

UNIVERSITY OF SOUTHAMPTON

FACULTY OF SOCIAL SCIENCES

EDUCATION

Doctor of Philosophy

**THE EVIDENCE FOR PROGRESSION IN THE DEMANDS FOR
GEOGRAPHICAL UNDERSTANDING IN THE CURRICULUM FOR
STUDENTS AGED 11 TO 18, SIGNALLED BY THE EXTERNAL
REQUIREMENTS AT KS3, GCSE AND A LEVEL**

by Trevor Harry Bennetts

December 2001

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ABSTRACT

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The aim of the thesis is to examine critically the support for progression in the geographical understanding of secondary students provided by the formal requirements of Key Stage 3 of the National Curriculum, and of GCSE and A Level examinations, from 1997 to 1999. Preliminary consideration, drawing on a range of relevant literature, is given to the concepts of understanding and progression, and their application in geographical education; and to the implications of using the formal requirements for assessment at KS3, GCSE and A Level as sources of evidence about the nature and quality of the understanding expected.

The core of the thesis is a detailed analysis of the scope for progression within two content themes - 'weather and climate' and 'settlements' - which are recurrent elements in the 11 to 18 geography curriculum. Within each of the themes, particular attention is focused on the curricular specifications, assessment questions and mark schemes for specific subthemes. The amount and quality of the evidence available from these sources vary considerably, both between the three stages of secondary education, and between the different examination syllabuses at each stage. Many of the statements in the content specifications and in the mark schemes give little indication of the depth of understanding expected, and are open to different interpretations. The methodology of the research is qualitative and interpretative.

The research reveals that the support for progression is uneven. There is little doubt that the geographical understanding required of 'weather and climate' and 'settlements', is progressively more demanding at each successive stage. But the very general nature of the specifications and official guidance for KS3 is inadequate to provide a sound base for progression in understanding in the secondary school curriculum. There is a marked advance in the quality of complexity and abstraction expected at A Level, compared to GCSE; and significant differences between the two themes in the nature of the progression, which may reflect differences between physical and human geography. There is no overall structure in place, designed to support progression in the development of geographical understanding across the three stages of secondary education.

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Acronyms/Abbreviations

ACAC	Curriculum and Assessment authority for Wales
AEB	The Associated Examining Board
Cambridge L	Cambridge Linear examinations
Cambridge M	Cambridge Modular examinations
CFAS	2 p 59
CSE	Certificate of Secondary Education
DES	Department of Education and Science
DES/WO	Department of Education and Science/Welsh Office
DfE	Department of Education
DfEE	Department of Education and Employment
GCE	General Certificate of Education
GCSE	General Certificate of Secondary Education
GYSL	Geography for the Young School Leaver
HCS	hypothetical cognitive structures
HMG	2 p 60
HMI	Her Majesty's Inspector of Schools
HSGP	High School Geography Project
IAAM	
ITCZ	intertropical-convergence zone
KS3 or KS4	Key Stage 3 or Key Stage 4
LEDC	Less economically developed countries
MEDC	Moderately economically developed countries
MEG	Midlands Examining Group
NEAB	Northern Examinations and Assessment Board
O & C	Oxford and Cambridge Examinations & Assessment Council
O & C	Oxford and Cambridge Examinations Board
OED	Overseas economic
QCA	Qualifications and Curriculum Authority
SAT	2 p 50
SCAA	School Curriculum and Assessment Authority
SEG	Southern Examining Group
SOLO	structure of observed learning outcomes
TGAT	Task Group on Assessment and Testing
WJEC	Welsh Joint Education Committee

CHAPTER 1. INTRODUCTION

When I initially embarked upon this research, I was motivated by two deep interests, one long standing and the other of more recent origin. The first, dating from the 1960s when I was a teacher in a secondary school, was a concern to clarify the nature of the geographical understanding which secondary school students were expected to develop, and to investigate how the curriculum could best be structured to support progression in that understanding. This continued to be a strong personal interest during the following two decades when, as an HMI (Her Majesty's Inspector of Schools), I was able to observe how the geography curriculum was structured and taught in a large number of schools. Because of the responsibilities that I held as the Staff Inspector for geography, from 1978 to 1992, I was in a privileged position to gain an overview of the curriculum changes taking place during that period, and opportunity to reflect on the implications of those changes for students' learning. The second interest arose out of the development of the National Curriculum for England and Wales, and my experience as the HMI adviser to the National Curriculum Geography Working Group, which was set up to advise the Secretaries of State for Education and Science and for Wales on the attainment targets and programmes of study appropriate for the subject. This was both a stimulating and a frustrating experience, the frustrations being largely a consequence of pressures from the Department of Education and Science (DES) to tailor the geography curriculum to a framework and to a conception of progression to which it was ill-suited, namely ten levels of attainment defined largely in terms of specific content (Bennetts, 1993).

At first, my aim was to focus on the implications for progression in geographical understanding of the statutory requirements for the subject in Key Stages 3 and 4 of the National Curriculum (the 11 to 16 age range) and of the proposed system of assessment based on statements of attainment. The intended critical analysis had much less practical significance after the Dearing Review (Dearing, 1993b) and subsequent changes to both the framework and the system of assessment. Geography was no longer part of the National Curriculum in Key Stage 4 (KS4) and the revised Statutory Order presented a very different structure within which to plan courses. I therefore decided to broaden the scope of my enquiry to the full age span of secondary education, and to consider the

extent to which, not only the National Curriculum in Years 7 - 9 (students aged 11-14), but also GCSE and A Level examinations, provide support for progression in understanding. The research is about the influences on a geography curriculum which remains the responsibility of individual schools, but which is subject to external requirements and controlled, to a greater or lesser extent, by formal assessment systems. The research focuses mainly on documentary evidence from primary source materials: for KS3, the attainment target, programme of study, and official advice about assessment; and for GCSE and A Level, the examination syllabuses, examination papers and mark schemes. It does not address what students actually understand, nor does it analyse how teachers, textbook authors and other professional educationalists have interpreted the National Curriculum and examination requirements. The choice of focus will be examined more fully in the section on methodology, in Chapter 2.

Because of the complexity of the geography curriculum and of the evidence available from the examination system, not least because of the number of examination syllabuses, it was necessary at a fairly early stage to concentrate on selected fields of study within the subject. As geographical content is structured thematically in nearly all GCSE and A Level syllabuses, and for much of the KS3 programme of study, it made sense to focus the research on selected themes. The thesis is based on an investigation of the curricular and assessment requirements in two themes: one from physical geography - weather and climate; and the other from human geography - settlements. Because of the breadth and complexity of both themes, subthemes from each were selected for deeper analysis. While this means that the treatment of the two themes is by no means comprehensive, care was taken in the choice of subthemes to ensure a reasonable coverage of syllabus content. The evidence from assessment at GCSE and A Level was drawn from examination papers and mark schemes for the three years, 1997 to 1999.

The pace of curriculum change since the mid-1980s, largely a consequence of central government policies and initiatives, has been remarkable (Table 1.1). The resultant lack of continuity has affected the evidence available from external examinations as well as from the National Curriculum. New A level syllabuses were introduced in 1995 for examination in 1997, and new GCSE syllabuses in 1996 for examination in 1998. While

the analysis of syllabus content is based on the newer syllabuses, the analysis of examination questions and mark schemes includes examples from the 1997 GCSE papers, which are related to the previous syllabuses. Although the GCSE syllabuses were reduced in number from 16 to 11, there were comparatively few changes in syllabus

1986.	Introduction of GCSE courses, replacing the CSE and GCE O Level;
1987.	Government announces intention to introduce a National Curriculum, 5-16;
1988.	The first year of GCSE Examinations; Education Reform Act; Report of the Task Group on Assessment and Testing (TGAT);
1989.	Establishment of the National Curriculum Geography Working Group;
1990.	Report of the National Curriculum Geography Working Group;
1991.	National Curriculum Orders for Geography 5-16; KS3 courses implemented from September;
1993.	Dearing Review of the National Curriculum and Assessment Framework; Revised A Level Subject Core;
1994.	Geography taken out of the National Curriculum for KS4;
1995.	Revised National Curriculum Orders; Revised GCSE National Criteria; New A Level courses implemented from September;
1996.	New GCSE courses implemented from September; Dearing Review of Qualifications for 16-19 Year Olds;
1997.	The first examinations for the 1995 A Level syllabuses; Decision to reformulate the AS and A Level syllabuses;
1998.	The first examinations for the 1996 GCSE syllabuses;
1999.	Review of National Curriculum; Revised AS/A Level Criteria;
2000.	Revised National Curriculum Orders; Revised GCSE Criteria; New AS/A Level courses implemented from September;
2001.	New GCSE courses to be implemented from September.

Table 1.1. A Succession of Curriculum Changes affecting Secondary School Geography, 1986 -2001.

content or style of questions about ‘weather and climate’ and ‘settlements’. It has not been feasible, in the time frame of the research, to take detailed account of the most recent changes, such as the second revision of the National Curriculum Orders (DfEE/QCA, 1999), and the latest sets of AS/A and GCSE syllabuses, for introduction in 2000 and 2001 respectively; although some reference is made to the most recent

interpretations of the KS3 programme of study, revealed in the exemplification materials for a scheme of work published by the Qualifications and Curriculum Authority (QCA, 2000).

The aim of the thesis, therefore, is:

to examine critically the opportunities and support for progression in the geographical understanding of secondary school students, provided by the formal requirements of Key Stage 3 of the National Curriculum, and of GCSE and A Level examinations, from 1997 to 1999.

The structure of the thesis is as follows. Chapter 2 analyses the key concepts of understanding and progression, especially in the context of geographical education; and the nature of the formal systems of assessment at KS3, GCSE and A Level as sources of evidence for the support for progression provided by the external requirements for the subject. Chapter 3 explains the research methodology. Chapters 4 and 5, which cover the main body of research, examines the evidence of support for progression in understanding 'weather and climate' and 'settlements', provided by the KS3, GCSE and A Level specifications and assessment. Chapter 6 summarises the main findings and reflects on them.

CHAPTER 2. PRELIMINARY CONSIDERATIONS: UNDERSTANDING, PROGRESSION, AND ASSESSMENT.

The concepts of understanding and progression need to be examined carefully, because our familiarity with the terms may encourage us to assume that their meanings can be taken for granted, and that their application in a chosen subject is likely to be straightforward. Similarly, it is important to consider how the purposes of assessment at KS3, GCSE and A Level, and the context in which that assessment takes place, affect its value as a source of evidence about the nature and quality of geographical understanding expected of students, and the progression intended. All three elements have a bearing on the methods chosen for the research.

The nature of Understanding

Although understanding is a prime educational goal, the idea is not one that is readily amenable to a precise definition. This is partly because of its breadth of application, and the different meanings attached to the idea when used in different contexts. We talk about understanding people, circumstances, events, issues, ideas, attitudes and values, how to use skills and techniques, and even of understanding such broad and complex fields of study as geography. Not surprisingly, we sometimes mean different things when we apply the word to different targets (White and Gunstone, 1992). This complexity of use and potential ambiguity of meaning may help to explain why the concept of understanding has received so little attention in the literature on learning produced by psychologists, and especially by those who have followed the behaviourist tradition. Pressley and McCormick (1995, p. 299) comment that ‘for much of [the twentieth century], thinking and mental phenomena were taboo in North American psychology, with the study and measurement of overt behaviour viewed as the only respectable pursuit for academic psychologists’. The behaviourist’s attitude towards understanding is well illustrated by Bloom, in his explanation of the rationale for the taxonomy of educational objectives, designed by him and his colleagues for purposes of assessment (Bloom et al., 1971). For them, understanding was a ‘construct invented to describe certain observable behaviour patterns’ (op. cit. p. 24). They asserted that ‘using operational rather than

nominal definitions [would] make statements of educational objectives clear and easier to communicate to others. Words like comprehension, understanding and appreciation [would] take on more precise behavioural meanings and [would] not be open to various interpretations' (op. cit. p. 24). In contrast, 'words such as understanding, thinking, memory, cognitive structures, and cognitive processes [have been described as] characteristic of cognitive theorists' (Childs, 1997, p. 121); while Bigge and Shermis (1992, p. 10) comment that 'cognitive interactionists define learning in terms of reorganisation of perceptual or cognitive fields so as to gain understanding'.

At the core of the concept of understanding is the notion of 'making sense' of something, or 'giving meaning' to whatever is the focus of interest. This usually involves the recognition and comprehension of associations and relationships, and often implies going beyond what is immediately obvious.

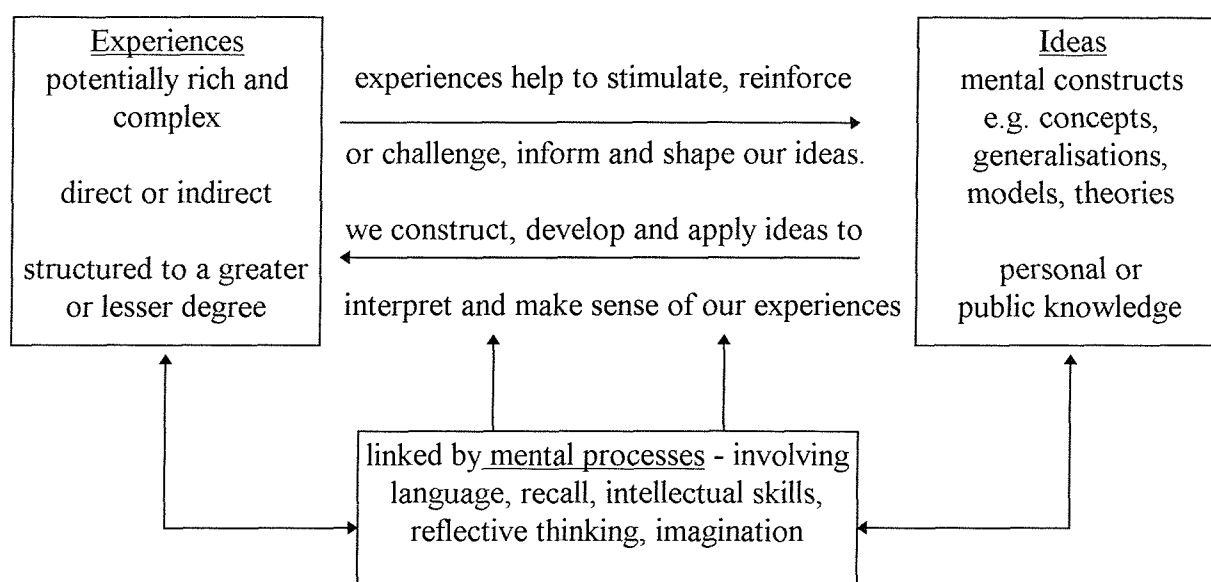


Figure 2.1. The Roots of Understanding

Understanding is a product of experience and ideas (Figure 2.1). The experiences to which most of us are exposed - through the environments in which we operate; the succession of situations, events and activities that make up our daily lives; our relationships with other people; and our individual patterns of behaviour and involvement-are immensely complex. They include direct and indirect experiences, the scope for the latter having been extended greatly by a rapid expansion of the ways in which information

can be communicated. Our experiences can range from those which appear to us to be highly structured to those which convey an impression of chaos.

The ideas which we have help us to make some sense of our experiences. Such ideas include concepts, generalisations and principles, models and theories. Concepts are the basic building blocks of our conceptual structures. They are developed by processes which involve discriminating, categorising and classifying. Dearden (1968, p. 108) states that 'to 'have' a concept... is to be in possession of a principle of unity according to which a number of things may all be regarded as being the same, or as a kind. Concepts, then, pick out features or respects which bring some unity into our experience'. Most of the concepts that we use regularly relate fairly closely to familiar features and experiences, and therefore involve a low order of abstraction. Others, invented to provide fresh insights, are more removed from immediate experience, and therefore involve a higher order of abstraction. Generalisations specify relationships between concepts, and are characteristically summarised by statements in the form of principles or rules. To understand the structure of an idea which is in the form of a generalisation, it is necessary to know the meaning of the concepts which are involved and the nature of the relationship. Concepts and generalisations can be combined to create more elaborate, conceptual structures, variously described as constructs, models and theories. Gregory (1996) has defined a model as 'an idealised and structured representation of the real' (op. cit. p. 385); and a theory as 'a set of connected statements used in the process of explanation' (op. cit. p. 622). While in practice, all three terms - construct, model and theory - are used in various ways, they all embody the notion of coherent conceptual frameworks, composed of interrelated ideas, which help us to organise our thinking (Tanck, 1969).

While understanding does not always involve such coherent conceptual structures, as characterise models and theories, it necessarily involves connections between content, or knowledge, or beliefs. Davies (1998, pp. 61-2) has distinguished between what he describes as *thin* knowledge of facts 'without reason' and *rich* knowledge that involves connections and relationships. He asserts that 'if my knowledge is *proper* or *rich* and hence understood, I have a grip on the way the content, propositions and properties

concerned are appropriately connected to much else in the way of content, propositions and properties’.

Figure 2.1 also draws attention to the strong interrelationships between experiences and ideas, with our experiences helping to stimulate and shape our ideas; and our ideas influencing how we perceive reality, and how we interpret and make sense of our experiences. We construct the links between our experiences and our ideas by mental processes, sometimes consciously, as when we engage in analytical and reflective thinking, but also subconsciously, and even unconsciously, as when we suddenly ‘hit upon’ a solution to some problem without knowing why that particular solution has come to mind at that particular moment, or how it developed into the form in which it emerged. The development of understanding is in some respects an imaginative and creative activity, which cannot be explained in terms of a series of logical, preordained steps.

Language has a particularly important part to play in the development and use of general ideas, as it is mainly through language that we conduct our thinking and communicate our thoughts. By attaching a label to an idea, we become more aware of that idea, and are more likely to focus upon it and make use of it. The vocabulary and linguistic structures at our command help us to clarify and articulate its meaning, describe and define its characteristic attributes, link it to other ideas, discuss its relevance to individual cases, and expose our interpretations and reasoning to public scrutiny. Thomson (1959, p. 176), using geographical metaphors, comments that ‘although we do not use words when we perceive the world, it is in virtue of having learned to name, describe and relate what is commonly perceived that we come to know a structured, consistent and ordered world. Language assists us to build up a detailed and understood map of the world that we inhabit’. The construction of such a map is not achieved simply by adding new knowledge to old. It sometimes also requires the reinterpretation and reorganisation of previously held views, a process that usually involves reflective thinking, supported by the use of language. Vygotsky (1962), who explored the role of language in the development of understanding, discussed it in terms of the tool which ‘creates the possibility of thought, organises the thinking processes, and both reflects and shapes the human society in which it is used’ (Hodson & Hodson, 1998, pp. 35-36).

A distinction needs to be made between the conceptions and understandings of an individual, which provide *personal meanings*, and those which are shared between people and thereby provide publicly accepted meanings. The former, which may be rich in detail, may, nevertheless, be skewed by the nature of an individual's personal experience, interests, attitudes and values. In contrast, the latter have been refined by reflection and discourse, to form a shared body of knowledge. This is not to imply that the *public meanings* are necessarily complete, entirely coherent, or even correct; but rather that they represent the present state of informed thinking, based on a pool of experience and critical review. Public meanings, as well as private meanings, change over time; and, at any given time, different theories or perspectives may offer alternative sets of meanings. While public meanings are derived from a variety of sources, much of the curriculum in secondary schools is organised in the form of 'subjects' - selected fields of study which are considered appropriate vehicles for the achievement of a range of educational goals. The so-called 'academic' subjects are linked to *disciplines of knowledge* (Hirst, 1974, Phenix, 1964), which are based mainly in higher education, especially universities. Before considering the types of understanding associated with geography, it is worthwhile to review briefly some of the claims made for disciplines as a prime source of ideas about what should be taught in the curriculum, and about how knowledge and understanding can best be structured to facilitate effective learning.

The nature and relevance of disciplines of knowledge received attention from some of the leading educational theorists who commented on and influenced curriculum reform in the USA and UK in the 1960s and 1970s (Bruner, 1960; Phenix, 1964; Schwab, 1964; King & Brownell, 1966; Hirst 1965, 1974; Whitfield, 1971; Pring, 1976). Among the characteristics claimed for the disciplines of knowledge are:

1. A recognised knowledge domain, or territory, which its practitioners construct and define, in response to their shared interests and the problems which they regard as significant. Unlike political territories, however, there are no boundaries separating the domains of different disciplines. Disciplines can have overlapping

interests; and new understandings are often developed in zones of contact between disciplines.

2. A conceptual structure, or structures, built around key concepts which reveals the particular interests of a discipline. While existing conceptual structures strongly influence what enquiries are undertaken, dynamic disciplines tend to generate new ideas and, eventually, new structures. Such structures form a network of possible relations in which experience can be understood (Hirst, 1974, Chapter 3).

3. Methods of investigation and principles of procedure suited to the domain of the discipline. These involve, not only specific techniques, often requiring particular skills as well as knowledge, but also the criteria or standards used to determine whether the conclusions reached within a given discipline are justified and significant. Schwab (1964) labelled this characteristic 'the syntactical structure' of a discipline.

4. Social structures which support the existence and development of the discipline, and protect and promote the interests of its members. These structures include organisations, such as subject associations; specialist journals; communication networks; courses and conferences; and systems for funding, delivering and evaluating education and research. The active practitioners of a discipline can be viewed as members of a 'community of discourse', within which understanding is shared and subjected to scrutiny (King & Brownell, 1966; Pring, 1976). A sociological account of a discipline may also draw attention to the competition within and between disciplines, the importance of the power structures within institutions and organisations, and the capacity of these to restrict as well as support developments (Musgrove, 1968; Goodson, 1983).

5. Individual histories that may involve the persistence of different traditions as well as significant changes. While new ideas and methods can lead to fresh

perspectives and interpretations, different perspectives may continue to develop alongside one another.

As a consequence of these characteristics, the academic disciplines generate, refine and explore the relationships between many of the ideas that help us to interpret and make sense of our environments and experiences. They produce public meanings. The rapid growth of knowledge, and the increasing specialisation required to extend understanding, have led to the creation of more and more academic disciplines. The map of knowledge has become increasingly complex. Several attempts have been made, especially by philosophers, to classify knowledge in terms of a limited number of basic categories, which together would cover the spectrum of human consciousness. The most notable have been those of Phenix and Hirst. Phenix (1964) claimed that analysis of the ‘distinctive modes of human understanding’ pointed to six fundamental *realms of meaning*, which he labelled symbolics, empirics, aesthetics, synnoetics, ethics and synoptics. Whitfield (1974, pp. 22-23), using slightly different labels, defined the categories as follows:

- symbolic meanings - derived from communication systems conforming to internally consistent rule systems;
- empirical meanings - based upon concepts whose truth is subject to tests by controlled observation using the senses or instrumental extensions of them, as in science;
- aesthetic meanings - derived from sensory, and in part intuitive, experience set against idealised perceptions of visual, tactile and auditory form;
- relational meanings - derived from relationships with other people and things signifying that man’s identity is not formed in a vacuum, but in relation to other persons and objects;
- ethical meanings - based upon moral concepts and codes concerning human thought and action; and
- perspective meanings - derived from overarching concepts of time, place, God, the ultimate reality and so on.

Hirst (1974, Ch. 3, p. 40) argued that ‘To acquire knowledge is to become aware of experience as structured, organised and made meaningful in some quite specific way, and the varieties of human knowledge constitute the highly developed forms in which man has found this possible’. He suggested that the historical development of ‘the rational mind’ had been marked by ‘the progressive differentiation in human consciousness of some seven or eight distinguishable cognitive structures, each of which involves the making of a distinctive form of reasoned judgement and is, therefore, a unique expression of man’s rationality’ (op. cit. p. 40). According to Hirst, the *forms of knowledge* have four distinguishing features:

1. They each involve certain central concepts that are peculiar in character to the form.
2. In a given form of knowledge these and other concepts that denote, if perhaps in a very complex way, certain aspects of experience, form a network of possible relationships in which experience can be understood. As a result the form has a distinctive structure.
3. Each form has distinctive features that are testable against experience in accordance with particular criteria that are peculiar to the form.
4. The forms have developed particular techniques and skills for exploring experience and testing their distinctive expressions.

His forms of knowledge were limited to propositional knowledge, and his classification was based primarily on the claim that each category has a logically distinct kind of criteria for validating its statements. The forms initially identified by Hirst were mathematics, the physical sciences, the human sciences and history, literature and the fine arts, morals, religion, and philosophy. Geography was not included in the list because the criteria used to validate geographical propositions are of the kinds found in other forms, notably the physical sciences, and the human sciences and history. According to Hirst’s view, geography is a *field of knowledge*, a discipline based on more than one form. In a later paper, Hirst (1974, Ch. 6, p. 86)) suggested that the social sciences and history, as pursued in universities and schools, may also ‘be concerned with truths of several different kinds’, and therefore do not qualify as a form or forms of knowledge. In his

revised thesis, he preferred to emphasise the distinction between one form of knowledge that is 'concerned with the truths of the physical world and another as concerned with truths of a mental or personal kind' (op. cit. p. 86).

However, the very idea that the rich variety and complexity of human knowledge and understanding, and our ways of knowing, can be reduced to a limited number of fundamental categories has been seriously questioned. Pring (1976), for example, comments that:

The achievements of mankind are very many: there are many different ways in which man has come to enquire in a disciplined manner into a wide variety of problems; many are the activities through which excellence of performance is sought and recognised. There seems something *prima facie* absurd in reducing all activity and achievement to a very few 'basic categories' (Pring, 1976, p. 36).

The Nature of Geographical Understanding

Emphasis on the variety and complexity of human knowledge and understanding is pertinent to any attempt to review the nature of geographical understanding.

Geographers face a challenge when they attempt to encapsulate in a concise statement what their discipline is about. Part of the difficulty can be attributed to the breadth of the field of study which the discipline embraces, but the difficulty also reflects different views about what the focus of geography should be, what methodologies should be used, and how to define geography in a way that distinguishes it from other disciplines. The short selection of definitions in [Table 2.1](#) illustrates a few of these difficulties. The brief quotes from Hartshorne and Haggett are notable examples of carefully worded, inclusive statements that can stand up to close scrutiny, but which on their own are not particularly informative. The other four, by being slightly more focused, reveal significant differences in emphasis: with Gilbert and James offering definitions in terms of regions or places, Ackerman appearing to favour relationships between people and the environment, and Morrill clearly asserting a spatial viewpoint. There is also a very clear distinction between Gilbert's emphasis on geography as an 'art' and Morrill's concern with geography as a

1. Geography is that discipline that seeks to describe and interpret the variable character from place to place of the Earth as the home of man. (Hartshorne, R., 1959)
2. Now geography is in my view the art of recognising, describing and interpreting the personalities of regions. (Gilbert, E. W., 1960)
3. Geography is that field of learning in which the characteristics of particular places on the Earth's surface are examined. It is concerned with the arrangement of things and with the associations of things that distinguish one area from another. It is concerned with connections and movements between areas. (James, P., 1952)
4. Its goal is nothing less than an understanding of the vast, interacting system comprising all humanity and its natural environment on the surface of the Earth. (Ackerman E. A., 1963)
5. Space, spatial relations and changes in space - how physical space is structured, how men relate through space, how man has organised his society in space, and how our conception and use of space change - are the elements of the science of geography. (Morrill, R. L., 1970)
6. For me, geography is most succinctly described as 'the study of the Earth's surface as the space within which the human population lives'. (Haggett, P., 1990)

Table 2.1. A Selection of Definitions of Geography

'science'. Some of these definitions can quite reasonably be interpreted as reflections of the time when they were written. In the 1950s, regional studies still dominated much of the geographical enquiry undertaken in the USA and the UK; by 1970, spatial analysis and a scientific approaches had become established at the forefront of research. Moreover, such brief extracts, deliberately selected to draw attention to differences, do not attempt to do justice to the analyses presented by their authors, who, while seeking a consensus, usually acknowledged the diversity of views within the discipline. Treatment of that diversity requires a different form of presentation than is possible in a short definition.

