noticed that several studies on content analysis have been conducted in the fields of Science, Mathematics, History, Social Sciences (previously known as Human and Social Sciences), Technology, Languages but little has been done in Geography such as Beets and Le Grange (2008). Apart from that these studies focused on social representation such as race, class, gender and disability. Instead of looking at social representation, I wanted to look at epistemological (knowledge) representation and cognitive demands. My main focus in this study was to analyze knowledge representation in Grade 12 Geography textbooks and my purpose was to see if there is any change in knowledge representation and cognitive demands in the old and new curriculum Grade 12 Geography textbooks. I use the term 'old' to describe textbooks dated before 1994, and 'new' to describe textbooks that were written for the FET National Curriculum Statements, which were implemented in Grade 10 classrooms in 2006, Grade 11 in 2007 and Grade 12 in 2008.

This study on textbook analysis was also inspired by the fact that there is a number of perceptions and debates around the issue of education, curriculum plan and practice and textbooks politics worldwide by the likes of Sleeter and Grant (1991) in the US context, Christie (1992), Jansen (1998) and McKinney (2005) in the SA context to count but a few.

As an experienced Geography educator who is also a subject head, it is with these innovations together with the vast production of the Grade 12 Geography textbooks that inspired me to conduct this kind of research. As concise as it looks due to its limited sample which cannot be generalized, the study was conducted with a hope that its results will add to the existing body of knowledge and shed light on the shortcomings or potentialities that might exist in the production of these textbooks in question or any other textbooks intended to be used in South African schools.

As a result of these perceptions, a will to develop my subject at school as one of the high stakes exam subjects and to add to the body of knowledge, I felt a need to

conduct this kind of study which will in a way inform the publishers out there to ensure that what goes to learners at school is scrutinised.

1.4 Key research questions

As the result of the literature I consulted, the debates that had been going on in the field of education and perceptions that stakeholders have about the transition in South African education system, I come up with the three key questions which were the focus of this research:

- 1.4.1 How is content knowledge represented in the old (NATED 550) and new (NCS) curriculum Grade 12 Geography textbooks?
- 1.4.2 What are the cognitive demands of activities in the old (NATED 550) and the new (NCS) Geography textbooks?
- 1.4.3 How has content knowledge and cognitive demands changed in the old (NATED 550) and new (NCS) Geography textbooks?

1.5 Structure of the thesis

Chapter One

In this chapter I introduce the whole study to the reader. I give some background to the South African education system. I then introduce my focus, purpose, and the rationale for conducting this kind of study.

Chapter Two

This chapter reviews literature with an attempt to give a broader picture about similar study conducted on textbooks analysis. I have reviewed studies conducted in several contexts but with a much greater focus on local context because there is where I have drawn more content that I used to construct the analytical tool, I used in this study. I have categorized my discussion by looking first at the integration occurred in the GET Band where Geography and History are being combined and how the Learning Outcomes progress and continue from this band to the FET band where the two subjects become separate entities again. I focus more on the FET Geography, how it is

being defined by several authors in comparison to how it is being viewed by the National Curriculum Statement.

Chapter Three

This chapter looks at the conceptual framework. Several concepts underpinning this study such as classification, integration, progression, continuity, cognitive demands and knowledge typologies drawn from authors such as Bernstein (1995), Krathwohl (2001), Anderson (2005), Beets and Le Grange (2008) are outlined in relation to this study. The criteria that I used for coding and examples, as well as an overview of the conceptual and analytical framework are provided.

Chapter Four

This chapter provided a discussion on the methodology and methods that were used to collect data as well as the analytical tool that was used to do the whole analysis. I also provided samples of pages that were coded in the four coded texts for validity purposes.

Chapter Five

This penultimate chapter provides answers to my critical research question. I discuss the findings about knowledge representation, language, images, and cognitive demands. I also provided basic statistical analysis in the form of tables and graphs, since the data tends to be more quantitative than qualitative.

Chapter Six

In this chapter I have consolidated all the main issues came up during the study including my findings, limitations and my general comments. I have linked my study to other studies and clarified the noticeable difference between the old and the new curriculum textbooks.

Chapter 2 Literature Review

2.1 Introduction

In this chapter I will review several studies done in textbooks analysis. I will also give some background to curriculum reform in South Africa in general and on the integrated Geography curriculum with a look at Curriculum 2005 in the GET band and the National Curriculum Statement in the FET Geography. I will also elaborate on concepts such as integration, progression, continuation, classification, used in this study as explained by several authors.

2.2 The evaluation of Geography school textbooks by teachers in schools

The screening of school textbooks by the School Management Team, subject educators and the DoE officials such as Subject Advisers and Ward Managers has been taking place for a while. This has always been done in order to assist with the requisitioning of Learning and Teaching Support Material (LTSM) in schools during each financial year. Since this study is about textbooks analysis I have decided to include this section in order to provide some issues that can be taken into consideration or serve as basic criteria to evaluate LTSM before the actual requisitioning from publishers and suppliers, more especially the Geography textbooks which are expected to contain relevant geographical images, graphs and maps. In the next paragraphs I have considered several authors who conducted similar studies.

Highlighting the role and influence of resources such as textbooks and charts in children's learning, Butt and Lambert's (1996), cited in Beets and Le Grange (2008) argue that what children learn, how effectively they learn it and how well they perform in examinations is probably tied up in some way with the provision of textbooks. Apart from enlightening learners of the subjectivity involved in representing knowledge about people and places in Geography, Winter (1997) cited in Beets and Le Grange (2008) argues that Geography teachers need to review textbooks

critically in order to identify and reject those, which reflect evidence of ethnocentric bias (and other prejudices).

Furthermore, in the light of resources, Kent (1996) maintains that evaluation is an essential element of the resource management task, which includes among other things the purchasing of resources such as textbooks. As vital as it is, it takes up a large proportion of a department's budget. Evaluation of textbooks (resources) is also important in a way that a large number of Geography lessons are taught by non-specialists (out of touch specialists) who rely strongly on support of textbooks. He also highlights some challenges that educators may encounter such as the danger of making a snap judgement on the curriculum resource based on face value (word of mouth or superficial contact with the resource), impossibility of screening all the resources, and the massive range of products to select from.

Furthermore, in order to overcome similar challenges highlighted by Kent (1996) above, Wright (1985) suggests ten questions (similar to Geographical Association categories for review of teaching resources) an educator may ask when evaluating a book, inter alia;

- What is the true cost of the book?
- Is the language appropriate?
- Is the date of the book up to date?
- Are the themes and topics interesting and relevant?
- Are the learners' activities varied and appropriate?
- Does the book have full colour printing?
- Is the design and printing clear and attractive?
- Are the maps and diagrams comprehensible and interesting?
- Is the value-system of the book acceptable?
- Does the book suit me and my learners?

Robinson (1986) highlights that a major part of school Geography is about what can be seen in the world and Geography educators rely heavily on visual material to bring some reality into their classrooms. Connolly (1993) affirms that visual images are a

powerful medium for transmitting ideas. Moreover, apart from the whole book evaluation, Wiegand (1982) and Wright (1985) highlight that sometimes a particular aspect of a curriculum resource is evaluated such as the images (photographs) in the textbook. Wright (1986) poses ten questions, which may be asked regarding photographs inter alia;

- Are the photographs big enough?
- Are they sharp enough?
- Is the tone satisfactory?
- Are they free from propaganda?
- Do most of them show relationships?
- Do most of them show people?
- Do they attend varied work?
- Are they up to date?
- Is there bias (gender, race, age) in the selection of subjects photographed?

As a result of what Wright (1985) suggests as the questions that may be posed by educators to evaluate the books and photographs, Kent et al (1996) affirm that publishers have become increasingly sensitive to allegations of bias in the products and they even offer guidance to authors.

Teachers who evaluate school textbooks will use different criteria compared to researchers who analyse the same textbooks. The next section focuses on findings from textbook analysis studies.

2.3 Some textbook analysis studies

Several studies on textbooks analysis such as those outlined in the next paragraphs have been conducted locally and internationally to address social and epistemological representation in textbooks. The literature reviewed below has been used to illustrate how textbook analysis has been conducted globally, their main area of focus and to portray the uniqueness of the perspective used in this study.

Writing in the US context, Apple (1990) poses a critical question about the kind of knowledge that should be granted high status as an official knowledge in textbooks. Apple (2000:181) also maintains that 'it is naïve to think of the school curriculum as neutral knowledge, rather what counts as legitimate knowledge is the result of complex power relations and struggles among identifiable class, race, gender, and religious groups'. Apple (1990, 2000) reveals a concern about the lack of neutrality in the representation of knowledge in schools textbooks in the critical point of view.

Differently from Apple's (1990) political perspective, to enlighten the researchers Kirk (1990) argues that the curriculum package is not the only important lens through which to view the construction of school knowledge. It provides a literature from the fields of curriculum development and sociology of knowledge which he considers useful in illuminating the structured practices of creating and implementing curricula. Furthermore, he outlines a framework that more adequately allows the researcher to theorize about the ideological and structural dimensions of the selection and organization of school knowledge.

Kirk (1990) also attempts to show how school knowledge, (fixed or absolute) is structured according to the interests of particular groups (curriculum reform movements) belonging or supporting the dominant classes, or coalitions within specific school subjects. He further maintains that many students are unjustly disadvantaged in and by their school experience as a result of the influence of these interest groups. Moreover, he says a number of kits (including text-books) and pre-designed programmes exist in schools but researchers interested in the sociology of school knowledge have been relatively neglectful of the curriculum package as a means of investigating how school knowledge is produced, legitimated, and organized.

Also in the US context, authors such as Sosniak and Perlman (1990) using a comparative academic approach analysed and compared the textbooks used across the subject matters. In Mathematics the authors noticed that teachers focused only on conceptual knowledge rather than on procedural knowledge and students have little potential as resources for student learning. They also found that work in English textbooks is viewed as largely self-explanatory and resourceful to students even

outside the classroom, while in History or Social Studies the texts are neither entirely self-contained nor complete self-explanatory. Sosniak and Perlman (1990) conclude that the findings from the study indicate not only that textbooks hold a central place in the definition of curriculum in the US (context) and in the process of instruction in secondary education, but also in that textbooks are used in systematically different ways for different academic subjects.

Writing in the Turkish context, like Sleeter and Grant (1991) in the US, Gok (2001) uses a political lens to analyse the way gender roles were presented and how girls and boys were depicted in two Turkish elementary school textbooks, using a content analysis method. Citing Delamont (1990) he says students are heavily influenced by their homes and their neighbourhoods, and may disregard what teachers and textbooks say. On the other hand, Sleeter and Grant (1991) as cited in Gok (2001) argue that even if students forget, ignore, or reject what they encounter in textbooks, textbook content is still important because it withholds, obscures, and renders unimportant many ideas and areas of knowledge.

A much larger study of textbooks conducted by Sleeter and Grant (1991) examines the treatment of various groups in Social Studies, Reading and Language Art, Science and Mathematics. Sleeter and Grant (1991) examined forty-seven textbooks used in Grade 1 through 8 between 1980 and 1988 in the US. They developed a textbook analysis instrument based on various instruments that have been developed and used elsewhere. The instrument consist of six different analyses such as picture analysis (tally who is in each picture categorised by sex, race, Asian American, Black American, Hispanic American, American Indian, White American, Race ambiguous and mixed race groups, disability; individual/group; racial sex stereotypes and social background considered), anthology analysis, 'people to study' analysis (race and sex of each person mentioned in the text: science, math, social studies texts).

Furthermore, regarding language analysis they looked at language in the text for sexist usage, loaded words that contain racial or sex stereotypes, words/phrases that obscure viewpoints/possible conflict situations For the story-line analysis (analysing which group receives the most sustained attention/looks at whose story is being told, which group resolves problems, how the other groups appear, the extent to which

these other groups cause/resolve problems, who the author intends the reader to sympathise with/learn most about) and miscellaneous (analysed race, sex, roles of people in math story problem. Conclusions were made on bases of the findings collected through this instrument.

Sleeter and Grant's (1991) findings show that whites receive more attention or dominate textbooks since they are shown in variety of roles, and dominate the story-line and list of accomplishments. Black Americans are the next most included racial group. Other races are barely covered but only few contemporary stories in reading books. There is a little interaction among races. The books have successfully addressed gender issues by eliminating most sexist language. Males dominate in most books. Females are shown more in non-traditional roles than males. Social class is not treated in the books much at all, since the great majority of people and situations presented are middle-class or involve at least a modest level of financial status. Social class and poverty do not appear on the curricular agenda. Disability is ignored in most books.

Their study shows that treatment of diversity in textbooks has not improved much over the past fifteen years (1970-1988) instead white- and male dominated curricular is resurfacing which they argue is quite dangerous, producing citizens with shallow social consciousness and narrow sense of history and culture, and alienating from school lower-class children and children of colour. These authors also illustrate how the writers and publishers of today's textbooks have selected knowledge of various American racial, social, class, gender, and disability groups. Furthermore, they also show how American's diversity is projected to children through the school day and their school career, and the extent to which children are challenged in any subject area to think about discrimination and oppression. They finally suggest that textbooks need to be scrutinized carefully and those that do not conform should not be bought and used.

Similarly to Sosniak and Perlman (1990) in the US, Goom (2005) in the UK context uses an academic lens to analyse texts selected from a series of children's illustrated history textbooks designed for upper primary schools in the UK. In her study she analyses uses subheadings such as tenor, field and mode, historical knowledge,

linguistic/textual literacy, writer as an insider, visual text and appraisal in the text. She is making the point that certain truth in history texts are somehow twisted/distorted/misrepresented, which lead to misunderstanding of reality by a child or by an adult who is not familiar with such texts.

She also argues that the visual context and page design of the children's history book that was analyzed has inadequate map coverage, for example, the extent of the Moor's empire is not clear. A map of the Portuguese expedition along the African coast would have been made clear that Columbus as a young man had already made several voyages, including working out of Portugal, along African coast. The text expands on one part and fails to develop the rest. Judgements, evaluations and arguments in the text are made implicit.

In Spain, Collado and Atxurra (2006) use a critical lens like Sleeter and Grant (1990) and Gok (2001), to analyze how textbooks deal with the issues of education for democratic citizenship encompassed within the European framework and Spanish education reform. They investigate the extent to which primary school textbooks in Spain (Basque Autonomous Region) incorporate the ideals of democratic education and citizenship using the five specific topics considered fundamental within the Western and European approaches.

Their study outlines three distinct objectives such as analyzing how values oriented towards democratic citizenship are dealt with in integrated social sciences, natural sciences and technology textbooks in order to determine the specific aspects considered and context in which they are presented; analyzing the approach adopted by different textbooks in relation to questions of democratic knowledge, skills and values and studying their continuity or sequencing throughout the primary school curriculum. They also attempt to establish the frequency with which each of the aspects analyzed appear throughout the entire content of the textbook as well as the global frequency of this type of content in comparison with more academic traditional subjects.

Moreover, Collado and Atxurras' (2006) findings reflect that textbooks are too objective in dealing with certain topics. They argue that what is considered to be most

functional and critical in citizenship education has a very limited presence in the textbooks, and in the series compiled by some publishers, hardly appear at all. They also observed that there is a tendency towards focusing on a few specific values while other key issues are relegated to the sidelines. A number and types of contexts presented by the textbook indicate a clear bias. Most series they examined focus on habits, rules and obligations and hardly touch on the themes of care and concern for others. The series also focused mostly on the road and traffic regulations but to a lesser extent on civic obligations associated with attitude and behaviour on public transport and responsibility in general.

Locally, using academic and critical lenses McKinney (2005) highlights that before one analyses representation of the social world in textbooks, it is necessary to determine the kind of social world desirable to represent such a real or ideal world. By the real world she says one should consider the extent textbooks should represent reality such as demographics of the population in relation to race, social class, gender and disability, continuing racial segregation, traditional, stereotypical gender roles. About the ideal world one should consider to the extent textbooks should represent the ideal by showing equal numbers of men and women in professional roles, children of all races playing and living together.

Her study focuses on a range of diversity issues in analysing representation in textbooks such as race (racism), social class, gender (sexism), rural/urban location, and disability, kinds of culture, values, and knowledge being presented in textbooks and what kind of society is being presented. Her focus was on North American and United Kingdom (Rich-North Countries) and African Countries: Kenya, Mozambique, Zambia and Zimbabwe and Pakistan (Poor-South-Countries) textbooks.

She analysed 61 textbooks consisting of 51 Grade 1 readers with 111 stories (20 separate books with one story each) and Grade 7 with six Languages and four Natural Sciences textbooks. Titles were selected from the information the publishers supplied. She focused on learner books not on teacher's guides. Information on Learning Support Materials (LSMs) used in sample of rural schools was randomly selected for qualitative research worked in conjunction with Human Sciences Research Council.

She used two sample schools from each of the three provinces of the Eastern Cape, Limpopo and KwaZulu-Natal.

McKinney (2005) employed a content analysis to look at qualitative and quantitative aspects in the textbooks. For the quantitative analysis, characters were identified and counted according to race, gender, social class, and disability of characters in three categories: on the book cover, as main character/s of the story, of all characters and images in the book; whether the story was set in a rural or urban, first-ness and prominence was considered.

In the qualitative analysis she pays more attention to the kinds of activities different characters were engaged in, whether characters of different racial groups were shown interacting together and their roles; the general content of texts and themes and ideologies were addressed. She maintains that potential tools for challenging racism, sexism, and different forms of exclusion across the language texts in English were also assessed. Furthermore, she also analyses visual images and written texts in Grade 1 readers and in Grade 7 English, Afrikaans and IsiXhosa and Science books she only focused on visual analysis as a result of linguistic and time constraints.

Another example of a South African study on textbooks is one that was conducted by Green and Naidoo (2008) which focuses on sociological and epistemological representation in three Grade 10 science textbooks in the context of political reform in SA and the implications for access. The study was done because the post-apartheid national physical science curriculum was implemented for the first time in Grade 10 in 2006 and a variety of new textbooks for Grade 10 were published.

Their study employed a comparative analysis of three popular textbooks of which one is for the old curriculum and the other two are for the new curriculum. In their study they use an eclectic theoretical approach and a mixed mode qualitative and quantitative methodology. It revealed that the old text represents hard discipline knowledge, one of the two new books was similar to the old and the other new textbook represented more contextualised science knowledge.

Their study results show that one of the new textbooks reflects inclusive, softened science knowledge in a popular format and interactive style. This text reflects

utilitarian knowledge, places an emphasis on facts and conceptual knowledge requiring a learner to remember and understand, shows a weakened boundary between science and real world, and includes higher cognitive processes requiring a learner to analyze and evaluate. It is underpinned by a social-constructivist epistemological and humanistic philosophy of knowledge.

The old textbook reflects de-contextualized physical science knowledge, conventional academic science knowledge separated from real world, is written in English for first language speakers, and places its emphasis on factual and conceptual knowledge requiring students to remember and understand. It is underpinned by objectivist epistemological and rationalist philosophy. However one of the new textbooks also resembled characteristics of this nature. Finally they argue that the new textbooks differ in their potential to improve access science to groups, which have historically been marginalized.

Given the review on some of the studies done on textbooks analysis in various subjects it has been noticed most authors use similar criteria such as social and symbolic representation (pictures, images, graphs), racism, sexism, classism (social classes), culture, values, diversity/inclusivity, language, human rights, under-representation. It has also been noticed that very few studies on textbooks analysis have been conducted in Geography.

Most authors including Sleeter and Grant (1991), McKinney (2005), and Green and Naidoo (2008) report their findings qualitatively (textually) and quantitatively in the form of value/numbers, tables and graphs. They all argue that there is over-representation of white males in terms of gender and race, the natives and the disable are ignored, there is a lot of gender stereotypes visible (women are passive, men are brave and bold need to protect women, people of colour are poor and poverty in America doesn't exist). Furthermore, white men are presented as visionary and genius. Middle class dominates, and facts about the origin and history (sufferings) of other racial groups are undermined.