Figure 2.2 is an attempt to map the diversity of content within geography, and to indicate the importance of links between the different categories, and significant external influences. The categories range from the most general at the top of the diagram to the most specific at the bottom. While geographers have developed and shaped their discipline by their intellectual, social and political activities within their particular fields of study and communities of discourse, many of the most important developments in geography have been subject to external influences. Prominent among these, especially during the last 40 years, has been the influence of different *philosophical perspectives*, each providing a framework within which research can be undertaken, based on beliefs or assumptions about: what we can know and how we can know it (epistemology); and what

the world must be like for that knowledge to be possible (ontology). These perspectives define the methodologies that give validity to how research is conducted and to the understanding that results from it (Johnston, 1983, Johnston et al., 1994, pp. 259-263; Bird, 1993). There is a distinct echo here of Schwab's notion of the syntactical structure of a discipline, except that the notion of a variety of philosophical perspectives within a single discipline is perhaps more suggestive of Hirst's fields of knowledge. Four broad perspectives are widely recognised as being relevant to geography - empiricism,

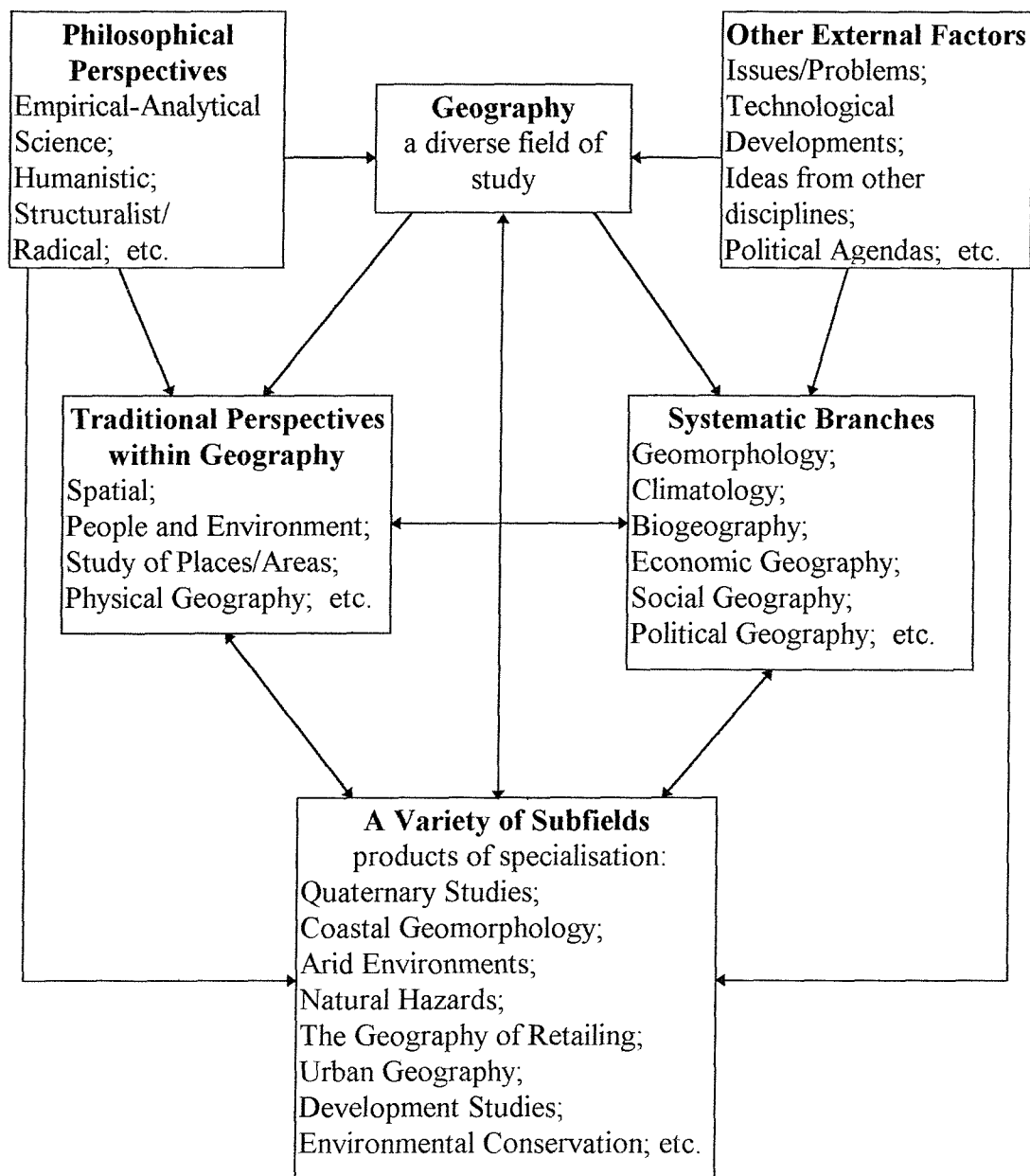


Figure 2.2. A 'Map' of the Substantive Structure of Geography.

positivism, humanism and structuralism; although various other perspectives are associated with these categories, for example 'behaviouralism' with positivism, 'idealism' and 'existentialism' with humanism, and 'realism' with 'structuralism'. Structuralism, because of its association with 'Marxism' and various forms of 'radical geography' also has strong political overtones. The considerable growth in human geographers' interest in humanistic and structuralist approaches, from the 1970s, was largely a consequence of dissatisfaction with what could be achieved through scientific methods based on positivism. However, positivism has remained the dominant philosophical perspective for physical geography (Clark et al, 1987) and continues to underpin a great deal of research in many of the subfields of human geography. Direct and explicit attention to philosophical perspectives is mainly evident at a research level, and much less apparent in teaching at lower levels. This is hardly surprising given the abstract nature of many of the ideas that characterise different perspectives, and the quality of reasoning necessary to make sense of them and their implications for enquiry and understanding. Nevertheless, particular ideas associated with individual perspectives, when expressed in suitably simple terms, may be highly relevant for understanding the appropriateness or limitations of different forms of explanation for different types of situation.

Some of the other external factors that have been important for the development of geography are more direct in their influence. Environmental, social and economic problems, such as water and atmospheric pollution, land degradation, global warming, the spatial patterns of criminal activities, the uneven distribution of economic opportunities and welfare; the social problems of inner city areas; transport problems in rural areas; the problems of developing countries and the effects of globalisation, present an intellectual as well as a moral challenge to researchers, who can see ways in which their discipline may be able to make useful contributions towards a better understanding, and even towards solving, some of the problems. Technological developments have presented opportunities to improve methods of enquiry, and tackle research which previously had been impossible. For example, advances in computer power and in remote sensing have supported the development of complex geographical information systems and the means to analyse the data collected. Ideas imported from other disciplines stimulate advances in geographical thinking. Governments influence disciplines by providing funds and other support for research, in order to further their own political agendas. Political priorities often include

ones which geographers are capable of researching, but major decisions about the allocation of funding are usually outside the control of the discipline and its institutions. Many examples of the operation of these factors in the UK are described in the quadrennial reviews prepared, on behalf of the Institute of British Geographers, for the International Geographical Union, and published in *The Geographical Journal* (Bennett and Thornes, 1988; Gardiner and Hay, 1992; Richards and Wrigley, 1996; and Thrift and Walling, 2000).

The *systematic branches* of geography are major subfields, which are closely related to other disciplines, mainly in the physical and social sciences. Thus, the study of weather and climate in geography is linked to meteorology, and political geography is linked to political science. While having their own geographical foci, the systematic branches also draw heavily on ideas from the related discipline. The list in Figure 2.2 is neither comprehensive nor permanently fixed. For example, hydrology could be included among the physical branches, and historical geography added as a human branch. The *traditional perspectives* are more fundamental elements, for they are not so much subdivisions of geography as the continuing interests which give this diverse discipline its character. Pattison (1964), in a short, seminal paper published in the *Journal of Geography*, identified four persistent traditions within the work of American (USA) geographers: the spatial tradition; the area studies tradition; the man-land tradition; and the earth science tradition. Similar categories have been described by other academic geographers, seeking to provide an overview of the discipline (e.g. Broek, 1965; Haggett, 1965; McNee, 1967; Taaffe, 1974). Each of the traditions has the potential to be dynamic, developing new methods and new insights, and they have varied considerably in their relative importance from one period to another. Nevertheless, they have all exhibited a degree of continuity, and at any one time each is likely to be related to the others in a variety of ways. Taaffe (1974) in an analysis of the three traditions associated with human geography commented that ‘an emphasis on one of the views rather than the others has significant consequences in research, in graduate training, and in geography’s role in general education’. His decision to subsume physical geography within the other three appears to have been influenced by the ways in which geography is organised in American schools and universities - geography usually being associated with social studies in their schools, and

the content of physical geography often being regarded as part of the earth sciences or environmental sciences in their universities.

The attraction of the idea of the different geographical perspectives, when considering what should be included in a geography curriculum, is evident in the Report of the National Curriculum Geography Working Group (DES/WO, 1990). The Group described the 'core' of geography in terms of 'place, space and environment', a convenient shorthand summary that had been used a few years earlier by Morrill (1987). These elements were elaborated in a set of aims, which included leading pupils to:

- understand some of the important characteristics of the Earth's major physical systems - its landforms, weather and climate, hydrological and ecological systems - and the interaction among those systems;
- understand the significance of location and of distribution patterns in human activities and physical processes; how places are linked by movements of people, materials and information, and by physical, economic, social and political relationships; and the interdependence of people, places and environments throughout the world;
- understand some of the relationships between people and environments, including both: the influence of environmental conditions on human activities; and the varied ways in which societies with different technologies, economic systems and cultural values have perceived, used, altered and created different environments;
- develop a sense of place: a feeling for the 'personality' of a place and what it might be like to live there. (DES/WO, 1990, p.7)

All four of Pattison's traditions of geography are prominent in the Working Group's specification. The aims also draw attention to some of the ideas associated with each of the traditions, although only in a very general way. The traditional perspectives, with their characteristic concepts, were clearly regarded as potentially accessible to students in schools, in a way that the philosophical perspectives were much less likely to be.

The subfields in the final box are much more varied, for they represent the whole spectrum of specialist interests within geography that are the foci of research and the

source of organised knowledge. Some subfields, such as coastal geomorphology, slope development, transport studies, and electoral geography, may be readily identified as subdivisions of individual systematic branches; many more can be recognised as occupying territory where branches overlap. Many of the subfields overlap with each other. Some are large and complex, drawing on the services of many practitioners; others rely on the work of a small number of enthusiasts. Some are well established and have their own traditions, while others are at an early stage of development. Although individual research projects are likely to be tackled within the framework of a single philosophical perspective, it is often possible to approach a given subfield from more than one perspective, whether philosophical or traditional.

It is clear that the content structure of geography is immensely complex, and in recent years has presented a rapidly shifting scene, especially at the level of the subfields. However, a great deal of students' geographical understanding is developed in the context of the subfields, for it is here that general ideas can more easily be related to specific processes and conditions, and reasonably coherent networks of ideas can be constructed and applied to situations that students can comprehend.

The Concept of Progression

The notion of progression focuses on the advances in a student's learning, over a period of time. It thus has qualitative and temporal dimensions. The idea is fundamental to the intention and practice of education. As Daugherty (1996, p.195) points out 'the idea of progression is implicit in any discussion of the nature of learning we hope students will engage on. If we did not hope that students should, in some sense, progress we would have no foundation on which to construct a curriculum or to embark on the act of teaching'. Progression permeates, implicitly if not explicitly, the whole enterprise of education, and has implications for key elements in curriculum planning and implementation: the specification of learning targets; the selection of content and activities; the design of learning materials; the interaction between teachers and students; the assessment and reporting of students' learning; and the evaluation and revision of

teaching programmes and strategies. While the idea of progression is especially applicable to students' learning, most notably in relation to the qualities which are associated with advances in attainment or performance, it can also be applied to the design of courses which are intended to bring about these changes. Much of the treatment of progression in the educational literature is about how best to structure courses to enable students to advance their learning in an orderly way.

Two ideas which are closely related to progression within the design of curricular structures, are continuity and sequence. The idea of *continuity* suggests the persistence over time of elements or features of curricular provision, such as particular elements of content and types of learning activity; or of assumptions about the nature and educational value of an individual subject which influence curricular decisions. An example of the latter might be a commitment to the values and ideas associated with all four of Pattison's 'traditional perspectives' in geography (op. cit. p. 17). The significance of strong continuity is that it makes it easier for teachers to design courses which enable students to build upon their previous experience and learning; and, thereby, help them to acquire knowledge and develop understanding, skills and competencies in a structured way (Bennetts, 1995b). While it does not guarantee progression, it provides conditions which facilitate the orderly development of learning. The idea of *sequence*, on the other hand, focuses attention on the order in which content is introduced and activities are organised. Any curricular programme displays some sort of sequence, but whether that sequence supports the process of learning, or is more a matter of organisational convenience, varies greatly. In North American educational literature, the term 'sequence' often appears to be used as a broad label which subsumes the idea of progression (e.g. Posner and Strike, 1976). However, the two ideas are by no means synonymous in meaning.

Because sequence is often related to content and activities, which are observable elements of the curriculum, it is more easily identified than progression. But the latter, with its concern for the quality of learning, is arguably the more important concept. Both sequence and progression can be applied to different time scales, ranging from a single lesson to the entire length of a student's schooling; with intermediate scales including units of study, measured in weeks, and courses lasting up to several years.

The idea of progression becomes increasingly important over the longer time scales, during which students' developing capabilities are affected by maturation processes, as

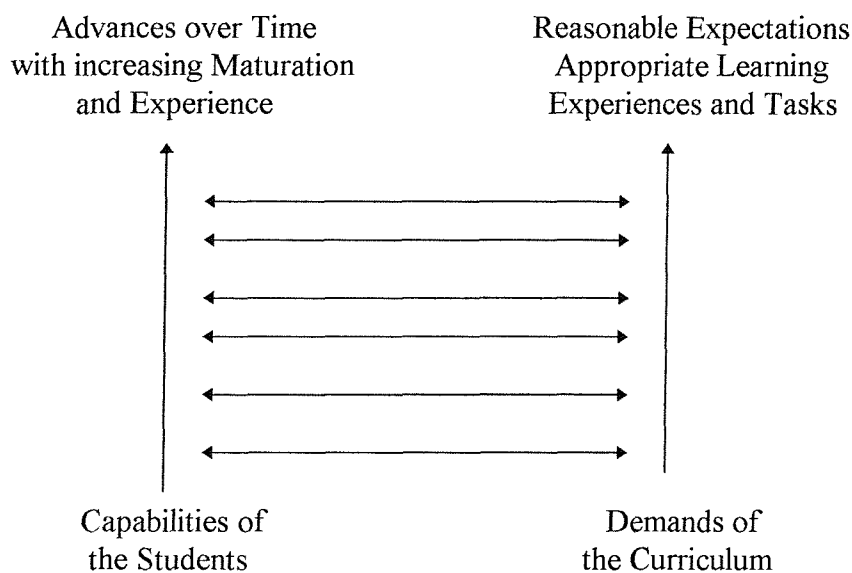


Figure 2.3. A Matching Model of Progression

well as by experience. Probably the most widely accepted principle underpinning planning for progression is that there should be a reasonable match between the capabilities of students and the demands of the curriculum (Figure 2.3); and that teachers' objectives, expectations and strategies should, therefore, take account of the ways in which students' capabilities develop. As Williams (1997, p.59) commented, 'maturity brings intellectual accomplishment with gains in knowledge and understanding, changes in values and attitudes, and the acquisition of a broader range of skills. It also brings substantial changes in pupils' enthusiasms, experience and interests. The geography teacher's task is to achieve a match between the learner as he or she matures and appropriate subject-matter defined in terms of knowledge, attitudes and skills'. The idea of *match*, in this context, can be interpreted as meaning that, not only should demands be realistic, in the sense that the understandings and skills intended should be within the reach of students, but also that they should lead students forward. The curriculum should aim to improve the capabilities of students, not merely reflect them. Expressed in this simple form, it could be claimed that the idea of progression equates with the intuitive, common sense approach adopted by many teachers, who draw upon their professional experience to pitch their lessons at appropriate levels. Nevertheless, the model can be interpreted as

having deeper implications for teaching. It can be argued that, to achieve anything like a satisfactory match, schools must carefully evaluate their students' capabilities. It follows, that they should have effective systems of formative assessment to monitor students' progress. As students vary in their capabilities, even in selective schools and in ability sets, there is likely to be a need to differentiate provision. This has implications for the setting of targets; the selection of content, learning activities and resource material; and the organisation of lessons (Walters, 1995; Battersby, 1997). However, it is open to question whether assessment of specific knowledge, understanding and skills could provide sufficiently valid evidence to support fine-grained decisions about matching and differentiation (Davies, 1998, pp. 122-126).

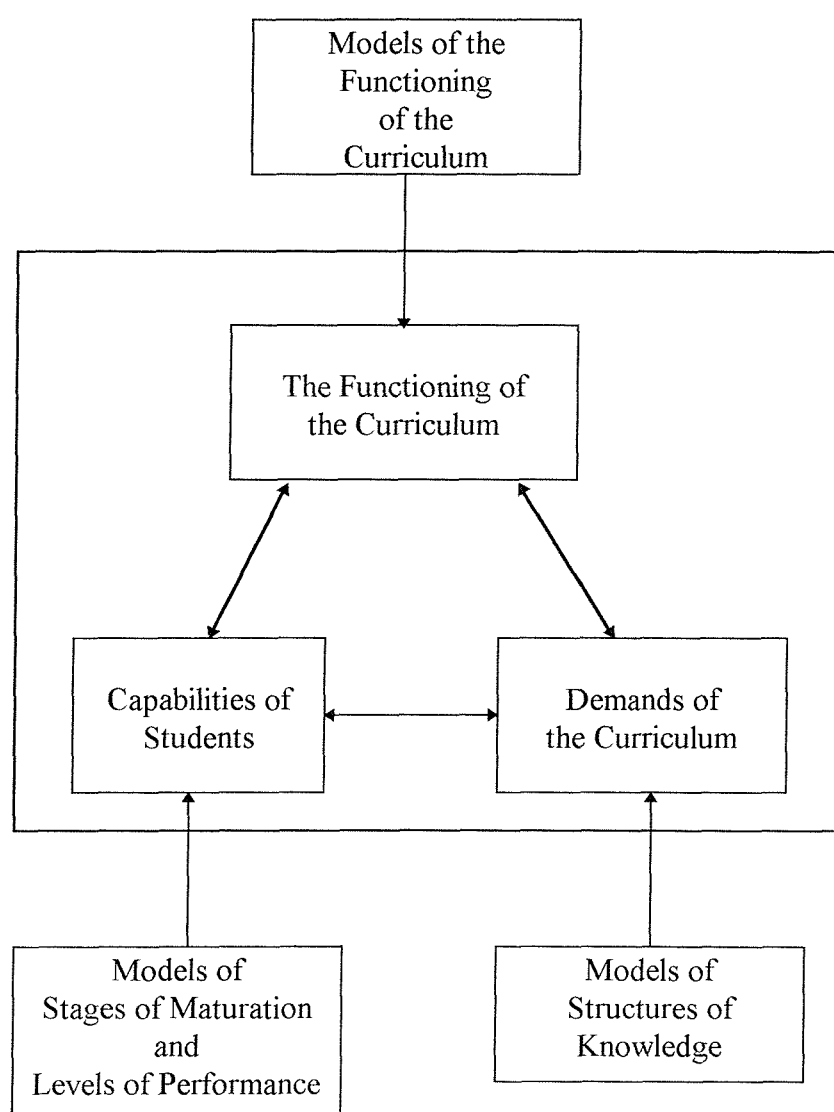


Figure 2.4. Essential Components for a Model of Progression

Figure 2.4 presents a broader framework that recognises the relevance of how the curriculum functions, as well as the relevance of the capabilities of students and of the demands placed upon them. Thus attention is given to the context in which teaching and learning takes place, including the structure of curricular provision and the methods used to support progression. The outer boxes suggest that an understanding of each of the main components, and decisions made about them, can be informed by relevant theoretical models. The diagram also indicates that there are significant interrelationships between the three central components. While each component has its set of characteristic ideas, anything approaching a comprehensive theory of progression, that could usefully inform educational practice, would need to take account of ideas from all three components. This is in line with Bruner's comment that his research had led him 'to think that the heart of the educational process consists of providing aids and dialogues for translating experience into more powerful systems of notation and ordering'; and that a theory of development must, therefore, 'be linked to a theory of knowledge and to a theory of instruction, or be doomed to triviality' (Bruner, 1966, p. 21). However, the theories at present available provide a range of diverse insights rather than a coherent outer framework.

Curricular Demands

Among the approaches that are especially relevant to curricular demands are:

1. seeking to design curricular frameworks that reflect the conceptual structures of individual disciplines;
2. analysing specific content and learning tasks, to identify what students must understand and be able to do in order to reach particular learning objectives; and
3. clarifying the qualities that influence the intellectual demands presented by particular ideas and content.

In the 1960s and 1970s, many subject-based curriculum projects in the USA and the UK, particularly in mathematics and the sciences, attempted to identify the key ideas and conceptual networks from their respective disciplines that might help to structure school curricula. However, at the same time, there was widespread recognition, by curriculum developers and curriculum theorists, that the logical structures derived from advanced research do not necessarily indicate the best sequence in which to introduce ideas to students who are at an early stage in their understanding of a subject. Phenix (1964) outlined three reasons why it is difficult to determine teaching sequences on the basis of such conceptual structures: first, there is no single logical pattern that must be used for any given field of enquiry - any number of conceptual schemes may be devised; secondly, logical structures only provide a set of relationships among the various components of a discipline - they do not dictate the order of teaching; thirdly, it is necessary to distinguish between two types of logical pattern - an order of discovery, which moves from the known to the unknown, and an order of analysis, which moves toward a more critical perspective on the known. When commenting on the relevance of the logical structure of a 'form of knowledge' to the order in which ideas should be taught, Hirst (1974, p. 50) argued that the logic of a subject 'is not a series of intellectual steps that must be climbed in strict order. It is not a specific psychological channel along which the mind must travel if there is to be understanding. This is to confuse logical characteristics with psychological processes'. Using a geographical analogy, he suggested that 'understanding a form of knowledge is far more like coming to know a country than climbing a ladder. Some places in a territory may only be get-at-able by a single specified route and some forms of knowledge may have concepts and relations that cannot be understood without first understanding certain others. But that countries are explorable only in one way is generally false, and even in mathematics, the most strictly sequential form of knowledge we have, many ways of coming to know the territory are possible' (Hirst, 1974, p. 50). This line of reasoning is even more pertinent to those disciplines, such as geography, which Hirst described as fields of knowledge.

Content and task analyses approach the structuring of courses from the opposite direction from that just considered, for they begin from specific curricular objectives rather than from logical structures of a subject-discipline. This approach is most closely associated

with Gagne, who introduced the concepts of *learning hierarchies* and *pre-requisites for learning*. Many of Gagne's ideas had their roots in the neo-behaviourist tradition of educational psychology. He envisaged learners as responding to stimuli, and described their learning in terms of observable changes in behaviour. His approach to understanding, therefore, was primarily by way of intellectual skills. He hypothesised that intellectual skills are acquired hierarchically; and presented a general, hierarchical model containing eight types of learning: signal learning, stimulus-response learning, chaining, verbal association, discrimination, concept learning, rule learning, and problem solving (Gagne, 1962). He claimed that most instruction in school subjects is concerned with the learning and use of concepts, rules and problem solving, that is, with the higher levels of the hierarchy (Gagne, 1970, p. 208). Furthermore, he believed that 'many subjects taught in schools, perhaps most, have an organisation that can readily be expressed as a hierarchy of rules' (Gagne, 1970, p. 208). He suggested that, where hierarchies could be identified, it might be possible to work backwards from a given objective in order to determine what the prerequisite learnings would be; and thereby inform the planning of sequences of learning within specific content areas. According to Gagne (1965, p. 21), 'when such an analysis is made, the result is a kind of map of what must be learned. Within this map, many alternative routes are available, some of which are quite as good as others in achieving the desired objective, But what is not possible in such a plan is to 'skip over' some essential intervening capabilities'. However, White and Gagne (1974, p. 23) acknowledged that most of the investigations into learning hierarchies had 'been concerned with quantitative skills that would generally form part of mathematics or science curricula in schools'; and, while they considered that hierarchies should be sought in other subjects, they recognised that, with the possible exception of language skills, the chances of success might be low. Bigge and Shermis (1992) have claimed that Gagne's educational theory gives little attention to theories of learning, being centred on 'instruction through information processing'. In general, Gagne's approach appears to be more applicable to planning short sequences of lessons than to tackling issues of progression over a longer time scale.

The qualities associated with advances in the cognitive demands of the curriculum are characteristically described in general terms, such as: breadth and range of knowledge;

depth of understanding, which is most commonly linked to complexity and conceptual abstraction; and the effective use of higher order skills such as analysis, synthesis and evaluation. Ausubel (1963, p. 21) suggested a wider range of changes in cognitive sophistication that enable older students to cope with more demanding subject matter:

- increased widening and complexity of the cognitive field;
- increased familiarity of the psychological world;
- greater differentiation of cognitive structure;
- greater precision and specificity of meanings;
- greater ability to comprehend and manipulate abstractions and relationships between abstractions - without recent or current reference to concrete, empirical experience;
- greater ability to deal with general propositions apart from particularised contexts;
- decreased subjectivity in approach to experience;
- increased attention span; and
- increased differentiation of intellectual ability.

But, while lists of general qualities may give an indication of the variety of cognitive developments associated with progression, interpretation of curricular demand in these terms is dependent on the context in which the qualities are applied - a context that involves content, intellectual activity and relevant circumstances. There is a specificity about the nature of knowledge and understanding that is difficult to avoid.

Students' Capabilities

The matching model (Figure 2.3) encourages careful consideration to be given to the extent to which the development of students' capabilities displays consistent patterns over the long period of primary and secondary education. Belief in the possibility of such patterns was encouraged by Piaget's model of *stages of cognitive development*, and the perceived relevance of that model to ideas about *readiness* and *matching*. The research

of Piaget and his colleagues at Geneva involved the detailed investigation of children's thinking by a 'clinical' method, which focused on children's responses to a wide range of structured tasks, and on evidence about the beliefs and opinions which underpinned their actions, revealed in conversations with the researchers (Beard, 1969). Piaget approached his study of cognitive development from a *constructivist* viewpoint. He considered that a child constructs a personal understanding of the world as a result of experiences, which are themselves shaped by the ideas which the child had constructed previously. The child's knowledge, therefore, is neither based wholly on experience, nor wholly on pre-existing mental structures, but is formed by interaction between the two (Turner, 1984). While Piaget viewed cognitive development as a continuous process, he and Inhelder, his main research associate, nevertheless, identified a sequence of stages and sub-stages through which individuals progress. According to the model, each stage is characterised by a coherent pattern of mental activities, which Piaget labelled a '*structure d'ensemble*'. He claimed that the sequence could not vary because each stage is a culmination of what is prepared in the preceding stage; and each supplies the foundation for, and becomes integrated into, the next (Tomlinson-Keasey, 1982). Piaget explained the development of cognitive stages as an outcome of processes of assimilation, accommodation and equilibration. Assimilation occurs when people are able to incorporate new ideas, information or experiences into their existing mental structures. In contrast, accommodation involves an adjustment of these structures in order to deal with a new situation which cannot be simply assimilated. Equilibration is the more radical shift in thinking which enables an individual to advance from one stage to the next; and involves the transformation of the individual's cognitive structures, while incorporating the preceding structures into the new ones.

Much of the research of Piaget and his close associates was based on the observation of young children. Not surprisingly, therefore, it has stimulated more interest in those concerned with understanding the cognitive development of pre-school children and pupils in the primary phase of schooling, than that of pupils in secondary schools. As far as the subjects of the secondary school curriculum are concerned, interest in Piagetian theory has been strongest in mathematics and science, probably reflecting the emphasis within Piagetian research on logical forms of reasoning, which are prominent in these

fields of study. For example, in the 1960s a developmental view based on Piaget's operational stages influenced a number of science curricula, notably, 'the Science Curriculum Improvement Study (SCIS) in the United States, the Australian Science Education Project (ASEP) and Science 5-13 in the UK. The general approach taken in these projects was to use stage theory as a basis for matching the logical demands of a particular science topic to the level of intellectual capability of the learner' (Driver et al., 1994a, p. 76). Shayer's use of Piagetian stages to assess the Nuffield Foundation's science projects in the 1970s revealed significant mismatches between the courses offered and the capabilities of many of the students (Shayer, 1979).

While Piaget is still widely regarded as an outstanding scholar and influence in the fields of genetic epistemology and cognitive development, important aspects of his research have been criticised; and the value for educational theory and practice of some of his ideas, in particular the stage model, has been much disputed (Modgil & Modgil, 1982). Doubts raised by critics include: whether the evidence presented by Piaget justifies the claimed integrity of the stages; the extent to which the stages can be defined in a meaningful way; the adequacy of Piaget's explanation of the stages; the consistency of individual's performance level in relation to different tasks and different conditions (Brown & Desforges, 1977); the emphasis placed on formal reasoning to define the highest stage (Bliss, 1995); and the tendency of Piaget to depict the learner as a lone investigator, to the neglect of social processes (Phillips & Soltis, 1998). Evidence of the variability of performance by individuals, in relation to different tasks, has led to suggestions that it would be better to think in terms of levels of response, rather than in terms of stages. It has been pointed out that responses can be influenced strongly by the nature of a specific task; the content of the task, especially the ideas which have to be understood; the context in which a question or problem has been set; and the conditions under which the task has to be undertaken. Some differences in response may be attributable to the variable use of different styles of thinking or different strategies of learning (Entwistle, 1979; Biggs, 1980).

The research of Peel (1971) and Biggs and Collis (1982) suggests that it is possible to identify general levels of performance in response to particular types of problem-solving

tasks. Peel, supported by other researchers, investigated the nature of the judgements made by adolescents, when they were asked to tackle intellectual problems which provide scope for different levels of response. In each case, students were presented with: (a) information, mainly in the form of short passages of prose, although in some cases also in other forms; and (b) questions relating to the information, but which could not be answered adequately by relying on that information alone. A substantive question, posing the problem, was followed by a second question, which required the students to explain their conclusions. For the students to produce mature judgements, they had to draw upon their personal experience and ideas to invoke possibilities which went beyond the information given. It was assumed that the explanations offered to the second question would give insight into the quality of the judgements. From a wide range of studies, Peel identified three basic levels of response:

1. *Restricted* - at the lowest level individuals tended to answer tautologically, to be put off by irrelevancies, or to deny premises or other conditions of the problem;
2. *Circumstantial* - at the next level the thinkers were dominated by the content of the material, and seemed unable to look beyond it; many took account of only one element in the information provided;
3. *Imaginative-comprehensive* - at the highest level the thinkers realised that they had to go beyond the information provided to evoke possible hypotheses from their own experience.

Peel emphasised the role of hypotheses and deductive reasoning at the highest level, which was especially clear in situations involving empirical data, as in science and geography. His analysis led him to conclude that 'making an intellectual judgement calls for several capabilities: explicit formulation of possible explanations or hypotheses, linked with a capacity to hold an argument through long examinations of the situations involved; a mastery of language in relation to reason; detection of inconsistencies and partialities; relating the situational facts to the offered hypothesis; selection and rejection of possibilities; and examining a situation formally and structurally as against circumstantially and merely by content' (Peel 1971 p. 94).

The groundwork for the SOLO model, proposed by Biggs and Collis (1982), originated in an attempt to find levels of cognitive development in the major subjects taught in 'high schools', in the hope, for example 'that teachers might recognise students' errors as natural phenomena, rather than carelessness' (Biggs, 1980, p.595). The difficulties that the researchers encountered - such as the different criteria used within different subjects to identify developmental stages; and the prevalence of decalages - the tendency for students to perform at different Piagetian levels, depending on the type of problem they are given - convinced them that they were not making judgements about the quality of students, but about the quality of performance achieved in relation to particular tasks. Biggs and Collis suggested that a clear distinction should be made between 'hypothetical cognitive structures' (HCS), such as Piaget's stages of development, which cannot be observed, and the 'structure of observed learning outcomes' (SOLO), which is task specific. They presented their SOLO Taxonomy as a descriptive model, which would be relevant to teaching because it offered a way of analysing what is meant by quality of response. The model suggests five levels, which are similar in many respects to the levels suggested by Peel and his associates:

1. *Pre-structural* - response lacks any logical relation; does not engage with the task; or is tautological, inconsistent, confused.
2. *Uni-structural* - presents one relevant, logical factor from the information available, but ignores all others.
3. *Multi-structural* - identifies several relevant factors from the information provided, without recognising any relationships between them.
4. *Relational* - includes all relevant data and their interrelationships; generalises or draws conclusions from the information provided.
5. *Extended Abstract* - introduces an abstract principle, which is not given directly in the data, to build a hypothetical logical structure that includes all the relevant data and their interrelationships; uses this structure to deduce several alternative outcomes; conclusions are held open or qualified to allow logically possible alternative outcomes.

Levels 2 to 4 all depend on inductive reasoning; while Level 5 requires deductive as well as inductive. The 'extended abstract level' of Biggs and Collis appears to equate exactly to Peel's 'imaginative-comprehensive' response.

The Children's Learning in Science Research Group at the University of Leeds, led by Driver, conducted a series of cross-age studies to investigate the conceptions of young people aged between 5 and 16, in a range of science domains. The researchers claimed that their cross-age studies revealed that 'learning within a particular domain can be characterised in terms of progress through a sequence of conceptualisations which portray significant steps in the way knowledge within the given domain is represented' (Driver et al. 1994a, p. 85). They have called such a sequence a *conceptual trajectory*. 'While the notion of a conceptual trajectory does not describe a pathway in the reasoning of any individual student, it does, however, indicate in broad terms the nature of the changes in reasoning which may be demonstrated by students in particular curricular settings' (Driver et al. 1994a, p. 85). They suggest that, from the evidence available, 'it appears that the commonalities which do exist are enough to warrant using them to inform educational decisions within specific scientific knowledge domains. Unlike the general framework that was provided for curriculum planning by the Piagetian stage theory, the research on the evolution of students' domain specific knowledge does not, as yet, lead to a general theory to underpin curriculum planning. The procedure is a complex one, with curriculum planning needing to draw on specific research findings domain by domain' (Driver et al. 1994a, p. 89). However, the researchers at Leeds concluded that, in their view, such research within a specific domain can provide evidence relevant to decisions about: 'how to sequence the introduction of scientific knowledge to students'; 'the ages at which it is appropriate for certain ideas to be introduced'; and 'the amount of time that can be required for students to adopt and use new concepts with confidence' (Driver et al. 1994a, p. 94-96).

The Curriculum

The third essential component in the model of progression is the curriculum, the complex structures and processes that are designed to promote students' learning. Whether

students' learning advances satisfactorily, in a way that matches and extends their capabilities, depends on the appropriateness of the curriculum and how well it actually functions, and these are influenced by many factors. At the heart of the curriculum is the interaction between teachers and students within a managed and supportive environment. Individual teachers and students have their own personalities and characteristics, and are influenced by their personal histories, social links and the settings in which they operate (Entwistle, 1987, p. 102-120). The field in which they operate can be viewed over a range of scales that relate to the organisation of schooling (e.g. from the scale of a teaching group to that of a subject department or course team, a school, or the wider educational system); and to the span of time (e.g. from that of a single lesson to the several years of a key stage, or to the entire period of schooling).

The complexity of the curriculum is illustrated by [Figure 2.5](#), which highlights the interrelationships between key elements in the day-to-day processes of teaching and learning. Whatever time scale is considered, all five elements are relevant, and each can have a bearing on all the others, and equally can be influenced by all the others. In practice, progression is influenced by all of these elements and their interrelationships.

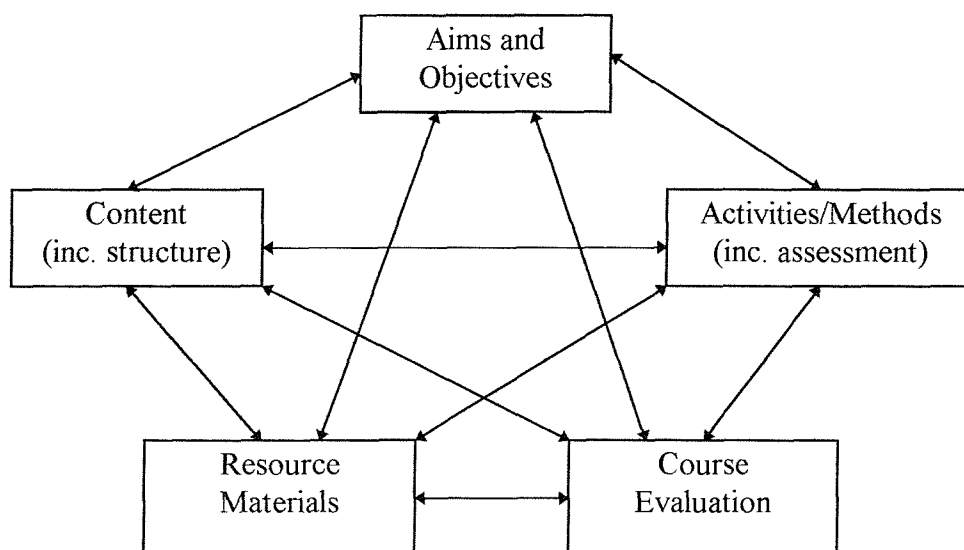


Figure 2.5. An Interaction Model of the Curriculum

The organisation of the curriculum, over a period of time, has implications for the interpretation and implementation of continuity and sequence. Within the context of the secondary school curriculum, the teaching of a subject is usually only continuous in the sense that time may be allocated to it on a regular and fairly frequent basis, such as a number of periods in each week. Strict continuity is only applicable on the scale of an individual lesson or event. Even the teaching of a short unit of study is broken by lessons in other subjects, as well as by all the time not devoted to formal education. Curricular continuity is, at best, intermittent. Furthermore, because of the nature of the subject matter of geography, the sequence of content within a course usually involves frequent shifts in focus from one theme or place to another, and a complex interweaving of ideas. Taken over a span of three, five or seven years, the time allocated to a specific theme may be spaced at irregular intervals over the length of the programme. While the attention given to some themes may be concentrated in one or two units of study, the attention given to others may be more widely dispersed through a programme, offering more opportunities to gradually develop understanding. These features help to explain the attraction of the idea of a *spiral curriculum*, as outlined by Bruner (1960) and Taba (1962). Important themes or ideas can usefully be regarded as recurrent threads, weaving through the programme and linking particular units of study, to provide the means to extend, refine and reinforce understanding. What emerges from this initially simple image, however, is a potentially complex model of the curriculum, for it is possible to suggest many elements which could be developed as threads. The number of themes or ideas which can realistically be planned in this way, within a single curriculum structure, is necessarily limited.

Progression in Students' Geographical Understanding

While application of the concept of progression to geography courses in secondary schools has, to some extent, been influenced by the ideas of curriculum theorists, it has also been influenced by geographers' views about the nature of their subject and how it should be studied. Until the late 1960s, many specialist geography teachers were committed to a regional approach, which emphasised the transmission of factual

information about places, and the gradual development of general ideas through a process of inductive reasoning (DES, 1974). Within this context, progression was conceived mainly in terms of the sequence in which places should be studied, underpinned by assumptions about the ease or difficulty of understanding different parts of the world. Methodological texts for geography teachers published during the 1960s (Briault & Shave, 1960, 1967; Gopsill, 1962; Long & Roberson, 1966; and Middlebrook, 1967) reveal these and other assumptions relevant to sequence and progression, many of which resemble ideas expressed by Fairgrieve (1926), some forty years earlier.

The most common way of arranging the regional content of geography courses for students aged 11 to 16, especially in grammar schools, was:

- Year 1 - the Home Area and case studies of other places;
- 2 - the Southern Continents;
- 3 - North America and Asia;
- 4 - Europe; and
- 5 - the British Isles.

An initial focus on the local area gave teachers the opportunity to draw on the direct experience of their students. The southern continents were chosen for Year 2 because, according to the IAAM Handbook (Middlebrook, 1967, p. 37) 'these three continents are of relatively simple structure and divide fairly readily into climatic provinces, while their social and economic development is at present less complicated than that of the remaining continents'. The handbook added that 'At this stage the syllabus will not provide overmuch in the way of general physical principles. The emphasis will be on the differences of relief and climate on human activities'. In contrast, Europe was generally considered to be the most difficult continent to study. Fairgrieve (1933, p. 312) noted that 'The physical geography of this continent, climatic, structural, orographic or vegetational, is less easy to understand than that of any other continent; the modifications, even of the physical geography, by human agency are so considerable that difficulties are introduced which do not occur in the other continents, while the human relationships are so complex, and the historical geography so important, that Europe cannot be studied till

other parts of the world have been taken'. Presumably, the British Isles was allocated to Year 5 because it was considered educationally desirable to provide students with a more detailed account of their own country.

While some of the authors recognised that progression in learning would involve building on the foundations of previous work, it was often unclear what form the structures would take. Expectations of students' intellectual capabilities appear to have been low, and teachers were discouraged from introducing general ideas or explanations to younger students. Briault and Shave (1960, p. 10) stated that 'the secondary school pupil, especially in the lower classes, is more interested in work that deals with the particular than with the general. Generalisation is an adult technique necessary for progress in thought and as a preliminary to action. Our pupils must come to it gradually'. They also warn against an excess of explanation. 'It is impossible to explain adequately all the phenomena we describe. Explanation of simple relationships as those between population and resources, between relief and routes, between climate and crops are very necessary. But every simple scientific explanation raises a further query and unless great care is taken, over-simplification can lead to grave inaccuracy. Frequently, too, explanation becomes a mere collection of words having no real meaning to the pupil' (op. cit. p. 10). While this extract appears to indicate that the authors had a very proper concern that explanations should be meaningful, their examples of 'simple relationships' are revealing. It is difficult to avoid the suspicion that, in these particular examples, the simple explanations that the authors had in mind were based on an over-simplified view of the relationships between physical conditions and human responses. There was no suggestion in the text that there could be different levels of understanding of such relationships.

The views of Long and Roberson (1966, p. 268-9) about the interests and capabilities of students in the lower years of secondary schools were similar to those of Briault and Shave: 'in most cases between the ages of twelve and fourteen children are mainly attracted to descriptive geography, whilst their need for explanations are generally satisfied by relatively simple statements. Their powers of and interest in abstract reasoning broadly develop later, and attempts to force this development prematurely may

engender distaste for what may appear to them to be arid learning'. They suggested that the intellectual process begins in earnest between the ages of fifteen and eighteen, and that before this stage it is unlikely that students will appreciate that it is possible to compare explanations and assess their relative merits. The statements about sequence and progression published in the 1960s appear to have been based on traditional views and assumptions about the subject and about students' interests and capabilities, rather than on research. Indeed, there had been very little research into the development of students' geographical understanding which might inform the author's views.

Context and Test Material	Questions
Soil erosion in the Magdalena Valley, in the Andes of Columbia. Paragraphs on soil erosion produced by an Andean farmer.	Why did the deep fertile soil cover disappear and make farming impossible? Why has this not happened before when there were trees in the ground? What could the farmer have done to prevent the destruction of his farmland?
Masai migration in East Africa. Map showing the twice yearly migration of the Masai with their cattle in and out of the Rift Valley, with explanatory notes.	Why do the Masai make this twice-yearly movement in accordance with the seasonal pattern shown on the map?
Commercial grain-growing on the Portage Plains of Manitoba. Photographs of prairies and a small prairie town.	Is it wise for the farmer to grow one crop only over such a very large area? Why has this small town grown up just here, where the main road and railway cross each other?
Intensive rice-cultivation on the island of Honshu, in Japan. Detailed plan of a Japanese village, a photograph and a brief commentary.	Why do you think the Japanese farmer lives in the village with his land scattered in a number of places?
Crofter farming on the island of Lewis, in the Outer Hebrides. Demographic charts, maps of the land and statistics showing agricultural activities of crofters.	Are the crofters making sensible use of their land by growing only a few crops in a small area?

Table 2.2. The Types of Problems posed by Rhys in his Research on Students' Geographical Judgements.

One significant research study conducted in the mid-1960s, which did focus on geographical understanding, was that of Rhys, one of Peel's research associates, but the findings of his research were not widely reported until the early 1970s (Peel, 1971; Rhys,

1972, 1973). Rhys investigated the responses of 120 students, aged between 9 and 16, to various intellectual tasks which were set within a geographical context. He used a range of materials, including text, pictures, maps, plans, statistical tables and diagrams, to present information related to farming and related features in five contrasting areas, which were unlikely to be familiar to the students. The places selected, the media used to present information to the students, and examples of the types of questions asked are shown in Table 2.2. The questions were ‘designed to focus attention on some critical or illuminating feature within a given situation, as a test of the children’s reasoning capacity rather than their factual knowledge’ (Rhys 1973, p. 96). Rhys explained that, throughout his investigation, he had operated from the basic premise that the understanding of geographical material at the secondary school stage ‘compels the adolescent to place a person other than himself in an environment other than his own, and furthermore, he must take into account the complex interplay of a miscellany of factors within that foreign environment’. The environment in this case was ‘taken to mean the Behavioural Environment - a particular field of human action - involving an appreciation of human (and) physical forces active within a particular setting’ (Peel, 1971, p.36-37). It is clear that Rhys’ view of geography encompassed spatial, people-environment, and behavioural perspectives. He was also well aware of the relevance of concepts and intellectual skills to the tasks that he had set. He observed that when children are called upon to examine territories which stand outside the bounds of their direct personal experience, they have to face several challenges:

1. In the absence of direct environmental contact, they have to interpret evidence presented in verbal, pictorial, cartographic or statistical form.
2. They have to orientate themselves spatially within the appropriate environmental context, and take into account all the relevant factors, whether these arose out of the local, the national, or the global situation.
3. They have to take note of the local decision-taking situation, in the light of the knowledge, material resources, and preferences of the local inhabitants.
4. Finally, to support a comprehensive explanation, they have to interrelate the factors which they consider to be significant (Rhys, 1972, p. 183-4)

From his analysis of students' responses, Rhys concluded that, although the questions set had varied in their difficulty, and individual students tended to fluctuate from one level to another, there was a consistent pattern of four qualitative levels, which he summarised as: (1) not reality orientated; (2) reality orientated, single piece of evidence used; (3) several pieces of evidence used, able to relate cause and effect; (4) comprehensive judgement based upon hypothetical-deductive reasoning. These are closely in line with the general patterns suggested by Peel, who drew upon the findings of Rhys, and by Biggs and Collis. In this particular study, responses at level 3 did not appear with marked frequency until students were aged 13+, and those at level 4 were associated with a chronological age of 15. But the 120 students who took part in the enquiry consisted of 100 at a large urban secondary modern boys' school and 20 from a nearby junior school. Therefore, the sample from the secondary phase was unlikely to have included many very able youngsters, who might be expected to produce higher level responses.

Progression in a Period of Change

From the late 1960s, the content and style of the geography curriculum in secondary schools began to change radically. Initially, the strongest stimulus for change came from developments in the parent discipline, which was itself experiencing a conceptual and methodological revolution. As the research frontiers in geography moved forward, new territories were opened up for exploration by teachers: spatial models and quantitative techniques were followed by systems analysis, behavioural geography, welfare geography, and radical and humanistic perspectives. Although there was controversy about the appropriateness of some of the approaches for the school curriculum, the changes were welcomed by many as offering rich opportunities for students to gain a deeper understanding of geographical patterns and processes, develop a wide range of intellectual skills, and apply understanding to social and environmental issues (Walford, 1973). At the same time, there were significant shifts in educational thinking, which were to varying degrees supported by curriculum development projects, as well as changes to the organisation of the secondary school system and to external examinations (Bennetts,

1988; Boardman & McPartland, 1993). While all of these affected the geography curriculum, some did little to strengthen progression.

The establishment, in some areas, of middle schools and sixth form colleges created additional breaks in continuity, which militated against the planning of progression. The placing of geography in combined studies courses, most commonly in Year 7 but sometimes over several years, likewise tended to weaken progression. The three main Schools Council geography projects - the Avery Hill Geography for the Young School Leaver (GYSL) Project, the Bristol 14-18 Project, and the London 16-19 Project (Rawling, 1980) - gave little attention to long term progression because in practice each was concerned with only two years of schooling. Even the 14-18 Project eventually reduced its focus to the two years of the 14-16 phase. The examinations at 16+ and 18+ were similarly focused on two year time spans, and in geography there was little co-ordination between the two levels. The main encouragement to plan for progression lay in the wider dissemination of ideas from general curriculum theorists, and the greater emphasis within the subject on understanding and skills, but it was left to individual geography departments to take up the challenge.

During this period, a succession of books about teaching geography, all written by experienced teacher trainers, offered guidance on curriculum planning that included perceptive comments on progression (Graves, 1971, 1975, 1978, 1980; Bailey, 1974; Boden, 1976; Hall, 1976; Marsden, 1976). Recurrent themes in these texts included: the problems of progression within regional geography, as taught in many schools; ideas from educational theorists that relate to progression; the relevance of concepts, generalisations and models to the development of understanding; and various qualities or 'dimensions' associated with progression.

The reaction against regional geography and the priority given to factual knowledge and recall was widespread. Graves (1971, p. 64) commented that: 'Undoubtedly, one of the most important criticisms of certain regional syllabuses is that there seemed to be little progression in the order of difficulty as pupils moved up the school, beyond an increasing quantity of factual content to be remembered. Such a situation presents the pupil with

little intellectual challenge from one year to the next'. He suggested that it was 'possible to arrange the content of geography in such a way that some sequential learning takes place from the simple to the more complex ideas and skills', but, to do this effectively, the idea that the fundamental units of learning for geography are areas would have to be abandoned. Bailey (1974) also argued that ideas, and explanations, should be introduced from an early age, with important ideas being 'presented again and again, in different contexts and at different levels of abstraction', but he did not reject the use of a regional framework as a means of delivering content which could support the development of ideas.

Most of the new texts about the teaching of geography, especially those by Graves (1975), Hall (1976), Marsden (1976) and Naish (1982), summarised ideas from educational research which were relevant to progression. Characteristically, outlines were provided of Piaget's model of stages of cognitive development, with particular attention being given to the relevance to secondary education of the distinction between 'concrete operations' and 'formal operations'; Bruner's ideas of a spiral curriculum, and of enactive, iconic and symbolic forms of representation; and, to a lesser extent, Gagne's ideas of the conditions of learning, pre-requisites and learning hierarchies. Attention was also given, in these and other texts, to: the relevance of general ideas to the development of geographical understanding; the need to distinguish between different kinds of ideas; and the need to identify those ideas which are especially important to geography. While authors varied in the extent to which they linked their analyses directly to the challenge of improving progression in students' learning, a growing appreciation of the role of concepts, generalisations, models and theories in geographical understanding helped to prepare the ground for a more informed treatment of progression. Several authors distinguished between different types of concepts, in particular emphasising the difference between those concepts which refer to objects or processes which can be observed directly, and concepts which must be communicated by definition. Graves (1975, p. 159) built on this distinction to present a finer classification of the concepts used in geography (Table 2.3). Marsden (1976, p. 39) suggested a classification of concepts along two dimensions: one being a concrete - abstract dimension and the other a vernacular - technical dimension. The second of these was recognised by Marsden as being

<p>1. <i>Concepts by observation:</i></p> <p>(a) simple descriptive concepts, e.g. stream, tributary, factory, river mouth, department store, wind, etc. many of which are concepts acquired in ordinary everyday experience but which can be reinforced in the geography curriculum;</p> <p>(b) more difficult descriptive concepts, that are either</p> <ol style="list-style-type: none"> those which it is difficult to experience directly because of their scale or location, e.g. a continent, a cirque, tundra; or those which require the understanding of two or three other concepts, e.g. an aquifer (a rock, porosity, water), functional zone or area; <p>(c) very complex descriptive concepts requiring the understanding of a large number of related concepts, e.g. the level of the water table, central business district, urban hierarchy;</p> <p>2. <i>concepts by definition:</i></p> <p>(a) simple defined relationships between two variables, e.g. density of population, location quotient, index of integration in a network;</p> <p>(b) more complex defined relationships in which three or more variables are involved, e.g. the concept of geostrophic wind involves an understanding of the relationship between air movement, the pressure gradient and the coriolis force.</p>

Table 2.3. A Classification of the Concepts used in Geography (Graves, 1975)

synonymous with Piaget's distinction between spontaneous and non-spontaneous concepts, and Vygotsky's distinction between vernacular and scientific concepts. The classifications suggested by Graves and Marsden can help teachers to recognise the ease or difficulty which individual concepts may pose for learners.

Geographers in both the USA and the UK have attempted to identify *organising concepts*, which might provide an overall key to the conceptual structure of the discipline; and *generalisations*, around which particular courses or themes could be planned. The American High School Geography Project (HSGP) stimulated early, and influential, examples of both types. It gave priority to the following broad concepts: ecosystem, man-land relations, sequent occupance, location, distance, pattern, spatial distribution, areal association, spatial interaction, diffusion, spatial hierarchy, region, and change through time (Helburn, 1968). While the Project recognised that there appeared to be no definitive list of the abstract ideas of geography at any level, this list clearly reflects the dominant views of geography in the USA, at that time. HSGP (1966) included generalisations among its objectives for units on 'manufacturing and agriculture' and 'habitat and resources'. The lead provided by HSGP was soon followed by geographers

in the UK. For example, attempts to identify key concepts were made by Bennetts (1972), Cromarty (1975) and Walker (1976). The Schools Council GYSL Project specified generalisations for each unit of its three themes: 'Man, Land and Leisure'; 'Cities and People'; and 'People, Place and Work' (Schools Council, 1974 - 5). Other lists of generalisations were produced to support the study of various systematic themes, including: settlement patterns and patterns within cities (Everson, 1971), shopping patterns in towns (Bennetts, 1971), agriculture (Bennetts, 1972), and 'recreation and tourism' and 'water supply' (Marsden, 1976). Generalisations, covering a wide range of physical and human themes, and targeted at the middle and secondary years of schooling, were produced by the geography team in Her Majesty's Inspectorate, and published in a booklet on 'The Teaching of Ideas in Geography' (HMI, 1978). Generalisations were also used for a series of A Level textbooks, published under the general label of 'Conceptual Frameworks in Geography' (Oliver & Boyd, 1976 - 1986). While all this listing of concepts and generalisations did not address directly the task of planning for progression in students' understanding, it did help to identify the sort of conceptual content from which schemes aiming at progression could be devised.

A more direct approach to addressing progression in geography has focused on those dimensions or qualities which appear to influence the demands presented by particular ideas, and their implications for teaching. Among those dimensions which have been suggested are: distance from experience, degree of complexity, degree of abstraction, degree of precision, and the extent to which values are embedded in an idea or are pertinent to a particular situation (Bennetts, 1972, 1981, 1986; HMI, 1978, 1986).

Distance from experience is not necessarily a matter of spatial distance from the home area, although that may be a factor, but rather of the extent to which students are familiar with examples of whatever it is that a general idea refers to. Appropriate direct experiences can provide an initial base for the development of a particular idea and reference points to return to. Older and intellectually mature students are less dependent on such experience, although it is usually a help.

Complexity is the dimension which probably is most widely recognised. It can be applied to environments, situations, patterns, processes or ideas which students are studying; the information which they are given; the tasks which they are set; and the objectives which they are expected to achieve. We denote something as complex when it consists of parts or elements which are not arranged in a simple manner; when it involves intricate relationships, and when it is not easily analysed or disentangled (OED, 1989). While this quality is related to the number of elements, variables and links that are involved, it is often as much to do with diversity of relationships. Complexity, by definition, increases the difficulty of identifying patterns or providing structure. Many of the features studied in geography are potentially complex.

The quality of *abstraction* relates particularly to ideas, whether expressed as concepts, generalisations, models or theories. Abstract ideas enable us to interpret and structure our thinking about complex situations, but they require us to focus in a highly selective way on relevant aspects of experience or information, and to reason without the support of direct concrete evidence. Concepts of objects or processes that can be observed directly are usually easier to understand than concepts of processes or relationships which can only be inferred. Some concepts, such as 'isotropic plain' and 'economic man' are idealised categories, which have no real world equivalents; they are ideas with which reality can be compared, but they stand apart from that reality. It is the degree of detachment from concrete experience and the dependence on mental activities which make abstract concepts difficult to understand. However, some degree of abstracting is essential to the development of concepts for it is only by 'the act or process of separating in thought, of considering a thing independently of its associations, or a substance independently of its attributes or quality independently of the substance to which it belongs' (OED, 1989), that an individual can proceed to group phenomena or experiences that are not identical and, thereby, move from the particular to the general. It therefore follows that the processes of abstracting and generalising are closely related. The capacity to operate with abstract ideas is the critical element in the changes in the reasoning of adolescents observed by Piaget (Beard, 1969), Peel (1971) and Rhys (1972). The idea of levels of abstraction is also relevant to Bruner's suggestion of a progression between enactive, iconic and symbolic means of communication (Bruner, 1966).

The achievement of greater *precision* - to be more accurate, to be more exact, and to avoid unhelpful ambiguity - also presents a challenge. The idea of precision is perhaps most closely associated with techniques of measurement, encouraged in geography by the use of scientific modes of enquiry and information technology; but it is also applicable to the use of language and to clarity of thinking. Greater precision in handling an idea may require some understanding of its defining attributes, but this is not to imply that when a new idea is introduced to students, it should necessarily be accompanied by a formal definition. It may be better for students first to explore an unfamiliar idea, using their own language. Teachers have to make judgements about when it is reasonable to expect students to be more accurate and precise in their measurements, descriptions and explanations.

Our reactions to places, environments and landscapes, and to some of the processes which affect these, are often highly subjective, being influenced by our *attitudes and values*, which in turn are influenced by our personal and social experiences. Enquiries into environmental, social and political issues may require students to reflect on their own attitudes and values, as well as gain an appreciation and understanding of those of other people. Some concepts which are important in human geography, such as human welfare, development, resource, environmental quality, conservation and sustainability, are clearly value-laden. But interpretations of, and reaction to, many other processes and features, such as planning, green belts, pollution, migration, multi-ethnic communities and trans-national companies, are also influenced by attitudes and values. Understanding views that are different from one's own, and reflecting on one's own attitudes and values, are intellectually demanding, and probably form a significant, although still poorly understood, dimension of progression. This dimension is only partly addressed by such research as that into moral judgement, carried out by Kohlberg (1976), and social judgement in adolescence, carried out by Silcock (1984).

Illustrations of planning for progression in geographical understanding have focused on individual concepts or themes. Examples of the former include: pre-requisites for understanding the salient features of a water table (Graves, 1971, p. 65); a concept

hierarchy for a river network (Graves, 1975, p. 159-161); and an analysis of how the concept of a resource could be understood at different levels (Bennetts, 1981, p. 170-172). Examples of the latter include: fluvial landscapes (Boden, 1976, p. 48-50); a year-by-year outline of conceptual content for a range of physical and human themes (Graves, 1978, p. 70-82); shopping patterns (Bennetts, 1981, p. 177-182); routes and route networks (Bennetts, 1986, p. 161-162); and manufacturing industry (HMI, 1986, p. 49-57). None of these was accompanied by any evidence of the proposals having been tested in schools. They were products of conceptual analyses and the application of fairly simple principles, such as: that while some ideas are more difficult than others, many can be approached at different levels of understanding; that careful analyses of ideas and learning tasks can help teachers to structure content and devise suitable methods; that learning is facilitated by building on students' prior experience and knowledge, and avoiding unnecessary difficulties or barriers; and that long term progression should take account of how students' capabilities develop with maturation.

Progression in the National Curriculum

The development and implementation of the National Curriculum for England and Wales brought the issue of progression in learning to the fore of teachers' concerns, in terms, not so much of clarifying principles and devising appropriate strategies, as of meeting the statutory requirements imposed by central government. The case for a national curriculum, as presented in consultation and policy documents (DES/WO, 1977, 1980, 1981, 1984, 1985) was based largely on criticisms of current levels of attainment and the perceived need to raise these. The frequently repeated criticism that many pupils were not making adequate progress in their learning was not usually accompanied by any elaboration of the nature of progression, nor of its implications for curriculum planning and practice. Nevertheless, when the Government finally outlined its intentions, it claimed that a national curriculum, in addition to raising standards, 'will also help children's progression within and between primary and secondary education (and on to further and higher education) and will help to secure the continuity and coherence which is often lacking in what they are taught' (DES/WO, 1987, p. 4).