It is noticeable that issues of gender, race, social class, disability need to be dealt with in terms of equity. Such issues also need to be analyzed more especially in terms of content (knowledge) representation, since most studies on textbooks analysis have

been dealing with social representation in textbooks. Moreover, very little has been done in Geography. It is for these reasons that I decided to focus my study on analysing epistemological representation and cognitive processes in the FET Grade 12 Geography textbooks and in order to demonstrate another perspective in textbooks analysis.

2.4 South African schools and curriculum before 1994

Ndlovu (1999) highlights that in the early 1950s the education of black children was the responsibility of the churches through the mission school. Education for white children was run by the state and was compulsory. The introduction of the 1953 apartheid Bantu Education led to the closing down of most mission schools, which contributed to the black children attending government schools which were based on national Christian values, policies of separate development and Afrikaans as a medium of instruction (Ndlovu, 1999). The latter brought about great contestation and conflicts which contributed to the 1976 June 16 Soweto Uprising, since according to Jansen (1999) the curriculum of this nature was described as racist, sexist, Eurocentric, authoritarian, prescriptive, context-blind and discriminatory. Moreover, in practice more money was spent on white learners and education resources offered to black learners were inferior and unequal.

In the 1980s and early 1990s various activists did attempt to introduce alternative curriculum such as People's Education but all was in vain (Christie, 1997). There were a range of various bodies which contributed to the curriculum debate, such as the National Education Coordinating Committee (NECC), National Education Policy Investigation (NEPI-reports), Private Sector Education Council (PRISEC), Education Policy and System Change Unit (EDUPOL), Non-Government Organisations (NGOs), apartheid state proposal Curriculum Model for South Africa (CUMSA), and the National Training Board (NTB) of the National Training Strategy Initiative (NTSI) (Christie, 1997).

2.5 South African school Geography Curriculum Reform since 1994

The political arena in South Africa since the inception of the new democratic era in 1994 led to various educational changes. The first curriculum change was the

reviewing of all syllabi from the numerous departments of education. Seleti (1997) highlights that the actual cleansing of the existing syllabus of the overt racist and sexist material was an interim solution that was justified by John Samuel, a Director General of Education in 1995, as inevitable.

Fataar (1999) says this superficial reviewing of the syllabuses, which occurred between August and December 1994 needed to be ready by the end of 1995 school year. This led to the adoption of the new interim core syllabus in the form of NATED Report 550. The use of 'old curriculum' in this thesis refers to the NATED 550 whereas 'new curriculum' refers to the National Curriculum Statement (NCS).

Amongst other changes that took place were in the major subject fields of Geography and History, which were integrated into Human and Social Sciences (HSS) Learning Area in the new Curriculum 2005 for Grades R – 9.

According to the Department of Education (DoE) (1997) the previously called Human Social Sciences integrates History, Geography, Democracy Education, Developmental Studies, World Ethical and Belief Systems, Utility and Social Sciences, Economics and Home Economics. Such integration gave rise to positive as well as negative concerns and criticisms by various stakeholders including professionals, academics and intellectuals. When C2005 was reviewed in 2000, it was recommended that there be a strengthening of the content. In the Revised National Curriculum Statement, Geography and History are still combined in one Learning Area called Social Science, but each discipline has a set of separate outcomes.

Below I will illustrate how curriculum reform has occurred in Geography as an integrated learning area in the GET band and as a separate subject in the FET, by looking at integration, progression and continuity by drawing the relevant theory from several authors.

2.5.1 Integration

As one of the NCS principles the DoE (2003) says integration is achieved within and across subject and fields of learning. It also says the integration of knowledge and

skills across subjects and terrains of practice is vital for achieving applied competences (as defined in the NQF) which integrate the three discrete NCS competences such as practical, foundational and reflective competences. It also emphasises that by the so doing, an integrated learning of theory, practice and reflection will be promoted.

Looking at integration, Seleti (1997) maintains that in the curriculum framework (C2005) has two distinct processes. One of the processes involves the way in which learning is organized which rejects the rigid division between academic and applied knowledge, theory and practice, knowledge and skills, as well as education and training. The other process he mentions is about reconstructing knowledge into eight learning areas. What he highlights about these two processes is evident in the Social Sciences framework and it concerns what the DoE (1995) intended to reform in the GET phase.

Then, regarding integration as one of the principles of C2005, the DoE (1997) states that it happens across the learning areas (subjects/discipline boundaries) where learners learn through themes rather than pure disciplinary knowledge only, across academic or training divide to close the gap between theory and practice (school knowledge and everyday knowledge). According to Chisholm (2006), integration in C2005 was the dominant design feature due to the fact that curriculum designers aimed at overturning the rigidities of the old subject-based curriculum, making the new curriculum more relevant to work and everyday life and to reconnect theory and practice.

The DoE (2000) explains that the C2005 is linked to the vision and goals of the NQF and one of its aims is to facilitate lifelong learning for all South Africans. By so doing, an allowance for the transfer of skills from the training to the education strand or the other way round will be ensured. And this kind of integration aimed at addressing issues of equity and redress since in the past many people were excluded from the formal education system.

Regarding the state of affairs up to 1999, Beets and Le Grange (2008) explain that in 1997 the National Education Ministry launched a new curriculum framework entitled

Curriculum 2005 (C2005). They also explain that this curriculum aimed at replacing content-based education with outcomes-based education (OBE), teacher-centred pedagogies with more learner-centred pedagogies, replacing the 42 school subjects offered to learners in South African primary schools by eight learning areas which combined the old subjects to promote holistic and integrated approach.

In terms of boundary classification between integrated subjects, Wilmot and Norton (2004) in Beets and Le Grange (2008) maintain that such developments were marked by a shift towards a generalist curriculum with a collapsing of discipline boundaries resulting in history and Geography being subsumed within the HSS learning area as illustrated in the previous paragraphs. Apparently, this idea affirms Nichol (1984) notion that assumes subject boundaries in the integrated Social Studies as artificial and merely reflecting the self-interested and self-indulgent academics in a university world divorced from the realities, which faces both the staff and learners in the real world of schools.

Seleti (1997) argues in a more positive way that in the Early Child Development and Foundation stages of learning children learn more effectively in an integrated way. Nichol (1984) says that integrated Social Studies learning areas give learners an insight into a pool of subjects rather than one so that when a learner reaches Grade 10 (FET) he will be able to make a sound selection of subject fields that will enable him to pursue his intended career. Furthermore, Persons (1996) in Seleti (1997) highlights that the integration approach allows teachers to work as a team in a more flexible and varied manner. He also says it also it opens up opportunities for creative curriculum development and efficient management of resources.

2.5.2 Progression

With regard to conceptual progression as part of progression in general, Naidoo (2009) says it refers to the increase in the number, complexity and interconnections between concepts taught to develop a well-organized knowledge base. About progression in general, Beets and Le Grange (2009) say it refers to the way a learner's knowledge, skills and understanding are deepened in a given knowledge area as he or she moves through the school system. As one of the principles underpinning both the

Revised National Curriculum Statement and the current National Curriculum Statement the DoE (2003) says it refers to the process of developing more advanced and complex knowledge and skills. It emphasizes that it should be from grade to grade and this is reflected in the Learning Outcomes and Assessment Standards in each grade where the level of expected performance increases gradually from grade to grade as well in the content and context where the progression is from simple to complex.

Beets and Le Grange (2008) warn that without progression, there may be no advances in learning as learners may merely continue to learn the same or easier things in different grades. Chambers and Donert (1996) in Beets and Le Grange (2008) view progression as the careful and deliberate sequencing of learning experiences and activities so that children can build their current learning on previous experience and prepare for the future as well. In view of progression, Bennets (1995) maintains that a Geography curriculum should be designed to give learners opportunities to improve the quality of their descriptions and explanations, and to apply their understanding in increasingly sophisticated ways. Moreover, their explanations can reveal their understanding and together they will reflect their knowledge and their styles of reasoning.

As evident in Geography LO 1-3, Beets and Le Grange (2008) suggest that the idea of progression in Geography in the GET band should focus on how learners' learn in terms of acquisition of enquiry, map skills and techniques; constructing knowledge and understanding; the exploration of issues which include the development of values and attitudes. Butt (2002) argues that progression in Geography education should gradually extend the geographical content to include different features such as places, processes, patterns, and activities to mention but a few.

Considering the breath of study, Beets and Le Grange (2008) highlight that the prescribed curriculum in the Senior Phase of the RNCS reflects an increase in the breadth of geographical content and measure progression in geographical themes and complexity of these themes. They also argue that DoE (2002) outlines the assessment standards in a linear fashion, which might not resonate with the cognitive development of learners, which is often non-linear.

They also maintain that if assessment standards are regarded as level descriptors of achievement in relation to the learning outcomes this will mean that the verbs such as describe, identify will be the important indicators of progression. However when they applied the revised Bloom's Taxonomy Krathwohl et al (2001) to verbs and related actions in Grade 7 to 9, the cognitive progression was not significant however dual progression in affective dimensions embedded in nouns or phrases describing the expected action and context was evident and more significant.

A good textbook will make provision of means to assist the learner to engage with the content and tasks on his or her own such as giving the explanations of difficult terms in the form of definitions and glossaries which a learners require in order to master the content. Apart from integration and progression it should also show a continuity in terms of themes, sections, terminology and content from grade to grade and across the sections in the textbook. Below I will outline how continuity occurs in Geography.

2.5.3 Continuity

Although the DoE (2003) NCS policy is silent about continuity but it can be intertwined with progression as they reflect an interplay as highlighted by Beets and Le Grange (2008) in the previous paragraphs. Apart from that, Beets and Le Grange (2008:68) say it relates to the extent to which significant features of a discipline are emphasized as a learner moves through the school system.

This concept as defined above was included in this study to reinforce an understanding of progression since they are in a way interwoven and they complement each other. Therefore, this section is essential because it informs us that in order for the learner to access more Geographic knowledge he or she needs to get used to the basic concepts and principles underpinning that particular subject. This means that if a child has mastered the meaning of weather, climate and other related terms in the previous grades he or she will be able to access the content in the higher grades such as in Grade 12 much more easily. A good textbook will often provide information boxes with essential basic concepts or glossaries in order to assist a learner to interact easily with the text without using misleading dictionary meanings.

Pertaining to continuity in Geography, Bennetts (1996) says it suggests the persistence of significant features in geographical education as a learner moves through the school system. This may refer to concepts such as time, space, weather, climate, atmosphere, water, gases and direction, which actually form the basis of the Geographical knowledge.

According to him this implies that there are certain specific geographical features in the teaching and learning of Geography that will be evident throughout a learner's experience of Geography in school such as those listed in the previous paragraph. Lambert and Balderstone (2000) affirm that where continuity is strong learners will have the benefit of using and building on their previous learning in Geography as a result of that, they acquire skills and techniques, knowledge and understanding, values and attitudes in a structured way since they might be used to essential basic concepts and procedures.

Furthermore, Owen and Ryan (2001) in Beets and Le Grange (2008) maintain that the evidence of continuity in long-term planning of Geography education can be reflected in features like content, types of learning activity, common assumptions about the nature of the subject, geographical skills and use of certain resources. The best part of this is that Beets and Le Grange (2008) used these features as the criteria to analyze the extent to which continuity is reflected in post-apartheid Geography curriculum policy document.

As a result of such scrutiny the RNCS revealed that the prominent aspects of continuity across grades and phases in the GET Band relate to the development and the use of maps to develop spatial literacy; and the development of enquiry skills to support learners to develop the ability to ask geographical questions, to work with sources of different formats and to communicate their findings systematically in appropriate ways; to the construction of geographical knowledge and understanding as well as the exploration of social and environmental issues by emphasizing identification and understanding of the issue of making choices underpinned by values and attitudes that promote sustainability.

Continuity from the GET to FET perspective can be understood in terms of content involved, in a way that what is being covered in the three GET Learning Outcomes (LO) is similar to the three FET LOs, however in according to the DoE (2002) in the former specific content is written into the assessment standards while in the latter generic standards which focus on the conceptual development of the learner is gazetted.

The DoE (2002) affirms that such a development is evident in the conceptual themes in all the assessment standards such as people and places, people and resources, and people and the environment that organize knowledge and understanding in the Senior Phase are further developed in the FET band elements of natural and human processes, related spatial patterns and the interrelationships between humans as well as between humans and the environment. Beets and Le Grange (2008) maintain that evidence of continuity is also evident in geographical knowledge and understanding across grades and across bands.

Butt (2002) in Beets and Le Grange (2008) argues that the interpretation of assessment standards in the FET band depends to all intents and purposes on teachers' exercising epistemological labour and applying the theory of knowledge whereas in the GET band continuity is ensured by writing content knowledge into the assessment standards.

Regarding types of activities such as map reading and interpretation, research and fieldwork, Beets and Le Grange (2008) noticed that they are promoted across phases, and they are a strong feature of both curricula (C2005 and RNCS). Furthermore, they affirm that inquiry skills such as asking questions, collecting, organizing, analyzing, synthesizing and communicating information are encouraged across the bands.

Considering all what has been discussed above, it becomes obvious that there is a clear connection between continuity and progression. Butt (2002) affirms that there is a relationship (interplay) between continuity and progression in a way that if a curriculum is to have a strong sense of continuity it should ensure that the next course of study builds on particular aspects of a learner's prior learning in Geography.

2.5.4 The Revised National Curriculum Statement for the GET

A Review Committee on C2005 (2000, 31st May) was set up to investigate about the steps to be taken in respect of the implementation of the new curriculum in Grades 4 and 8 in 2002. Furthermore, the Committee had to investigate the key success factors and strategies for the strengthened implementation of the new curriculum, the structure of the new curriculum and the level of understanding of outcomes-based education. Chisholm (2000) who was the chair of the Review Committee in 2000 says among other findings of the committee was that:

- Teachers had a shallow understanding of the principles of C2005 and it varied from school to school and among DoE officials.
- The structure and design of C2005 was found to be skewed; there was a lack of alignment between C2005 and the Assessment Policy.
- Inadequate training of educators; learner support materials (LTSMs) were variable in quality and often unavailable.
- Follow up support insufficient, time frames unmanageable and unrealistic.

Three months after the Minister announced the establishment of the Review Committee on the 8th February 2000 and on the 21st of May 2000 the Review Committee provided a number of recommendations under three categories:

1. The structure and design of the revised curriculum.

An NCS for the ECD, GET, FET and ABET bands underpinned by four key design features such as the Critical Outcomes, Learning Area Statements, Learning Outcomes and Assessment Standards was to be developed.

All terminology used in the curriculum documents should be made clear and accessible.

Learning Areas reduced from eight to six in the GET band, more time allocated to Mathematics and Languages.

2. **Implementation of the revised curriculum.**

- The DoE officials in all structures was required to do a thorough curriculum planning, delivery and give a full support in terms of training, textbooks, LTSM.
- Teacher orientation, training and support will be given.
- A clear guideline regarding production of LTSM to be provided to the publishers and government.
- Teachers should be trained to use textbooks and LTSMs.

3. **Pace and scope of the implementation.**

- The NCS, which provides the framework for teaching and learning from Grades 0 to 9, should be developed by June 2001 (Chisholm, 2000).
- Grade four should continue until it is overtaken by a revised, streamlined curriculum, Grade eight continue on modified basis entailed by the reduction of learning areas from eight to six and the learning outcomes informed by NCS (Chisholm, 2000).

Chisholm (2000) highlights that the review of Curriculum 2005 in 2000 led to the creation of the Revised National Curriculum (RNCS) in 2002, which also became policy in the same year.

Apart from the recommendations that were given by the Review Committee (2000), in relation to Geography authors such as Beets and Le Grange (2008) examined whether revisions to curriculum frameworks have strengthened continuity and progression (as their main focus) in SA school Geography. They concluded that the elements of the two constructs in question are evident in both the Human and Social Sciences document of Curriculum 2005 (C2005) and the Revised National Curriculum Statement (RNCS) currently known as NCS for Social Sciences. They also highlight that several shortcomings that they discovered regarding the issue in question only needs teacher's competence and capacity in both geographical and

pedagogical knowledge, in a case where an educator who is allocated Geography is not qualified to teach it.

Moreover, Beets and Le Grange (2008) highlight that at the policy level, in the GET Band changes have occurred during the introduction of the interim syllabus in 1996; during the introduction of Curriculum 2005 in 1997; and finally during the introduction of the Revised National Curriculum Statement (RNCS) in 2002. They also argue that these changes in the three aforementioned phases have been introduced to strengthen Social Sciences in South Africa more specifically Geography as their main focus. They also argue that the question that arises from such changes and developments is about the criteria that could be used to assess improvement in the quality of Geography education in schools, ‘What criteria could we use to assess improvement in the quality of Geography education in school?’ (Beets and Le Grange, 2008).

In order to address the question they posed in the previous paragraph, they review some criteria that Chalkley, Fournier and Hill (2000) in Beets and Le Grange (2008) suggested such as the clarity of the goals and objectives, the development of a sound base of knowledge and understanding, ensuring an appropriate level of difficulty and learner-centred programmes to achieve deep rather than superficial learning.

Cited in Beets and Le Grange (2008), Chalkey et al (2000) argue that learners should be exposed to increasingly complex challenges through programmes that have attributes that motivate and engage them in learning that is systematically planned and organized. One other pedagogical issue Chalkey (2000) suggests is that educators should use a wealth of learning resources and appropriate forms of formative and summative assessment, since they tend to leave out continuity and progression which are discussed in paragraph 2.2.2 and 2.2.3 above. Beets and Le Grange (2008) regard continuity and progression as the key elements of Geography learning.

Furthermore, Beets and Le Grange (2008) argue that C2005 and RNCS accommodate the two constructs in its design features such as the phase specific range statements and assessment criteria respectively. However, in 2002 the RNCS policy document was finally published and retained OBE as a foundation as well as the Critical

Outcomes but Specific Outcomes were replaced by Learning Outcomes (which are more curriculum linked), parts of Physical Geography remained located within the Natural Science learning area, content was explicitly defined per grade, knowledge area with its own learning outcomes and knowledge foci the same way as in History.

In the GET Band, Beet and Le Grange (2008) highlight that according to the DoE (2002) learning and teaching Geography in the RNCS is about the development of enquiry skills to investigate key concepts and processes in Geography; knowledge and understanding of the interrelationships between people, resources and environment; critical analysis of development issues on a local, national and global scale. The GET senior phase policy document for the (SS) Social Sciences outlines (LO) Learning Outcomes 1, 2 and 3 as follows:

Learning Outcome 1: the learner will be able to use enquiry skills to investigate geographical and environmental concepts and processes (Geographical enquiry),

Learning Outcome 2: the learner will be able to demonstrate geographical and environmental knowledge and understanding (Knowledge and Understanding),

Learning Outcome 3: the learner will be able to make informed decisions about social and environmental issues and problems (exploring issues).

They also highlight that the LO 2 competences across the senior phase are organized into three themes such as:

- people and places,
- people and resources, and
- people and environment.

Bliss (2006) also in Beets and Le Grange (2008) maintains that these themes are further defined and reflect the spatial dimension (where and why thing are there) and ecological dimension (how humans interact with the environs) as the two key dimensions in Geography.

2.6 What does the NCS Policy Document say about FET Geography?

As it was discussed above, many changes occurred in the GET band where History and Geography were integrated as Human and Social Sciences, during the era of Curriculum 2005, and then became Social Science in the Revised National Curriculum Statement. Geography became a singular subject in the FET National Curriculum Statement. What I have noticed is that in the NCS policy document of the FET band is that there is an evidence of progression, continuity and integration with reference to the Learning Outcomes and Assessment Standards also outlined in the GET policy document (DoE 2002, 2003). The GET and FET LOs and ASs are outlined in the table 1 below:

Table1: Progression in the GET/FET Learning Outcomes and assessment Standards

LOs and ASs in the GET Band Senior Phase	LOs and ASs in the FET Band
<p>1. the learner will be able to use enquiry skills to investigate geographical and environmental concepts and processes (Geographical enquiry),</p> <p>A learner:</p> <ul style="list-style-type: none"> • carries out independent enquiries about aspects of the interrelationships between people, places and the environment. • Asks significant questions to evaluate sources e.g. to identify bias and stereotypes, omission, gaps. 	<p>1. focuses on geographical skills and techniques;</p> <p>Learners are expected to:</p> <ul style="list-style-type: none"> • identify issues and formulate questions for an investigation, • acquires information from fieldwork and variety of other sources, organizes information graphically, pictorially and diagrammatically, • analyses information obtained from a variety of sources reports findings in oral and/or written form.
<p>2. the learner will be able to demonstrate geographical and environmental knowledge and understanding (Knowledge and Understanding),</p> <p>A learner:</p> <ul style="list-style-type: none"> • provides a reasoned explanation of some approaches to development 	<p>2. focuses on knowledge and understanding</p> <p>Learners:</p> <ul style="list-style-type: none"> • Describe processes and associated spatial patterns in places and regions. • Identify similarities and differences in process and spatial patterns

<p>(people focuses on the application of skills and knowledge to practical issues and challenges and places).</p>	<p>between places or between regions.</p> <ul style="list-style-type: none"> • Describe the links between environmental problems and social injustices in a local/global context. • Describe the interdependence between humans and the environment at different scales.
<p>2. the learner will be able to make informed decisions about social and environmental issues and problems (Exploring issues).</p> <p>A learner:</p> <ul style="list-style-type: none"> • Identifies social and environmental conflicts in South Africa and compare with other contexts. • Identifies factors affecting selected social and environmental disputes including rights, gender, social, economic, and political demands in a particular context. • Analyses the causes of the disputes or conflicts. • Makes informed decisions about various solutions to and environs conflicts. (make choices). 	<p>3. focuses on the application of skills and knowledge to practical issues and challenges.</p> <p>Learners:</p> <ul style="list-style-type: none"> • Apply skills and knowledge to a range of phenomena, issues and challenges at a local and global level. • Identifies different values and attitudes held by individuals and groups associated with processes, spatial patterns, and human-environment interactions on a local and global scale.

Extracted from NCS Grade 10-12 (General) Learning Programme Guidelines (2005:11)

Learning Outcome 1: focuses on geographical skills and techniques;

Learning Outcome 2: focuses on knowledge and understanding and

Learning Outcome 3: focuses on the application of skills and knowledge to practical issues and challenges.

Regarding the scope of Geography, the DoE (2003: 11) also maintains that in each grade the LOs are underpinned by eleven assessment standards, which are supported by the relevant subject content. The most noticeable change is that in the FET Band there is continuity, progression and integration of the physical and human Geography sections' content knowledge, which were separated in the GET Band. Also covered in the scope is that the DoE (2003:10) emphasis that the five broad, essential skills and techniques such as asking questions, acquiring, organizing and analysing information, and answering questions should be integrated throughout all the learning Outcomes for Geography and never be treated as separate elements that are isolated from the content knowledge.

Given the purpose of Geography in the FET, the DoE (2003:9) outlines three aims such as:

- To develop tools and skills to research, interpret, analyse and make judgements based on the information gathered, thereby contributing to geographical literacy.
- To develop knowledge and critical understanding of the changing nature and interrelatedness of human existence and the environment over space and time.
- To prepare learners to become informed, critical and responsible citizens who can make sound judgements and take appropriate action that will contribute to equitable and sustainable development of human society the physical environment.

Drawing from these aims outlined in the previous sentences, it is evident that they are linked to the three GET and FET Learning Outcomes such as LO 1 (Geographical Enquiry), 2 (Knowledge and Understanding) and 3 (Exploring Issues) as outlined in the previous paragraphs.

The DoE (2003: 9) also maintains that Geography as a subject-field in the FET enables learners to explain processes and spatial patterns to make well-informed

judgements about the changing environments and contexts to think more critically and creatively about what it means to live sustainably, to recognize how values and attitudes influence and affect the environment and to apply a range of geographical skills and techniques to issues and challenges in a rapidly-changing world.

2.6.1 Comparing the NATED 550 syllabus and the NCS FET

According to Umalusi (2009) the NATED 550 Geography curriculum like other school subject fields was divided into higher and standard grade syllabi with separate external final examination question papers in both grades at the end of the year. Currently in the NCS curriculum the Grade 12 Geography candidates are assessed internally via portfolio tasks and externally in the final examinations. In the NCS the Geography content is not indicated as distinct grades but as Physical and Human Geography, which provide the broad framework of the examination for the theory part of the subject.

Furthermore, considering the curriculum organising principles such as sequencing, progression and pacing, general and subject-specific curriculum aims, pedagogic approaches advocated, guidance for internal and external assessment, Umalusi (2009) maintains that Geographic themes covered in both Physical and Human Geography sections in Grades 10 to 12 ensure a smooth continuity across school years. It was noticed that in both the NCS and the NATED 550, the specific content covered in a school grade is different from the content prescribed for the preceding or following grade such as Grade 11 which does not link to either Grade ten or Grade 12 syllabus. Due to this shortcoming of the lack of continuity, the Geography matriculation examination was and is still based on work covered in Grade 12 only.

The 2008 Maintaining Standards Report by Umalusi (2009) maintains that there is a minimal change in terms of the content and the broad Geographical themes coverage when comparing the NATED 550 to the NCS Grade 12 Geography curriculum framework. Among other topics that used to be in the old curriculum framework for Grade 12 Geography are the sections on Soil studies, ecosystems and environmental conservation. The new sections that are being added in the new curriculum are the smaller subtopics representing more relevant contemporary human environmental realities and issues under the theme of People and Places such as changing urban centres (post-modern urban settlements), local authorities, Agenda 21 (governance of urban settlements).

Furthermore, the NATED 550 higher-grade curriculum used to stipulate more content, more higher order type of cognitive demand than the standard grade curriculum. Apart from that, Umalusi (2009:37) highlights that the new curriculum reflects a new trend since greater emphasis is on how humans contribute to the environmental problems, how they respond to the natural and environmental phenomena and issues, which was absent in the old curriculum framework.

Moreover, in terms of level of difficulty between the NCS and NATED 550 higher grade curriculum frameworks, the former expects the learners to demonstrate the ability to use enquiry and Geographical skills and techniques (evident in Learning Outcome: 1) in the process of constructing Geographical knowledge and understanding (Learning Outcome: 2) which they should be able to apply (LO 3) in familiar and unfamiliar situations.

According to Umalusi (2009:37) this trend highlighted above is in a way similar to that of the past where it is assumed that the majority of learners are likely to perform at typical Standard grade level. However, the learners in the current system are not only expected to recall information like in the NATED 550 curricula for higher and standard grade but to show understanding of the selected content topics, to demonstrate that they can apply knowledge (newly acquired insights) and skills (assessment standards) as well as to solve problems.

In terms of time allocation for specific sections or topics, the NATED 550 higher and standard grade as well as the NCS does not provide clear indications. About 98% of the content in both curricula comprise discipline-specific knowledge (core Geography content) and 2% generic (applicable to Geography and other school subjects) and life-related knowledge (useful for life outside school). With an exception of Soil Studies, Ecology and Environmental Conservation which is omitted from the NCS curriculum, there is a slight change in terms of epistemological development across the Geography sections regarding content focus for instance, Climatology (disciplinary 95.2%, generic 4.8%, life-related 100%) in NATED 550 higher and standard grade whereas Climate and Weather in the NCS (disciplinary 90.5%, generic 9.5%, life-related 100%). In the NATED 550, Paper One used to be a section in Map-work but

in the NCS curricula Map-work, Map Projections and Geographical Information Systems (GIS) is integrated into Paper Two (Umalusi, 2009:40).

Umalusi (2009) also highlights that there was no description of desired general teaching and learning Education approach and aims in the NATED 550 documentation whereas in the NCS, a list of social principles and Outcomes Based Education (OBE) approach is fore-grounded. Moreover, assessment is also supported by the Subject Assessment Guideline, which outlines the Programme of Assessment with the required number of tasks to be completed by a learner for a continuous assessment.

2.7 Some concerns about Curriculum Change in South Africa since 1994

Drawing from previous studies, Seleti (1997) maintains that in other African countries such as Botswana, Zimbabwe, Kenya where this integration of subject fields occurred it created numerous problems and perceptions. Among other things, Persons (1996) says that the process of integration resulted in widespread teacher and parent hostility towards Integrated Social Studies (ISS) at junior level and pupil apathy and confusion. He says teachers also noted that the lack of basic knowledge and skills among incoming History and Geography students who had only done ISS at the junior secondary level. As a result of this hostility towards ISS, parents and teachers in Zimbabwe organized themselves against it and succeeded in preventing its implementation of which it could have influenced the perceptions of the South Africans towards integration in one way or another.

It has been noticed that the introduction of C2005 stirred up various stakeholders such as authors like Jansen and Christie (1998, 1999) into criticisms, concerns, discussions, debates, reviews (Chisholm et al., 2000) and revisions stemming from the difficulties of implementing the new curriculum in resource-poor contexts. Jansen (1998) argues that syllabus alterations in the early period in South Africa's democracy had symbolic rather than actual significance, even the cleansing of the inherited curriculum was more superficial since it came as a result of a set of pressures faced by a South African state in transition. Furthermore, these authors highlight that the superficial

cleansing of the apartheid curriculum meant that Geography curriculum did not change significantly just after the legal dismantling of apartheid (Chisholm et al., 2000).

Based on that drastic change in curriculum, Beets and Le Grange (2008) point out that the changes focused mainly on transition of factual knowledge and not on the development of enquiry skills in order to apply geographical knowledge and understanding to different geographical issues and context. They highlight that across the country including the Western Cape Education Department (1996:1) relied persistently on summative assessment that requires learners to recall memorized facts.

They further argue that the intended curriculum does have a bearing on classroom practice because the research in SA has shown that traditionally teachers have relied mainly on documents such as syllabuses and school textbooks and others to frame and guide their work. They have noticed that since 1994 curriculum change in Geography education was not substantive, in a way that in its revision it involved racial content as well as outdated inaccurate subject matter from school syllabuses.

Furthermore, Binns (1999) as cited in Beets and Le Grange (2008) explains that the launching of C2005 in 1997 raised concerns among geographers and Geography teachers that the essence and the distinctive character of Geography as a discipline could be eroded since the aspect of Human Geography were located in Human and Social Sciences and Physical Geography in Natural Sciences learning areas.

Drawing from Earle and Keats, Van der Merwe (1996) in Beets and Le Grange (2008) they argue that such a concern was based on the fact that the discipline itself is made up of many fields of knowledge such as Economics, Conservation, Hydrology, Politics, Demography, Development Studies, Regional Studies, Spatial Literacy, Environmental Studies, Energy Studies, Pedology, Biology, Geography, Meteorology, Climatology, Geophysics, Geology and Astronomy. Moreover, Mosidi (1998) as cited in Beets and Le Grange (2008) argues that if such sub-disciplines of Geography are not integrated into a separate Geography learning area they could become lost or diluted. However the Geography community attempts to create a more cohesive

learning area were all in vain since a split between Human Geography and Physical Geography has remained and has been left unaddressed.

Apart from that split in Geography sections as highlighted above, in terms of the content to be taught, the Human and Social Sciences (HSS) Learning Area in C2005 relied heavily on educators since there was no content prescribed for each grade in the GET band. Due to that the educator had to use any relevant learning programme activities to enable the learners to achieve the appropriate Specific Outcomes (or Learning Outcomes) and Critical Outcomes. Moreover, based on the individual educator-learning programme, their content emphasized the transmission of factual knowledge (memorized geographical facts), which was assessed through summative assessment, rather than the development of enquiry skills, which, allows the learners to apply geographical knowledge and understanding to various geographical issues and contexts.

According to Beets and Le Grange (2008) out of nine Specific Outcomes of the HSS Learning Area, eight of them are content outcomes, of which Specific Outcomes four to six are classified as Geography knowledge and understanding and Specific Outcomes seven focused on exploration of geographical issues. Similarly to Ballantyne (1999) these authors argue about the fact that success of the learners achieving these outcomes relied upon the educator's depth of knowledge and experience, the inverse is true.

In contrast to Ballantyne (1999), Beets and Le Grange (2008) argue that C2005 provided chances to break away from textbook-based behaviourist approaches to Geography education and chances for introducing social constructivist approaches to Geography education. Ballantyne (1999) also argues that C2005 in the GET Band aimed at providing the FET Band with background for specialist knowledge since it is compulsory for all the learners in the lower grades.

2.8 Some views on Geography as a school subject

I have included this brief discussion in order to give an overview as how authors view Geography as a discipline offered at the school level and to make a link to what the NCS Geography policy document prescribes as content knowledge to be taught at South African schools in the FET Band as evident in the Learning Outcomes highlighted above.

On one hand, Sebba (1995) says Geography is about the relationships between people and places; it aims to assist learners to make sense of their surroundings and develop an understanding about the interaction of people with the environment. On the other, Gregg and Leinhardt (1994) in Seleti (1997) maintain that the Geography as a field of knowledge is characterized by four concerns such as the distribution of features over the earth's surface which contribute to the unique character of places; understanding of how and why things happen, where and when do they happen; ways in which things that occur are causes and consequences of human decision; communicating information and ideas in the language of maps.

According to Boden (1976) Geography is made up of the three frameworks such as conceptual (ideas about terms and theories used to explain the location), systematic (distinctive features in the landscape and their particular locational attribute) and regional (areas or subunits of the Earth's surface).

Due to its strong integrative tendencies, Boardman (1986) places Geography in empirics since like physics, biology it relies on scientific method and accepts certain rules for the verification of the meanings, which they propound. Moreover, like Beets and Le Grange (2008), Hirst (1970) cited in Graves (1984) maintains that Geography is the arch example of an overlapping subject, and what he suggests is evident in physical Geography where geomorphology overlaps into geology and climatology into meteorology; also in human Geography where it overlaps into economics, politics, sociology and history.

Apparently, Phenix and Hirst, King and Brownell (1966) as cited in Graves (1984) affirmed that knowledge is not one but pluralistic and consists of several disciplines

of knowledge of which each is adding meaning to the experience of total reality as perceived by humans. This gives us an idea that such an infusion or integration of various chunks of knowledge into school Geography from the other disciplines of knowledge is for the entire intellectual development of the learners as encounters of Geography education in the teaching and learning situations in schools. From a single subject they experience and gain knowledge from different subjects, and they end up knowing what is happening in other fields.

In a broader view, King and Browell (1966) in Graves (1984) maintain that, like other disciplines Geography has a community of scholars, (syntactical) modes of enquiry and (substantive) interlocking concepts and principles forming part of language of the discipline structure, a heritage of literature and communication network, and emotive appeal to its adherents as they enjoy spending time working on it.

Cited in Graves (1984) Hirst (1970), King and Brownell (1966) give different perspectives about Geography as school subject. Hirst (1970) says that Geography as a school subject qualifies to be regarded as a field of knowledge whereas Hilton (1985) in Kent et al (1996) maintain that it qualifies to be an academic Geography. In the context of climatology and geomorphology Mottershead (1989) in Kent et al (1996) say that it qualifies to be a process-oriented (physical) Geography while King and Brownell (1966) says that it can be regarded as a discipline of knowledge.

Giving a brief background to changes in Geography since the initial coining of the word Geography by the Greeks and its first recognition as a school subject in the sixteen century, Boden (1976) says Geographers had to rely solely on data collected by first hand observation of features in the landscape. Furthermore, they changed into cause-effect model, later it was transformed into cause-effect deterministic model (to study land-man relationships), the latter was replaced by the broader framework of scientific method (inductive-deductive procedures) described as conceptual revolution in Geography.

Cited in Kent et al (1996), Hilton (1985) maintains that Geography as a subject researched and taught in higher education has traditionally had an influence on the nature and content of school Geography. She also highlights that physical Geography

in higher education for more than three decades has been perceived and practiced as a science. Moreover, in the context of physical Geography she maintains that science can be considered as a way in which knowledge about the living and non-living worlds is established since it uses scientific methods to generate and test ideas and theories as Boden (1976) affirm in the previous paragraphs above.

In view of sciences or conceptions Geography embraces, authors such as Boden (1976), Hilton (1985), Johnston (1997) affirm that Geography is an overlapping discipline and it can be explained by the three conceptions inter alia;

- **Analytical (positivist empirical) science** which, draws knowledge from direct experiences using senses such as visual observation (accurate observation and reportage);
- **Hermeneutic science** which involves interpretation of the world as it is perceived through a system of meanings that human construct developed by individuals through a continuous process of socialization and re-socialization in contact with others;
- **Critical science** ensures that people understand the rules by which a society operates so that they may be emancipated.

The NCS Grades 10-12 Policy for Geography (2003:11) LO2 highlights that it is an applied science, which seeks to apply skills and techniques, knowledge and understanding to issues and challenges in (our) immediate environments, and at a local, national, continental and global scale.

In comparison to what has been elaborated above, the National Curriculum Statement Grades 10-12 Policy for Geography (2003:9) defines Geography as a science that studies physical and human processes and spatial patterns on Earth in an integrated way over space and time. It further explains that it examines the spatial distribution of people and their activities, physical and human-made features, ecosystems and interactions between humans, and between humans and the environment in a dynamic context.

The whole definition given by the DoE (2003) portrays the elements of Geography as analytical, hermeneutics and critical science outlined by Boden (1976). It also reflects some attributes of interaction and relationships between humans themselves together with their immediate environments (systemic and regional framework) as Sebba (1995), an overlapping character is also evident as well Hirst (1976) as it integrates various aspect from the other disciplines of knowledge.

2.9 Conclusion

Drawing from the previous studies done on textbooks analysis and the background on curriculum change in Geography since 1994, as outlined in the previous sections, one would realize how essential it is to scrutinize formal texts and how the current FET National Curriculum Statement evolved from the Interim core syllabus in the NATED Report 550, the controversial C2005 and Revised National Curriculum Statement. One would also realize how Geography collapsed into Human and Social Sciences in Curriculum 2005 and transformed into Social Sciences in the Revised National Curriculum Statement both in the GET band. The role of continuity and progression was also highlighted which is evident in the Learning Outcomes and themes which occur in various degrees from the GET to FET band and from grade to grade. It was highlighted that Geography as a school subject according to NCS is an applied science and according to the three perceptions Hilton (1985) and the other authors highlighted, it qualifies mostly as an analytical science since it depends upon empirical data more especially in climatology of which its variables can be measured and calculated.

Chapter 3 Conceptual Framework

3.1 Introduction

In this chapter I will describe concepts informing this study such as the integration of school knowledge and everyday knowledge, collection code, integrated code, specific instructional discourse and classification as outlined in Bernstein (1971, 1996, 2000). The concepts from Bloom's Revised Taxonomy of knowledge dimensions and cognitive dimensions are also used (Anderson, et al. 2001, Krathwohl, 2002)

3.2 Knowledge typologies

Bernstein (1971, 2000) distinguished between school knowledge and everyday community knowledge. He regards school knowledge as specialized knowledge, educational knowledge or uncommon-sense knowledge, which is free from the particular or local knowledge. He maintains that this kind of knowledge comprises context-independent making of meaning or particular ways of organizing experience and making meaning in relation to school (code) knowledge. By school code he says it refers to meanings that reflect situations that are more abstract (codified, vertical, specialised) and context independent. It is found in the school curriculum and in school textbooks. In contrast to school knowledge, he says everyday knowledge is local, concrete experience based and context-dependent. This is what a layman would call a general knowledge or common-sense knowledge.