The delivery of the foundation subjects of the National Curriculum was to be underpinned by a structure consisting of three main elements - attainment targets, programmes of study, and arrangements for assessment. Each of these elements would be related to four key stages, which would cover the period of compulsory schooling. It was the 'arrangements for assessment' that determined how progression would be conceived and shaped. A Task Group on Assessment and Testing (TGAT), which was commissioned to advise the Secretaries of State on a 'coherent system of assessment, including testing, to cover the whole period of compulsory schooling' (TGAT, 1988, Appendix B), recommended that the system should be criterion referenced; essentially formative, in the sense of providing 'both feed back to the pupil and feed back to the next teacher'; and related to progression. TGAT suggested that the purposes of national assessment required a broad indication of progression, which could be satisfied by a ten-level scale. An average pupil would be expected to progress from one level to the next approximately every two years, with the majority of pupils being expected to attain Level 2 at the end of Key Stage 1 (age 7); Level 4 at the end of Key Stage 2 (age 11); Levels 5/6 at the end of Key Stage 3 (age 14); and Levels 6/7 at the end of Key Stage 4 (age 16). The Task Group also recommended that the criteria defining each level in each subject should be in the form of statements of attainment. In England, the ten-level scale was eventually applied to seven of the foundation subjects: English, mathematics, science, technology, modern foreign languages, history and geography. In Wales, the Welsh language was also included. Although a pattern of broad criteria for each key stage was considered more appropriate for art, music and physical education, the Working Groups for these subjects were required to produce level-related statements of attainment for non-statutory guidance, in order to help teachers 'plan for continuity and progression'.

As Daugherty (1995, p. 24) points out, there was a close link between 'the thinking leading to an advocacy of a criterion-referenced approach to assessment' and 'the case for a scale defined in terms of progressively more demanding levels of attainment. If attainment [was] not to be described in terms of expectations of an age group, expressed as a performance above or below a norm for the group, a set of explicit criteria would be needed to define what would count as progress'. But the proposals presented a

formidable challenge, for they were 'leading national assessment into waters which were largely uncharted, not only in England and Wales but also in any other national or regional system of education' (Daugherty, 1995, p. 24). Initially at least, the Government accepted most of TGAT's proposals.

Between 1989 and 1992, following publication of the reports of the subject working parties and formal consultation procedures, Statutory Orders for the foundation subjects were laid before Parliament, and the planning of new courses and their implementation got under way. But both were beset by difficulties arising from: the complexity of the Orders; the scale and pace of change, especially for primary schools; the implications for assessment of the large numbers of statements of attainment; the workload being placed on teachers; controversies about priorities in some subjects, particularly English; and shifting political policies, for example, in relation to Key Stage 4. The scale of unrest among teachers, including boycotts of some of the arrangements for assessment, led the Secretary of State to ask Sir Ron Dearing to conduct a 'Review of the Current National Curriculum and Assessment Framework' (Dearing, 1993a, 1993b). Among the issues which Dearing was asked to address were the suitability of the ten-level scale, and whether there were viable alternatives that would 'ensure that children's progress is measured clearly in relation to the targets set out in the curriculum so that the next steps for children's learning are apparent to teachers and parents' (Dearing, 1993a, p.65).

An important assumption underpinning the ten-level scale of the National Curriculum was that attainment of a given level would necessarily subsume the learning associated with lower levels; in other words, it was hierarchical in nature. In his Interim Report, Dearing (1993a, p. 40) recognised three fundamental weaknesses in this assumption:

1. Much of the knowledge and skills encapsulated in the programmes of study of National Curriculum subjects cannot plausibly be sequenced into any linear scale. The attempt to articulate progress in terms of the scale distorts, therefore, the nature of the different subjects.

2. The assumption that a pupil's development in every National Curriculum subject progresses in an orderly way through ten levels is simplistic and unhelpful. Learning is not necessarily linear.
3. It is difficult to devise clear, unambiguous, hierarchical criteria except for simple or clearly defined tasks. Many of the criteria set out in National Curriculum statements of attainment lack precision. It is not surprising that teachers interpret them in different ways and have different views on the knowledge, understanding and skills required at each level. This means that the scale is not a sure measure of progress (Dearing, 1993a, para. 4.13)

The Interim Report was widely interpreted as indicating that the ten-level scale had sufficient weaknesses that it would be replaced, possibly by end of key stage gradings. However, by the time he was ready to submit his Final Report, Dearing (1993b) had decided that the balance of advantage lay with retaining the scale. Emphasis was placed on the need to slim down the content of the National Curriculum and to simplify the statutory requirements, in order to make them more manageable. Dearing also suggested that 'the opportunity might be taken to gather the main statements of attainment into clusters to create a more integrated description of what a pupil must know, understand and be able to do at each level' (Dearing, 1993b, p. 62). Thus the way was prepared for the introduction of level descriptions.

Another proposal in the Report, which was relevant to the structuring of progression in the curriculum, was that the ten-level scale should not operate in Key Stage 4. Dearing recommended that the 'well established and well understood' GCSE gradings should be retained, along with the starred grade A which had recently been introduced to recognise the highest levels of attainment. The revised Orders, to be implemented from the beginning of the autumn term, 1995, involved considerable changes to the framework of the National Curriculum. The number of attainment targets was greatly reduced and the statements of attainment in Key Stages 1-3 were replaced by *level descriptions*. Each attainment target had eight level descriptions and a description for an exceptional performance. Art, music and physical education had end of key stage descriptions, together with descriptions for exceptional performance. GCSE retained its own gradings.

Progression in Geography in the National Curriculum

As the Government's thinking about progression in the curriculum was so closely linked to its plans for assessment, the formal provision for progression within the statutory Orders for geography is most clearly seen in the treatment of the levels of attainment. In the 1991 Orders, the levels were expressed in the form of 183 statements of attainment, distributed between five attainment targets; and in the 1995 and 1999 revisions as level descriptions, within a single attainment target. The Orders provided no account of the rationale for progression within an attainment target, although it is possible to infer some principles or assumptions from the descriptions of the requirements for successive levels. However, other indications are available from official documents that were either part of the preparation for the Orders or were produced to guide their implementation.

The National Curriculum Geography Working Group envisaged progression as occurring in:

- a) the breadth of studies (e.g. by the gradual extension of content to include different places, different environments, different human activities and different physical processes);
- b) the scale of the areas studied (from localities, through regions and countries, to international and global scales);
- c) the complexity of the phenomena studied and the tasks set;
- d) the use of generalised knowledge and abstract ideas;
- e) the precision required in practical and intellectual tasks; and
- f) awareness and understanding of social political and environmental issues involving different attitudes and values. (DES/WO, 1990, p.12)

These are very similar to the general dimensions of progression outlined earlier (op.cit. pp. 42-44). However, the Working Group did not attempt to relate its broad criteria to the structures which it created with its 183 statements of attainment. Although content strands within the attainment targets for 'physical geography', 'human geography' and 'environmental geography' were intended to facilitate continuity between levels and,

thereby, provide scope for progression, the more obvious effect was to highlight the complexity of the specifications.

In the advice which they offered for the 1995 revision of the National Curriculum, the Schools Curriculum and Assessment Authority for England (SCAA, 1994) and the Curriculum Council for Wales (ACAC, 1994) suggested criteria for progression within each key stage. While these also have some similarities to the criteria proposed by the Geography Working Group, particularly in their high level of generality, they differ from them in that they make direct reference to geographical contexts. For example, SCAA suggested that students within KS3 would increasingly:

- broaden and deepen their knowledge and understanding of places and themes;
- make use of a wide and precise geographical vocabulary;
- analyse, rather than describe, geographical patterns, processes and change;
- appreciate the interactions within and between physical and human processes that operate in any environment;
- appreciate the interdependence of places;
- become proficient at conducting and comparing studies at a widening range of scales and in contrasting places and environments;
- apply their geographical knowledge and understanding to unfamiliar contexts;
- select and make effective use of skills and techniques to support their geographical investigations;
- appreciate the limitations of geographical evidence and the tentative and incomplete nature of some explanations. (SCAA, 1994, p. 7)

While the term ‘geographical’ occurs in most of the statements listed above, the elements of geographical understanding included are very generalised and few in number. It was expected that progression would be related to: places, themes and environments; geographical patterns, processes and change; interactions within and between physical and human processes; and the interdependence of places. In some of the statements it is far from clear what sort of progression is intended. The suggestion that students will increasingly ‘*appreciate*’ process interactions and the interdependence of places begs the

question whether, in these cases, progression is conceived in terms of a greater range of examples and variety of conditions, or in terms of the depth of understanding of particular interactions and relationships. ‘Appreciate’ could be interpreted as implying something less than understanding. The statement about the use of geographical vocabulary makes no reference to the challenge of understanding specialist vocabulary when this involves abstract ideas or a technical meaning given to a vernacular term. The significance of abstract understandings to progression in learning is completely ignored. The only reference to ‘explanations’ in SCAA’s criteria is in the suggestion that progression should include an increasing appreciation that some explanations can be tentative and incomplete. There is no suggestion here that progression might be expected to involve an advance in the general quality of pupils’ geographical explanations. ACAC may have intended this when it suggests that pupils will increasingly ‘progress from simple descriptions and explanations to a more complex analysis of geographical patterns, processes and change’. But the way in which this criterion has been expressed does not indicate clearly that the quality of both description and explanation can advance over time, and that this involves more than a shift towards ‘complex analysis’.

Aspect	From		To
Vocabulary	using a limited geographical vocabulary	→	precise use of a wider range of vocabulary
Knowledge of places	geographical knowledge of some places	→	understanding of a wider range of areas and links between them
Patterns and processes	describing geographical patterns and places	→	explaining geographical patterns and places
Geographical thinking	participating in practical geographical activities	→	building increasingly abstract models of real situations
Geographical explanation	explaining events and phenomena in terms of their own ideas	→	explaining these in terms of accepted ideas or models

Table 2.4. Some Aspects of Progression in Geography at Key Stage 3. [An extract from a table in QCA’s ‘Geography. A Scheme of Work for Key Stage 3. Teacher’s Guide’]

A different emphasis is evident in the analysis of progression included in a recent publication, from the Qualifications and Curriculum Authority (QCA, 2000), which

offered guidance to teachers on the preparation of a Key Stage 3 scheme of work based on the latest revision of the National Curriculum (DfEE/QCA, 1999). Table 2.4, which is an extract from a table in the teachers' guide to the scheme (QCA, 2000, p. 21), lists 'aspects of progression' which focus on knowledge and understanding. The significant feature of this list is the greater recognition given to the importance, to progression in geographical understanding, of the ability of Key Stage 3 students to make use of more abstract ideas in their geographical thinking and explanations. The importance of such ideas, the need to build on prior learning, and some implications for teaching were also emphasised in a list of questions for curriculum planning, which accompanied the table. The questions included:

- What is known about what pupils have already achieved at Key Stage 2 and how does this affect the pitch of early units?
- What ideas in geography depend on secure understanding of other ideas?
- How can units be sequenced so that earlier work lays the foundation for later work?
- Are there opportunities to visit and reinforce the ideas pupils need to understand and which some will find difficult?
- When ideas are revisited or reinforced is it in a different context or using different activities?

It is the attainment targets themselves, however, that provide the clearest indication of the scope for progression, although in practice this has been overshadowed by their implications for assessment. In the 1991 Orders, the content specificity of many of the statements of attainment, combined with the number of statements and the overlap of levels between key stages, created formidable problems for curriculum planning, as well as for assessment. While KS3 was targeted at Levels 3 to 7, Levels 3 to 5 overlapped with KS2 and Levels 4 to 7 with KS4. There were 114 statements of attainment within the span of levels for KS3. Of these, 26 were in AT1 (geographical skills), 26 in AT2 (knowledge and understanding of places), 24 in AT3 (physical geography), 25 in AT4 (human geography) and 13 in AT5 (environmental geography). The three thematic attainment targets contained 11 strands which were intended to facilitate progression, although many of the strands had significant changes in content between levels, and some

had gaps in their coverage of levels. Often, there was no reason why content which figured at particular levels should not have supported knowledge and understanding of a quality which was appropriate for other levels. While command terms such as describe, compare, explain and analyse were intended to give an idea of the type of learning expected, the two most common terms - 'describe' and 'explain' - were used over a wide range of levels. In practice, what 'description' or 'explanation' might mean in a particular statement of attainment had to be interpreted in the context of the content to which it referred, and of the level at which the statement had been placed. There was, therefore, a circular rationale to the definition of the qualities of understanding and of intellectual skills expected at each level. Progression was handicapped rather than assisted by the structure and content of the 1991 attainment targets.

The replacement of statements of attainment by level descriptions was aimed mainly at making end-of-key stage assessment much more manageable. Each description is an attempt to encapsulate various aspects of progression within a short paragraph of continuous prose. It was necessary to achieve a reasonable degree of coherence within each description, and provide continuity and coherence between the levels. While the main purpose was to enable teachers, at the end of a key stage, to judge which description best fits a pupil's performance (SCAA, 1994), it was also hoped that, by indicating expectations at each level and progression in the subject, the descriptions would help teachers by informing their planning, teaching and assessment (SCAA, 1996a). But the brevity of each description is achieved by a high level of generality and narrow selection of broad ideas, the most prominent being patterns, processes, changes, places and environments (Appendix A). The use of continuous prose in the level descriptions permits a greater degree of overall cross referencing than was possible with the large number of much more specific statements of attainment. This is well illustrated in part of the description for Level 7:

They describe the interactions within and between physical and human processes. They show how these interactions create geographical patterns and contribute to changes in places and patterns. They show understanding that many factors influence decisions made about places, and use this to explain how places change.

They appreciate that peoples' lives and environment in one place are affected by actions and events in other places. They recognise that human actions may have unintended environmental consequences and that change sometimes leads to conflict.

In general, while the level descriptions emphasise place and environment, they tend to neglect the spatial dimension in geographical understanding. The spatial perspective tends to be occupied by the much broader notion of 'pattern and process' which, with only a few exceptions, is not specifically linked to location, spatial distributions or spatial interrelations and interactions, within the descriptions. Although the revised attainment target for geography (DEE/QCA, 1999) has rather fuller level descriptions, attention remains focused on a narrow range of ideas, which limits the value of the descriptions for curriculum planning, teaching and assessment.

The Frameworks for Assessment at KS3, GCSE and A Level

The formal systems of assessment associated with the National Curriculum, and with GCSE and A Level examinations, offer the clearest and most readily available evidence of the nature and quality of geographical understanding expected of secondary school students. The content specified, the modes of assessment employed and the criteria for assessment at each stage strongly influence the opportunities for progression in learning. The strength of that influence stems from the relationships between these assessment systems and the geography curriculum. Assessment can serve a variety of purposes. Black (1998, p. 25) distinguishes between three main types, 'concerned respectively with the support of learning, with reporting the achievements of individuals, and with satisfying the demands for public accountability'. These categories can be compared to those used by Davies (1998, p. 13-19), who comments on assessment to facilitate matching and differentiation; to provide feedback to pupils on their progress; to enable teachers to discover how effective their teaching has been; and to measure the achievements of teachers and schools'. A more detailed list might specify:

1. screening to identify individual students who are in need of special help;
2. diagnosing individual students' strengths and weaknesses;
3. motivating students;
4. monitoring the standards and progress of individual students and teaching groups;
5. evaluating the effectiveness of teaching (including such contributory elements as the objectives, content, learning activities and resources) in a specific context;
6. certification - providing a qualification which signifies the attainment of a given level of competence or knowledge;
7. assisting selection, for example, for higher education;
8. exercising control over the curriculum;
9. raising standards; and
10. making teachers and schools accountable (Deale, 1975, p. 19-20; Satterly, 1981, p. 3-12; Gipps & Stobart, 1993, p. 10-20).

While there are overlaps and links between many of these purposes, it is open to question how many of them can be adequately satisfied by the same assessment. Fitness for purpose is the essential criterion (Gipps, 1994, pp. 2-4). A distinction is often made between *formative and summative assessment*, the former taking place 'during the course of teaching and used essentially to feed back into the teaching/learning process', while the latter 'takes place at the end of a term or course and is used to provide information about how much students have learned and how well a course has worked' (Gipps, 1994, Glossary p. viii). Closely related to this is the distinction between assessment which is aimed directly at improving teaching and learning, and assessment which is directed at control of the curriculum and at making teachers and schools accountable for the standards of attainment achieved by their students. Table 2.5 emphasises the differences between the two approaches. While it can be claimed that both aim to improve the quality of students' learning, they differ significantly in their immediate purposes, their strategies and their relationships to the curriculum. The first of them can be regarded as a 'professional approach', in the sense that it can be conducted as an integral part of the curriculum and is intended to serve directly the processes of teaching and learning; and in

the sense that responsibility for the forms of assessment, and for the interpretation and use made of findings, lies primarily with the schools and their teachers. It can make use of a wide range of assessment techniques, is more sensitive to the needs of individual schools and situations, and can provide immediate feedback to help students and teachers. In

A Professional Approach to improving Learning and Teaching	An Externally Imposed Approach directed at Control and Accountability
Prime purposes are to raise standards by: (a) helping individual students and teaching groups to improve their learning; (b) contributing to the evaluation of teaching in order to improve the curriculum.	Prime purposes are to raise standards by: (a) exercising control over what is taught; (b) making teachers and schools accountable to parents and others for the quality of their students' learning.
Focus on: formative assessment informal methods school - based assessment	Focus on: summative assessment formal methods tasks/tests designed externally and subject to external controls
Value placed on: the validity and manageability of the assessments	Value placed on: the reliability of the assessments and comparability between schools
'Low Stakes' Assessment an integral part of the curriculum	'High Stakes' Assessment tends to determine the curriculum

Table 2.5. Contrasting Approaches to Assessment

contrast, the second approach, with its emphasis on accountability, makes use of assessment to evaluate the performance of schools and teachers and to exert an indirect form of control over externally specified curricular frameworks. While school-based assessment is more likely to be formative and make use of informal as well as formal methods, externally imposed assessment tends to be summative and to have a strong preference for formal methods. Concerns about the reliability of assessments, and comparability between schools and between individual teachers, lead to an emphasis on carefully regulated procedures. The latter are intended, at least in part, to create confidence in the system of assessment. When students' performances in tests and examinations have an impact on the well-being of teachers and schools, assessment tends to exert a strong influence on the curriculum. Such an influence can be beneficial, as when it brings about improvements in teaching and in the content of the curriculum.

However, there can also be negative effects, for 'high stakes' assessment can lead teachers to focus narrowly on the requirements of a test, and neglect broader and longer term goals (Gipps & Stobart, 1993, p. 38). Madaus (1999), in his critique of 'measurement-driven instruction', asserts as general principles that 'if important decisions are presumed to be related to test results, then teachers will teach to the test' (op. cit. p. 90); 'in every setting where a high stakes test operates, a tradition of past exams develops, which eventually de facto defines the curriculum' (op. cit. p. 93); and 'teachers pay particular attention to the form of the questions on a high stakes test (for example, short answer, essay, multiple choice) and adjust their instruction accordingly' (op. cit. p. 95). Although Madaus was writing primarily about the educational scene in the USA, with its prevalence of testing regimes, many of which relied heavily on standardised testing with multiple choice formats, the general points which he makes about the power of testing to influence the curriculum, teaching and learning, are relevant to secondary education in England and Wales.

Assessment for the National Curriculum

At the outset, the assessment component of the structure of the National Curriculum was intended to serve several very different purposes. While the Government, in its initial consultation document (DES/WO, 1987, para. 28), emphasised that the main purpose of this assessment would be to 'show what a pupil has learnt and mastered and to enable teachers and parents to ensure that he or she is making adequate progress', it also stated that a national curriculum would 'enable schools to be more accountable for the education they offer to their pupils, individually and collectively', and that parents would 'be able to judge their children's progress against agreed national targets for attainment and ... also be able to judge the effectiveness of their school'. Thus, from the beginning, the arrangements for National Curriculum assessment were intended to monitor the standards and progress of individual pupils, and make teachers and schools accountable.

The notion of a broad approach to assessment was reinforced by the Secretary of State in his letter of guidance to TGAT, in which he explained that he was seeking 'advice on a coherent national system for assessment and testing in relation to agreed attainment

targets that recognises the different purposes to which assessment is put and takes account of how they interrelate with and complement each other (TGAT, 1988, Appendix B, paras. 6-8). The Task Group emphasised the value of formative assessment and, although it recommended the use of standard assessment tasks to strengthen the quality of assessment and comparability between schools, it emphasised that, in its view, the assessment should be school-based. It concluded that an assessment system designed for formative purposes could meet all the needs of national assessment at ages before 16, when the focus would shift from formative to summative purposes (TGAT, 1988, para. 16). The TGAT model can be viewed as an attempt by professional educationalists to satisfy the Government's aim of increasing the accountability of schools while, at the same time, enabling assessment to serve more immediate educational purposes. Although it is clear that TGAT was sensitive to the need for assessment to satisfy the principles of validity and reliability, its report did not adequately address the inherent tension between the two purposes. That tension could not be resolved by simply combining teacher assessments and national tests, nor by moderating teacher assessments.

Political beliefs and priorities, and practical problems with the implementation of the TGAT model, led the Government to change its policies towards National Curriculum assessment. Daugherty, in his detailed account of the development of those policies between 1987 and 1994, points out that, while the Government appeared for a time to accept the TGAT vision of standard assessment tasks, very early on 'in the minds of ministers, officials and their adviser, the term SAT seems to have come to mean end-of-key-stage test rather than standard test materials to be used at a time chosen by the teacher' (Daugherty, 1995, p. 36). Some of the initial test materials produced by agencies were received very critically, with teachers expressing concerns about the manageability of the assessment, and the Government and its political advisers were concerned that the assessment would not deliver the sort of information that they were seeking. It became clear that the Government's priority was to ensure that the assessment system would provide information that would make schools more accountable. In the wake of the Citizens' Charter, a high profile political initiative, the Government sought to give parents more power to choose schools for their children and to influence the working of schools, within the framework provided by the National Curriculum (DfE/WO, 1992). The 1992

Education (Schools) Act gave the Secretary of State powers to require schools to publish information on the educational performance of their pupils in National Curriculum tests and in public examinations. The supposed 'disciplines of the market' were to be applied to the education service.

The situation in geography illustrates some of the technical difficulties arising from features of the 1991 Order, in particular: the large number of SATs (114 in KS3 alone); the content specificity of many of the statements; abrupt changes of content between levels; and the scope for different interpretations of individual statements (Graves et al., 1990; Bennetts, 1993 and 1994a). Pre-testing of KS3 end-of-key-stage geography papers took place in June and November 1992 and January 1993. The plan was to involve 56 schools in the pilot exercise, but because of strong reactions in schools against the Government's KS3 testing strategy, highlighted by the widespread boycott of the 1993 tests in mathematics, science, English and technology, the sample of geography scripts received was smaller and less representative than intended (CFAS, 1993). With the setting up of the Dearing Enquiry, in response to the emerging crisis in the National Curriculum, further work on geography tests was placed on hold. There was no statutory assessment of geography in KS3 in 1995 and 1996. Since 1997, geography teachers have been 'required to make a judgement about the level which best summarises each pupil's attainment in geography at the end of Key Stage 3', but this is entirely teacher assessment, using knowledge from a wide range of a pupil's work over a period of time. Although, for the purpose of national data collection, schools have to send information about the number of students achieving each level in each of the non-core subjects, they are not required to publish these results. As far as geography is concerned, National Curriculum assessment can be regarded as 'low stake' assessment, with no reason to 'teach to the test'.

SCAA and ACAC produced non-statutory guidance to help teachers use the level descriptions when making their summative judgements. The booklet, 'Exemplification of Standards' (SCAA, 1996a), consists mainly of examples of students work, with one section containing a variety of work from different students in different schools, in order to 'indicate the range of materials from which information can be derived'; and another

concentrating on examples of work from three Year 9 students to 'indicate how level descriptions can be used when [teachers] make judgements about which level best describes a [student's] performance at the end of the key stage'. For the most part, the comments on students' work focus narrowly on demonstrating a match between features of the work and elements of the level descriptions. However, there was one notable exception. An evaluation of a response to a task requiring a student to suggest a suitable location for a fish finger factory, states that:

Ian identifies a feasible site, using a range of map interpretation skills and drawing on his previous knowledge and understanding. He supports his decision with reasons covering transport, site, planning permission and raw materials, although he has missed out power supply, market and labour force. He is beginning to offer appropriate explanations for geographical locations and patterns although his reasons are a little vague and unsubstantiated ('quite a way from', 'quite easy to get planning permission' etc.). He does not show appreciation of the range of factors affecting industrial decision-making at different scales (SCAA, 1996a, p. 51).

The text displays expectations of understanding, which are specific to the economic activity that is the subject of the task. In so doing, it reveals the gap which may exist between very general criteria, such as those expressed in the level descriptions, and the particular contexts to which they are to be applied. In this case, the general ideas about industrial location which have been introduced are intermediate in specificity, between the task which has been set and the very broad idea of geographical patterns being an outcome of processes, which may involve a complexity of factors.

The optional test and task materials produced by SCAA (1996b) and ACAC (1997) contain exemplars of assessment tasks embedded in curriculum units. They were designed, in part at least, to show how National Curriculum assessment could be carried out as an integral part of normal classroom activities, and thereby serve formative as well as summative purposes. One conclusion that might usefully be drawn from both sets of publications is that the evaluation of students' geographical understanding, from the

evidence of their written work, requires information about the conditions under which that work was undertaken. For example, for any individual piece of work, it may be important to know:

- the nature of the tasks which were set, and the activities involved;
- the teaching which prepared the students for the tasks;
- the information supplied to, or available to, the students;
- the guidance and support given to the students during the work;
- the time allowed for the tasks;
- the extent to which a final product was the outcome of the effort of an individual student or a group of students;

A major part of the attraction of formal public examinations, and especially those papers tackled under tightly controlled conditions, is that most of this information is readily available; and that the rules of a public examination apply to all centres submitting candidates.

Public Examinations for GCSE and A Level

In the 1985 White Paper, 'Better Schools' (HMG, 1985, p. 29), the Government asserted its belief that the public examinations taken in secondary schools should serve a range of specific objectives, that included: to raise standards across the whole ability range; to support improvements in the curriculum and the way in which it is taught; to provide clear aims for teachers and pupils, to the benefit of both and of higher education and employers; and to record proven achievement. Public examinations, like National Curriculum assessment, are therefore intended to serve a variety of purposes. However, they are essentially summative forms of assessment, which rely mainly on formal methods and tight control over the procedures of examining. Given the importance of GCSE and A level qualifications for students' entry into higher education and employment, and the publication of the examination results in order to make schools accountable, there can be no doubt that GCSE and A level are examples of 'high stakes' assessment. Teachers are

expected to prepare their students for these examinations and therefore, to some extent, to 'teach to the test'.

The examination syllabuses for GCSE and A Level, or 'specifications' as the latest versions are more accurately described, are much more detailed documents than the National Curriculum Orders. Although the geography syllabuses, at each level, differ to

Aims include:

- acquire knowledge and understanding of a range of places, environments and geographical patterns at a range of scales from local to global, as well as an understanding of the physical and human processes, including decision-making, which affect their development;
- develop a sense of place and an appreciation of the environment, as well as awareness of the ways in which people and environments interact, and of the opportunities, challenges and constraints that face people in different places;
- appreciate that the study of geography is dynamic, not only because geographical features, patterns and issues change but also because new ideas and methods lead to new interpretations.

Assessment Objectives include:

- show understanding of the geographical ideas specified in syllabus;
- apply their knowledge and understanding in a variety of physical and human contexts.

Syllabus Content includes:

- study of a variety of places - at a range of scales in different parts of the world and in different types of environment - and consideration of their wider context and of the way in which places are interdependent;
- study of how physical and human processes contribute to the development of geographical patterns, the geographical characteristics of particular places, and the interdependence between places;
- study of the interrelationships between people and the environment;
- study of the geographical aspects of social, economic, political and environmental issues;
- study of the significance and effects of attitudes and values of those involved in geographical issues and in decision making about the use and management of environments.

Table 2.6. Specifications for Geographical Understanding in the National Criteria for GCSE Syllabuses (1995).

some extent in what they include and in their style of presentation, they have a number of features in common as a result of national criteria imposed by Central Government. For example, to satisfy the 1995 national subject criteria (SCAA, 1995), each GCSE geography syllabus included statements of aims, assessment objectives, a scheme of assessment, subject content, and guidance on coursework. Table 2.6 brings together the requirements relating to geographical understanding that were specified in the 1995 GCSE national criteria, under the headings of aims, assessment objectives and subject content. All three sections are expressed in very general terms, with the assessment objectives providing a bridge to the ‘geographical ideas’ and the ‘variety of physical and human contexts’ that would be specified in individual syllabuses. The latter would

The Knowledge required by the Core included:

- geographical terminology;
- a range of geographical processes;
- geographical concepts, principles and theories

The Understanding required by the Core involved:

- the nature and interaction of different processes;
- the distinctiveness and independence of places;
- the significance of both spatial and temporal scales and the links between them;
- how spatial systems, patterns and places respond to changing physical and human processes;
- how the procedures and techniques available to geographers must be applied selectively to their studies;
- the potential and limitations of geographical data;
- the role of values, perceptions and decision making processes in geographical situations.

Assessment Objectives include the ability to:

- select and apply geographical concepts, principles, theories and methods;
- identify, analyse and evaluate the relative importance of interrelationships, spatial outcomes and processes influencing both physical and human environments;
- appreciate and analyse the role of values, perceptions and decision making processes in geographical contexts;
- demonstrate a critical awareness of the potential and limitations of different forms of data and of the concepts and theories used by geographers.

Table 2.7. Specifications relating to Geographical Understanding in the Subject Core for A and AS Level Syllabuses (1993).

provide the detail. The GCSE subject criteria also included Grade Descriptions for

Grades A, C and F (Appendix 2). These are very similar in content and style to the National Curriculum Level Descriptions.