In view of these knowledge forms, Durkheim (1956) calls them sacred (context-independent) and profane (context-dependent) knowledge whereas Dowling (1998) calls them esoteric-domain (context-independent/disciplinary) and public - domain (context-dependent/everyday) knowledge. Bernstein (1999) distinguishes between horizontal and vertical discourses. By horizontal discourse he says it refers to everyday or commonsense knowledge that one acquires from an everyday context and is useful in everyday life. An example of this is when one illustrates the process of evaporation and condensation which is abstract, a teacher would use the everyday example of boiling water in the pot where a steam goes up and condenses on the lid of

the pot. One can see that this is everyday knowledge which Bernstein would describe as local, context-dependent and segmentally organized.

Concerning vertical discourse he says it refers to specialised subject knowledge that is context independent. Here, in order to illustrate the occurrence of the same processes (abstract concepts) one will then refer to the steam as water vapour which is water in a gaseous state and this rises up because it is lighter in mass than the column of cold air around, it condenses because the cold upper surfaces of which in real situation scientifically warm moist air expands becomes lighter, rises and cools off in the tropopause which is the cold imaginary layer of the atmosphere where clouds accumulate due to the release of latent heat and condensation process. This example is about moving from general (horizontal knowledge) to specific (vertical knowledge).

Hoadley (2007) argues that everyday knowledge is often emphasized in the progressive agenda aimed at empowering learners and facilitating their access to school knowledge. In a more critical view, she also highlights that it often the marginal groups such as the lower-ability learners or working-class children who are exposed to local, everyday knowledge often at the expense of the more specialized knowledge.

Bernstein (2000) also distinguishes between another set of discourses, namely the specific instructional discourse and the specific regulative discourse. The Specific Instructional Discourse (SID) refers to knowledge and cognitive competences, which indicate the knowledge contents to be taught in the teaching-learning context. Linking this discourse to the previous concepts outlined thus far, it refers to academic tradition or vertical knowledge. The Specific Regulative Discourse (SRD) refers to values, attitudes, and socio-affective competences, which establish order, relation and identity in the teaching-learning context. This in practice refers to the kind of interaction in the classroom situation, which cannot be seen in textbooks since it is more practical than theoretical and it is about the nature of control that occurs between the educator and the learners.

Knowledge can also be distinguished according to the traditions highlighted by Goodson (1987, 1992) such as the academic tradition and utilitarian tradition. According to him, the high status Academic Tradition is content-focused and stresses

(abstract) theoretical knowledge for examination whereas the Utilitarian Tradition focuses on practical knowledge related to the non-professional vocations. Goodson (1990, 1992) also highlights that the utilitarian tradition is of low status as it deals with practical knowledge not for written examination purposes.

Considering the types of curriculum the school may have, Bernstein (1971) from the sociological point of view distinguishes between a collection type and integrated type. Regarding the collection type (code) he says subjects are kept apart (well insulated) from each other hence they have very distinct (clear-cut) boundaries or contents are clearly bounded with a strong classification. In the integrated type (code) there is a little (reduced) insulation of subjects, the strength of the boundary between contents are blurred (permeable) because the curriculum may be based on themes. He also highlights that in the collection code, the contents stand in a closed relation to each other and a learner has to collect a group of favoured contents in order to satisfy some criteria of evaluation. In the integrated code, the contents stand in an open relationship to each other.

Furthermore, Bernstein (1971) also distinguishes between surface and deep structure of the knowledge or experiential knowledge. In simple terms a deep structure refers to elaborated code (more abstract, universalistic, context-independent, less context-bound, implicit) whereas surface structure refers to restricted code (context-specific, dependent or particularistic, predictable, explicit). Bernstein argues that pedagogy of integrated codes is likely to emphasize various ways of knowing in the pedagogical relationship. He further explains that in a collection code curriculum, the pedagogy tends to proceed from the surface structure of knowledge to the deep structure whereas in the integrated codes, the pedagogy is likely to proceed from the deep structure to the surface structure.

Bernstein (2000) also distinguishes between lateral and vertical demarcation. By the lateral (horizontal) he says it indicates how knowledge units and clusters are to be demarcated (separated) from each other, such as the boundaries between different subjects, between school and everyday knowledge. By vertical demarcation he says that it establishes how knowledge is sequenced within a particular knowledge cluster. It also focuses on how the knowledge within a discipline or knowledge cluster is organized.

This study shows how knowledge is represented in the old and the new Geography Grade 12-curriculum textbooks, in terms of school knowledge and everyday knowledge. Bernstein's concept of classification was used for coding and analysing the knowledge statements in the textbooks.

3.3 Classification

Drawing from Bernstein's (1971, 1996) theory, in the context and level in which my study is conducted (micro level), classification does not refer to what is classified but refers to the relations between the contents and the degree of boundary-maintenance between categories such as discourses. It also refers to the nature of differentiation between contents. A curriculum or a text may have strong classification, where boundaries are explicit and categories are insulated from one another; or weak classification where there is integration or where the boundary is weak or blurred.

With regard to discourses, the relations between different subject areas is called inter-disciplinary relations; between school knowledge and everyday knowledge which is being analyzed in this study is referred to as inter-discursive relations and if the relations between knowledge is within a particular subject area, it is referred to as intra-disciplinary integration. Concerning content knowledge, if there is integration across subjects this means that the boundary between them is weak, which means there is weak classification. If there is strong insulation of a subject, the boundaries are described as a strong and the classification is strong.

Where there is a strong classification that will be a collection code where pure Geography/disciplinary knowledge dominates the whole textbook or teaching but where there is a weak classification that will be an integrated code where everyday knowledge/integration across subjects is evident in the textbook or teaching is according to themes. In terms of the relative status and the amount of time accorded to a given content, the collection code becomes compulsory (academic tradition), which means that only disciplinary knowledge is assessed during the exam because it is more subject-specific. On the other hand, the integrated knowledge becomes more optional (utilitarian tradition), which means that everyday knowledge is included in the text to reinforce an understanding of the subject specific knowledge but it cannot be assessed during the exam.

Basically, in this study the concept of classification, integrated and collection (knowledge) codes are being used to assist with the understanding of how the Grade 12 Geography text transmits the knowledge forms (Bernstein 2000, Dowling 1998) outlined above.

3.4 Cognitive Demands

In order to deal with the issue of analyzing the cognitive demands, whereby I had to examine questions in each task given in each text, I chose to adapt the method applied by Green and Naidoo (2008) in their analysis where they used the Revised Bloom's (1956) taxonomy (Anderson, Krathwohl, Airasian, Cruikshank, Mayer, Pintrich, 2001). I had to categorise the cognitive level required and the kind of knowledge the assessor requires from the learner.

Anderson (2005) highlights that successful attempts have been made by a group of educators, people with expertise in cognitive psychology, in curriculum and instruction, testing, measurement and assessment in order to revise the original Bloom's (1956) Taxonomy of Educational Objectives. He argues that the original Taxonomy contained six major categories, which were placed in a single dimension, arranged from simple to complex (cumulative hierarchy) and from concrete to abstract. He also mentions that according to the original Taxonomy knowledge and comprehension were believed to be more simple and concrete whereas synthesis and evaluation were more complex and abstract.

In contrast to the original taxonomy with a single dimension, the revised (Anderson, Krathwohl, Airasian, Cruikshank, Mayer, Pintrich, Rath and Wittrock, 2001) taxonomy contained two dimensions with both the horizontal and vertical dimension. They regard the horizontal dimension as a cognitive process dimension in which levels like application, analysis and evaluation has been substituted by their verb form. In the light of action words used, Knowledge was replaced by Remember, Comprehension, Understand, Synthesis, and Create of which Create was later placed in the highest position of cognitive process.

Anderson et al (2005:105) name the vertical dimension a knowledge dimension consisting of Factual, Conceptual, Procedural and Metacognitive knowledge. They

maintain that this was a move from content to types of knowledge. In order to make this much simpler they give a brief description of each type of knowledge as outlined below:

- A. **Factual Knowledge-** the basic elements that learners must know to be acquainted with a discipline or solve problems in it such as terminology and details.
- B. **Conceptual Knowledge-** the interrelationships among the basic elements within a larger structure that enable them to function together such as classifications, categories, principles, generalizations, theories, models and structures.
- C. **Procedural Knowledge-** how to do something, methods of enquiry, and criteria for using skills, algorithms, techniques, and methods.
- D. **Metacognitive Knowledge-** knowledge of cognition in general as well as awareness and knowledge of one's own cognition such as strategic knowledge, task knowledge and self-knowledge.

The main levels in the Cognitive Process dimension are:

1. **Remember-** retrieving relevant knowledge from long-term memory.
2. **Understand-** determining the meaning of instructional messages, including oral, written and graphic communication.
3. **Apply-** carrying out or using a procedure in a give situation.
4. **Analyze-** breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose.
5. **Evaluate-** making judgements based on criteria and standards.
6. **Create-** putting elements together to form a novel, coherent whole or making an original product. (Krathwohl et al, 2002: 214-215)

3.5 Overview of the Theoretical and Analytical Framework

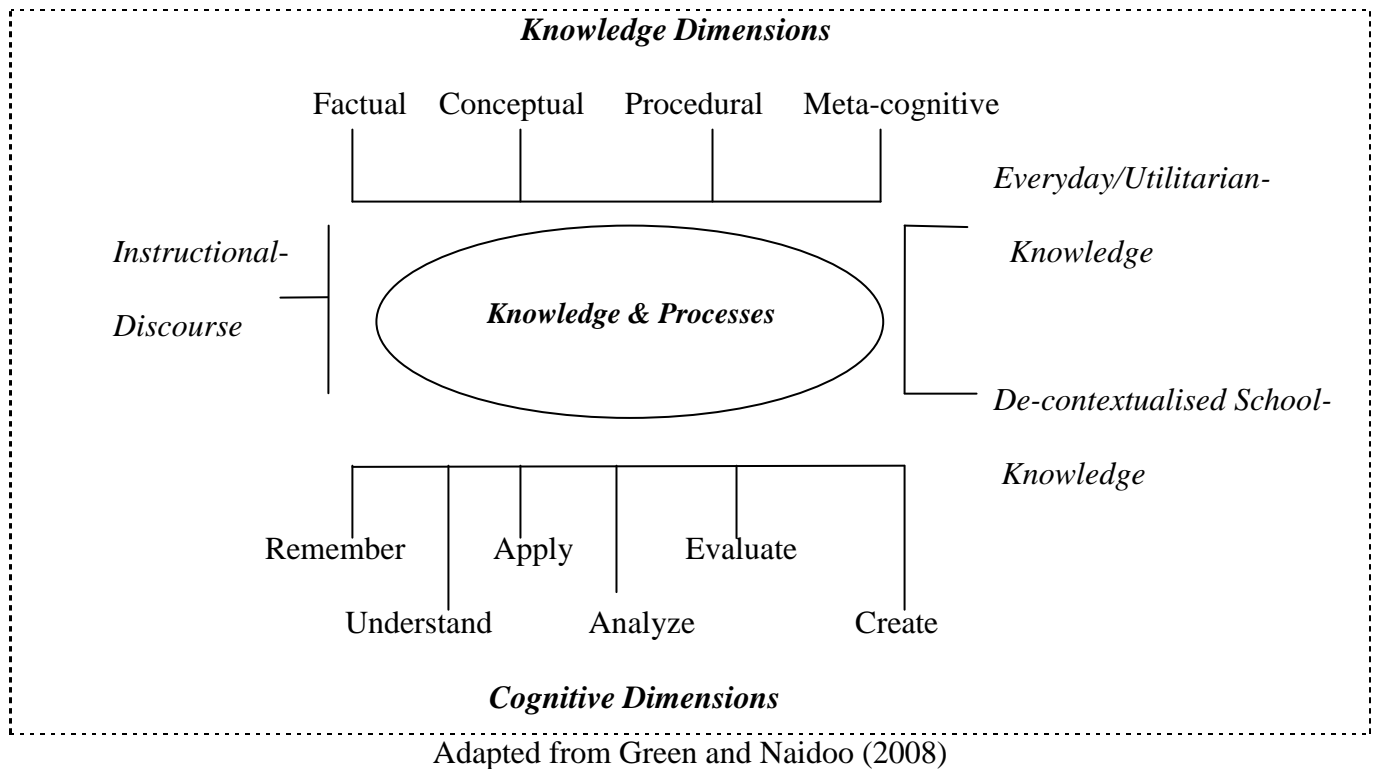


Figure 1. Knowledge and Cognitive Dimensions in Geography Grade 12 Textbooks.

3.6 Conclusion

In this chapter the key concepts informing this study were described. Concepts about knowledge and classification were drawn from Bernstein (1971, 1996). For cognitive demands where tasks were examined, a revised Bloom’s (1956) taxonomy by Krathwohl et al (2002) was used to analyze questions with an aim of locating the cognitive levels the questions were asked and the kind of knowledge required from the learner as outlined in Figure 1 in section 3.5.

Chapter 4

Methodology

4.1 Introduction

As it was discussed in the previous chapter, the analytical framework for this study was drawn mostly from Bernstein's (1971, 1996) knowledge typologies and classification codes as well as from Anderson and Krathwohl (2002) Revised Bloom's taxonomy.

In this section I will discuss the methodology and samples used to conduct this study. This study employs quantitative content analysis to analyse the texts and uses an adapted analytical tool as an instrument to record data. It represents the data in a quantitative style. The study draws theory mainly from Bernstein's theory of knowledge and the revised Bloom's Taxonomy. It was modelled on a study by Green and Naidoo (2008).

4.2 Sample

Four Grade 12 Geography textbooks were purposively selected. They are described using pseudonyms namely; Text A1 (1986) old curriculum textbook and Text A2 (2006) new curriculum textbook both by the same authors and same publisher; Text B1 (1990) also from the old curriculum and Text B2 (2007) from the new curriculum by different authors and different publishers.

The main purpose of this was to see if there is any change evident between the old curriculum textbooks and the new curriculum textbooks in terms of knowledge representation and cognitive demands. With this idea in mind, I decided to examine a widely used textbook that has long been around and has continued to publish between the two curriculum eras coded here as Text A1 and Text A2. This was to trace the trend and a noticeable shift from the old to the new curriculum. I also used two different textbooks from the old and the new curriculum eras by different authors and different publishers coded here as Text B1 and B2. The latter was used to get an adequate picture of curriculum change in Grade 12 Geography textbooks and to do a comparative content analysis between the old and the new textbooks.

As it was highlighted in section 2.6, the NCS Grades 10-12 Policy for Geography (2003:11) LO2 highlights that Geography is an applied science, which seeks to apply skills and techniques, knowledge and understanding to issues and challenges in (our) immediate environments, and at a local, national, continental and global scale. Therefore, with this definition in mind I decided to sample Climatology, which is a subsection of physical Geography. I decided to examine this section because it is more scientific in nature and it is where a change could be noticeable. This does not mean that in other sections such as Human Geography, Regional Geography and Map work there could not be any change. As a more abstract section, an author might try to do an integration of more general explanation, using everyday knowledge and examples with an aim of increasing an understanding of the abstract processes in the content.

The four texts had varying number of pages in climatology and for the whole book, as shown in the table 2 below:

Table 2: Number of pages per text

Climatology only					The whole textbook			
Texts	A1	A2	B1	B2	A1 (1986)	A2 (2006)	B1 (1990)	B2 (2007)
No of Pages	55	67	38	55	520	340	415	340

Generally, each one of the sampled texts had varying number of pages, text A1 had the largest number of pages of about 520, text B1 had 415 pages, text A2 and B2 as new curriculum texts had 340 pages each which is less than the old texts. However, with climatology, which was the section that was selected for the analysis, the new texts had more pages than the old texts as illustrated on the table above and in the next paragraph.

In terms of the unit on Climatology, Text A1 had 55 pages with more content knowledge and images such as maps, symbols, diagrams and less number of tasks which are given as revision questions or a summative assessment. Text A2 has 67 pages with more content knowledge and illustrations, geographic and social pictures, maps and it provide assessment tasks both as formative and a broader module

assessment as a ‘summative assessment’. Text B1 had 38 pages which were fewer compared to the other texts but with more content knowledge, illustrations and maps, and it provides formative assessment which is presented as ‘something to do’ after each subtopic and also provided a list of revision questions as a summative assessment after a chapter. Text B2 had 55 pages with less content knowledge and case studies, more illustrations, maps and pictures, a number of information boxes presented as ‘key terms’ with definitions, ‘did you know’ and cartoons with more hints about the subtopics being covered. It also provides a glossary, which is presented as ‘revise the terms’. It has numerous tasks presented as formative assessment after each subtopic and revision questions ‘assessment’ presented as a summative assessment.

4.3 Analytical tool

An analytical tool used to analyze the texts was adapted from Green and Naidoo (2008), Bernstein’s knowledge theory and classification codes (1971, 2000) as well as from the revised Bloom (1956) taxonomies by Krathwohl and Anderson (2002). The study employed this because the main focus was only in examining the epistemological representation and cognitive demands (processes) in the Grade 12 Geography textbooks, which happened to be either textual or visual segments or both. 20% of each textbook’s content was coded and analyzed. The DoE (2003) views Geography as an applied science, and then the section of Geography, which contains more science, is physical Geography. For this study I used climatology for my analysis. (See the Analytical Tool in Table 3 below)

With the other M.Ed student researcher who was doing a similar study, we decided to code paragraphs, tasks, images and language glossaries and use them as the units of analysis.

4.3.1 Paragraphs

With the other researcher who was doing a similar study, we decided to code textual segments instead of singular sentences containing content knowledge in order to analyse knowledge representation as shown below and in figure 3 and 4. A group of

sentences reflecting integration as shown below were coded as C- since they do not reflect pure geographic content:

'I was born in the Koue Bokkerveld near Ceres. After attending Kleinvlei Secondary School in Eerste Rivier, I completed a BSc and MSc (Oceanography) degree at University of Cape Town. I completed...' **K (Knowledge statement) 1 C-** (extract from text A2, a case study of a Climatologist).

A group of sentences reflecting a pure geographic content were coded as C+ as shown below:

'During summer, if there is an inversion it is positioned at a higher level than that of the plateau.' **K (Knowledge Statement) 2 C+** (extract from text B2, a content knowledge about the occurrence of the inversion layer)

4.3.2 Tasks

Activities/assessment tasks were coded as tasks and in each task we coded each question item asked in order to analyze cognitive demands as shown below and in figure 3 and 4:

Example of coding of a task for analysis of cognitive dimensions

ACTIVITY 4 Basics of the tri-cellular model (LO1, AS4) TEXT B2 P. 63

1. Briefly explain why the global circulation of the atmosphere occurs in three cells. **(2B) 2-understanding, B-conceptual knowledge**
2. What is the direction of the winds in the tropical cell? **(1A) 1-remember, A-factual knowledge**
3. Describe what happens where the tropical easterly winds meet at the equator. **(2A) 2-understanding, A-factual knowledge**
4. What occurs at the polar front? **(2A) 2-understanding, A-factual knowledge**

Each task had to indicate whether it is written or an oral work, a group work or an individual work as well.

4.3.3 Images

We coded visual segments such as diagrams, illustrations/drawings, maps and pictures as images, as shown in Figures 2a, 2b, 3 and 4. Social pictures such as those shown in figure 2a were coded as C- since they do not reflect pure geographic attributes.



FIGURE 2.25: Preparing for the storm. Eleanor Garmer, with her scooter loaded with hurricane supplies. She survived Cyclone Rita on her boat with four cats

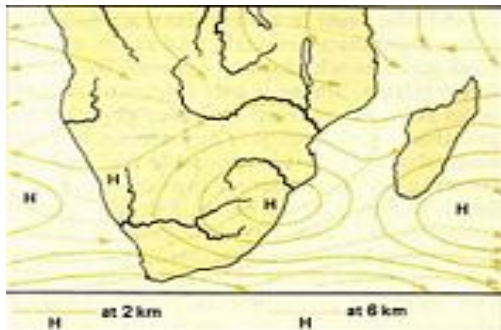


This annual average temperature of a city can be several degrees higher than that of the surrounding countryside

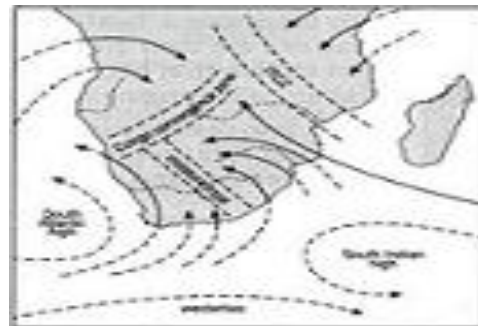
Figure 2a (Text B2) I (Image)1 C-

(Text A1 and A2). I (Image)2 C-

Pictures such as those shown in figure 2b were coded as C+, because they reflect a pure geographic attribute.



(Text B1) I (Image) 4 C+



(Text B2) I (Image) 5 C+

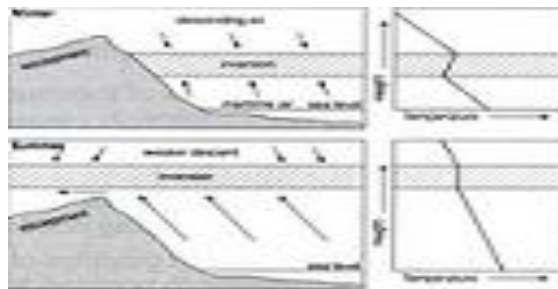
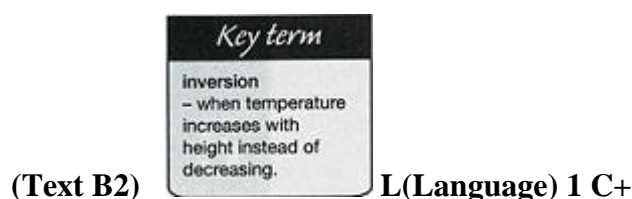


Figure 2b (Text A2).

I (Image) 6 C+

4.3.4 Language

Glossaries and information boxes such as the one shown below with key terms, explanations or definitions were coded as language because they provide more meaning to the content by explaining subject specific terms or concepts with other subjects used in the text. Concepts and definitions, which reflect integration from the other subjects were coded as C- and those which reflect pure geographic knowledge were coded as C+ as shown below and in figure 3 and 4.



In summary, all the paragraphs in each page till the last page in each textbook in the sampled chapter were coded e.g. K1, C+/C- (K-knowledge, 1-number of the paragraph, then C+ for strong classification, or C- for weak classification of content in each paragraph).

In the same format, tasks were also coded e.g. T1, 2a (T-task, 1-number of the task coded; then 2-cognitive process dimension, and a-knowledge dimension of each item (question) coded in each task across all textbooks). Images across the chapter in each textbook were coded as, I1 C+/C-, I2 C+/C- etc.

I-image on the page, 1 image number in that section, C+- strong classification/does it constitute pure Geography and linked to the content/task or everyday knowledge/no link; C- weak classification, does not constitute pure Geography and no link to the content/task.

Language was coded as L1, L2 etc. L- language, definitions on margins/footer or glossaries in each page of each textbook, 1- number of the definition, glossary provided in each page across all the four textbooks.

The table below shows an example of an Analytical Tool that was used for the analysis of texts. Samples of pages are provided in figure 3 and 4, larger version of sample pages on annexure A.

Table 3: Example of the Analytical Tool

Unit of Analysis	Categories	Classification/Codes
1.Paragraphs	1.Academic Knowledge Specialized/subject specific and abstract	C+ Strong
	2.Everyday Community Knowledge General/non-geographic/concrete experience based	C- Weak
2. Images	Academic Specialized/subject specific/pure geographic	C+ Strong
	Everyday General/Social/non geographic	C-Weak
3. Language	Academic Specialized/pure geographic/abstract/subject specific	C+ Strong
	Everyday Non geographic/integrated	C-Weak
4. Tasks	Knowledge Dimension	
	A. Factual Knowledge -basic elements that learners must know	A
	B. Conceptual Knowledge -interrelationship among basic elements	B
	C. Procedural Knowledge -how something, methods of enquiry	C
	D. Metacognitive Knowledge -knowledge of cognition in general, awareness and knowledge of own cognition	D
	Cognitive Dimension	
	1. Remember -retrieving relevant knowledge from long term memory	1
	2. Understand -determining the meaning of instructional messages	2
	3. Apply -carrying out, using a procedure in a given situation	3
	4. Analyze -breaking material into its constituent parts and detecting how parts relate to one another and to purpose	4
	5. Evaluate -making judgements based on criteria and standards	5
6. Create -putting elements together to form a novel, coherent whole or making an original product	6	

anticyclone. They realise that it is impossible to represent on one map the air circulation on the plateau and at sea level. All weather maps show sea level circulation in terms of surface isobars, and plateau circulation in terms of contours at the 850 hPa pressure level.

A high pressure cell is formed by subsiding air. Meteorologists ascribe this downward movement of air to inversion conditions in the upper atmosphere – the temperature rises with increasing height instead of decreasing, as would normally be expected. Since subsidence is dominant, uplift, the requirement for all precipitation processes, cannot occur. The location of the Kalahari high in its usual position therefore indicates fine weather, no rain, much sunshine and an absence of cloud – the conditions associated with 'sunny South Africa'.

Although this situation occurs chiefly in the winter months, it is also very common in summer. Rain-producing conditions are the exception rather than the rule and southern Africa has problems of drought. The prevailing

pattern of atmospheric pressure and circulation must be disrupted before the conditions are favourable for the formation of precipitation.)

Subsiding air during winter anticyclonic conditions establishes stability. Since subsiding air is heated adiabatically, the lower layers of this air are relatively warm. A sharp temperature inversion occurs between the coast and the escarpment. The base of this inversion varies in height from 1 km in the south (at 30° S) to 2 km above Mozambique. As indicated in the figure, the inversion and accompanying stable conditions are often lower than the level of the plateau.

Upward and westward movement of moist air by the easterly airstream of the cyclone, as well as penetration of other disturbances into the interior of the country, is virtually impossible. Consequently, the winters on the plateau are dry.

During the summer, if there is an inversion, it is located at a higher level than that of the plateau (fig. 2.21). Penetration of moist air

Fig. 2.21 The stable conditions and inversion created by anticyclonic subsidence occur both in winter and in summer, with one important difference – the height and intensity of the inversion.

system, as well as penetration of other disturbances into the interior, is virtually impossible. Consequently, dry winter conditions prevail on the plateau.

During summer, if there is an inversion it is positioned at a higher level than that of the plateau. Penetration of moist air from the anticyclone into the interior, and onto the plateau, can then take place freely from an easterly direction. However, anticyclonic subsidence remains predominant over Namibia, thus accounting for desert and semi-desert conditions along the west coast (fig. 2.30).

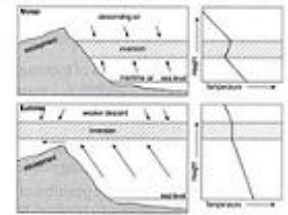


Fig. 2.30 The stable conditions and inversions created by anticyclonic subsidence in winter and summer

Moving disturbances in summer

T1

Activity 1B Map reading about moving disturbances in summer (CASS)

Study the following two maps illustrating the basic summer patterns of air pressure (fig. 2.31) and air circulation (fig. 2.32).



Fig. 2.31 Basic summer pattern of air pressure



Fig. 2.32 Summer air circulation patterns

- 1 Do you think the mid-latitude frontal systems normally have an effect on the country during summer? Substantiate your answer.
- 2 The centre of the South Indian high-pressure system is situated far from land. Explain how air moves around this cell until it reaches the land.
- 3 Why is the following statement true? 'The air is laden with moisture by the time it reaches the coast of southern Africa'.
- 4 As the South Indian High nears the land, south-easterly winds move into the north-eastern parts of the subcontinent. Explain what happens as the air current reaches the escarpment (Drakensberg) and what the consequences are.

Text A1 (Old/1986, p. 73).

Text A2 (New/2006, p.87)

Figure 3, Sample pages of the old and the new textbook, showing the sections of texts divided into coded segments for analysis.

Explanation of Figure 3

Text A1

K1-K6 C+: statements, which conveyed knowledge, which is strongly classified.

I1 C+: represent pure geographical image, which is strongly classified.

Text A2

K1-K2: statement, which conveyed knowledge that is strongly classified.

I1-I3: represent pure geographical images that are strongly classified.

T1: represent first activity in the text.

2B: question that requires understanding (level 2) of conceptual knowledge (B),

anticyclone in the southern hemisphere is anticlockwise and divergent with subsiding air and stable conditions. The main contribution of this cell to the weather of South Africa is that it causes on-shore south-westerly winds that blow over the cold Benguela current towards the coast of South-West Africa/Namibia. Evaporation does not take place easily over the cold current and the atmosphere associated with anticyclones is basically stable. Thus although the winds may be on shore, they do not bring much rain, but are responsible instead for the very misty conditions which are common along this coast. The mist or fog may be accompanied by fine drizzle, particularly early in the morning. These conditions are limited to the coastal areas; blue skies dominate a few miles inland with hot, dry conditions. The South Indian anticyclone fluctuates more than the South Atlantic anticyclone. It moves further away from the coast in summer and

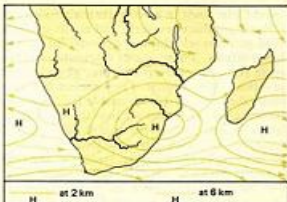


Figure 2.28 Solid lines show the position of the interior anticyclone at 2 000 m (i.e. about the level of the plateau), the dotted lines show the position of the high pressure centre at about 6 000 m in the atmosphere. Viewed three-dimensionally the high pressure cell would therefore lean towards the north-west

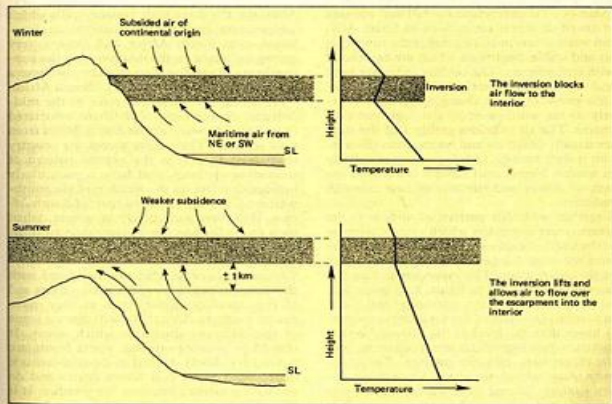


Figure 2.29 The effects of the anticyclonic inversion layer in winter and in summer (after P. D. Tyson)

35

Text B1 (Old/1990, p.35).

Key term
inversion – when temperature increases with height instead of decreasing.

The South Indian anticyclone (SIA)
This system is also a permanent feature. Air moves anticlockwise around the system and feeds warm moist air into South Africa from the north-east. When the system is located close to South Africa there is a greater chance of moist winds reaching the western part of the country.
During the winter months, the SIA is dominant over the interior.
During winter when temperatures are lower, cool dense air descends onto the interior. This creates clear, fine conditions in the interior. As the air descends it is compressed and heated adiabatically. This causes the lower layers to be warmer than those above them and an inversion might form. As a result of the air descending, the pressure system 'rests' on the escarpment. It prevents warm, moist air entering the interior from the Indian Ocean. This causes the interior to experience dry winters.
During the summer the air is warmer and the system is less intense. An inversion may occur above the level of the escarpment. Thermal lows that develop in the interior also cause the inversion layer to occur at a higher altitude. Under these conditions moist air from the Indian Ocean can flow into the interior. This results in summer rainfall in the interior.

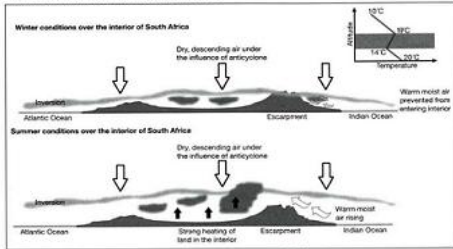


Figure 2.28: Seasonal movement of air into the interior

ACTIVITY 12 Factors that influence South Africa's weather and climate
1 What impact do the ocean currents along the east and west coast of South Africa have on rainfall experienced over these coasts?
2 Describe the characteristics of the high pressure cells that dominate South Africa's weather and climate.
3 a Explain why the central interior of South Africa experiences warm, wet conditions during summer and dry, cooler conditions during winter.
b What impact does this have on farming activities in the interior?

84

Text B2 (New/2007, p.84)

Figure 4. Sample pages of the old and new textbooks, showing the sections of texts divided into coded segments for analysis.

Explanation of Figure 4

Text B1

K1-K2: statements, which conveyed knowledge that is strongly classified

I1-I2: represent pure geographical images that are strongly classified.

Text B2

K1-K3: statements, which conveyed knowledge that is strongly classified.

I1: represent pure geographical image

L1: represent pure geographical concept and definition

T1: first assessment activity, 2A: question that requires understanding (level 2) of factual knowledge (A), 2B understanding of conceptual knowledge.

As shown in these four texts in Figures 3 and 4, the total numbers of each unit of analysis coded were tallied and added together for frequencies. They were represented quantitatively in tables and graphs in order to do a comparative analysis as shown in chapter 5, in Tables 1 to 8 and Figures 5 to 12.

4.4 Limitations of the study

The research topic indicates that the study is analysing knowledge representation and cognitive demands in four Grade 12 Geography textbooks used in SA schools.

Our country South Africa is very huge. It has many high schools and the Grade 12 Geography textbooks that they use are not limited to the one that I used in this study, they vary from one school to the next.

I have purposively sampled a minimum of four textbooks, which is a small sample that cannot be generalised.

As an experienced Geography educator who is doing this kind of a study, I was aware of my own position as a researcher that in one way or the other I could be biased. Therefore, as a researcher in order to eliminate an element of biasness I have developed a common analytical tool, which will be applied equally to all the sample textbooks and collaborated with my fellow M.Ed student researcher to decide on the unit of analysis and the type of coding to be used.

The study was not a holistic or exhaustive analysis since it only focused on knowledge representation and cognitive demand and on one section in the in the Grade 12 Geography textbooks. The unit that was analysed was a 'scientific' topic and possibly different results would emerge if a unit on Human Geography had been analysed.

4.5 Ethical Consideration

My study was about textbooks, which are open to public scrutiny not real people who are subject to the dangers of exploitation. I was aware of what Mouton (2001) cited in

Cohen, Manion and Morrison (2007) calls epistemic imperative, which is about a commitment to objectivity and integrity as well as to a search for truth. Mouton (2001) highlights that a researcher in my position should not fabricate or falsify data, claim as their own the work of others, misrepresent their findings in any way.

As I was analysing other people's work I will acknowledge their sources; indicate the limits of my study as I am only focusing on knowledge representation and cognitive demands not every aspect in the sampled textbooks. I have reported my findings fully and accurately (professionally); and disclosed details of theories, methods and research designs that I used to interpret the findings. For validity purposes I have given one specimen page of the coded pages from each textbook and in order to protect the author's identities of the sampled textbooks in my study I have decided to use pseudonyms (for confidentiality) such as Text A1, B1 for the old textbooks and Text A2 and B2 for the new textbooks.

4.6 Conclusion

This chapter has demonstrated how the actual study as a quantitative content analysis was conducted. It explained that the data was collected using an analytical tool adapted from Green and Naidoo (2008) and it will be represented quantitatively in tables and bar graphs. It described the purposive sample of the four texts used and the method used for the coding. Examples of the unit of analysis coded such as quotations, images and sample pages were also provided to increase validity. Inter-coder reliability was also applied in order to increase the reliability of the data. Pseudonyms were also used to protect the names of the authors and publishers. The chapter also explained about the limitations of the study such as the size of purposive samples used, which cannot be generalized.

Chapter 5 Findings

5.1 Introduction

In this chapter I will discuss the findings of this study. As it was concluded in the previous chapter, that after the coding, analyzing and counting was completed, the data was then represented in the form of tables and graphs for a basic statistical analysis of the whole analysis. In the next paragraphs I will present the findings that were used to answer my key research questions quantitatively and also provide an interpretation of the data.

5.2. Knowledge Representations

Table 4 and Figure 5 reflect the number of knowledge statements coded as C+ and C- in each textbook.

Table 4: Number of textual segments coded

Sampled Textbooks:	Text A1		Text A2		Text B1		Text B2	
	C+	C-	C+	C-	C+	C-	C+	C-
Total number of verbal statements coded	321	5	158	4	116	4	129	0

Figure 5: Graph showing classification of knowledge statements

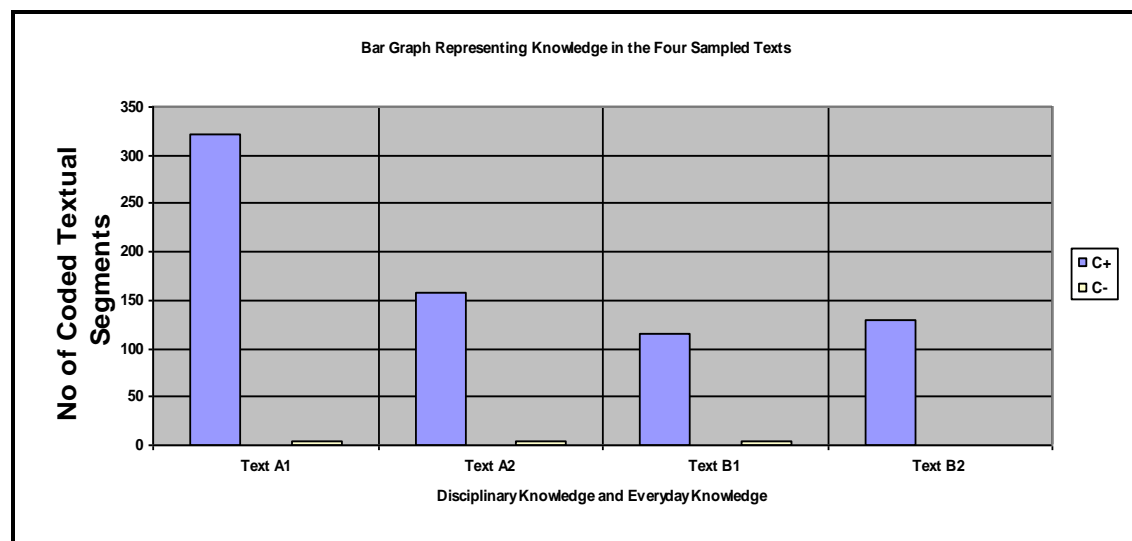


Table 4 and Figure 5, shows that A1 has far more textual segments coded compared to the other three books. Most coded statements constitute pure geographical knowledge across all the four texts, which show that there is not much integration evident in the four texts. Moreover, in the old text there is more content and images with few tasks, whereas in the new texts there is less content and more tasks and images.

In text A1 representing the old curriculum text, there were 326 textual segments that were coded, 321 had strong classification and only 5 were weakly classified. In text A2 representing the new curriculum text, 162 textual segments were coded, 158 were strongly classified and 4 were weakly classified.

Text B1 representing the old curriculum text, there were 120 textual segments, 116 were strongly classified and 4 were weakly classified. Text B2 representing a new curriculum text, there were 129 textual segments, all the 129 were strongly classified which shows that there is no integration at all in the new curriculum text in terms of academic and everyday knowledge.

5.3 Images/pictorial representation.

Table 5 and Figure 6- represent the number of pictures coded in each textbook.