The national criteria for A Level subjects have, for historical reasons, focused on the concept of a common core. The 1993 subject core, which was in operation for the syllabuses analysed in this research, was intended to cover about one-third of an A Level syllabus and two-thirds of an AS syllabus. The content had to include a chosen physical environment, a chosen human environment, and a theme which would emphasise the interaction between people and their environment. The description of the Core also included specifications for 'knowledge and understanding' and 'skills' (Table 2.7); and commented on the relationships between knowledge and understanding, noting that 'knowledge in geography is not only valuable in its own right but is the foundation for the understanding of places, phenomena and processes', while 'geographical understanding is rooted in the recall and application of knowledge' and 'is signalled by the ability to recall and select relevant information accurately and in the manner in which that information is applied to new situations' (SCAA, 1993b). The document also included a more detailed specification for 'assessment objectives', which was not dissimilar to the specifications for syllabus content in the GCSE subject criteria. There were no grade descriptions in the 1993 A Level subject core, although, a few years later, descriptions for Grades A, C and E were produced for the AS examinations in 2001 and the A Level examinations in 2002. The general statements about geographical understanding in the national subject specifications for GCSE and A Level, in the level descriptions for the National Curriculum and in the grade descriptions for GCSE and A Level, emphasise very similar ideas. These are ideas with very wide application, and most are only geographical when linked to the central geographical concepts of place, space and environment. The terms 'space' and 'spatial' are conspicuous by their absence in these official documents, but the importance of the spatial dimension of geography is implied by references to location, geographical patterns and (geographical) scales. Regrettably, the references to location are invariably in the context of knowledge, rather than of understanding. Figure 2.6 is an attempt to structure the ideas by suggesting how they can be grouped into various clusters, and by indicating the complex relationships between these clusters. In comparing the statements

across the three stages, with the exception of the references to theory at A Level, continuity of interest is more apparent than any strong sense of progression.

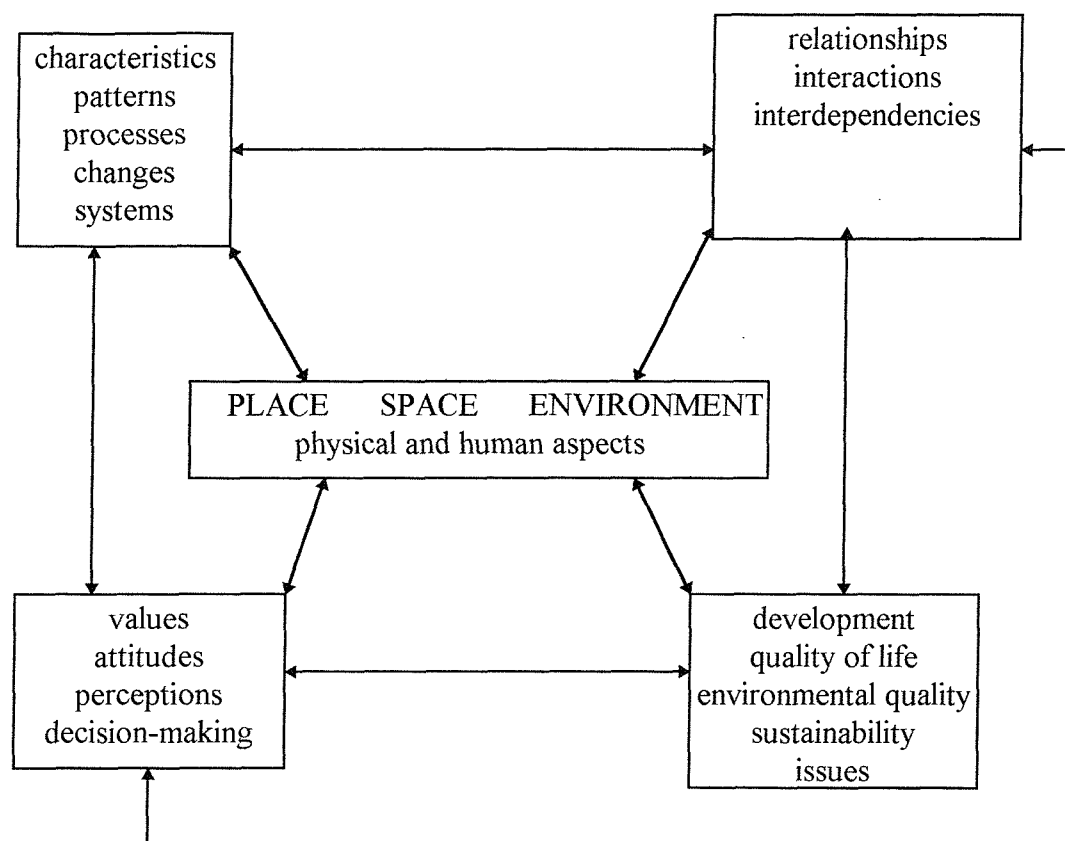


Figure 2.6. Key Ideas in the Geography Specifications and Level/Grade Descriptions for the National Curriculum and for GCSE and A Level Examinations

While the broad statements of aims, assessment objectives and content, based directly on national criteria for GCSE and A Level, provide only general pointers for curriculum planning and assessment, the more detailed specification and articulation of content in the examination syllabuses offer more detailed and more concrete guidance than that available for the National Curriculum. It is in these more detailed statements that the differences between syllabuses are apparent.

The description of content in the GCSE syllabuses varied considerably, especially in respect to content specificity and the elaboration of ideas. However, almost all of the syllabuses had a strong thematic framework. The only exception in the 1998 and 1999 set

was NEAB Syllabus B, which had a place-specific structure, and even this syllabus had a substructure of themes. In general, the content of the syllabuses included the physical environment, relationships between people and environments, economic activities, population and settlements, and environmental issues; although physical geography was comparatively weak in some syllabuses. There were also differences between schemes in the structure of their examinations, for example in the percentage of marks allocated to centre-based components, the overall time allocated to terminal papers, the use of tiered papers, and whether there was a choice of questions within a paper. The 1995 National Criteria led to a reduction of syllabuses from 16 to 11, and to more uniform arrangements for assessment, for example, with the weighting allocated to coursework restricted to a 20-25% range, and a requirement that question papers be set for two tiers. Among the persistent characteristics of GCSE papers has been a heavy emphasis on stimulus-response questions. Information is provided in a variety of forms, usually including maps, sketches, photographs, diagrams, statistics and text. Another characteristic is the tendency for questions to have a large number of parts, the overall effect of which is to limit the scope for candidates to display understanding through extended answers. However, candidates entered for higher tier papers invariably have fewer questions to answer than those entered for the corresponding lower tier.

The A Level syllabuses and examinations were similarly varied, although the common subject core ensured that each syllabus included a chosen physical environment, a chosen human environment, and a theme which emphasised the interaction between people and their environment. While these elements had an effect on the content of the syllabuses, the broad character of the core permitted a variety of structures. The planning of the syllabuses was also influenced by the parallel development of Advance Subsidiary (AS) courses; the widespread introduction of modular patterns of assessment; and rules, made at the instigation of the Government, that at least 30% of externally assessed work should be taken at the end of the course, and that the marks allocated to coursework should be restricted to 15-20%. Bradford (1995) suggests that the speed with which the new syllabuses had to be produced may have limited the scale of the changes made by the examination boards.

A modular pattern of examining has become widespread at A Level. One examining board, the University of Cambridge Local Examinations Syndicate, had separate linear and modular syllabuses. The other 7 syllabuses were available, either in linear and modular form, or solely in modular form, but with the option of all modules being assessed at the end of the course. The schemes varied considerably in the total time allocated to examination papers; and to the choice available, both between units of content within a syllabus, and between questions within examination papers. While all nine syllabuses provided opportunity for candidates to submit a report on a personal investigation, three (AEB, Cambridge Linear and NEAB) also offered the alternative of an additional written paper which focused on investigative skills. In the case of the Cambridge Linear examination, the alternative included a short report summarising a fieldwork based enquiry, as well as a 2 hour 'practical' paper. Leaving aside the optional papers which were an alternative to a personal investigation, the A level syllabuses required candidates to take from two to five papers, with the total time allocated to them ranging from 315 minutes (AEB) to 515 minutes (London B).

Most A Level syllabuses had a combination of compulsory and optional elements in the structure of their content. Only London Syllabus A had no choice between units of study, although there was a choice of questions in its examination papers. In contrast, the AEB and the Cambridge Linear syllabuses had no compulsory units, offering choices within broad areas of content. Several syllabuses included a compulsory 'synoptic' unit, designed for students to draw upon and synthesise knowledge and understanding from earlier units. The optional patterns enabled boards to offer schools the opportunity to tackle less traditional fields of content. But in some cases, a consequence of this was that well established themes of the A level curriculum could be omitted from students' programmes.

The style of questions asked at A level were varied. While the traditional essay format remained much more common at A level than at GCSE, there has been a trend towards the use of short answer, data-response questions. Some of the examinations combined structured questions and essay questions within the same paper; other examinations used different papers to set different types of questions. London B and NEAB had 'decision-

making' exercises, based in part on information made available to candidates in advance of the examination. Overall, the A level papers tended to provide more opportunities for candidates to reveal their geographical understanding through extended answers, than did the GCSE papers.

The sources of evidence about the scope for progression in geographical learning, available from official documents about National Curriculum assessment at KS3 and GCSE and A level examinations, which have been used in this research, include: the specifications of required content provided by the KS3 programme of study and the examination syllabuses; the general subject criteria for judging the quality of students' attainment, summarised in the National Curriculum level descriptions and the GCSE grade descriptions; published guidance on assessment at KS3, and examination papers and mark schemes for GCSE and A level over the three years from 1997 to 1999. It is a considerable body of information about educational assumptions and intentions within externally imposed assessment systems, which exert a powerful influence over the curriculum of secondary schools.

CHAPTER 3. METHODOLOGY

This chapter is concerned with the rationale for the research and for the methods used. Attention will be given to: the significance of the overall aim of the research for methods of enquiry; possible alternative strategies for the research, and explanations of the strategy that was chosen and methods that have been employed; the assumptions and beliefs underlying the research; and the key questions which have been posed;

The overall aim, as outlined in the introductory chapter, is ‘to examine critically the scope for progression in the demands for geographical understanding, in the secondary years of education (11 -18), signalled by the formal specifications and assessment for KS3 of the National Curriculum and for GCSE and A Level examinations’. It is a very broad statement that simply identifies the field of enquiry, the focus of enquiry, and the sources of evidence to be used. Each of these components requires some comment.

The field of enquiry is the geographical understanding students are intended to develop during the secondary years of education. The general concept of understanding and the particular nature of geographical understanding have already been considered in Chapter 2. Figure 2.2, for example, illustrates the diversity and complexity of the substantive structure of the discipline, as well as the variety of factors which influence geographical understanding. Such is the breadth of geographical content and the specificity of many of the ideas associated with individual geographical themes and subthemes, even in the secondary school curriculum, that it was necessary to select specific fields of content for the detailed investigation required for the research.

The focus of the enquiry is the scope for progression in the curricular demands for geographical understanding over the seven year period of the secondary phase. The matching model of progression (Figure 2.3) emphasises the importance of the relationship between the demands of the curriculum and the capabilities of the students. This particular research endeavour has focused mainly on the demands, both because of the extent to which these are now defined externally, and because so little research has been undertaken into what it is reasonable to expect students to

understand in geography, at successive stages and with appropriate teaching. This is in no way to deny the theoretical and practical importance to students' learning of the relationship between curricular demands and their experience and capabilities.

The main sources of evidence that I have used in the analysis of the geographical understanding required from secondary phase students are official documents, in the form of curricular policy statements, curriculum and examination specifications, assessment questions and mark schemes. Among the attractions of such texts, as sources, are that they are authoritative and intended to be prescriptive. While individual geography teachers or departments may not necessarily approve of the substance or style of some of the documents, the latter are formal statements that the responsible authorities have produced, either to give direction to the curriculum or to measure attainments based on the external specifications. They express what is expected of schools and their students. But, as Bowe et al. (1992, p. 21) comment, 'the expression of policy is fraught with the possibility of misunderstanding, texts are generalised, written in relation to idealisations of the 'real world', and can never be exhaustive, they cannot cover all the eventualities'. This is clearly so in the case of those educational policies that are intended to affect the content and quality of what students learn in schools. There is no simple, direct route between the statements of intentions, principles and frameworks produced by external authorities, such as central government and examining bodies, and their translation into curricular practices. The initial policy texts are interpreted and reinterpreted by many people at different stages, during which the general intentions are transformed by complex processes into increasingly concrete manifestations.

Figure 3.1 identifies some of the most important elements and links which influence the development of the secondary school geography curriculum. The translation of national policies into specifications, and specifications into external examinations and curricula, involves interpretations and creative activity at each step. An individual subject is likely to be affected by the overall organisation of a school's curriculum, in particular such features as the allocation of time and specialist staff to the subject, and the extent to which the subject is optional for students. Curricular developments in

schools are also influenced by external support systems, which include the activities of professional bodies such as the Geographical Association, the publication of teaching resources and learning materials , and various forms of professional development and inservice training. While all the components in the diagram are relevant to progression

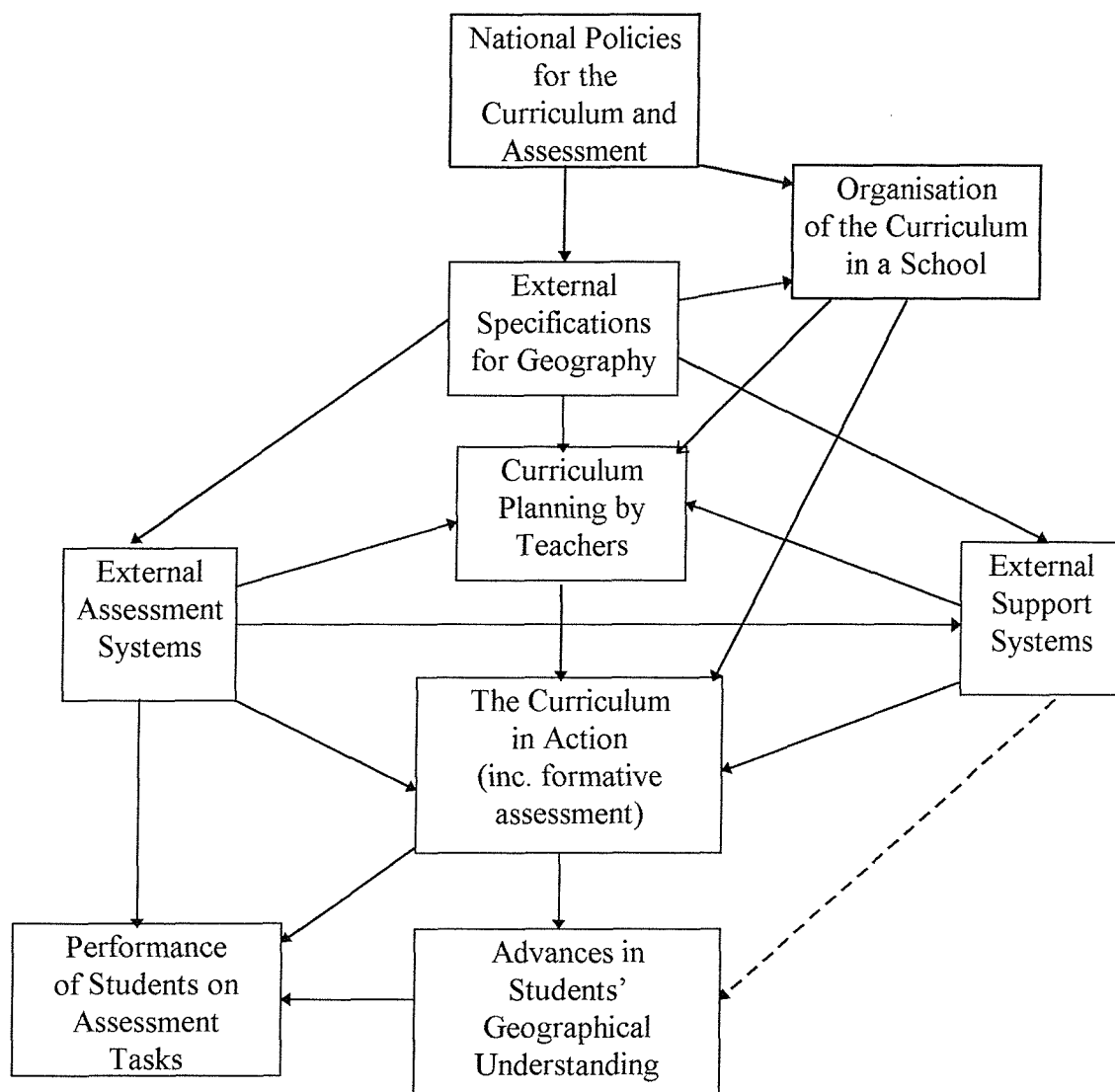


Figure 3.1. Potential Sources of Information for Research into Progression in Geographical Understanding, at KS3, GCSE and A level.

in students' geographical understanding, the research focuses mainly on the boxes labelled 'national policies for the curriculum and assessment', 'external specifications for geography', and 'external assessment systems'. Some account is also taken of

official guidance on curriculum planning and assessment for geography in KS3 of the National Curriculum.

Figure 3.1 is consistent with a recognition that policy making and implementation can occur at different levels (Foskett, 1996; Lawton, 1989). It would be reasonable to expect the important texts at each level to be prepared with the intended audience in mind. Thus, in the case of the main source documents for this research, the National Curriculum specifications would be targeted at those who are most responsible for implementing the policies - the appropriate teachers; the National Criteria for GCSE and the A Level Core requirements at the Examining Groups; the examination specifications at the schools and at examiners, especially the question setters; the question papers at the candidates; and the mark schemes at the markers. At each level, however, others also have a proper interest in the documents. For example, many groups, including teacher trainers, the authors of teaching and learning materials, and parents have an interest in curriculum specifications; while mark schemes could be valuable to teachers, as indicators of the quality of response expected from candidates. How such documents are received may depend upon a variety of factors, including the style as well as the content of a document; and the experience, capabilities and priorities of the recipients. A useful distinction can be made between policy texts that appear to respect the professional expertise of the recipients and seek to involve them constructively in the development of that policy; and texts that treat the recipients as 'technicians', who are given little scope to participate in policy development, but are expected to implement policies which have already been determined (Bowe et al., 1992, pp. 11-12). In the case of geography, the post-Dearing revisions of the National Curriculum have shifted the balance of responsibilities towards teachers. But where high stakes assessment is involved, the degree of professionalism that is encouraged depends strongly on the nature of the assessments and the purposes for which they are used.

Returning to the aim of the research, the phrase 'examine critically' highlights the intention to include an evaluative dimension in the analysis of the evidence obtained from the curricular specifications and assessments associated with each of the three

stages of secondary education. A constructively critical eye will be cast at the specifications, assessment tasks and mark schemes; and, more particularly, at the suitability of the overall structure as a framework for progression in understanding.

Alternative strategies for educational research

As Robson (1993, p. 18) has commented, ‘the task of carrying out an enquiry [in the social sciences] is complicated by the fact that there is no overall consensus about how to conceptualise the doing of research’. In educational research, as in geography, there is a variety of approaches, based on different ontological and epistemological assumptions, different purposes, and different schools of thought about which methods should be used. However, many of the approaches in educational research can be linked to one or other of two main tradition, a ‘scientific/quantitative’ tradition and an ‘interpretative/qualitative’ tradition. A third category, which has been labelled the ‘critical tradition’, can also be identified in some educational research. It is useful to outline the characteristic features of each of these three clusters before explaining the approach adopted for this research.

The scientific/quantitative tradition

The scientific research model has been the dominant tradition in educational research, particularly in those enquiries which have used methodologies derived from sociology and psychology. Such research has tended to draw ‘its pattern and spirit from the physical sciences and has presented a rigorous, structured type of analysis’ (Best and Kahn, 1998, pp. 20-21). Accounts of the rationale for such research often appear to be underpinned by the following beliefs or assumptions:

1. that there is an objective reality that can be distinguished from the subjective views of the researcher, and enquiry can therefore be value-free;

2. that this objective world/reality is characterised by cause-effect relationships, which determine the observed features, events, patterns and processes;
 3. that the goal of scientific research is to discover broad generalisations - hypotheses, laws and theories - that explain such relationships;
 4. that the generalisations must have the support of empirical evidence;
 5. that the phenomena should be explained in the most economic way.
- (Cohen and Manion, 1994; Bartlett and Payne, 1997)

These help to explain the importance that researchers pursuing a scientific agenda attach to:

- accurately observing, describing and measuring phenomena;
- carefully distinguishing between causes and effects, and between dependent and independent variables;
- devising sampling procedures which make it possible to extend findings to larger populations;
- controlling the conditions under which investigations are carried out, so as to reduce the number of variables that have to be considered;
- formulating theories which have tight, coherent structures, and therefore greater explanatory power; and
- systematically testing hypotheses, laws and theories.

Because scientifically orientated research in education is so concerned 'with the development and testing of theories of how students and teachers behave in educational settings' (Best and Kahn, 1998, p. 21), it tends to focus on phenomena which can be 'directly observed, described and measured' (Williams, 1996, p. 6).

Scientific method is often presented in the form of an idealised sequence of activities which starts from an existing theoretical structure. As described by Bartlett and Payne (1997, p. 174), 'starting from a body of theory, research hypotheses are formulated by a process of deductive inference and are then operationalised in an experimental design

where the appropriate and dependent and independent variables are measured and controlled for in a particular sample of the target population'. These authors follow Agar (1986) in pointing out that 'the questions which need to be addressed in formulating a research problem are the product of the researchers' received view of science'. Robson (1993, p. 19) describes five sequential steps:

1. Deducing a hypothesis (a testable proposition about the relationship between two or more events or concepts) from the theory.
2. Expressing the hypothesis in operational terms (i.e. ones indicating exactly how the variables are to be measured) which propose the relationship between two specific variables.
3. Testing this operational hypothesis. This will involve an experiment or some other form of empirical enquiry.
4. Examining the specific outcome of the enquiry. It will either tend to confirm the theory or indicate the need for its modification.
5. If necessary, modify the theory in the light of the findings. An attempt is often made to verify the revised theory by going back to the first step and repeating the while cycle.

But Robson adds that 'this kind of model with its orderliness and separation into a clear linear sequence is more of a reconstruction enshrined in methods textbooks and conventional journal formats than an account of the scientific research process in practice'.

The interpretative/qualitative tradition

Although the qualitative research cluster encompasses a range of philosophical viewpoints and employs a variety of methods, it is possible to identify features which are fairly common across the different subgroups. Qualitative approaches were developed, in part at least, as a consequence of dissatisfaction with the underlying rationale of the powerful, but restricting, positivist school of science. In particular,

many of the approaches which were initially developed in the physical sciences, were increasingly seen to be an inadequate way of making sense of human behaviour.

Among the beliefs that are widely shared among qualitative researchers are:

1. that 'observers and interpreters of the world ... are inextricably part of it, [and] cannot step outside of [their] own experience to obtain some observer-independent account of what [they] experience. Thus it is always possible for there to be different, equally valid accounts from different perspectives' (Maxwell, 1992, p. 283). Much social science research, and therefore much educational research, 'is seen as a subjective rather than an objective undertaking' (Cohen and Manion, 1994, p. 26);
2. that human behaviour is not 'governed by general laws and characterised by underlying regularities' (Cohen and Manion, op. cit.), and that an emphasis on constructing such laws reduces rather than enhances the quality of understanding of teaching and learning;
3. that 'the most fundamental characteristic of qualitative research is its expressed commitment to viewing events, actions, norms, values etc. from the perspective of the people being studied', (Bryman, 1988, p. 61);
4. that, because of the complexity of reality, most phenomena cannot be studied in isolation, but must take account of the context of that phenomena. 'If all empirical studies were exclusively designed according to the model of clear cause-effect relations, all complex objectives would have to be excluded' (Flick, 1998, p. 5);
5. that qualitative research aims to reveal the complexity and particularity of situations and conditions, rather than to construct abstract generalisations;
6. that the criteria used to evaluate scientific research are inappropriate for qualitative research.

As with educational researchers who adopt a strictly scientific approach, the beliefs and assumptions of those who engage in qualitative research strongly influence their methods. Among the characteristic features of qualitative methods are:

1. the use of a variety of approaches and methods. Flick (1998, p. 5) emphasises that the methods used should be 'so open that they do justice to the complexity of the object under study'. Similarly, Corney (1996, p. 78) argues for an eclectic approach to qualitative design in geographical education, commenting that 'the choice of research tradition or approach, as well as the specific methods of data collection and analysis, should be made in relation to the particular aims of the study and in order to answer its specific research questions'.
2. a research approach that tends to be 'field focused'. Eisner (1998, pp. 32-33) comments that 'in education, those conducting qualitative research go out to schools, visit classrooms and observe teachers' but he notes that 'the field focus I describe is not limited to places in which humans interact, it also includes the study of inanimate objects: school architecture, textbooks, classroom design In short, anything that has import for education is a potential subject matter for qualitative study'.
3. a strongly interpretative character, so much so that the term 'interpretative' is sometimes used as an overall generic label, covering approximately the same field of research as that described as qualitative. Gerber (1996), in his overview of 'interpretative approaches to geographical and environmental education research', appears to be using the term in this broad sense. Walker (1985, p. 3) asserts that 'analyses of qualitative material is more explicitly interpretative, creative and personal than in quantitative analysis, which is not to say that it should not be equally systematic and careful'.
4. attention to detail and to particulars. Bryman (1988, p. 63) suggests that one of the main reasons why qualitative researchers pursuing ethnographic approaches give so much attention to descriptive detail is that this provides 'a backdrop whereby events and situations can be viewed within a social context'. Walker (op. cit.), in the context of applied research, comments that 'typically, qualitative methods yield large volumes of exceedingly rich data obtained from a limited number of individuals. Eisner (1998, p. 38) refers specifically to the attention to particulars. He comments that while 'conventional social science uses particulars to arrive at general statements

..... the flavour of the particular situation, individual event, or object is lost. Qualitative studies tend to provide that flavour’.

Theory occupies a different place in qualitative research from that described earlier in relation to scientific research. While most scientific enquiries start from a body of theory, in the interpretative [qualitative] approach concepts and theories tend to be developed from the enquiry. ‘They come after the data collection rather than before it. Because of this [the approach] is often referred to as *hypothesis generating* (as against *hypothesis testing*) research’ (Robson, 1993, p. 19). The same distinction is described by Anderson and Burns (1989) as that between the *confirmatory mode* of enquiry, which seeks verification of theory and the *interpretative mode*, which seeks to generate theory (Corney, 1996, p. 80-81). Eisner (1998, p. 238) points out that theory performs a focusing role in the interpretation of social phenomena and is valuable in helping researchers to account for what they describe, but, he notes that ‘It has been my experience that the application of theory in qualitative studies is often difficult and rather thin’. He suggests several reasons for this:

First, much of the theory that is available to educational researchers is either too general or ill-suited to the phenomena being described. The fit is not comfortable. Second, the particular features of the situation often require a more customised and context-specific interpretation than the theory alone can provide. Third, most qualitative studies are undertaken not as hypothesis-testing enterprises, but as efforts that provide ex post facto explanations. That is, although researchers may have a general theme in which they are interested, the focus is usually emergent. Very often researchers do not really know what they are going to study until they have immersed themselves in the context. The task is more a matter of exploring what they have seen than of searching for qualities to test a theory (Eisner, 1998. p. 238).

Evaluation of scientific research depends on the testing of operational hypotheses, within controlled experiments or other forms of enquiry designed to assist the formulation of generalisations and facilitate testing procedures. Such a strategy does

not accommodate the characteristic features of a qualitative approach; other types of criteria are necessary to underpin evaluation. According to Flick (1998, p. 5), 'the validity of [a qualitative] study is assessed with reference to the object under study and does not exclusively follow abstract academic criteria of science as in quantitative research. Rather, control criteria in qualitative research are grounded in empirical material and whether methods have been appropriately selected and applied to the object under study. The relevance of findings and the reflexivity of proceedings are further criteria'. Eisner suggests specifically that:

qualitative research becomes believable because of its coherence, insight and instrumental utilityThe evidence employed in qualitative studies comes from multiple sources. We are persuaded by its 'weight', by the coherence of the case, by the cogency of the interpretation. In qualitative research there is no statistical test of significance to determine if results 'count'; in the end, what counts is a matter of judgement. In qualitative enquiry, judgement is alive and well, and hence the arena for debate and difference is always open. In qualitative research the facts never speak for themselves (Eisner, 1998, p. 39).

The critical tradition

Although there is evidence of a critical perspective in research into geographical education, it has been less productive of substantive work than either the scientific or qualitative traditions. While it shares with the other two, concerns that methods of enquiry should be appropriate for the objectives of an investigation, and that rigorous standards and criteria for validity and reliability should be applied to research methods and findings, it is a much more radical enterprise in its aims and assumptions. This is well illustrated by Fien and Hillcoat (1996) in some of their own assertions and quotes from other authors, which they include in their review of 'the critical tradition in research in geographical and environmental education':

The critical perspective entails a commitment to socially transformative research for the common good of individuals within society (Fien and Hillcoat, 1996, p. 28).

Critical theory has been described as ideologically-orientated enquiry becoming critical means developing an analytical posture towards arguments, procedures and language using a lens related to issues of power and control in relationships and developing an action-orientated commitment to common welfare (Robottom and Hart, 1993; in Fien and Hillcoat, op. cit. p. 28).

Critical theory is not simply explanatory, but is committed to enabling change towards better relationships, towards a more just and rational society. In identifying the biases and distortions which prevent healthy and social growth, it helps teachers to free themselves and their pupils from those malforming constraints (Gibson, 1986; in Fien and Hillcoat, op. cit. p. 29).