Table 5: Classification of images

Sampled Textbooks	Text A1		Text A2		Text B1		Text B2	
	C+	C-	C+	C-	C+	C-	C+	C-
Total number of images coded.	60	1	70	1	55	0	59	7

Figure 6: Graph representing classification of images

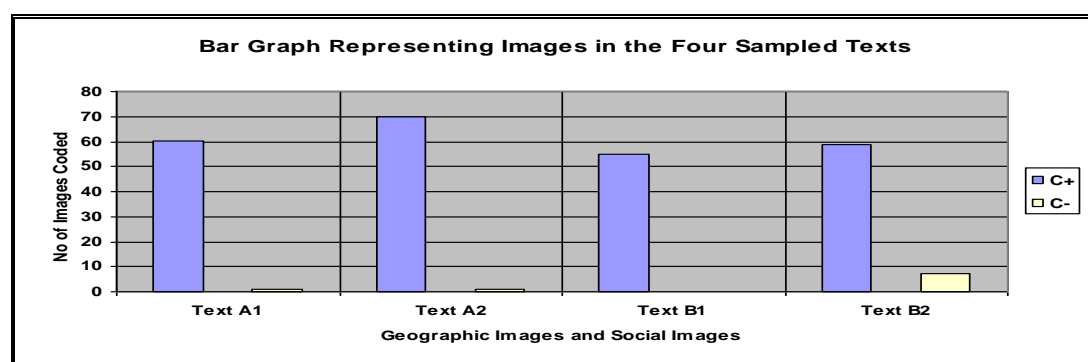


Table 5 and Figure 6 indicate that all the four texts contain mostly pure geographical images and very few are non-geographic images. Text A1 had 61 images and only 1 was weakly classified. Text A2 had more of about 71 and only 1 was weakly classified. Text B1 had 55 images and all were strongly classified. Text B2 had 66 images and 7 were weakly classified. It is evident that in terms of images represented in all the four texts, only text B2 has done a little integration of everyday images.

5.4 Language representation

Table 6 and Figure 7 represents definitions and glossaries coded.

Table 6: Classification of definitions and glossaries

Sampled Textbooks.	Text A1		Text A2		Text B1		Text B2	
	C+	C-	C+	C-	C+	C-	C+	C-
Total number of definitions and glossaries coded	1	0	10	0	0	0	40	0

Figure 7: Graph showing classification of language

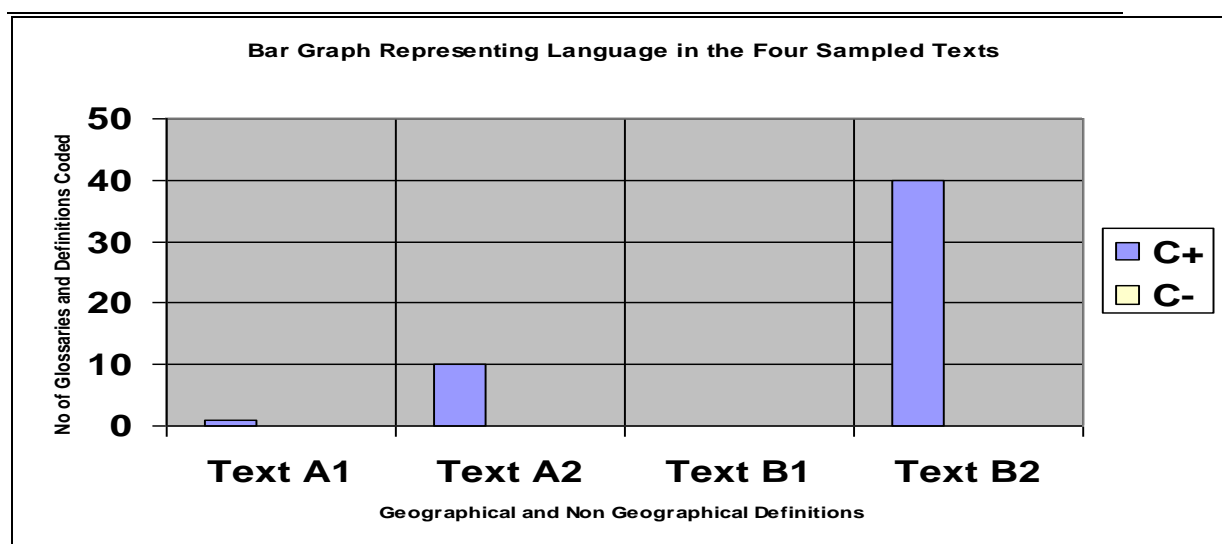


Table 6 and Figure 7 show that text B2 contains far more definitions and glossaries than the other texts. Text A1 had only 1 out- of-text definition provided. Text A2 had 10 out-of-text definitions included. Text B1 had no out- of-text definitions provided. In text B2 there were 40 definitions provided as glossaries and information boxes. In

all the four textbooks there is no integration in terms of definitions from other subjects or other languages, only subject specific definitions were given.

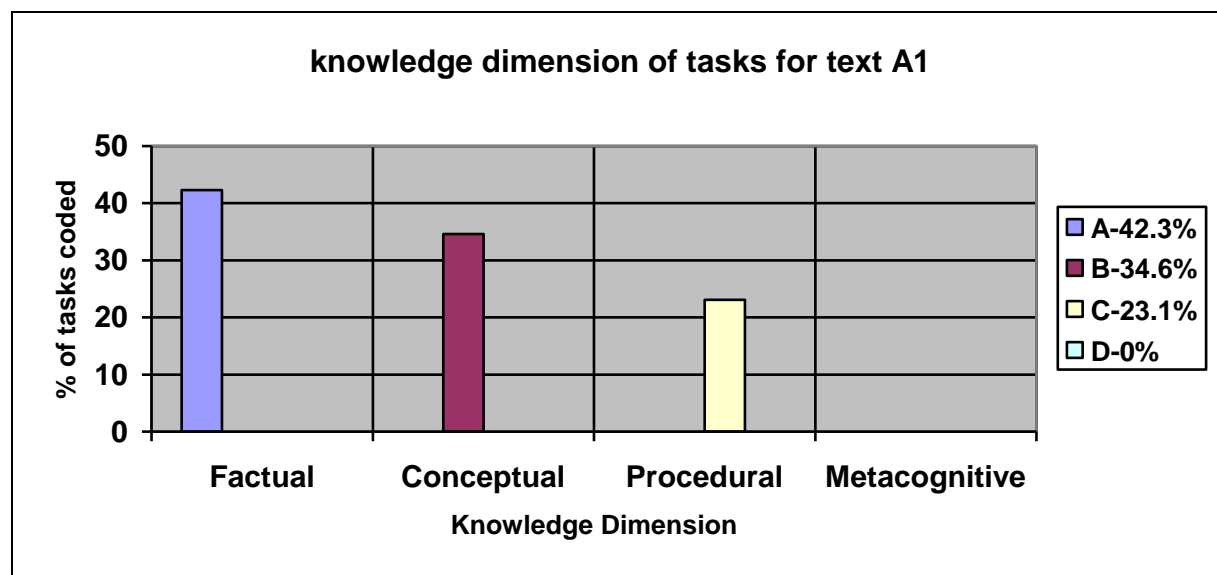
5.5 Kinds of knowledge represented and cognitive processes expected.

The following data concerns Text A1 (1986):

Table 7a: Knowledge dimensions of tasks for Text A1

Sampled Textbooks	Text A1				
	A (Factual)	B (Conceptual)	C (Procedural)	D (Metacognition)	Total
Knowledge Dimensions.					
Total number of tasks coded.	11	9	6	0	26
Percentage of tasks & items coded	42.3	34.6	23.1	0	100

Figure 8a: Knowledge Dimension of tasks for Text A1.

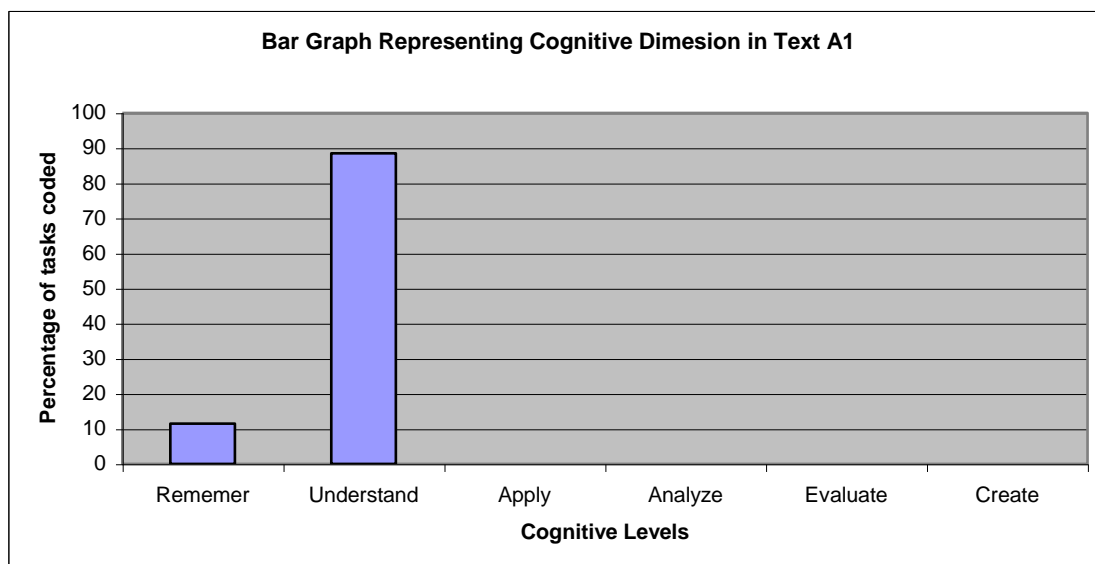


Text A1 had 11 questions that required factual knowledge, 9 required conceptual knowledge, 6 that require procedural knowledge and there was no question that requires metacognition. The data shows that in text A1 there is an irregular distribution of cognitive levels in the kind of tasks provided in the whole text.

Table 7b: Cognitive dimension of tasks for Text A1

Sampled Textbooks	Text A1						
Cognitive Dimensions	1 (Remember)	2 (Understand)	3 (Apply)	4 (Analyze)	5 (Evaluate)	6 (Create)	Total
Total number of tasks coded.	3	23	0	0	0	0	26
Percentage of tasks & items coded	11.5	88.5	0	0	0	0	100

Figure 8b: Cognitive Dimensions of tasks for Text A1



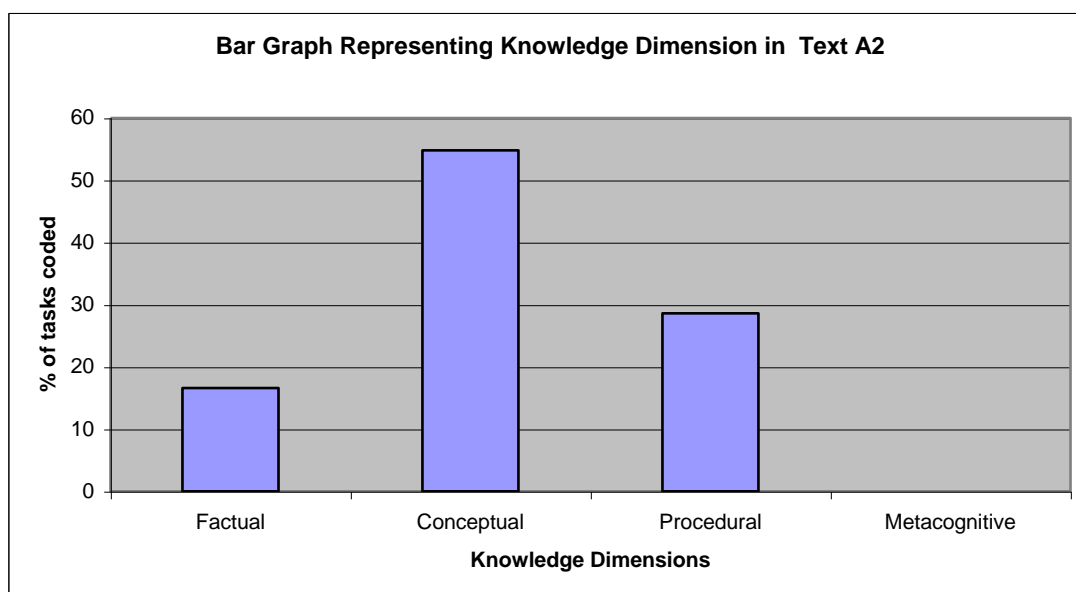
Text A1 had three questions that required a learner to remember factual knowledge, which encourages memorising, and 23 questions that required understanding. Text A1 shows that there is an uneven distribution questions in each task in terms of cognitive levels. There were no questions requiring higher levels of cognitive demands

The following data concerns text A2 (2006):

Table 8a: Knowledge dimensions of tasks for Text A2

Sampled Textbooks	Text A2				
Knowledge Dimensions.	A (Factual)	B (Conceptual)	C (Procedural)	D	Total
Total no of tasks coded	7	23	12	0	42
Percentage of tasks & items coded	16.6	54.8	28.6	0	100

Figure 9a: Knowledge dimensions of tasks in Text A2



Text A2 had seven (16.6%) questions that required a learner to reproduce factual knowledge, 23 (54.8%) require conceptual knowledge, 12 (28.6%) required procedural knowledge and no questions required metacognitive knowledge. Text A2 shows that not much change has occurred drawing from Text A1 in table 7a and figure 8a only the number of tasks and questions in each task given has increased in the new text compared to the old but in terms of distribution of questions a slight change has occurred.

Table 8b: Illustration of change in knowledge dimensions in text A1 (1986) and A2 (2006) by the same authors and same publishers.

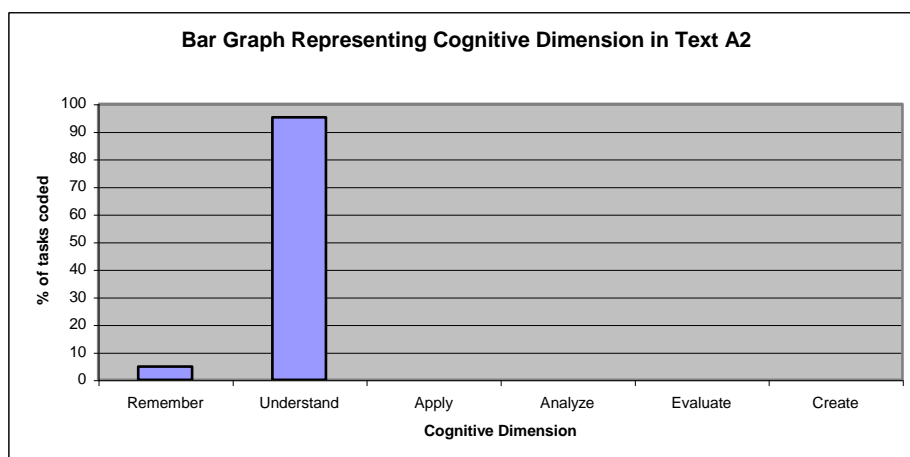
Texts		
Knowledge level Required	A1	A2
Factual knowledge	42.3%	16.6%
Conceptual knowledge	34.6%	54.8%
Procedural knowledge	23.1%	28.6%
Metacognitive knowledge	0%	0%

Table 8b shows that in text A2 Factual knowledge has dropped by 25,7%, Conceptual Knowledge has increased by 20.2%, Procedural knowledge has increased by 5.5% and no change has occurred in metacognitive knowledge.

Table 8c: Cognitive dimensions of tasks in text A2

Sampled Textbooks	Text A2						
Cognitive Dimensions	1 (Remember)	2 (Understand)	3 (Apply)	4 (Analyze)	5 (Evaluate)	6 (Create)	Total
Total no of tasks coded	2	40	0	0	0	0	42
Percentage of tasks & items coded	4.8	95.2	0	0	0	0	100

Figure 9b: Cognitive Dimensions in Text A2



Text A2 has 4.8% of questions that require a learner to remember, 95% of questions that requires understanding and nothing in the other higher cognitive levels. Text A2 reflects that the number of tasks and questions has increased but a balance has not been created in relation to the levels in which questions are asked.

Table 8d: Illustration of change in the cognitive dimensions in Text A1 (1986) and A2 (2006) by the same authors and same publisher:

Texts		
Cognitive Demand Required	A1	A2
Remember	11.5%	4.8%
Understand	88.5%	95.2%
Apply	0%	0%
Analyze	0%	0%
Evaluate	0%	0%
Create	0%	0%

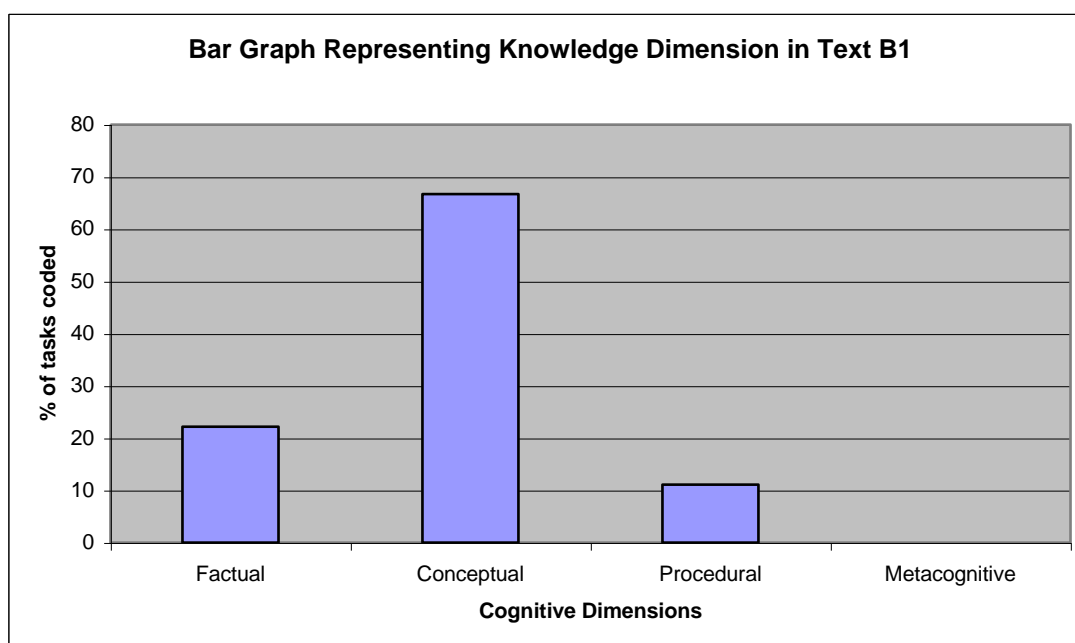
Table 8d shows that questions that require a learner to remember in text A2 have dropped by 6.7%, questions that require a learner to understand have increased by 6.7% which is a slight change. The table also shows that there is no change that has occurred in the other higher cognitive demands.