[Critical social science] seeks a theory which will simultaneously explain the social world, criticise it, and empower its audience to overthrow it (Fay, 1987; in Fien and Hillcoat, op. cit. p. 29).

The language used in these extracts reveal the strength of feeling, and the radical nature of the beliefs and assumptions of the authors. There is a clear ideological underpinning, and an explicit political agenda expressed in terms of empowerment, action-orientation, the transformation of society and even 'overthrowing' the existing social world. In less emotive terms, some of the assumptions of the critical perspective appear to be:

1. that an individuals' world view is socially constructed;
2. that the existing social world creates conspicuously uneven opportunities for different individuals and different groups;
3. that society can be improved by better understanding of the inequalities and effective actions to remedy them;

4. that the necessary improvement of society requires a commitment from educational researchers and teachers.

Fien and Hillcoat (1996, p. 35) assert that the three major research methods employed by critical educational researchers are discourse analysis, critical ethnography, and action research. This matches their view that:

‘a critical social science approach to an area of social life such as educational research would be *scientific, critical and practical*. It would be scientific because it would seek to provide comprehensive explanations subject to public, empirical evidence; it would be critical in its unmasking and analysis of the structures of oppression which hinder educational reform; and it would be practical in the sense of providing teachers and other educational stakeholders, such as students and parents, with the sorts of understanding, skill and motivation they need to bring about desired changes (Fien and Hillcoat, 1996, p. 29).

Beliefs underpinning this research project

At this point, it is appropriate for me to acknowledge the beliefs and assumptions that, in my view, have underpinned my own research effort. This is an example of self reflection, which may have gained from the benefit of hindsight. However, the a priori assumptions that I believe have been most important in this respect have been:

1. that the secondary school geography curriculum is strongly influenced, both directly and indirectly, by the external requirements of KS3 of the National Curriculum and of GCSE and A Level examinations;
2. that the specifications, assessment tasks and mark schemes associated with KS3, GCSE and A Level are likely to reveal evidence of the nature and quality of geographical understanding required at each successive stage;

3. that such external requirements are highly relevant to the planning of progression in students' geographical understanding;
4. that it is necessary to evaluate critically the opportunities and constraints for progression in geographical understanding, created by the external requirements, in order to inform existing curriculum planning and assessment, and any future revision of the specifications;
5. that analyses and evaluations of the specifications, assessment tasks and mark schemes necessarily involve interpretations and judgements.

Chapters	Key Questions			
	1	2	3	4
1. Introduction	√	√	√	√
2. Preliminary Considerations	*			
Understanding	*			
Geographical Understanding	*			
Progression in Understanding	*			
Progression in Geog. Understanding	*			
Assessment	*			
3. Methodology	√	√	√	√
4. Weather and Climate		*	*	√
5. Settlements		*	*	√
6. Conclusions	√	√	√	*

* major attention.

√ significant attention

Table 3.1. Where Key Research Questions are addressed in the Structure of the Thesis

These beliefs both provided the stimulus and gave direction to the research. They led to the following **key research questions** which are addressed in the thesis ([Table 3.1](#))

1. What are the distinctive characteristics of geographical understanding, and the role of assessment in defining students' progression in that understanding?

2. How is the geographical understanding required for KS3, GCSE and A Level signalled in the specifications for the National Curriculum and for the external examinations?
3. What evidence of progression in the geographical understanding required is provided by assessment tasks and mark schemes at successive stages?
4. To what extent do the external requirements for the geography curriculum provide a satisfactory framework for the development of progression in students understanding?

In terms of the perspectives outlined above, this research is in the **qualitative mode** rather than scientific or critical. Although informed by existing general ideas, such as those discussed in Chapter 2, it does not have its origin in a coherent body of theory, and does not involve testing operational hypotheses derived from theory. The ideas which have had strongest influence on the research have been of a very general nature, providing frameworks for investigating the evidence available, rather than providing explanations. The key research questions are of an open nature, suitable for more than one method of enquiry and potentially capable of stimulating a variety of insights. The aim of the research is directed at better understanding rather than explanations. The techniques of analysis which have been used are non-quantitative, simply because the qualities which are relevant to the investigation are not well suited to measurement or to statistical analysis. In contrast, interpretation figures prominently, both in what is studied - the successive reinterpretation and construction that accompanies the translation of policy statements into external specifications, examinations, curricular programmes, teaching and learning - and in the process of research based on documentary evidence. The interpretations and judgements which are an integral part of this research are necessarily subjective. The extensive inclusion, in Chapters 4 and 5, of extracts from the National Curriculum Geography Order, and from GCSE and A Level syllabuses, examination questions and mark schemes, is in order to present the source material to which the interpretations and judgements relate, in a clear and accessible form. Although the evaluative dimension in the research is signalled at the very beginning of the aim, with the phrase 'to examine critically', this critical approach is not linked to a radical ideology, broad critique of society, or a political agenda. It is

not part of that 'critical tradition' described earlier. The commitment is towards better understanding rather than political action, although accompanied by a hope the analysis and findings will be of value to various contributors to the education system, ranging from policy makers and examining boards to curriculum managers in schools and teachers of geography.

As indicated in Chapter 1, the history of this research project has been influenced by my earlier professional experience and attempts to explore progression in the geography curriculum; and by changes to the National Curriculum and to GCSE and A Level examinations that took place during the period of the research. Consequently, the progress of the research has not been characterised by the sort of systematic sequence of activities traditionally recommended. For example, the literature search, which has been drawn upon to write Chapter 2, was not concentrated in a specific phase of activity, prior to analysing and evaluating the external curricular specifications and assessment, which form the heart of the research. I was already familiar with some of the literature, and this was extended at various times during the research in order to broaden and strengthen my understanding of particular aspects. Other ideas were acquired by sustained monitoring of relevant current literature, whether published in the form of books or as papers in academic journals. The search for, and of, relevant literature has continued throughout the period of enquiry. However, while there has been no general shortage of publications, stimulated by the curricular policies of central government and their implications for schools, relatively little of this literature has focused on the concept of progression in understanding.

During the early part of the research, when the main intention was to investigate the practical implications of the 1991 National Curriculum Order, for planning progression in students' geographical understanding, links were established with twelve secondary schools, located in Dorset, Hampshire and West Sussex. Over a period of seven terms, from the summer of 1995 to the summer of 1997, 47 visits were made to these schools, to interview and hold informal discussions with the heads of department for geography, and to collect and analyse schemes of work, teaching materials and examples of students' work. Some visits also involved discussion with other teachers

of the subject, attendance at departmental meetings, and observation of lessons. This strand of the investigation had to be brought to a close when the decision was made to focus down onto the documents that conveyed the external requirements for the geography curriculum, and to extend the evidence base to the full range of existing GCSE and A Level schemes and three years of external examination papers and mark schemes. Nevertheless, the visits revealed the scale of the task of planning a geography curriculum to satisfy the requirements of the 1991 Order; the variety of planning strategies employed by the departments; and the views of the heads of department about progression in geographical understanding. Although these were thoughtful and conscientious heads of department, most had given only limited attention to progression when planning their new KS3 courses. In part, this may have been because at the time other considerations were more urgent, but it may also have been because most lacked an adequate model to guide their planning for progression (Bennetts, 1995b, 1996). The findings relating to their implementation of the National Curriculum requirements for geography were consistent with those of Roberts (1991, 1995, with 1997), based on her much larger survey and detailed case studies from South Yorkshire.

Reference has already been made to the extent to which the main body of the research, reported in Chapters 4 and 5, has been based on evidence derived from authoritative documents. The source of evidence has therefore been dominantly in the form of text. Flick (1998, p. 23) comments that 'texts are neither the world per se nor an objective representation of parts of the world. Rather they result from the interests of those who produced the text as well as of those who read it. Different readers resolve the vagueness and ambiguity every text contains in different ways - depending on the perspectives they bring to the particular text'. According to Flick (1998, p. 34), in the context of qualitative research, 'the person who reads and interprets the written text is as involved in the construction of reality as the person who writes the text'. It follows that the researcher is as much involved in the process of interpretation as those who produced the texts which are to be analysed.

When the text available to the researcher is extensive, selection becomes an important consideration. In the present case, it was necessary to decide which fields and subfields of geographical understanding to include, which examination syllabuses to investigate, and over how many years to extend the analysis. It was decided to include all the GCSE and A Level syllabuses operating in 1998, in order to take account of possible differences of approach and demand between the various schemes. The study of examination questions and mark schemes was extended to three years in order to ensure a reasonable range of questions for each content area. It was, however, necessary to select between content areas if the task was to be at all manageable. As explained in Chapter 1, a thematic approach was adopted because it matched the structure of content in nearly all the syllabuses. The selection was intended to reflect the breadth of understanding within the geography and within the selected content themes; and to provide suitable scope to explore continuity and progression through the three stages of the secondary school curriculum. Initially it was intended to explore three major themes, all of which are prominent recurrent strands within the geography curriculum: weather and climate, as a theme from physical geography; settlements, as a theme from human geography; and environmental issues, as a theme which focuses on relationships between people and their environments. Although an analysis of the specifications for environmental issues was completed, it became apparent that there was insufficient time to undertake an adequate survey of the relevant evidence from GCSE and A Level questions. The focus had to be on two rather than three themes. However, the inclusion of atmospheric hazards, as a subtheme of weather and climate, ensured that some attention was given to people-environment relations. While it was also not feasible to attempt a comprehensive study of either weather and climate or settlements, the subthemes selected cover a significant proportion of the content specified for each of the two themes. Neither rural settlements nor settlement patterns was selected for detailed analysis, because these subthemes were not widely included in GCSE syllabuses. Nevertheless, the inclusion of processes in the rural-urban fringe of MEDCs, and rural to urban migration in LEDCs, within the subthemes selected, made it possible to give some attention to relationships between rural and urban settlements.

The main criterion for the selection of assessment tasks from the exemplar materials for KS3, and from examination questions for GCSE and A Level, was to include those which most directly addressed geographical understanding. It is often impossible to discriminate unambiguously between those which, in practice, require understanding and those which can be answered mainly by recall, or by applying skills to information provided with the question. In many cases, knowledge, understanding and skills may appropriately be combined to answer a question; or a part question which is directed at assessing understanding may be linked directly to other parts of the same question which ask for recall or skills.

The GCSE and A Level questions are from timed examination papers. In GCSE examinations with tiered papers, which include all those for 1998 and 1999, the questions selected are nearly all from higher tier papers, because these and their mark schemes gave a clearer indication of the understanding intended. Coursework components, which are usually based on investigative studies, were not included because the broadly framed instructions and mark schemes for such work usually provided little information about the nature and quality of understanding required. The examination questions and the more extensive extracts from syllabuses and mark schemes, which underpin the analyses in Chapters 4 and 5, are presented in tables within these chapters. Each question is accompanied by the mark allocated to it, and a brief reference to any accompanying support materials. While the marks are not strictly comparable between papers, they give a rough indication of the length of the answers expected. The tables include a high proportion of the questions intended to assess understanding of the selected subthemes, at A Level and within higher tier papers at GCSE, over the three years 1997-1999. In a small number of cases, questions and mark schemes have been slightly reworded, either to increase their clarity or to shorten their length, but without altering their meaning. Appendix B identifies the sources of each question, and therefore also of the mark schemes.

Each of Chapters 4 (Weather and Climate) and 5 (Settlements) contains a brief outline of the nature and content of the respective theme as an academic field of study. This is not to suggest that such an outline provides a key to the selection and structuring of

subject content for the school curriculum, but is merely to indicate the breadth of the field, identify important subfields within it, and show how these are interrelated. This is relevant in so far as the 'parent discipline' is considered to be important as a source of ideas for the development of geographical understanding in schools. What is selected from this source and how it is adapted for teaching, and is structured within a curriculum is influenced by many factors. The remainder of each chapter is organised to focus on aspects of the theme which are prominent in the specifications for the curriculum, and in which it would be reasonable to expect progression in understanding. The aim here is to identify, in the formal texts associated with the National Curriculum and with the GCSE and A Level examinations, the nature of the understanding expected at each stage, especially the relationships which have to be studied, the ideas which have to be introduced, and any indications of the quality of understanding expected. Account is taken of the extent to which the nature and format of assessment tasks enable students to display their understanding. The research attempts to clarify the principles that define progression in understanding, and to evaluate the extent to which the external requirements for the curriculum support progression in learning.

In several places in Chapters 4 and 5, I go beyond an analysis of what is stated in a mark scheme, to suggest what might be looked for in a higher quality response, or what sort of learning at a prior stage might help to prepare a student for the type of understanding which appears to be required by a specific question. The purpose of such comments is not to suggest what should have been included in a given mark scheme, but to explore how the demands of a question might be interpreted, or what might constitute higher quality understanding or contribute to progression, within the context of a specific field of knowledge and a specific assessment task

CHAPTER 4. THE SCOPE FOR PROGRESSION IN UNDERSTANDING IN THE STUDY OF WEATHER AND CLIMATE AT KS3, GCSE AND A LEVEL

The purpose of this chapter is to examine critically the opportunities, presented by the external requirements for KS3, GCSE and A Level, for progression of understanding within a specific theme from physical geography - weather and climate. This focus makes it possible to apply some of the general ideas about understanding and progression, discussed in Chapter 2, to particular content, which is either specified in the external requirements for the subject, or revealed through assessment tasks and mark schemes. The chapter presents a broad overview of the theme and its content structures; an outline of the specifications of content and provision for assessment at each of the three stages; and an analysis of the scope for progression in five subthemes. The subthemes are: water in the atmosphere; mid-latitude weather systems and air masses; the global energy balance and atmospheric circulation; types of climate; and natural hazards associated with weather and climate.

Features of the theme

The understanding of atmospheric processes, and of the causes of weather phenomena and climatic patterns, has advanced greatly during the last half century, largely as a result of new observational techniques, the use of increasingly more powerful computers to store and analyse vast quantities of data, and significant theoretical developments (Atkinson, 1987). One effect has been to widen the gap between what is studied in higher education and what is studied in schools. Disjunctions also exist between stages within the secondary school curriculum. While changes in A Level syllabuses have led to more attention being given to the study of processes and scientific explanations, the treatment of the theme in earlier years has tended to remain largely descriptive, continuing along traditional lines. In some geography courses, climate is introduced primarily as a factor influencing human activities, such as farming and tourism, and as a hazard or potential hazard. The emphasis, therefore, is often on the role of weather and climate in the interrelationships between people and their environment. In other courses, specific

attention is given to the description and explanation of climatic patterns and atmospheric processes.

Content structures within the theme

Figure 4.1 is an attempt to present an overview of the content of weather and climate in geography, by highlighting important subfields and the links between them. It is concerned with content rather than methods, and is, therefore, close to what Schwab (1964) described as a 'substantive structure', as distinct from a 'syntactical' one. It is not so much a map of the territory, as a general framework within which understanding can be

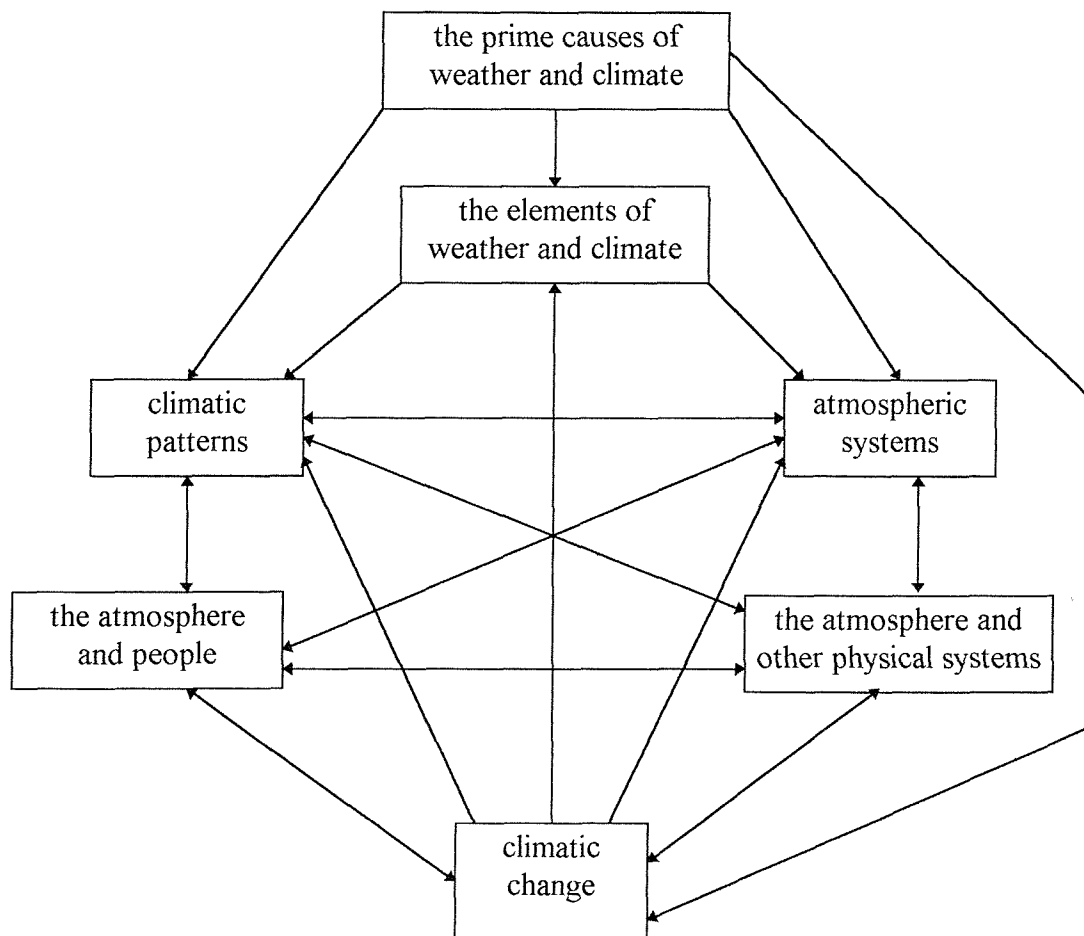


Figure 4.1. A Content Framework for the Study of Weather and Climate in Geography

analysed. The individual sections have distinctive conceptual networks which can help students make sense of the working of the atmosphere, and of the relationships and interactions between the atmosphere and other components of the environment, including human beings.

There is a degree of logic in the arrangement of content within the diagram, in that it progresses from the basic causes of weather and climate (e.g. solar radiation, the shape of the planet and its movements in relation to the sun, the composition and structure of the atmosphere, and the nature of the boundary zone between the atmosphere and the surface of the earth); to the systematic treatment of the various elements of weather and climate (in particular, temperature patterns, water in the atmosphere, pressure and wind systems); the synthesis of such elements within atmospheric systems and types of climate; and the wider and even more complex systems involving the relationships between the atmosphere and other environmental systems, both physical and human. Climatic Change, which includes past, present and future, affects all the other subfields, and is itself affected by some of them. Alternative content structures could be devised, highlighting other distinctions, for example, between the different spatial and temporal scales of weather phenomena; and between pure and applied studies. It is important to emphasise that the diagram is not intended to suggest an order in which the various components should be taught. As explained in Chapter 2, logical structures do not provide the sole criteria, nor even necessarily the best criteria, for determining the sequence of content within a subject curriculum. Individual subfields, and many of the ideas associated with them, can be understood at different levels, and that understanding can be broadened and deepened in successive stages. As these subfields are themselves recurrent elements in the geography curriculum, each can be regarded as a possible vehicle for progression in understanding.

The challenge to be faced when attempting to apply existing models of the development of cognitive abilities to students' progression in understanding specific geographical themes, arises from the generalised nature of the former and the lack of detailed research evidence about the latter. There has been no large-scale, cross-age research into students' understanding of weather and climate, comparable to the investigations of children's learning in various knowledge domains in science. At present, geographical educators are

in no position to apply the idea of ‘conceptual trajectories’, described by Driver and her co-workers (Driver et al, 1994a), to such specific domains as the traditional content themes within physical and human geography. In practice, geography teachers have to place much greater reliance on their own teaching experience to make judgements about students’ capabilities at different stages; and on their own analyses of the learning demands presented, for example, by the complexity of specific subject matter, its distance from the direct experience of the students, the degree of abstraction within relevant ideas, and the precision of thinking and the forms of reasoning required from students.

The specification of content and provision for assessment

The 1995 programme of study for **KS3** (DfE, 1995) stipulated that:

In studying how and why weather and climate vary, pupils should be taught:

- a. how weather and climate differ;
- b. about the components and links in the water cycle;
- c. how and why aspects of weather and climate vary from place to place.

These brief statements only provided a very general indication of the sort of understanding envisaged and, in the absence of supplementary guidance, were open to a wide range of interpretations. The distinction between weather and climate is a fundamental one, which presumably was intended to underpin subsequent learning. While the concept of weather is not difficult to grasp, because it can be related to direct, day-by-day experience; climate is a more abstract idea, which encompasses a generalised view of weather patterns over a long time scale. But no guidance was offered about what level of understanding of these ideas was expected at Key Stage 3. The inclusion of the very general statement about the water cycle, within a section of the programme of study focusing on weather and climate, is confusing. A concern to prune subject content for the 1995 Order appears to have led to the omission of hydrological systems (rivers and river basins) from the KS3 themes and the transfer of the water cycle to the theme of weather and climate, but at the expense of ‘the causes of rainfall’, which had figured in the earlier

Level 6 statement of attainment (DES, 1991, p. 15). The 1995 Order offered no guidance on what should be taught about atmospheric processes within the broad framework of the water cycle, nor any indication whether students were still expected to have some understanding of the causes of rainfall. The third requirement, to teach how and why aspects of weather and climate vary between places, has an obvious geographical emphasis. However, as with the other statements, it left much to the judgements of teachers, in this case with respect to: the aspects to include; the places to study; the spatial scales on which to focus; and the sort of understanding which would be most worthwhile and appropriate for students of this age. The restriction to 'aspects' of weather and climate appears to suggest that only selected elements, such as rainfall and temperature, had to be considered; and that, in contrast to the 1991 Order, there was no longer any requirement to introduce KS3 students to different types of climate, as distinct categories with characteristic features.

A lack of clarity and specificity in the programme of study gives greater weight to the importance of national assessment as a source of evidence about how statements are to be interpreted. But, in the absence of national tests for geography at KS3, the only official source of information available was the guidance given in documents produced by SCAA and ACAC. There is very little about weather and climate in the 'Exemplification of Standards' and 'Optional Tests and Tasks' issued by SCAA (1996a, 1996b). The theme is more prominent in ACAC's 'Optional Tests and Task Materials' (ACAC, 1997), being present in two of the ten units in that document: in Unit 4, students have to compare the climate of The Gambia with that of Wales; and in Unit 5, 'Rainfall and Water Supplies', they are questioned about the water cycle and the distribution of rainfall in Britain.

Weather and climate is not a strong theme in the current **GCSE** syllabuses. While the 1995 subject criteria stipulated that the syllabuses must have 'a balanced coverage of physical, human and environmental aspects of the subject' (SCAA, 1995a, para.4.1), it was left to individual examining groups to determine for each of their syllabuses what weighting to give to physical geography, and which aspects of physical geography to emphasise. There are significant differences between the syllabuses in the overall attention given to weather and climate, both in the topics specified and in the detail with

which content is presented. In most of the syllabuses, weather and climate figure as a subsection within a broader component focusing on physical geography or on the relationships between people and their physical environment. However, MEG Syllabus A has no substantial section on weather and climate, the only relevant content being about acid rain; and in NEAB Syllabuses A and C, the only significant treatment of the theme is in the context of environmental hazards. Although London Syllabus A and SEG Syllabus A do have substantial sections on weather and climate, in each case the section is optional. In NEAB Syllabus B, with its structure of place-specific topics, the proportion of the total content devoted to weather and climate is small and the theme is fragmented. Overall, less than half of the eleven GCSE syllabuses require all their candidates to undertake a fairly broad study of the theme.

	M			N			S		L		W
ASPECTS INCLUDED IN SYLLABUSES	A	B	C	A	B	C	A	B	A	B	A
The concepts of weather and climate								√	√		
Factors influencing aspects of weather			√						√		
Causes of rainfall					√			√			
The water cycle			√			√		√	√		
Weather systems - depressions and anticyclones		√	√				√	√	√	√	√
Types of climate		√	√		√		√	√	√		√
Factors influencing climate		√	√				√	√	√		√
Small scale weather systems/microclimates			√						√		
Hazards			√	√	√	√	√	√		√	
Effects of weather and climate on human activities		√	√	√	√		√			√	√
Effects of human activities on weather and climate	√	√				√	√		√	√	√
Measuring, recording and interpreting		√					√		√	√	√

[M - Midland Examining Group; N - Northern Examinations and Assessment Board; S - Southern Examining Group; L - London Examinations/EDEXCEL; W - Welsh Joint Examining Committee]

Table 4.1. Aspects of Weather and Climate included in GCSE Geography Syllabuses.

The occurrence of specific topics in individual syllabuses is summarised in [Table 4.1](#). The comparatively narrow content coverage of some of the syllabuses, evident from the table, seriously limits the scope for progression from KS3. The most common aspects of content are weather systems, types of climate, and the relationships and interactions between people and the atmosphere. In many of the syllabuses, topics based on the last of

these are more common than those which focus on the atmosphere itself. Natural hazards figure prominently, with storms, tropical cyclones, tornadoes, drought and fog being specified within particular syllabuses. Topics about the effects of human activities on weather and climate focus mainly on acid rain, desertification, the greenhouse effect, and global warming. References to the influence of weather and climate on human activities are mainly in the context of farming, tourism and water resources. Those topics dealing with the interactions between people and the atmosphere tend to emphasise the human activities, whether as causes or responses, rather than the physical processes.

The brief descriptions of weather and climate in many GCSE syllabuses give little guidance on the quality of understanding expected. Key ideas or questions sometimes provide a useful framework for content, as in the case of MEG Syllabus C, where the following ‘questions for enquiry’ give direction to the content, and emphasise the importance attached to seeking explanations:

- How do weather conditions reflect processes in the atmosphere at the local scale?
- What influences the patterns of climate at the regional scale?
- How does the global atmospheric system affect the climate in particular places?
- Is the climate changing?

But, in most GCSE syllabuses, key ideas tend to be expressed in very general terms, while the accompanying statements of content vary greatly in their specificity and in the clarity of their guidance. Some statements of content are no more than headings, for example, ‘the nature of the Mediterranean climate’ (NEAB Syllabus B); and others merely indicate the need for explanation, for example, ‘tropical storms: their causes and consequences’ (NEAB Syllabus A). Some point towards the type of explanation required, by listing relevant factors. For example, the question for enquiry in MEG Syllabus C, asking how the global atmospheric system affects the climate in particular places, is accompanied by a statement, which indicates that what is required is an understanding of the influence of latitude, land and sea, relief and ocean currents. The approach is helpful, although it is surprising that while ocean currents are included in the list, wind systems are not.

The extract from SEG Syllabus B (Table 4.2) illustrates some of the difficulties of interpretation which can arise from a broad statement that lacks either detailed specification or adequate illustration. Even the assertion that ‘rainfall is caused in different ways’ is not supported by any indication of which causes are to be studied, or what sort of understanding is expected. The ‘required content’ is expressed in very general terms which are open to different interpretations. For example, it is far from clear

Key Geographical Ideas	Required Content
<ul style="list-style-type: none"> Weather and climate are different. 	Understanding of weather patterns in the UK including depressions and anticyclones.
<ul style="list-style-type: none"> There are climates very different from the UK’s. 	General Understanding of global climates and factors affecting them. Compare climate in UK with example from the tropical world.
<ul style="list-style-type: none"> Rainfall is caused in different ways. 	General understanding of the circulation of air. The main components and links in the water cycle
<ul style="list-style-type: none"> Weather events can be a hazard. 	<p>Global appreciation of weather hazards.</p> <p>Consideration of a weather event as a natural hazard (storm, drought, flood).</p>

Table 4.2. GCSE Extract on Weather and Climate from SEG Syllabus B.

what is intended by ‘*general understanding* of global climates’; ‘*general understanding* of the circulation of the air’ and ‘*global appreciation* of weather hazards’ [the italics are mine]. In the light of the low-level character of the key ideas, it could be that ‘general understanding’ should be interpreted as ‘simple understanding’, though the meaning of that phrase would need clarification; and that ‘global appreciation’ might only be intended to indicate that examples can be taken from any part of the world. The only indication that explanations are expected is the reference to factors affecting global climates, which again is a very generalised statement. The combination of low-level ideas and broad statements of content provides little support to teachers and examiners. In comparison with SEG Syllabus B, the WJEC Syllabus presents a more informative statement (Table 4.3), possibly as a consequence of thinking in terms of the ‘learning outcomes’ intended

to follow from a consideration of each key idea or question. In this case, it is reasonably clear which places are to be studied; and each of the main points, whether idea or

Key Ideas/Questions	Specific Learning Outcomes
1. What makes up the weather?	An understanding and interpretation of records of weather elements: air pressure, temperature, precipitation, wind direction and force, and sunshine totals.
2. Different air masses influence the weather of the British Isles.	A basic understanding of the characteristics, in terms of temperature and precipitation, of: Polar, Tropical, Continental, Maritime air.
3. The weather over the British Isles varies according to the air mass and pressure system. These are dynamic.	Description and explanation of the weather associated with: i. an anticyclone; ii. a depression and associated fronts; their contrast in speed, direction of movement and change of form.
4. What are the factors affecting climate?	An understanding of the effects of: latitude; altitude and aspect; continentality; wind direction; on temperature and precipitation patterns in: Britain and adjacent parts of Europe; an Alpine area of Europe; and area of European Mediterranean.

Table 4.3. GCSE Extract on Weather and Climate from the WJEC Syllabus.

question, is supported by subsidiary points which have a useful explicatory role. For example, the reader is informed which air masses, and which of their characteristics, should be studied in relation to the anticyclones and depressions affecting the weather of the British Isles; and which climatic factors should be investigated in relation to particular areas of Europe. There is a much stronger conceptual base to this extract, particularly in the introduction of the idea of air masses, and a clearer indication where explanations are required.

Weather and climate figured in most of the 1997-1999 GCSE geography examinations, although it was a fairly weak component in some, reflecting the relative status of the theme in the different syllabuses. At this level, the theme rarely occupied the whole of a

question. The majority of the assessment tasks were of the stimulus-response variety, and required fairly short answers. The majority of these tasks were designed to assess skills or knowledge, rather than understanding. Most of the tasks requiring longer answers were about human responses to particular weather conditions or types of climate.

The theme of weather and climate was more prominent in the nine **A Level** syllabuses which were in place from September 1996 to September 2000. In two of the nine, the AEB and Cambridge Linear syllabuses, the theme was located entirely in optional units. In the other seven, it was a component within compulsory units, and in five of these also occurred in optional units. The breadth and balance of relevant content in the compulsory sections varied considerably. For example, while the Oxford and Cambridge syllabus included a broad treatment of atmospheric processes in its core, the NEAB core focused on 'changes', both long term and short term; the Oxford core, on temperate climates; and the WJEC core, on water in the atmosphere.

	AEB	CAM		LON		N	OX	O&C	WJ
ASPECTS INCLUDED	L+M	L	M	A	B	L+M	L+M	M	L+M
Global Energy Budget		√	√	√			√	√	
Atmospheric Circulation	√	√	√	√		√	√	√	√
Atmospheric Temperatures	√	√		√			√	√	
Water in the Atmosphere	√	√		√	√	√	√	√	√
Air Masses & Frontal Systems	√	√	√	√	√	√	√	√	
Small Scale Weather Systems	√	√	√	√		√	√	√	
Types of Climate	√	√	√		√		√	√	√
Physical Environments	√	√	√	√	√	√	√	√	√
People and the Atmosphere	√	√	√	√	√	√	√	√	
Atmospheric Hazards	√	√	√	√	√	√	√		√
Climatic Change	√	√	√	√	√	√	√	√	
Application of Skills	√	√	√	√	√				

[AEB - Associated Examining Board; CAM - Cambridge; LON - London; OX - Oxford; O&C - Oxford and Cambridge; WJ - Welsh Joint Education Committee; L - Linear; M - Modular]

Table 4.4. Aspects of Weather and Climate included in A Level Geography Syllabuses.

Table 4.4 summarises the occurrence of specific aspects of weather and climate in the individual A Level syllabuses. Overall, it is apparent that A Level syllabuses tend to have

a much wider coverage of content for this theme than do the GCSE syllabuses. The continuation of some aspects from GCSE into A Level - for example, water in the atmosphere, types of climate, atmospheric hazards, and the more general subtheme of people and the atmosphere - suggests potential lines of progression. Table 4.4 also includes a number of elements which are not usually prominent until A Level, in particular: global systems, such as the global energy balance and atmospheric circulation; air masses, which at GCSE only appears in the WJEC syllabus; the atmosphere as a component of broader environmental systems; and long term climatic change. Most of

<p>(a) <u>The energy balance of the atmosphere: inputs, outputs and exchanges.</u> The generalised model, the significance of clouds, gases and impurities in the atmosphere. The influence of human activity: pollution, the greenhouse effect.</p> <p>(b) <u>Vertical and horizontal variations in temperature.</u> Average and seasonal world patterns. The significance of the factors of: (i). latitude (ii). altitude (iii). land/sea distribution (iv). ocean currents. The environmental lapse rate and its variations in time and space.</p> <p>(c) <u>Pressure and winds.</u> The distribution of pressure and the resultant pattern of surface planetary winds with seasonal variations.</p> <p>(d) <u>Atmospheric moisture and the water cycle. Humidity, precipitation: lapse rates - stability and instability.</u> States of occurrence - vapour, liquid, solid. Processes of change of state: evaporation, condensation, freezing, melting, deposition and sublimation. Conditions attending the changes of state including those of volume, temperature, pressure and humidity. (i) Contact/radiation cooling (ii) Adiabatic changes and processes leading to an understanding of lapse rates and the concepts of stability, instability and conditional instability Weather phenomena associated with contact and radiation cooling processes: clouds, rain, hail, snow, frost, dew, fog.</p>

[The underlined parts form the actual syllabus; the accompanying detail comes under the heading of 'Notes for Guidance']

Table 4.5. A Level Extract from the Oxford and Cambridge Syllabus, emphasising Atmospheric Processes.

these require a good understanding of atmospheric processes, and an ability to make sense of complex relationships, but this is not to suggest that some of them could not be introduced in a simple, but intellectually valid, form at an earlier stage. Some optional

units appear to have been designed to enable students to investigate topics which they are unlikely to have studied at any depth previously, for example: weather prediction, in the Cambridge Modular syllabus; climates of temperate and tropical cities, in the NEAB syllabus; and atmospheric pollution, in London Syllabus B.

Three general features of the treatment of the content of weather and climate in A Level syllabuses contrast with its treatment in GCSE syllabuses: the much fuller description of what is to be studied; the stronger conceptual content; and the more explicit attention to explanation. The fuller descriptions appear to reflect, not just the greater content to be covered at A Level, but also a greater concern to clarify the understanding expected. This has been done mainly by specifying the more important ideas which candidates are expected to learn. Table 4.5, which is an extract from the 'Geographical Core: Physical Environment' unit of the Oxford and Cambridge syllabus, illustrates both the thorough treatment of processes and the attention to abstract ideas which is characteristic of the study of weather and climate at A Level. While the syllabuses do not all specify the same ideas, most include references to the global energy balance, the general atmospheric

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| <ul style="list-style-type: none"> • how do physical atmospheric processes combine to cause variations in weather and climate over space and time? (London B) • what are the global systems and processes which explain the global distribution of different natural environments? (Cambridge Modular); • precipitation is the outcome of atmospheric uplift and cooling, and may be explained by (a) different causes of uplift; (b) stability and instability, (c) theories of rainfall formation (WJEC) • causes of condensation and precipitation: orographic, convectional and frontal mechanisms (London A); • processes causing the development and intensity of tropical storms (Cambridge Linear); • factors affecting spatial and temporal variations in heating [of the atmosphere] (AEB); • the reasons for the weather types experienced in simple synoptic situations (O & C); |
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Table 4.6. Examples of Statements from A Level Syllabuses, signalling that explanations are expected.

circulation, air masses and frontal activity, and the relevance of lapse rates to atmospheric stability and instability. A concern that candidates should be able to explain atmospheric

conditions and processes is signalled by key questions; by generalisations which assert an explanatory relationship; and, most commonly, by statements which refer to ‘causes’, ‘factors’, ‘influences’ and ‘reasons’. While most of the extracts in [Table 4.6](#) suggest a simple cause-and-effect approach to explanation, the WJEC statement recognises the role of theory in explanations.

Each of the 1997, 1998 and 1999 A Level examinations had several questions on weather and climate. In a few examinations, these were concentrated in one paper which was devoted entirely to physical geography; more commonly, they occurred in more than one paper. However, because of the choices given in many papers, it was sometimes possible for candidates to avoid answering any question on this theme. Although some papers consisted mainly of structured questions requiring short answers, there were many more questions at A Level, than at GCSE, which required extended answers. Many of the latter were not supported by stimulus materials, another contrast with GCSE.

The selection of subthemes

The analysis of the support for progression in students’ understanding of weather and climate, that is provided by the external requirements for geography at KS3, GCSE and A Level, is based on five subthemes:

- water in the atmosphere;
- mid-latitude weather systems and air masses;
- the global energy balance and general atmospheric circulation;
- types of climate; and
- natural hazards associated with weather and climate

Together, these account for a significant proportion of the content specified for the theme in each of the three stages. Two of the subthemes, water in the atmosphere and types of climate, are present in all three stages; two others, mid-latitude weather systems and hazards associated with weather and climate, are prominent at GCSE and A Level; while the global energy balance and general atmospheric circulation are generally restricted to A Level. The selection was made partly on the pragmatic grounds that there was sufficient evidence from assessment items to support an analysis, and partly because the subthemes reflect most of the physical components of the content framework presented in [Figure 4.1](#).

Not only do types of climate and mid-latitude weather systems have their obvious equivalents in that framework, but water in the atmosphere is one of the most important 'elements of weather and climate', and atmospheric hazards provide good examples of relationships between 'the atmosphere and people'. The concepts of the energy balance and atmospheric circulation are also closely linked to particular elements of weather and climate - the temperature of the air and wind systems. The complex interrelationships between the components of the content framework are reflected in links and overlaps between the curricular subthemes. For example, the treatment of patterns and processes associated with water in the atmosphere is sometimes linked to climatic types and weather systems. Similarly, atmospheric hazards, such as fog, storms and drought, can be related to particular weather systems and particular types of climate. An analysis of the implications of the structure of knowledge and understanding for progression in learning must take account of such relationships.

Subtheme 1. Water in the atmosphere.

Water is one of the main elements of weather and climate, alongside the temperature, pressure and motion of the atmosphere. It is an essential component of weather systems and climatic patterns, and figures prominently in the links between the atmosphere and other environmental systems. The study of water, therefore, overlaps strongly with other subthemes. Water in the atmosphere takes a variety of forms, ranging from water vapour to fog, cloud, rain, hail and snow. To explain the occurrence of these forms and their spatial and temporal patterns, geographers have given attention to the physical conditions which favour their occurrence and, more recently, to the processes which are involved in their formation and development. The latter approach, which draws heavily on scientific concepts, has produced a deeper understanding of observed patterns. As might be expected, the emphasis on processes is more evident at A Level, than at earlier stages.

Potential content that can be borne in mind while reviewing the subtheme includes:

- the spatial patterns of the various forms of water in the atmosphere;

- the processes which produce such patterns;
- specific weather conditions, involving condensation and/or precipitation, recorded at particular locations and particular times;

The specifications of content for this subtheme, both in the KS3 Programme of Study and in GCSE syllabuses, are brief. At KS3, they occur only in an indirect form, through the references to ‘the components and links in the water cycle’ and to ‘how and why aspects of weather and climate vary from place to place’. In GCSE syllabuses, they often amount to little more than a reference to ‘evaporation, condensation and precipitation’, within the context of the water cycle; or to ‘the factors responsible for rainfall patterns’. These brief references contrast with the more detailed specifications at A Level, as illustrated in the extract from the O & C Syllabus (Table 4.5), in which strong attention is given to processes.

Assessment tasks set for KS3, GCSE and A Level reveal shifts in balance in the attention given to various aspects of the subtheme, in line with the requirements of the programme of study and examination syllabuses. At KS3, the ACAC publication, ‘Optional Tests and Task Materials’ (ACAC, 1997), includes questions about the water cycle and the distribution of rainfall in Britain. GCSE questions, while retaining some interest in the water cycle, have focused more on the occurrence and causes of rainfall, and on weather systems. A Level questions have covered a wider range of weather features, and a wider range of spatial scales. Questions which link fog, clouds and precipitation to weather systems and to specific types of climate will be considered separately, within subthemes 2 and 4.

KS3. The ACAC (1997) test items about the water cycle, in its unit on ‘Rainfall and Water Supplies’, are in tiered papers. The higher tier questions require students to: draw and label a diagram of the water cycle; and explain how water moves around the cycle. The lower tier questions require students to label a diagram and complete gaps in a text, using words from lists which accompany the questions. It is a matching exercise, with particular words having to be placed correctly within the supportive structures provided by the diagram and the text. The questions and mark schemes implicitly emphasise the

importance of vocabulary, with the mark scheme for the higher tier questions introducing a number of abstract ideas relating to the framework of the model (stores, flows) and to atmospheric processes (solar energy, changes of state, evaporation, evapo-transpiration and condensation). It is not clear whether the students are expected to be familiar with all of these terms, or whether the text of the mark scheme was prepared with only the teachers in mind. The account of the water cycle conveyed by the completed diagram and text from the lower tier paper is along the lines that:

1. the sun's energy evaporates water from the surface of the sea and land;
2. evaporation leads to the production of water vapour;
3. the water vapour rises and cools, as a result of which it condenses and forms clouds;
4. the clouds are 'blown by the wind' towards high relief ;
5. as the clouds approach the high relief, the water falls back to the ground as precipitation (rain, hail or snow).

Attempts to simplify the model, in order to make it accessible to younger students, may give rise to misconceptions. For example, diagrams drawn to illustrate the cycle, tend to overemphasise the role of relief in the production of rainfall; they give no indication of the long horizontal distances over which water vapour can be transported by air currents; and no reason why clouds produce rain. In the case of the ACAC diagram, the clouds appear to collide with a mountain top. The water cycle may not be an ideal vehicle for explaining the development of clouds or precipitation.

The ACAC unit also includes questions about rainfall patterns in Britain. Having been given a map showing the distribution of average annual rainfall over the British Isles and the direction of the prevailing wind, and referred to an atlas map showing the distribution of highland and lowland areas, students are asked to describe the pattern of rainfall in Britain. This is essentially a test of skills, rather than of understanding. The lower tier paper asks students to suggest one reason for the pattern they have described, while the higher tier paper asks why the patterns of highland and rainfall are similar. The two mark schemes point to the same form of explanation, with that for the lower tier referring to the prevailing winds blowing from the sea, and the highland causing the air to rise; and that

for the higher tier suggesting that a Level 7 response (i.e. a good answer) would make clear links between highland, prevailing wind, ocean and rainfall. For both tiers, therefore, explanation is envisaged in terms of the conditions which favour relief rainfall in the west and north of the country: the presence of an ocean/sea as the main source of the water for the clouds and rainfall; prevailing winds, to transport the water from this source to the land; and high ground to force the air to rise. Students were not expected to refer to the processes associated with rising air which lead to condensation and rainfall.

GCSE. The few GCSE questions which have addressed atmospheric elements and links within the water cycle have involved little more than labelling diagrams, in most cases by selecting correct terms from a list supplied with the question. The sort of terms to be used were: evaporation, evapotranspiration, condensation and precipitation. There was no attempt in these questions to assess whether candidates understood what the terms mean. These tasks show no advance in intellectual demand on that set for KS3 students in ACAC's lower tier paper. GCSE papers have also included a few questions which ask directly about processes responsible for rainfall, and many more questions which approach processes indirectly by asking candidates to explain particular rainfall patterns (Table 4.7). Questions about frontal rainfall will be considered in Subtheme 2.

The mark schemes for the first two questions in [Table 4.7](#) are not especially informative about the understanding of relief rainfall and convectional rainfall expected of the candidates. The NEAB Syllabus B mark scheme emphasised that 'the question does not demand reasoning', an assertion which probably stems from the fact that the question required candidates to describe the processes leading to the formation of relief rainfall, rather than explain them. While examiners were instructed to give the higher marks to those who 'display a wide range of processes and an idea of sequence', the scheme indicated that maximum marks could be awarded for an answer which simply referred to evaporation, air rising, condensation and clouds, providing that these were in the correct order. The London Syllabus A examiners were instructed to allow a half mark for each valid idea about how convectional rain is caused, for example 'air rises (1/2) because it is warm (1/2)', but to limit the score to a maximum of two marks if the answer gave no clear cause for the air rising. Although a good mark therefore required some degree of

explanation, no guidance was given about the overall quality of explanation which would be considered reasonable.

1. Describe the processes leading to the formation of relief rainfall. You may use an annotated diagram to answer the question. (5) NEAB B, 1999.
2. Draw a fully labelled diagram to show how convectional rain is caused. (4) London A, 1997.
3. Explain the relationship between the amount of rainfall and wind direction. [diagram based on records from a 14 day period in Somerset]. (4) WJEC, 1997.
4. Explain the link between rainfall and altitude. [cross-section of part of North West England]. (4) NEAB D, 1997.
5. Explain the pattern of rainfall across northern England. [simplified cross-section of relief, with information about rainfall totals]. (5) WJEC, 1999.
6. Explain why the high pressure brought so little rain. [same diagram as in Q. 3; and statement that 'the dry days were the result of high pressure']. (3) WJEC, 1997.
7. Explain why the change in pressure brings the summer rain in Timbuktu. [graph of rainfall and atmospheric pressure, and location map]. (3) WJEC 1999.
8. Explain the pattern of precipitation throughout the year in Tomsk. [climate graph and location map]. (5) London A, 1999.

Table 4.7. GCSE Questions. The Causes of Rainfall and Precipitation Patterns.

Questions 3 to 8 in the table focus, either explicitly or implicitly, on relationships between precipitation and factors that influence the spatial or temporal patterns shown in accompanying stimulus materials. In Question 3, the relationship is between rainfall and wind direction; in Questions 4 and 5, between rainfall and altitude or relief; in Questions 6 and 7, between rainfall and pressure; and in Question 8, between precipitation and continentality. The stimulus materials were mainly in the form of diagrams, although Questions 7 and 8 also had location maps, the first showing the latitude of Timbuktu and its location near the southern edge of the Sahara Desert, and the second showing the distance of Tomsk from oceans. There were no rainfall maps among the materials. The mark schemes for these questions indicate that explanations were expected to be in terms of the geographical conditions producing the pattern, or of processes, or of both. With the exception of Question 8, there was little requirement for prior knowledge about the climate of the places figuring in the questions. The mark schemes for Question 4 (NEAB D) and Question 8 (London A) gave very little indication of the quality of responses expected. For example, while the London mark scheme stated that a Level 3

response must explain both the low annual precipitation and the summer maximum at Tomsk, it gave no guidance on the sort of explanation required. As the syllabus for London A includes ‘continental interior climates’ among those which its candidates are required to study, and the question was accompanied by a map showing the general location of Tomsk, as well as a climate graph for the town, it would be reasonable to expect candidates to recognise the influence of continentality. What is not clear is how far candidates were expected to go beyond the information given, for example: by linking the average monthly temperatures to the capacity of the air to hold water vapour, and thereby influence the amount of water available for precipitation; and by explaining the effects on precipitation of the seasonal differences in this region’s pressure patterns and wind systems. The reference in the question to ‘precipitation’ is a recognition that what little does fall in winter is in the form of snow, although there is no mention of this in the mark scheme.

<p><u>Question 3.</u> [related to wind direction] ‘(West) winds off ocean (1) bring humid air (1). (East) winds off continent/land (1) bring dry air (1). Depressions from west (1), development (+1)’. Maximum 4 marks.</p> <p><u>Question 5.</u> [related to relief] ‘Moist air from the sea (1) prevailing wind from the west (1) forced to rise (1) and cool (1) so vapour condenses (1) leading to cloud formation (1). Air sinks (1) and warms (1) clouds evaporate (1) a rainshadow (1) and explanation (1)’. Maximum 5 marks.</p> <p><u>Question 6.</u> [related to high pressure] ‘Sinking (1) warms up (1) due to compression/weight/density of air (1); increases capacity to hold water vapour (1); reduces condensation (1) evaporates cloud (1)’. Maximum 3 marks.</p> <p><u>Question 7.</u> [related to low pressure] ‘Overhead sun heats land (1) air rises (1) cools (1) as it expands (1) water vapour condenses (1) creating cloud (1)’. Maximum 3 marks.</p>
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Table 4.8. Extracts from WJEC Mark Schemes for Questions in Table 4.7. Explaining Precipitation Patterns

In comparison, the mark schemes for the four WJEC questions (Table 4.8) were more explicit about the explanations expected, even though these were presented in rather terse summaries. The explanation of the influence of wind direction on the rainfall recorded at the Somerset weather station (Question 3) was given in terms of the general geographical conditions affecting the location: the main direction of depressions crossing southern Britain, as well as the association of westerly winds with an oceanic influence, and of easterly winds with a continental influence. The mark schemes for Questions 5 to 7 gave more attention to the processes associated with rising and sinking air, relating these

vertical movements to the changing density and temperature of the air, with height above sea level, and the consequent capacity of the air to hold water vapour. Embedded in these schemes is a set of relationships which could, at a later stage, underpin an understanding of adiabatic processes (Figure 4.2). But the system of point marking used for the WJEC questions would have enabled their GCSE candidates to gain maximum marks from answers which were far from comprehensive or cohesive.

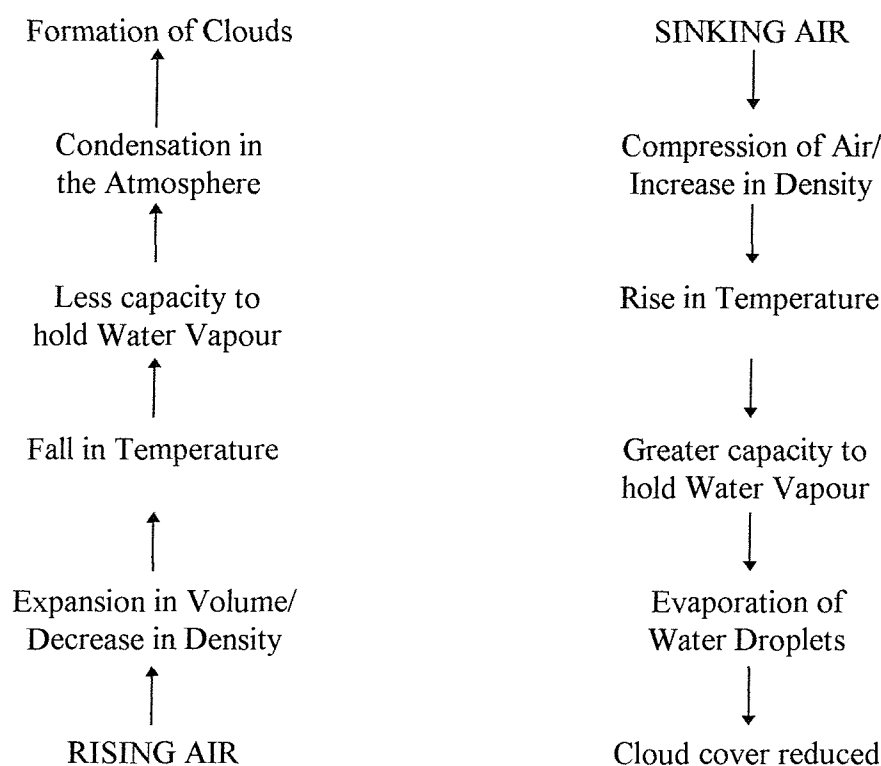


Figure 4.2. Processes Associated with Vertical Movements of Air in the Atmosphere

The **A Level** examination papers covered a greater range of content within this subtheme, for example, by including questions which focused on fog (Table 4.10) and atmospheric instability (Table 4.11), as well as on precipitation patterns (Table 4.9). Even within the set of questions concerned specifically with explaining precipitation patterns, a wider range of topics is evident, extending from the familiar ground of rainfall totals to the distribution of thunderstorms, snow, and precipitation variability. The questions in Table 4.9 also address a variety of spatial scales, ranging from regional (Question 1) to global (Questions 4 - 6). Even more important in relation to progression, is the extent to which

these questions required candidates to apply an understanding of general atmospheric processes, as well as make use of specific knowledge about relevant conditions in particular places. Candidates needed to provide evidence of their understanding of processes in order to explain why particular conditions are important; and to do that effectively, they usually had to introduce abstract concepts. The mark schemes show that examiners were expecting candidates to make use of abstract ideas, even in response to questions which had a relatively small allocation of marks. For example, candidates answering Question 1 (Cambridge M), which is not dissimilar in content from some of the GCSE questions about the influence of relief on rainfall, were expected to refer to adiabatic cooling and warming, lapse rates, dew point and relative humidity. It suggests a much deeper treatment of the processes outlined in Figure 4.2. The mark scheme for Question 2 (London B), which asks for an explanation of the distribution of average

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| <ol style="list-style-type: none"> 1. Describe and explain the differences in temperature, cloud and precipitation between the windward and leeward sides of the mountain range [diagram]. (7) Cambridge M., 1997. 2. Describe and suggest reasons for the distribution of either thunderstorms or snowfall [Great Britain distribution maps]. (6) London B., 1998. 3. Examine the influence of altitude and continentality on the distribution of rainfall in the British Isles. (15) WJEC, 1998. 4. Describe and explain global patterns of precipitation. (25) Oxford, 1997. 5. Choose one area which has a precipitation variability of under 20% and suggest reasons why its precipitation varies so little from year to year [world map of precipitation variability]. (5) Cambridge M., 1997. 6. <ol style="list-style-type: none"> a. describe the distribution of those areas which receive more than 2000 millimetres mean annual precipitation. (3) b. Explain the high annual precipitation in locations A and B. (6) c. Explain, with the aid of an annotated diagram or map, why location X has low annual precipitation (5) [world map of mean annual precipitation]. London A. 1997. |
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Table 4.9. A Level Examinations. Explaining Precipitation Patterns.

annual snowfall over Great Britain, referred to the process of supercooled droplets of water freezing on tiny ice crystals; and to the conditions associated with particular air masses and weather systems which are likely to produce snow. Several of the mark schemes recognised the relevance of air masses and atmospheric stability or instability for

explanations of precipitation patterns. At the global scale, spatial and temporal patterns were placed in the context of the general atmospheric circulation. The Oxford Delegacy mark scheme for Question 4, a very broad, full-length question about global patterns of precipitation, which was not accompanied by a distribution map, illustrates the breadth of knowledge and understanding expected of candidates. Their answers were to include description of the main latitudinal zones (e.g. equatorial, tropical seasonally humid, hot deserts, Mediterranean etc.) with 'some indication of the relative amounts and seasonality of precipitation'; and explanation in terms of global climatic zones, solar radiation, air masses, wind systems, ocean currents, the distribution of land and sea, and regional factors, such as mountain systems. The examiners were instructed to 'mark on degree of detail and level of explanation', which, without the support of a map, placed heavy emphasis on accurate recall as well as on breadth of understanding.

Because the London Syllabus A question (Question 6) was accompanied by a map, the subquestion requiring a description of an aspect of the distribution pattern was largely a test of candidates' skills. However, the subquestions asking for explanations of the high or low mean annual totals at particular places, required candidates to reason from their knowledge and understanding of the general circulation of the atmosphere and of other relevant factors, such as relief and ocean currents. Thus for location (A), in Southern Chile, the mark scheme listed the factors responsible for the high mean as: 'west wind drift i.e. onshore wet winds; high relief (Andes); area of polar front so frontal rainfall'. For location (B), on the island of Sumatra, the corresponding list was: 'intense convectional rainfall; onshore winds forced to rise by relief; area of inter-tropical front so frontal rainfall; monsoon'. Examiners were also informed that an acceptable diagram for the arid location (X), on or near the coast of Peru, could either place the location in the context of the [Hadley] Cell or be more localised and show the wind direction, relief and ocean current. In all three cases, the answers that examiners were looking for combined knowledge about the conditions operating at particular locations and a general understanding of processes.

While there is no direct mention of fog in either the KS3 programme of study or GCSE syllabuses, it is referred to in most A Level syllabuses. In some of these, it is simply listed

among the weather phenomenon to be studied, but more commonly it is included as a natural hazard which has been affected by human activities. From the several examination questions focusing on fog (Table 4.10), and their accompanying mark schemes, it is clear

1. Briefly outline the conditions under which radiation fog can occur. (3) Cambridge L. 1997.
2. Compare the changes in the frequency of fog occurrence in Central England and the Irish Sea Coast during the period 1950-83 and suggest reasons for your findings [map with bar graphs for selected stations]. (4) Cambridge L., 1998.
3. Define the term 'fog'. (1) Describe the pattern shown [map of the incidence of fog days, British Isles] (3) Suggest reasons for the 'high' incidence of fog in the areas indicated. (3) Why is fog common in anticyclonic conditions? (3) Why does fog commonly occur over the sea in Autumn and Spring? (4) In what ways can human activity lead to an increase in the incidence of fog? (3) What problems does fog pose for human activities? (3) London A, 1997.
4. Describe ways in which particulates and other factors you have studied influence the occurrence of fog in urban areas. (10) Suggest ways in which the number of particulates in the atmosphere in urban areas are reduced. (7) NEAB, 1998.

Table 4.10. A Level Questions. Explaining Fog Patterns.

that candidates are expected to be able to distinguish between radiation and advection fog, and to explain the conditions which favour the development of these types, and the association of each with particular seasons and particular weather systems. As with explanations of precipitation patterns, explanations of fog patterns require attention to processes as well as to conditions. This is well illustrated by radiation fog and its association with anticyclonic activity, leading to: clear skies; nocturnal loss of heat from the ground, by radiation; cooling of the air in contact with the ground, to dew point; condensation of water vapour, to form the small water particles which constitute the fog; light winds which are sufficient to replace the saturated air in contact with the ground, and thus thicken the fog, but not so strong as to disperse it; and the development of a temperature inversion, which can stabilise fog for several days. There is an interrelated chain of processes which help to explain why and how the combination of anticyclones, clear skies, light winds and temperature inversions produce fog. Similar attention to both conditions and processes is necessary to explain why particular sites attract fog, for



example, its common occurrence in valley bottoms as a result of heavier, cold air from hill tops or plateau surfaces flowing down valley slopes and collecting on valley floors.

The emphasis given in Question 4 to the role of particulates and other factors, including human activities, on the development of fog in urban areas, reflects the content specified for the unit on 'Urban Physical Geography' within the NEAB syllabus. In addition to emphasising the importance of particulates as condensation nuclei, the mark scheme refers to a variety of contributory factors, ranging from sources of particulates and water vapour within towns, site conditions, and the effects of buildings on wind speeds; to the effects of legislation, monitoring agencies and planning controls. There is recognition here of the complexity of conditions and processes operating within a large urban environment.