The following data concerns text B1 (1990):

Table 9a: Knowledge Dimensions in Text B1

Sampled Textbooks	Text B1				
Knowledge Dimensions	A (Factual)	B (Conceptual)	C (Procedural)	D (Metacognitive)	Total
Total number of tasks coded.	4	12	2	0	18
Percentage of tasks & items coded.	22.2	66.7	11.1	0	100

Figure 10a: Knowledge Dimensions in Text B1

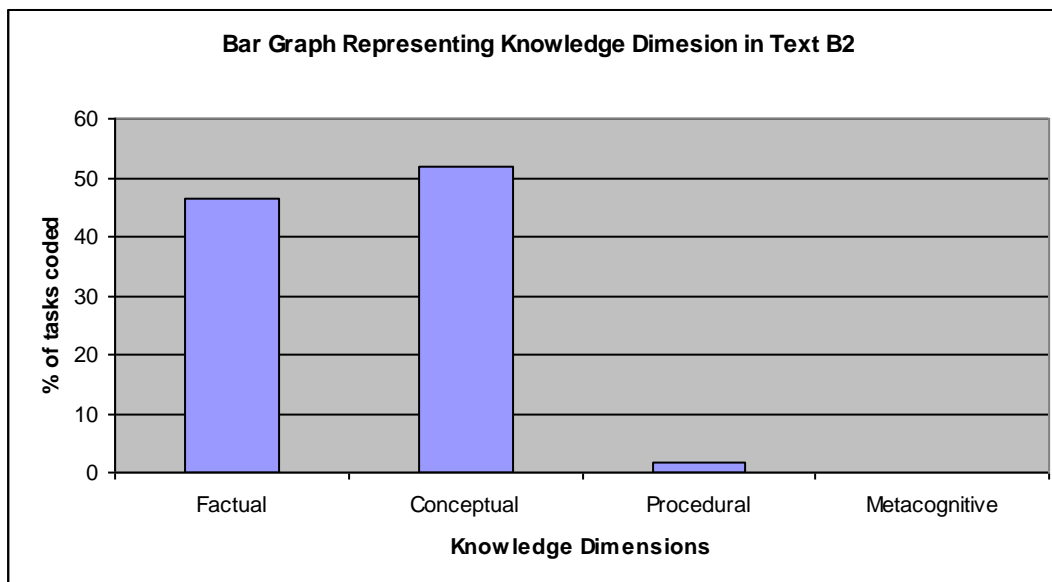


Text B1 has 22.2% of questions that require factual knowledge, 66.7% of questions that need conceptual knowledge, 11.1% of questions that need procedural knowledge and no questions that need metacognitive knowledge. It also shows that questions that need higher cognitive demands were not asked.

Table 9b: Cognitive Dimensions in Text B1

Sampled Textbooks	Text B1						
	1 (Remember)	2 (Understand)	3 (Apply)	4 (Analyze)	5 (Evaluate)	6 (Create)	Total
Cognitive Dimensions.							
Total number of tasks coded.	1	17	0	0	0	0	18
Percentage of tasks & items coded.	5.6	94.4	0	0	0	0	100

Figure 10b: Cognitive Dimension in Text B1

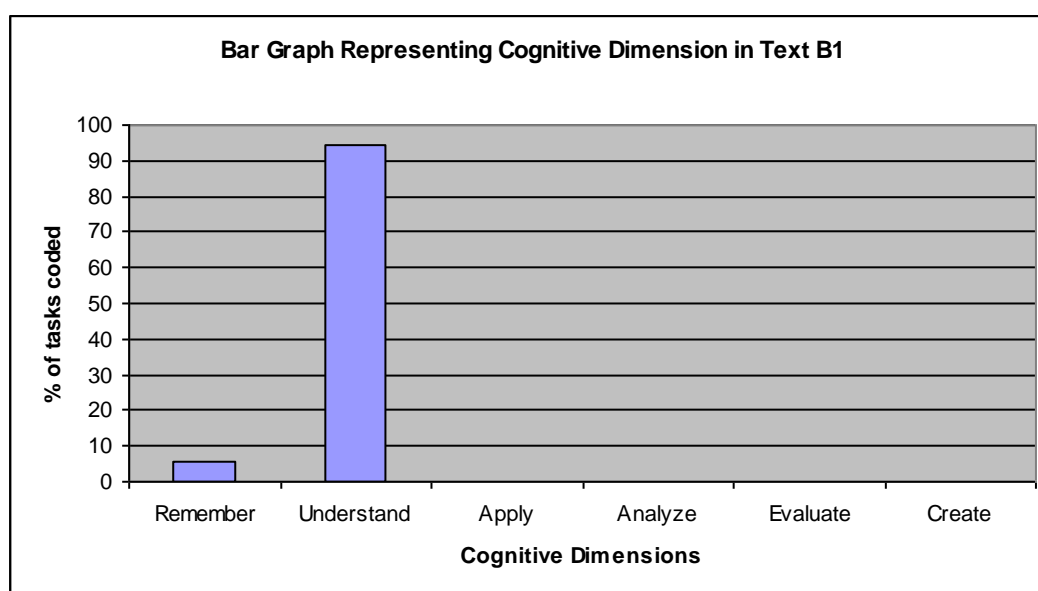


Text B1 regarding cognitive demands shows that 5.6% of questions required remembering, 94.4% of questions required understanding, no questions were asked in the higher cognitive levels.

Table 10a: Knowledge Dimensions in Text B2

Sampled Textbooks	Text B2				
Knowledge Dimensions	A (Factual)	B (Conceptual)	C (Procedural)	D (Metacognitive)	Total
Total no of tasks coded	58	65	2	0	125
Percentage of tasks and items coded	46.4	52	1.6	0	100

Figure 11a: Knowledge Dimensions in Text B2



Text B2 shows that 46.4% of questions asked required factual knowledge, 52% require conceptual knowledge, 16% required procedural knowledge and no questions that needed metacognitive knowledge. There is an indication that question in terms of knowledge dimensions were unevenly distributed, more focus was on factual and conceptual knowledge, not much focus on procedural knowledge and nothing on metacognitive knowledge.

Looking at Table 10b, which shows a comparison of Text B1 and B2 in terms of knowledge dimensions, it is evident that the number of tasks and number of questions

per task have increased but the distribution of questions is still uneven. There were 22.2% of questions that required factual knowledge in B1 and 46.4% in B2, 66.7% questions required conceptual knowledge in B1 and 52% in B2, 11.1% of questions that required procedural knowledge in B1 and 1.6% in B2, nothing was asked in both texts that required metacognitive knowledge. In short, both the old and the new curriculum texts still rely heavily in assessing factual and procedural knowledge rather than on procedural and metacognitive. No balance is being created and maintained regarding distribution of questions across the nature of tasks given.

Table 10b: Illustration of change in knowledge dimensions in text B1 and B2 by different authors and different publishers.

Texts		
Knowledge level Required	B1	B2
Factual knowledge	22.2%	46.4%
Conceptual knowledge	66.7%	52%
Procedural knowledge	11.1%	1.6%
Metacognitive knowledge	0%	0%

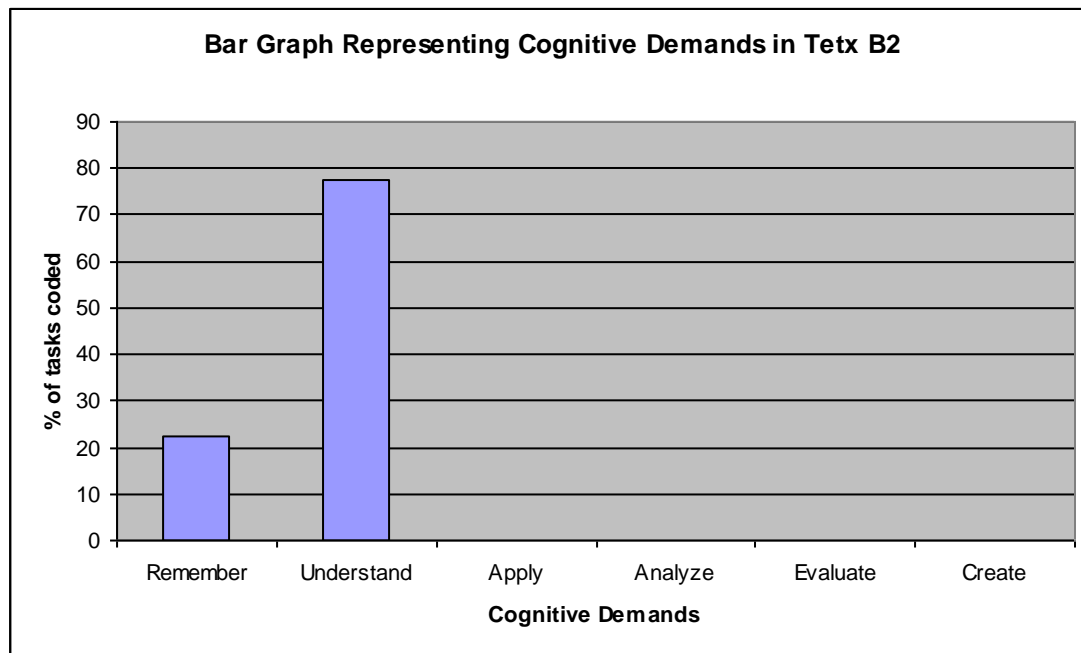
In the new text (B1) questions that require factual knowledge have increased by 24.2%, questions that require conceptual knowledge have dropped by 14.7%, questions that require procedural knowledge have dropped by 9.5% and there were no questions that required metacognitive knowledge. This tells us that there is also a slight change in knowledge dimensions of the tasks between text B1 and B2.

The following data concerns B2:

Table 10c: Cognitive Dimensions in Text B2

Sampled Textbooks	Text B2						
Cognitive Dimensions.	1 (Remember)	2 (Understand)	3 (Apply)	4 (Analyze)	5 Evaluate)	6 (Create)	Total
Total number of tasks coded.	28	97	0	0	0	0	125
Percentage of tasks & items coded.	22.4	77.6	0	0	0	0	100

Figure 11b: Cognitive Dimensions in Text B2



Text B2 shows that there were 5.6% of questions that required a learner to remember content knowledge, 94.4% required understanding, and the other cognitive levels were not covered.

Table 10d: Illustration of change in the cognitive dimensions in Text B1 (1990) and B2 (2007) by different authors and different publishers:

Texts		
Question Required	B1	B2
Remember	5.6%	22.4%
Understand	94.4%	77.6%
Apply	0%	0%
Analyze	0%	0%
Evaluate	0%	0%
Create	0%	0%

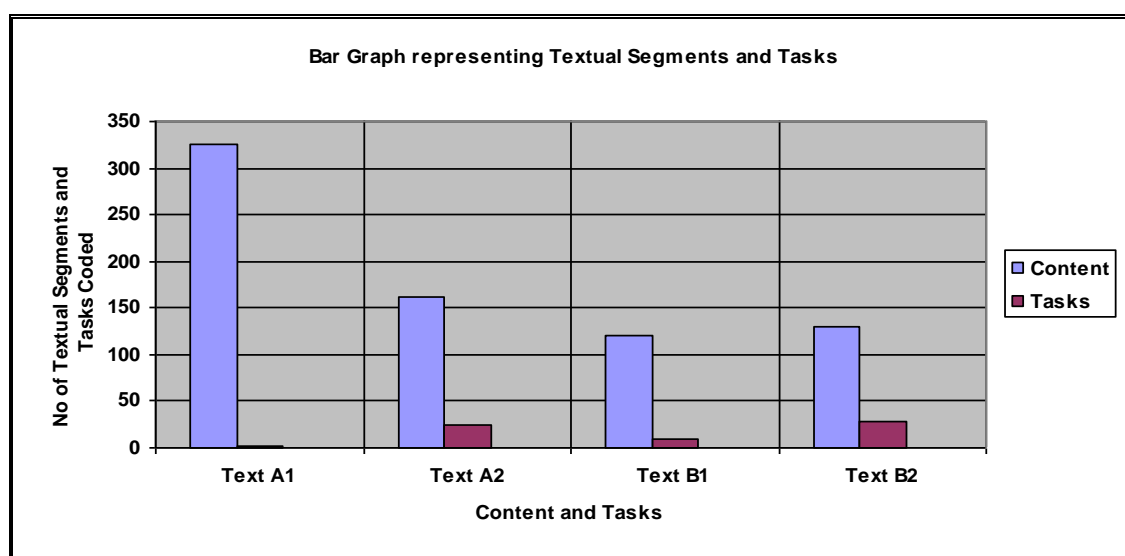
Table 10d shows that there is a slight change in cognitive demands required by the tasks between text B1 and B2. In the new text (B2) questions that required remembering have increased by 16.8%, questions that required understanding have decreased by 16.8% and no change has occurred in the higher cognitive levels.

Looking at the illustration provided above, it is evident that there has been a slight increase in the number of questions that require a learner to remember content knowledge, in Text B1 there were 5.6%, in B2 there are 22.4% with an increase of 16.8%. The number of questions that required understanding has dropped from 94.4% in Text B1 to 77.6% in Text B2 with a difference of 16.8%. Questions that required higher cognitive levels were not considered. One would then conclude that the only noticeable change is with regard to an increase in the number of tasks and the number of questions pre tasks given but in terms of the distribution of cognitive levels little has been done to maintain the balance. The change is more quantitative rather than qualitative.

Table 11: number of textual segments and tasks coded

Sampled Textbooks:	Text A1	Text A2	Text B1	Text B2
Total number of Textual Segments Coded	326	162	120	129
Total number of Tasks Coded	1	24	9	28

Figure 12: textual segments and tasks in the four sampled texts



I have included this graph with an aim of making a comparison between the number of textual segments and number of tasks coded across all the four texts.

Text A1 shows that there were 326 textual segments coded and only 1 task was included in the text, which was provided as a revision questions.

Text A2 shows that there were 162 textual segments that were coded and 24 tasks were included in the text.

Text B1 has 120 textual segments coded and 9 tasks that were included in the text.

Text B2 has 129 textual segments that were coded and 28 tasks that were included in the text.

The noticeable change in the new curriculum texts is that there is an increase in the number of pages per section as it was illustrated in section 4.2 (A2-67 pages, B2-55 pages), an increase in the number of tasks and questions and a drop in the number of textual segments. Text A1 and A2 by the same authors and same publisher are still having more textual segments or content knowledge. The old texts, which are Text A1 and B1 have less number of pages in the unit on Climatology (A1-55, B1-38). All the texts contain pure geographic content, which is strongly classified. The new texts (texts A2 and B2) have more tasks than the old texts (text A1 and B1).

5.6 Conclusion

In summary, this chapter has provided data that was used to answer the key questions such as:

1. How is content knowledge represented in the old and new curriculum Grade 12 Geography textbooks?
2. What are the cognitive demands of activities in the old and the new curriculum Grade 12 Geography textbooks?
3. How has content knowledge and cognitive demands changed in the old and new curriculum Grade 12 Geography textbooks?

The data which provide answers for the first question was illustrated in paragraphs 5.2 to 5.4. where it was concluded that all the four samples contain pure geographic knowledge which is presented in an academic tradition rather than everyday knowledge which is presented in a utilitarian tradition. The content, images, language has a strong classification in terms of boundaries between the subjects and the sections within the subject itself. This implied that no knowledge integration has occurred in any of the four texts.

It was noticed that there has not been any much change in terms of integration in terms of content knowledge presented, however Text A2 as a new text has made some attempts and in B2 nothing had been done. The only part where integration has been attempted is in images, which is only evident in B2.

The second and the third key research questions answers were illustrated in section 5.5. where it was concluded that all the four samples show that even distribution of both knowledge and cognitive dimensions in terms of the tasks and questions posed has not been considered in the old and the new texts. They rely mostly on questions that require factual, conceptual and few procedural knowledge and they do not require metacognitive knowledge at all. The four texts in terms of cognitive dimensions rely mostly on questions that require a learner to remember, to understand and to apply, the other higher cognitive levels were not considered. Then it was concluded that since the old and the new texts present the same nature of knowledge and cognitive dimensions then the extent in which the change has occurred is limited, however knowledge levels required have changed between A1 and A2, and B1 and B2. In text A2 questions that required factual knowledge have dropped, and questions that required conceptual and procedural have increased. In text B2 questions that required factual knowledge has increased, and questions that required conceptual and procedural knowledge have decreased.

Chapter 6 Discussion and Conclusion

6.1 Introduction

In this chapter I will discuss the interpretations and implications of the data presented in chapter 5 as findings for this study. I will also link relevant literature and what was discussed in the previous chapters to the findings of this study.

6.2 Knowledge representation and integration

It was highlighted that integration of knowledge is one of the NCS principles. In the light of this principle, the DoE (2003) says it is achieved within and across subject and fields of learning. It also maintains that the integration of knowledge and skills across subjects and terrains of practice is vital for achieving applied competences (as defined in the NQF), which integrate the three discrete NCS competences such as practical, foundational and reflective competences. It also emphasizes that by so doing, an integrated learning of theory, practice and reflection will be promoted.

In view of what the DoE (2003) argues about, it was important and relevant to consider integration as part of my study. It was also explained that this study was informed by Bernstein's (1997, 2000) theory of knowledge, which distinguishes between formal and everyday knowledge. Drawing from this literature the findings of this study show that in terms of knowledge representation across all the four textbooks, there is a slight change in a way that they still emphasize pure geographical knowledge without integration of the everyday knowledge. In similar way like the academics, publishers and authors are provided with guidelines regarding what is expected of them before they even engage with the project of writing of textbooks. Moreover, knowledgeable people screen textbooks before they are forwarded to schools for requisition process. One would expect all the new texts to be closer to the policy requirements, which requires integration in their knowledge content.

There is still a strong classification in the knowledge content presented in all the four texts, since knowledge is presented in an academic tradition. A major change was noticed in the volume of content reflected in the number of coded textual segments. There are more content statements in the old textbooks compared to the new

textbooks where more space has been taken probably by the number of tasks and images.

All the four texts comprise mostly pure geographical images although Text B2 has at least 11% of images adapted from everyday community knowledge, which reflects a minimal integration of the formal and informal knowledge.

Regarding exposure of learners to geographical concepts which form part of progression and continuity and which assist the learner to access more Geography content, only Text B2 has made an attempt to introduce the learners to the basic and important geographical terms through definitions and glossaries as it was highlighted in paragraph 4.3.4. All the other three texts have included the terms in the content itself and no information boxes were included either.

Apart from integrating everyday knowledge, which is supposed to be presented in a utilitarian tradition with subject knowledge, the definition by the DoE (2003) outlines that integration of skills and knowledge should be done within and across learning fields. In Text A2 and B2 as the new texts in my sample, the evidence of integration of subject knowledge within the subject is visible. In these two texts (A2 and B2) human Geography and regional Geography subsections such as agriculture as a human activity, which logically depending on climate, human response to floods based on cyclones and global warming are integrated with climatology.

Classification of subject knowledge across the subject fields is very strong, since there is no integration evident in climatology in all the four texts. However, in the other Geography sections there is a weak classification evident such as in people and places (settlement Geography) and people and their needs (regional Geography) where elements of economics are being integrated such as the economic sectors (primary, secondary, tertiary and quaternary sectors). In text A2 the authors made a brief attempt to integrate Life Orientation (Careers in Climatology) with climatology such as in the example given in paragraph 4.3.1.

In the previous chapters it was highlighted that this study was modelled by Green and Naidoo's (2008) study, which was done on Grade 10 science textbooks. In terms of knowledge in the old textbooks, they found that it was presented as pure

decontextualised physical science knowledge, where conventional academic 'hard' science knowledge is strongly separated from the real world. This is similar to this study where it was found that in both the old and the new texts, knowledge was presented as pure geographic knowledge with very little integration.

My study did not look at language as a medium of instruction but it looked at it in the light of glossaries and definitions as a way of accessing the pure Geography content. Since in terms of continuity and progression as it was explained in the previous chapters, geographical concepts such weather, climate temperature, cloud, wind, rain are some of the basic terms in climatology which means if the learner master their meanings in the lower grades he or she will not experience a problem in understanding the theory attached to these terms in the higher grades. There will be continuity in terms of concepts as significant feature and a progression in theory linked to the concepts as a learner progresses from grade to grade. In terms language of communication, Green and Naidoo (2008) found that it assumed that English was the first language of all students, which is also similar to the textbooks which I examined.

Out of the three textbooks (one old and two new texts) they sampled they found that one of the new textbooks is similar to the old. One of the new textbooks presented science knowledge using a popular format and interactive style. It also presented knowledge as academic science knowledge and as utilitarian knowledge. In terms of classification, they founded that there was a weak boundaries between science and real world. Since they also analyzed other types of knowledge, they found that it incorporates indigenous knowledge at a lowest extent.

Taking into account the findings of Green and Naidoo (2008), one would conclude that in terms of integration a lot has to be done by authors and publishers, in a way that only one Grade 10 science text out of the three samples they examined had a weak classification in terms of knowledge. Although their results cannot be generalized due to the size of the sample they use, their findings are similar to the findings for this study because they also found that change in terms of integration of subject knowledge with everyday knowledge was very minimal.

The National Curriculum Statement Grades 10-12 Policy for Geography (2003:9) defines Geography as a science that studies physical and human processes and spatial patterns on Earth in an integrated way over space and time. As it is indicated in this definition, climatology falls in physical Geography such as geomorphology but climatology is more abstract in nature since it studies things like the weather processes. With regard to the content I would expect the text to have more integration of knowledge within the subject and across the subjects, with everyday knowledge by using examples from the learner immediate environment to the extent that it even use indigenous knowledge starting from the general to specific. As it was explained in the previous paragraph integration of knowledge has not been considered in the new texts used in this study

6.3 Cognitive demand

Regarding cognitive processes I would expect questions to be distributed across all the cognitive levels and engage the learners with all the knowledge dimensions. Questions directed to learners should be more practical than abstract because as a science subject with a focus in climatology an analytical science (Boden, 1976) should allow learners to draw knowledge from direct experience using senses such as visual observation. The kinds of task might include a group or individual projects and experiments where the learners explore knowledge, engaged in various competences such as apply the theory that was acquired in the classroom to real life, create and invent for instance improvised measuring instruments such as a rain gauge, or observe, record, analyze, evaluate and report about any of the weather phenomena the learnt about in the classroom rather than reproducing facts without understanding.

Moreover, the NCS (2003) emphasises group-work and learner-centred approach where a learner is exposed in experiential learning and work as a team in order to assist one another, then I would expect a textbook to give tasks that would promote independent learning and self-discovery. Apart from that, the NCS in the FET is exam or assessment-driven, this is done in order to have the records for continuous assessment and to motivate educators and learners to work. As a Geography educator in Grade 12 I would also expect the textbook to have more activities, which focus on baseline assessment and formative assessment. Out of the four texts, only text B2

contained some tasks that are included at the end of each subsection of the whole chapter and at the end of the chapter. Having more of such tasks in the text would assist the learner to catch up and master the content knowledge easily.

In terms of cognitive processes there was some change in text B1 and B2 , although tasks included in all the four textbooks do not engage the learners to the other higher cognitive levels such as apply, analyze, evaluate and create other than level two which requires understanding and level one which requires recalling of what has been learnt. Concerning knowledge dimensions the questions in the tasks provided required mostly factual and conceptual knowledge. None of the textbooks consider all the three NCS competences (DoE, 2003) a learner has to encounter during the schooling process in the assessment tasks such as practical (demonstrate ability), foundational (demonstrate understanding) and reflexive competences (demonstrate ability to integrate and adapt to change). None of the tasks in any textbook gave a clear guide as whether a learner has to write or do the tasks orally, individual or group work.

The study that was conducted by Green and Naidoo (2008) revealed that the old Grade 10 science textbook emphasised factual and conceptual knowledge presented at level 1 (remember) and 2 (understand) of Bloom taxonomies, which is similar to what the Grade 12 Geography new and old texts presented as cognitive and knowledge dimensions. In contrast to my finding is that their findings show that one of the new textbooks situates science knowledge in social, historical and cultural experiences, that learners could identify with, which was absent in the Grade 12 Geography samples analysed.

Furthermore, what is different from my study is that in Green and Naidoo (2008), one of the new science textbooks there was a metacognitive reflection on the acquisition of academic and social competences, which was constantly expected. The higher cognitive processes such as analysis and evaluation were evident. In contrast to the old textbook, which was underpinned by an objectivist epistemology, they found that a social-constructivist epistemology and a humanistic philosophy of knowledge underpinned that new textbook.

In contrast to Green and Naidoo's (2008) findings, in my study it was evident that the number of tasks and questions has increased in the new texts as compared to the old textbooks although the cognitive and knowledge dimensions were not all evenly distributed across the tasks given. As a result of such an increase in the number of tasks in the new texts such as B2 learners will have more revision of the content as a formative or a summative assessment. However, as a result of the lack of the other higher knowledge and cognitive dimensions the learner will not be able to explore other insightful aspects in Geography, the learner learning styles are not fully utilised to his or her own benefit, and he/she is not exposed to the other forms of assessment and levels which questions are asked which might pose a problem when he or she writes Geography as one of the high stakes exam subjects.

6.4 Summary of findings

In this chapter I have interpreted the data presented in chapter 5 and linked the relevant literature to my findings as well as the main points I discussed in the previous chapters.

In summary, the study examined the knowledge representation and cognitive demands in four Grade 12 textbooks by comparing the results obtained when analyzing two old curriculum textbooks and comparing these with two new curriculum textbooks. It showed that there is a slight change in terms of integration of knowledge, knowledge and cognitive dimensions examined.

The study was conducted to analyze knowledge representation in Grade 12 textbooks. The main purpose was to see if there is any change in knowledge representation and cognitive demands in the old and new curriculum Grade 12 Geography textbooks.

The three key research questions were answered with the data collected through an analytical tool adapted from Green and Naidoo (2008). It was a reliable tool because the results were similar in terms of knowledge representation, cognitive and knowledge dimensions. This study found that in terms of knowledge representation there is a strong classification, since integration within the subject and between school knowledge and everyday knowledge is not happening across any of the four textbooks. Language and images were also examined, it was also evident that there

was a strong classification in the concepts defined in glossaries and information boxes across the four texts examined whereas in text B2 there was a weak classification because there was a minimum integration of social images in the text and there was a strong classification in A1, A2 and B1 since there was only pure geographic images that were included in the texts.

Regarding knowledge and cognitive dimensions a slight change has occurred because the new texts still contain the same nature of questions like the old texts that demand more factual and conceptual knowledge, and less procedural and no metacognitive knowledge. At a cognitive level, most questions demand level 1 (remember) and 2 (understand).

It was not a huge study since I only considered one section (twenty percent) of the whole textbook and only a few samples were examined. However through these results one can affirm that there is great need for improvement in knowledge representation and cognitive demands in the Grade 12 Geography textbooks. Authors have to do more integration in the Geography content, which is intra-disciplinary (within Geography), inter-discursive (between pure geographic and everyday knowledge) and inter-disciplinary (between Geography and other subjects), (Bernstein 1996).

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ANNEXURES

Annexure A: Text A1 (1986)

K1 C+

anticyclone. They realise that it is impossible to represent on one map the air circulation on the plateau and at sea level. All weather maps show **sea level circulation** in terms of **surface isobars**, and **plateau circulation** in terms of contours at the **850 hPa pressure level**.

A high pressure cell is formed by **subsiding air**. Meteorologists ascribe this downward movement of air to inversion conditions in the upper atmosphere – the temperature rises with increasing height instead of decreasing, as would normally be expected. Since subsidence is dominant, uplift, the requirement for all precipitation processes, cannot occur. The location of the Kalahari high in its usual position therefore indicates **fine weather**, no rain, much sunshine and an absence of cloud – the conditions associated with 'sunny South Africa'.

Although this situation occurs **chiefly in the winter months**, it is also **very common in summer**. Rain-producing conditions are the exception rather than the rule and southern Africa has **problems of drought**. The prevailing

pattern of atmospheric pressure and circulation **must be disrupted** before the conditions are favourable for the formation of precipitation.

Subsiding air during winter anticyclonic conditions establishes **stability**. Since subsiding air is heated adiabatically, the lower layers of this air are relatively warm. A sharp temperature inversion occurs between the coast and the escarpment. The base of this inversion varies in height from 1 km in the south (at 30° S) to 2 km above Mozambique. As indicated in the figure the inversion and accompanying stable conditions are often **lower than the level of the plateau**.

Upward and westward movement of moist air by the easterly airstream of the cyclone, as well as penetration of other disturbances into the interior of the country, is virtually impossible. Consequently, the **winters on the plateau are dry**.

During the **summer**, if there is an **inversion**, it is located at a **higher level** than that of the plateau (fig. 2.21). Penetration of moist air

K3 C+

K6 C+

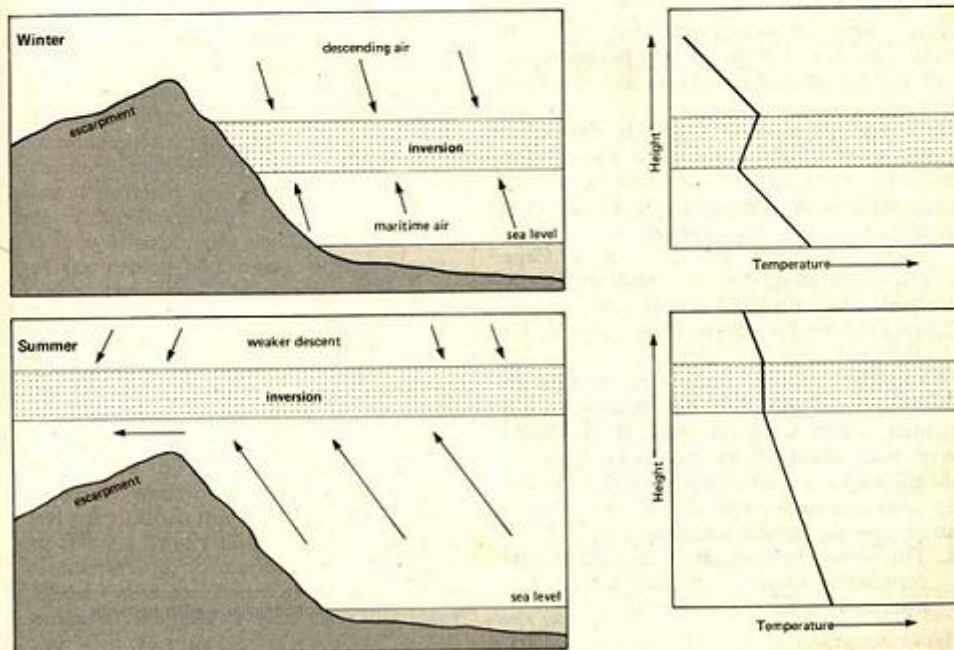


Fig. 2.21 The stable conditions and inversion created by anticyclonic subsidence occur both in winter and in summer, with one important difference – the height and intensity of the inversion.

I1 C+

Annexure B: Text A2 (2006)

system, as well as penetration of other disturbances into the interior, is virtually impossible. Consequently, dry winter conditions prevail on the plateau.

During summer, if there is an inversion it is positioned at a higher level than that of the plateau. Penetration of moist air from the anticyclone into the interior, and onto the plateau, can then take place freely from an easterly direction. However, anticyclonic subsidence remains predominant over Namibia, thus accounting for desert and semi-desert conditions along the west coast Fig. 2.30.

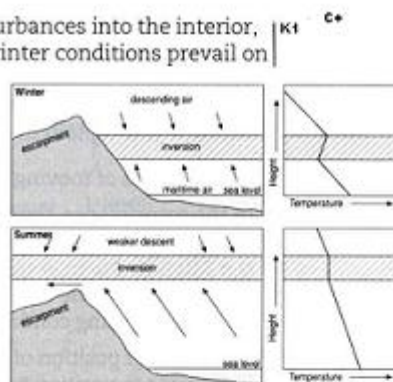


Fig. 2.30 The stable conditions and inversions created by anticyclonic subsidence in winter and summer

Moving disturbances in summer

Activity 10 Map reading about moving disturbances in summer (CASS)

Study the following two maps illustrating the basic summer patterns of air pressure (Fig. 2.31) and air circulation (Fig. 2.32).

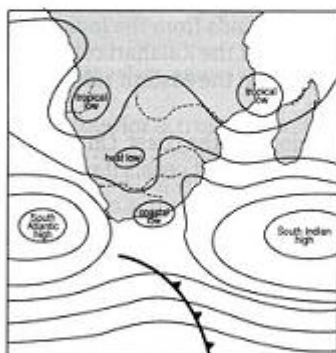


Fig. 2.31 Basic summer pattern of air pressure

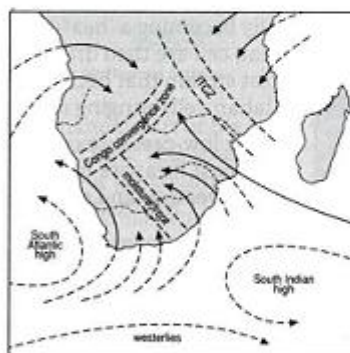


Fig. 2.32 Summer air circulation patterns

- 1 Do you think the mid-latitude frontal systems normally have an effect on the country during summer? Substantiate your answer. **2B**
- 2 The centre of the South Indian high-pressure system is situated far from land. Explain how air moves around this cell until it reaches the land. **2B**
- 3 Why is the following statement true? 'The air is laden with moisture by the time it reaches the coast of southern Africa'. **2B**
- 4 As the South Indian High nears the land, south-easterly winds move into the north-eastern parts of the subcontinent. Explain what happens as the air current reaches the escarpment (Drakensberg) and what the consequences are. **2B**

Annexure C: Text B1 (1990)

K1 C+

anticyclone in the southern hemisphere is anticlockwise and divergent with subsiding air and stable conditions. The main contribution of this cell to the weather of South Africa is that it causes on-shore south-westerly winds that blow over the cold Benguela current towards the coast of South-West Africa/Namibia. Evaporation does not take place easily over the cold current and the atmosphere associated with anticyclones is basically stable. Thus although the winds may be on shore, they do not bring much rain, but are responsible instead for the very misty conditions which are common along this coast. The mist or fog may be accompanied by fine drizzle, particularly early in the morning. These conditions are limited to the coastal area; blue skies dominate a few miles inland with hot, dry conditions.

K2 C+

The South Indian anticyclone fluctuates more than the South Atlantic anticyclone. It moves further away from the coast in summer and

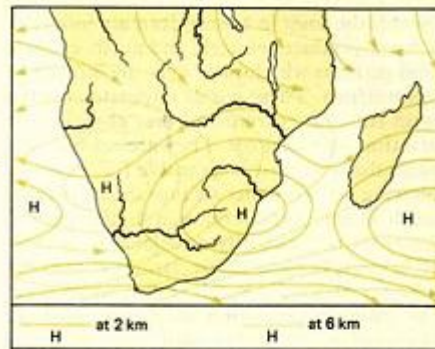


Figure 2.28 Solid lines show the position of the interior anticyclone at 2000 m (i.e. about the level of the plateau), the dotted lines show the position of the high pressure centre at about 6000 m in the atmosphere. Viewed three-dimensionally the high pressure cell would therefore lean towards the north-west **I1 C+**

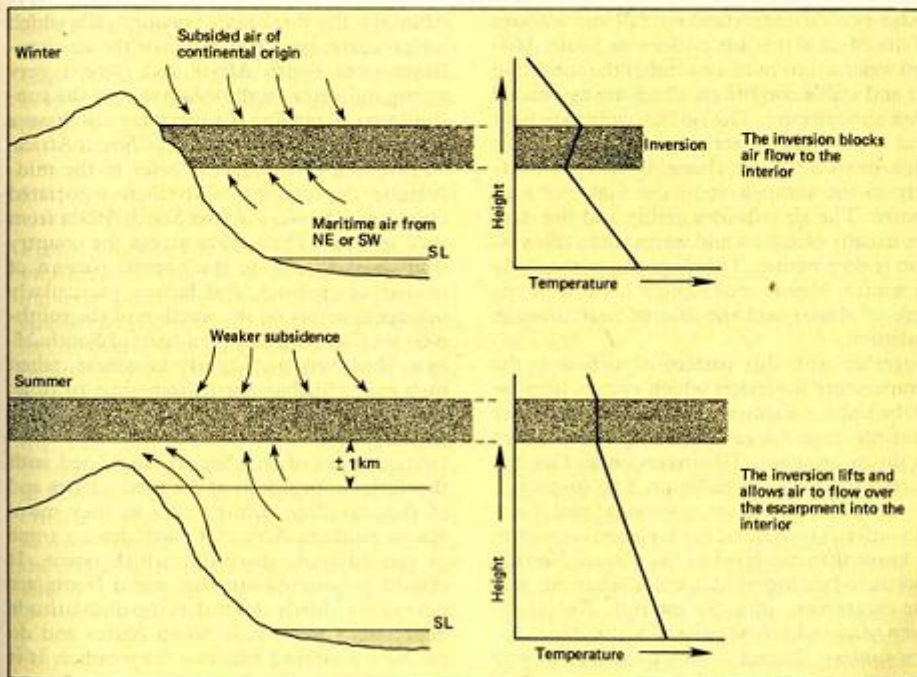


Figure 2.29 The effects of the anticyclonic inversion layer in winter and in summer (after P. D. Tyson) **I2 C+**

Annexure D: Text B2 (2007)

Key term

inversion
– when temperature increases with height instead of decreasing.

L1 C+

The South Indian anticyclone (SIA)

K1 C+

This system is also a permanent feature. Air moves anticlockwise around the system and feeds warm moist air into South Africa from the north-east. When the system is located close to South Africa there is a greater chance of moist winds reaching the western part of the country.

K2 C+

During the winter months, the SIA is dominant over the interior.

During winter when temperatures are lower, cool dense air descends onto the interior. This creates clear, fine conditions in the interior. As the air descends it is compressed and heated adiabatically. This causes the lower layers to be warmer than those above them and an **inversion** might form. As a result of the air descending, the pressure system 'rests' on the escarpment. It prevents warm, moist air entering the interior from the Indian Ocean. This causes the interior to experience dry winters.

K3 C+

During the summer the air is warmer and the system is less intense. An inversion may occur above the level of the escarpment. Thermal lows that develop in the interior also cause the inversion layer to occur at a higher altitude. Under these conditions moist air from the Indian Ocean can flow into the interior. This results in summer rainfall in the interior.

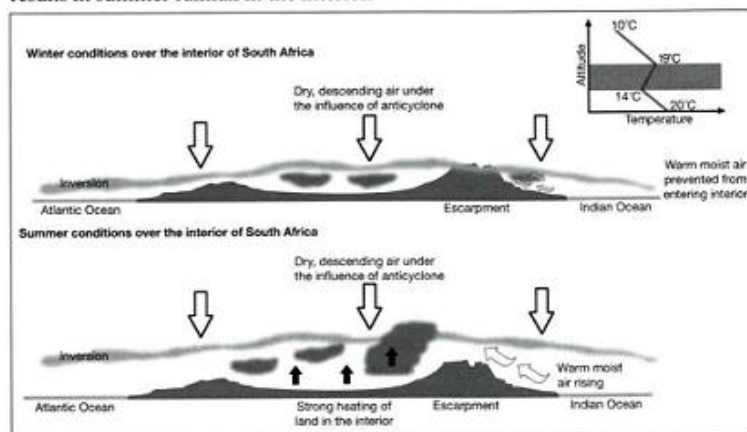


FIGURE 2.28: Seasonal movement of air into the interior **I1 C+**

T1 C+

ACTIVITY 12 Factors that influence South Africa's weather and climate (L02, AS1 and 2)

- 1 What impact do the ocean currents along the east and west coast of South Africa have on rainfall experienced over these coasts? **2B**
- 2 Describe the characteristics of the high pressure cells that dominate South Africa's weather and climate. **2B**
- 3 a Explain why the central interior of South Africa experiences warm, wet conditions during summer and dry, cooler conditions during winter. **2A**
- b What impact does this have on farming activities in the interior? **2B**

Annexure E: Ethical Clearance Certificate



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28 October 2009

Mr T D Ngubeni
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3200

Dear Mr Ngubeni

PROTOCOL: A Knowledge Analysis of Grade 12 Geography Textbooks Used in South African Schools

ETHICAL APPROVAL NUMBER: HSS/0742/2009: Faculty of Education

In response to your application dated 15 October 2009, Student Number: **206519328** the Humanities & Social Sciences Ethics Committee has considered the abovementioned application and the protocol has been given **FULL APPROVAL**.

PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Professor Steve Collings (Chair)
HUMANITIES & SOCIAL SCIENCES ETHICS COMMITTEE

SC/sn

cc: C Bertram
cc: Ms R Govender