While the study of fog provides opportunities for a depth of understanding that is clearly appropriate for A Level, it could equally well be a suitable topic at GCSE or KS3. Many students are likely to have experienced the phenomenon directly, and are probably capable of identifying some of the conditions under which it forms. The fact that fog is not widely introduced into the content of the geography curriculum until a later stage, is probably due more to tradition and competing priorities for curricular time, than to any serious hurdles to be overcome in order to gain some understanding of this type of weather.

Questions which address directly the relationships and processes that produce atmospheric stability or instability tend to be intellectually more demanding (Table 4.11). At the heart of these processes are the relationships between adiabatic and environmental lapse rates. To appreciate these relationships, it is necessary to understand the concepts of relative humidity, dewpoint and latent heat of condensation; and the distinction between dry and saturated lapse rates, and between absolute stability, absolute instability and conditional instability. It is, therefore, necessary for candidates to make sense of a number of abstract concepts, as well as the general idea of the atmosphere being in a state of dynamic equilibrium, the type of relationship identified by Peel and others (*op. cit.* p. 29) as of critical importance in the progress of adolescent students towards mature ways

of reasoning. Questions 1 and 3 show that candidates are expected to be familiar with the form of diagrams that are used to help explain the relationships between adiabatic lapse rates and atmospheric instability. In this case, understanding and graphicacy are closely

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| <ol style="list-style-type: none"> 1. What do you understand by the term adiabatic lapse rate? Using diagrams show how adiabatic lapse rates can affect stability and instability. (9) Cambridge. L. 1998 2. Explain how instability in the atmosphere can result in precipitation. How may the presence of either an urban area or an area of high relief affect local atmospheric instability and precipitation? (10) Cambridge. L., 1998. 3. Complete the graph by drawing in a line representing the Saturated Adiabatic Lapse Rate (SALR) of the parcel of air. (2)
Explain why there is a change in the rate of cooling at the condensation level. (3)
Clearly label on the graph those areas where the air is, (1) stable, (2) unstable. (2)
The graph shows an atmospheric situation that is termed conditional instability.
Explain what is meant by this term. (3)
Identify and explain two causes of atmospheric uplift. (6) WJEC, 1997. |
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Table 4.11. A Level Questions. Explaining the Stability and Instability of the Air.

intertwined. Questions 2 and 3 also require understanding of the basic mechanisms that trigger atmospheric uplift: with a choice between relief and convectional activity for Question 2; and a more open choice for Question 3, that accommodates frontal activity. However, the mark scheme for this part of Question 3 does not suggest a level of explanation beyond that which might reasonably be expected for some GCSE examinations.

Subtheme 2. Mid-latitude weather systems and air masses

‘A weather system is an organised state of the atmosphere associated with a characteristic weather pattern’ (Strahler & Strahler, 1997). Such systems have identifiable internal structures, involving pressure, wind, temperature, condensation and precipitation patterns. They are dynamic features which change in form. Much of the changeable weather experienced in the British Isles is associated with the succession of frontal depressions and anticyclones within the prevailing westerlies which are characteristic of the mid-latitudes. These systems are not only responsible for a variety of weather conditions, but also have an important function in the massive transfer of warm and cold air between latitudes. Our understanding of such weather systems has been greatly improved as a result of the

formulation of the concept of an air mass and the development of the polar front theory. While secondary school students can be expected to have some conception of depressions and anticyclones from experience outside of formal education, not least because these features are so frequently referred to in weather forecasts, there is abundant scope in geography to extend and refine their understanding.

Potential content that can be borne in mind when reviewing the subtheme includes:

- the structural features of depressions and anticyclones in mid-latitudes;
- the weather patterns characteristic of depressions and anticyclones;
- the processes associated with these patterns;
- the formation and development of depressions and anticyclones in mid-latitudes - their source areas, conditions suitable for their development, and tracks commonly followed;
- the role of air masses in the formation and development of depressions and anticyclones;
- the relationships between these weather systems and conditions in the upper atmosphere;

Depressions and anticyclones are not referred to specifically in the KS3 programme of study, although they could be regarded as subsumed within the catch-all statement 'how and why weather and climate varies from place to place'. Nor do they figure in the test materials issued by ACAC. As shown earlier, however, they are prominent in the GCSE and A Level syllabuses and examinations. They are included in the content of seven of the GCSE syllabuses, mainly in relation to the UK. In several cases the relevant content is linked to the interpretation of satellite images and synoptic weather maps. Only one GCSE syllabus, WJEC Syllabus A, relates weather systems to air masses, requiring candidates to have 'a basic understanding of the characteristics, in terms of temperature and precipitation, of: Polar, Tropical, Continental [and] Maritime air'. Depressions and anticyclones were included in all but one of the A Level syllabuses, the only exception being the WJEC, a strange omission given its treatment of the subtheme at GCSE. In most A Level syllabuses the systems were linked to the concept of air masses and the role

of these in cyclogenesis; and in some, as at GCSE, a direct link is made to the interpretation of synoptic weather charts. For example, the Cambridge Linear Syllabus amplified its broad generalisation that ‘changing weather systems cause great variability in the weather over N W Europe’ with the following statement of content:

Air masses: source regions, characteristics, modifications and associated weather of principal air masses affecting N W Europe

Weather systems: The polar front formation and principal weather associated with mid-latitude depressions and anticyclones. Interpretation of principal features of synoptic charts. Effects of local environmental conditions.

At **GCSE**, the questions about the weather associated with mid-latitude depressions and anticyclones have been linked closely to stimulus materials, especially weather maps. Typically, they occur as structured questions, with some parts designed to assess understanding, and others parts to assess recall of knowledge, or the skills required to extract information from the materials supplied. One of the attractions of the use of weather maps and satellite photographs in examinations is the opportunity they provide for candidates to apply their general knowledge and understanding to the task of explaining the specific conditions recorded at a particular place, at a particular time. The GCSE questions requiring explanations of specific weather conditions fall into two categories: those that focus on selected aspects of the weather (Table 4.12); and those that are concerned with the general weather conditions at a given place or places (Table 4.13). The temperature contrasts noted in Question 1 of [Table 4.12](#) appear to relate to La Coruna (C), in northwest Spain, and Riga (R), the capital of Latvia. The mark scheme recognised the scope for candidates to comment on a variety of influences, including: the difference in latitude between the two cities; the contrast between maritime and continental conditions, signalled not only by location but also by the direction of the winds; and the likelihood that (C) was receiving air from a Tropical maritime source, and (R) from a Polar continental source. The reference to air masses reflects the fact that this question was based on the WJEC Syllabus. The other four questions in Table 4.12 ask for explanations of cloud patterns or rainfall. Not surprisingly, the understanding required has similarities to that expected for the questions about rainfall in Subtheme 1, the main

difference being that for the questions in Table 4.12, the uplift of the air is associated with frontal systems - warm fronts in the case of Questions 3 and 5, and a cold front for

1. Explain ...why it is so much milder (14 C) at L than it is at R (-06 C). [weather map of western Europe, a January day] (3) WJEC, 1997.
2. Why are there clouds along the front? [satellite image] (2) SEG A, 1997.
3. It is raining on the south coast of Norway (station Z) but is not raining on the north coast (station Y). Why is this? [weather map of Europe, a March day] (4) London A, 1997.
4. It is raining heavily in Rome. Draw a fully labelled diagram to explain why. [a map of isobars and fronts for Europe and the North Atlantic, a January day] (5) London A, 1998.
5. Explain why it is raining in Southampton. Refer to atmospheric processes. A diagram may help your answer. [weather map of the British Isles and surrounding areas, a January day] (5) London A, 1999.

Table 4.12. GCSE Questions. Explaining Aspects of the Weather at Particular Places, from the Evidence on Weather Maps and Satellite Images.

Question 4. For Question 3, another factor is that at (Z) the winds are blowing from the sea, while at (Y) they are offshore. All four mark schemes indicate that candidates are expected to comment on the processes set in train when air is forced to rise. The London Syllabus A mark scheme for Question 5, which instructs candidates to refer to atmospheric processes, suggests that a Level 3 response should include 'something a little more specific' than the rising - cooling - condensation sequence: 'such as the implication of (adiabatic) cooling as a result of expansion'; and 'maybe a reference to the rain-making processes in deep clouds'. This recognition that the formation of rain needs more than the development of clouds was exceptional in the GCSE mark schemes.

The questions in Table 4.13 range from explaining the weather recorded at one location (Question 1) to explaining differences between the weather experienced at two locations (Question 2), predicting how a particular depression might have effected the weather of a given area which was in its path (Question 3), and explaining the reasons for a given weather forecast (Question 4). Unfortunately, the mark schemes for three of these were expressed in such general terms that they give little idea of the quality of understanding expected. For example, the mark scheme for the first question (MEG Syllabus C) asserted that the cloud cover, rainfall/thunderstorm and wind direction could all be

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|---|
| <ol style="list-style-type: none"> 1. Describe and explain the weather at the station in south west Ireland. [extract from a weather map of the British Isles] (4) MEG C, 1998. 2. Explain the differences between the weather at station (A) and station (B). [weather map and cross section showing a depression over the east coast of North America, a March day] (4) MEG B, 1999. 3. Low A was moving towards the British Isles on 4 January 1991. Suggest how it might have affected the weather as it crossed the area. [weather map and satellite photograph of parts of Western Europe and the North Atlantic, a January day] (5) SEG B, 1998. 4. With the help of (the map) explain the weather forecast for London. [weather forecast, and a map showing a high pressure system covering the British Isles, a mid-September day] (6) SEG A, 1998 |
|---|

Table 4.13. GCSE Questions. Explaining General Weather Conditions at Specific Places, from the evidence on Weather Maps and Diagrams.

explained in relation to the position of a cold front, but gave no illustration of the form of explanation required. The schemes for both the second question (MEG Syllabus C) and the third (SEG Syllabus B) were descriptive rather than explanatory, with that for SEG Syllabus B drawing no distinction between warm and cold fronts, and making no reference to changes in temperatures or winds, although these could be inferred from the weather map. The mark scheme for the fourth question (SEG Syllabus A), asking candidates to explain a forecast for a September day in London, during which the weather would be dominated by an anticyclone, was much more informative. The forecast was that ‘an early mist will clear, then it will be dry and sunny. Winds will be light, mainly northerly. Maximum temperature 17C’. Explanations were offered along the lines that:

- there would be clear skies and no rain because the air in a high pressure system sinks, and there would be no fronts near London;
- winds would be light because the isobars showed a low pressure gradient;
- winds would be from a northerly direction because London was to the south east of the centre of the anticyclone, and [in the northern hemisphere] winds blow clockwise away from centres of high pressure;
- the early mist would have been formed during the night by loss of heat as a result of radiation under clear skies, leading to cooling of the ground and, subsequently, cooling of the air above, which in turn would cause [water vapour] to condense as mist;

- during the day the temperatures would rise to 17°C because, in the absence of clouds, the sun would shine directly on the ground [or buildings]; and
- the warmth of the ground would heat the air, causing the mist to evaporate.

Although candidates were not expected to include all these points, the mark scheme gives a good indication of the sort of understanding and reasoning that the SEG Syllabus A examiners considered to be appropriate.

The **A Level** questions about mid-latitude weather systems fall into three categories: those that focused on the influence of air masses (Table 4.14); those that were about the weather patterns associated with anticyclonic conditions or the passage of a depression, but were not accompanied by support materials (Table 4.15); and those which required the interpretation of a weather map or some other source of information (Table 4.16).

- | |
|---|
| <ol style="list-style-type: none"> 1. Explain how different air masses and their modification in passage can affect the weather of Britain. (10) Cambridge Linear, 1997. 2. Describe and explain the characteristics and properties of the major air masses that influence temperate climates. (25) Oxford, 1997. 3. Show how a knowledge of air mass types helps to explain the climatic regime of one temperate climate you have studied. (15) AEB, 1997. 4. Suggest reasons for the differences in the percentages of annual precipitation Blackpool and Rotherham receive from Polar maritime, Polar continental and Arctic air masses. [table]. (7) Cambridge Modular, 1998. |
|---|

Table 4.14. A Level Questions. Explaining the effects of Air Masses on Mid-latitude Weather Systems.

A small number of A Level examination questions asked candidates about the characteristics of different air masses and, in most cases, how these affect weather or climate (Table 4.14). The first three questions in this table are broad in scope. There is some evidence from the Cambridge Linear and AEB mark schemes that examiners were looking for detailed descriptions of air masses, and explanations of their characteristics and influence on weather patterns that take account of the nature of their source areas, how air masses are modified by the routes that they take, their seasonal patterns and frequency, their stability, and the frontal systems that develop where they meet. Although Question 2 (Oxford) and Question 3 (AEB) could have been answered in relation to any

temperate climate, the mark schemes reflected an assumption that most candidates would base their answers on the UK. The Oxford scheme gave very little guidance about the content and quality of answer required. The levels of response guidance for Question 1 (Cambridge Linear), which did attempt to address the issue of quality of understanding, suggested that a good answer would reveal ‘an awareness that a single air mass will have different effects on different parts of Britain, and that at times different parts of the country can be affected simultaneously by different air masses’. A similar recognition of the complexity of the impact of different air masses on different places underpinned Question 4 (Cambridge Modular), which was accompanied by a table showing the percentage of precipitation received at Blackpool and Rotherham from different weather

1. Describe and explain the weather associated with a large anticyclone over the British Isles in: (a) summer (b) winter. (8) Cambridge Linear, 1997.
2. Describe and suggest reasons for the likely weather conditions which would be experienced with an anticyclone centred over the British Isles in summer. (7) NEAB, 1997.
3. Explain why the sequence of weather experienced during a depression will be different from that experienced during an anticyclone. (9) Cambridge Linear, 1998.
4. Describe the features of a temperate depression (cyclone) and explain the weather associated with the passage of such a depression across the British Isles. (25) Oxford, 1998.
5. With the aid of a diagram, describe and suggest reasons for the likely sequence of weather conditions as the warm front of a depression passes over a drainage basin in the British Isles [that you have studied]. (8) NEAB, 1997.
6. With the aid of a diagram or diagrams, describe and explain the origin and development of a temperate cyclone (depression). (25) Oxford, 1997.

Table 4.15. A Level Questions. Explaining General Weather Patterns associated with Anticyclonic Conditions or the Passage of a Depression

systems, over a five year period. Although no mark scheme could be obtained for this paper, it is reasonable to assume that candidates were expected to explain the relevance, not only of the character and relative frequency of the air masses affecting the two locations, but also of the relief of northern England.

The questions in [Table 4.15](#) were not supported by weather maps or diagrams. Nearly all have a ‘describe and explain’ format. Differences in the quality of explanations expected from questions in different papers may to some extent be a consequence of the breadth of

individual questions, the marks allocated to them, or the contrasting styles of the mark schemes. For example, the guidance for Question 1 (Cambridge Linear), about explanations of anticyclonic weather, was in very general terms, noting that: the descending air in anticyclones creates stability; which in summer limits convective activity and produces mainly clear skies with, at most, fair weather cumulus clouds; while in winter, the clear skies and calm conditions promote rapid ground cooling at night. In contrast, the NEAB mark scheme for Question 2 presented a more detailed explanation of the weather associated with summer anticyclones, recognising the variety of possible conditions, and introducing a range of relevant ideas:

Widespread descent of air leads to adiabatic compression and warming of air (10 C change per 1000m). This is usually greater than the environmental lapse rate, thus the air is warmer. This results in a very low relative humidity.

Convection currents suppressed by sinking air, this prevents cloud formation.

Pressure gradients are gentle, thus calms or weak winds. Rapid radiation at night could lead to temperature inversions (dew and mist). Intense insolation - hot sunny days (no cloud).

Allow variations - coastal v. inland; hilly v. lowland areas.

There are also contrasts in emphasis in the mark schemes for questions asking for explanations of the weather associated with the passage of a depression. According to the mark scheme for Question 4 (Oxford), the explanation should be in terms of the basic mechanisms of a front, but these were outlined in fairly simple, and mainly descriptive, terms: 'warm air overriding cold at warm front; uplift of air, condensation, precipitation; warm air in the warm sector; cold air undercutting warm at the cold front; greater intensity of precipitation at cold front because of its steeper angle.' For the highest marks, some indication of the types of air masses involved was also required. In comparison, the mark scheme for Question 5 (NEAB), focusing on the passage of a warm front, while brief, referred more directly to air masses, and indicated the relevance of the general circulation of the atmosphere:

Change from cold polar air (Pm) to warmer tropical air (Tm).

General west to east movement of system, due to upper westerlies (jet streams?).

Rising warm air at front, over gentle incline, leads to condensation /precipitation processes.

The mark scheme for Question 6 (Oxford), asking candidates about the origin and development of a depression, advised examiners to ‘expect the standard wave model of the interaction of different air masses and the model for frontogenesis’. But, while the mark scheme recognised the theoretical nature of the explanation likely to be offered, it did not present any specific theory-related criteria. It appears that marks could be awarded for a more traditional approach. Although the question did not ask how the development of a depression affected the weather, examiners were instructed to ‘credit reference to weather if made relevant i.e. associated with the passage of a depression’.

Questions based on weather maps occurred at A Level as well as at GCSE. The A Level questions in [Table 4.16](#) cover a wider range of content than those at GCSE, and include fog and thunderstorms, as well as cloud cover, rainfall and temperatures. Three of the broader questions (Questions 5-7) involve weather predictions. Characteristically, the A Level questions required candidates to interpret the information presented on the maps, and in order to provide satisfactory answers, candidates usually had to go beyond the information given. In most cases, this involved introducing appropriate concepts and commenting on the processes operating in particular situations. Expectations of breadth of understanding are revealed by the combinations of part questions, as in Questions 1 to 3, and by the mark schemes for individual parts. Candidates were expected to recognise that a variety of factors might be operating within a given situation; and to take full account of the current weather system and the season of the year, as well as locational factors related to latitude, distance from the sea, and relief. For example, the reasons given in the mark scheme for the ‘extremely hot and hazy conditions experienced in London’, on a particular August day (Question 1d, London B), involved: the presence of tropical continental air in the warm sector of a depression, the ‘urban heat island’ effect of London, and the possibility of pollution creating ‘dust dome conditions’. Reasons given for higher than average temperatures over a large area of western and central Europe, during a period in early October (Question 3c, AEB), included: the clockwise direction of winds around a high pressure area, drawing in tropical maritime air from the south; the fact that these winds had had a long sea journey at a time when the sea was at its warmest; and the dry sunny conditions associated with the anticyclone, allowing maximum solar insolation for this time of the year.

1. Suggest reasons for two of the following:
 - a. the widespread occurrence of cloudy and rainy conditions in Northern England and Scotland;
 - b. the occurrence of a fog along most of the coast of eastern England;
 - c. the widespread occurrence of thunderstorms in Central England;
 - d. the extremely hot and hazy conditions experienced in London.
 [an August day, depression over Great Britain and Ireland] (10) London B, 1997.
2. Suggest reasons for the formation of fog under anticyclonic conditions such as those shown, and suggest why fog has persisted in locations until 12.00 hrs. [British Isles, a late October day] (6) NEAB, 1998.
3.
 - a. Explain why rain was forecast for central and northern parts of Sweden. (4)
 - b. Why was the temperature in South East England expected to be higher than that in Scotland and Ireland? (2)
 - c. Outline two reasons why much of western and central Europe was experiencing higher than average temperatures for early October. (4) [an early October day] AEB, 1997.
4.
 - a. Suggest two reasons why the temperature at Station C is lower than the temperature at Station B. (2)
 - b. Suggest two pieces of evidence from the chart which suggest that the air mass affecting the British Isles is unstable. [A January day] (2) O & C, 1997.
5. The Meteorological Office has issued a severe weather warning for midnight for the London area. Suggest reasons for this, and explain why it is not always possible to predict such weather conditions accurately. [as with Q.1] (8) London B, 1997
6.
 - a. Identify and describe the main features of the frontal and pressure patterns. (4)
 - b. Briefly describe the weather conditions likely to be experienced over Britain at this time of the year. [an August day] (4) Cambridge Linear, 1997.
7. During the next 48 hours a depression moved towards the British Isles from the Atlantic. The centre of the depression (994 mb) passes to the north of Scotland. Discuss the effects of this system on the weather experienced in the British Isles during the 48 hour period. [as with Q.2] (7) NEAB, 1998.

Table 4.16. A Level Questions. Explaining the Weather shown on Weather Maps.

Similar depth of understanding appeared to be anticipated in relation to questions about the occurrence of fog and precipitation. For example, the mark scheme for Question 2 (NEAB), which sought reasons for the formation of fog in late October, with an anticyclone centred over the North Sea and European mainland, commented on the effects of daytime evaporation under clear skies; radiation cooling in the evening and during the night; and the role of the light winds. It also suggested that the fog in coastal areas might be influenced by moist winds from the North Sea [to produce advection fog]; and that as the British Isles were close to the eastern edge of the anticyclone there was also the possibility of anticyclonic gloom.

The mark schemes for Questions 5 to 7 all commented on the element of uncertainty that could occur with weather predictions. This was explicitly asked for in Question 5 (London B), where the ‘severe weather warning’ was ‘likely to be for very heavy thunderstorms’. An earlier part of the same question (Question 1c in Table 4.16) had drawn attention to the linear belt of thunderstorms associated with a cold front, which lay across Central England during the afternoon of this very hot July day. The mark scheme pointed out that the uncertainty in the weather forecast was linked to problems of timing - how fast the front would move; problems of spatial variation - the localised occurrence of thunderstorms, which are small scale weather systems; and problems of magnitude - for example, the intensity of rain and size of hailstones. In each of Questions 6 (Cambridge L) and 7 (NEAB), the uncertainty related to the track that an approaching depression, with its frontal systems, might take if a ‘blocking high’ caused it to be diverted from its route. To produce good answers for these questions, candidates had to recognise the possibility of the weather systems developing in alternative ways, and to be able to explain why this should be so, and what the effects were likely to be. This required close deductive reasoning.

Subtheme 3. The global energy balance and atmospheric circulation

The global energy balance, or ‘heat balance’, and the global atmospheric circulation are not usually introduced into the geography curriculum until after GCSE. The only relevant reference to either idea in a GCSE syllabus is that in SEG Syllabus B to a ‘general understanding of the circulation of the air’, but it is not clear what that phrase is intended to cover, and there were no questions in the 1997-99 examinations to assist interpretation. In contrast, the ideas are included in many A Level syllabuses (Table 4.4) and have been the subject of a number of examination questions (Tables 4.17 and 4.18).

The global energy balance and the general atmospheric circulation are conceptual models, which describe the energy flows and transformations that maintain the Earth’s atmosphere in a state of dynamic equilibrium. The models simplify an immensely complex system by focusing on particular patterns and processes. These are patterns which are stable when measured over a long period of time, but depart from their respective models when measured over shorter periods. Without the stability provided by the global energy

balance, the atmospheric conditions of our planet would not support life; without the atmospheric circulation, lower latitudes would be much hotter and higher latitudes much colder than at present. Together, the two models have a pivotal role in explaining the links between the receipt of solar energy at the outer edge of the atmosphere, the latitudinal imbalance in net radiation at the surface, the redistribution of heat by wind systems and ocean currents, and climatic patterns.

Potential content that can be borne in mind when reviewing this subtheme includes:

- the reasons for including the models of the energy balance and atmospheric circulation in the secondary school curriculum;
- the main features of each of the models, and the intellectual challenges posed by them;
- the depth of understanding intended;

The most obvious reasons for including the models in the curriculum, at least at A Level, have already been alluded to: the importance of their contribution to our understanding of how the atmospheric engine functions, and the critical relevance of this to life on Earth. The models, and the concepts incorporated within them, also inform our understanding of the implications of possible changes to weather and climate, such as those associated with global warming.

Each of the models present a number of challenges to learners. The idea of the global energy balance applies to the Earth's atmosphere and surface, as a whole. The measurements entered into the overall budget-account, identify the main pathways along which the energy flows. Although the model is often presented in a diagrammatic form which suggests spatial relationships (e.g. Musk, 1988, p. 22; and Barry and Chorley, 1998, p. 41), the pathways in these diagrams represent types of energy transfer, rather than actual routes. They are more abstract diagrams than, for example, strongly figurative representations of the hydrological cycle. To gain a reasonable understanding of the model, it is necessary to understand a considerable number of subsidiary concepts, many of which are abstract in character, for example:

solar radiation, short wave and long wave radiation; insolation; the scattering, reflection and absorption of radiant energy; albedo; counterradiation and the 'greenhouse effect'; sensible heat, latent heat and their transfer; net radiation, with its latitudinal variations, leading to energy surplus and energy deficit zones; the poleward transfer of energy from tropical and subtropical latitudes.

The last of these leads into the realms of atmospheric and oceanic circulations. Modelling of the global atmospheric circulation has evolved over a period of more than 300 years, as scientists have acquired more information about the atmosphere and revised their understanding of how it functions. Current views combine two broad approaches: a traditional approach based on the concept of meridional cells, which remains relevant to explaining the main patterns of airflow in the tropics, where the Hadley Cell is a dominant feature; and a more recent approach based on wave theory, which has been more successful in explaining the complicated circulation in the middle latitudes. While the former emphasises long-term average patterns, the latter emphasises dynamic processes, such as the transfers of energy by the eddies within the mid-latitude, westerly air streams (Musk, 1988, pp.149-154). As more is learnt about the dynamics of the atmosphere, including the relationships between conditions in the lower and upper atmosphere, even the relatively simple graphic models of the global circulation used for teaching purposes need to portray fairly complex flow patterns within a three dimensional space. In addition to being able to identify and describe the more familiar pressure and wind systems within the general circulation, such as the subtropical high and the trade winds, students need to make sense of:

atmospheric cells, fronts and eddies; Rossby waves and jet streams; pressure gradients, the Coriolis effect, geostrophic wind and conservation of angular momentum; transfers of energy and momentum.

Prominent among the challenges for students posed by the two models, therefore, are the idea of a dynamic equilibrium, which lies at the heart of each; the abstract nature of many of their subsidiary concepts; and how to relate the necessarily simplified forms of the models to the great variety of conditions observed in the atmosphere and the complex processes that produce them.

The references to these models in the A Level syllabuses tended to be brief, and they varied in the extent to which they introduced more recent ideas. For example, the NEAB syllabus, which included the global circulation within a section on ‘the causes of seasonal atmospheric changes’, had entirely traditional content: ‘the general atmospheric circulation system; seasonal atmospheric changes; movements of major atmospheric belts; influence of mid-latitude depressions, subtropical anticyclones and the intertropical-convergence zone (ITCZ); seasonal variations in wind direction, precipitation and temperature’. In contrast, Cambridge Linear and London Syllabus A included features of the upper atmosphere. London Syllabus A included, under the heading of atmospheric circulation, ‘the Earth’s heat budget; global surface and upper air circulation, including cells, Rossby waves, jet streams and fronts’; resulting global patterns of pressure, precipitation and temperature’. While over half of the A Level syllabuses included ‘global warming’ within their content, not one of them made a specific link between the processes involved in global warming and the model of the global energy/heat balance.

The **A Level** questions concerned with aspects of the global energy/heat balance (Table 4.17) had small to moderate allocations of marks. Several focused on a single concept, or a few concepts, such as incoming shortwave energy, outgoing longwave energy, reflective energy, absorbed energy, albedo and net radiation balance. Most of these required short answers which would reveal understanding of the basic meaning of the ideas, or of the relationship between two or three of them. Others asked candidates to explain broad patterns and processes, such as: why the amount of incoming shortwave energy varies with latitude (Question 6b); how land, oceans and ocean currents can affect temperature patterns at the surface (Question 3); and how surplus energy is transferred from low to high latitudes (Question 6c). Although these usually required slightly longer answers, they were not particularly difficult. Two of the questions raised the issue of the possible effects on the energy balance of increases in the levels of greenhouse gases, with Question 5c focusing on modifications to energy flow, and Question 6 on climatic consequences. These were potentially more difficult questions, especially Question 5c which included the influence of ozone, the thermal role of which is complex (Barry R. G. & Chorley, R. J., 1998, p. 40). However, the mark schemes for neither question gave a clear indication of the level of understanding expected from candidates. The only question which asked in

1. Briefly explain how variations in the nature of the Earth's surface can effect albedo? (3) Cambridge Linear, 1999.
2. Describe the main features of the Earth's heat energy system (heat budget). (3) AEB, 1997.
3. What do you understand by the term net radiation balance? Explain how the global distribution of land, oceans and ocean currents can effect temperature patterns on the surface of the earth. (9) Cambridge Linear, 1997.
4. a. Describe the relationship between effective incoming, reflective and absorbed radiation.
b. Suggest reasons for the differences between the tropical and polar regions in the amounts of energy reflected and absorbed. [diagram] (7) Cambridge Modular, 1997.
5. a. What is the technical term for the fraction of the solar radiation reflected from a surface? e.g. the tops of the clouds, the ground surface. (1)
b. Why may the fraction of solar radiation reflected from a surface increase in winter? (2)
c. Explain how the increase in the levels of greenhouse gases (e.g. CO₂, CH₄) and ozone (O₃) may modify the energy flows in the system. [diagram]. (8) (O & C, 1997).
6. a. State the source of: 1. incoming shortwave radiation; 2. outgoing longwave radiation (2).
b. Explain why the amount of incoming shortwave radiation varies with latitude. (4)
c. Outline the ways in which surplus energy is transferred from low to high latitudes, (5)
d. Increasing emissions of carbon dioxide (CO₂) affect the Earth's budget. Comment on the possible climatic consequences of this. [diagram] (5) London A, 1999.

Table 4.17. A Level Questions. Describing and Explaining Aspects of the Earth's Energy Balance.

general terms about the main features of the Earth's energy system (Question 2) was allocated 3 marks, and from the mark scheme it is clear that the examiners expected brief answers, which simply described the contrast between the surplus energy in tropical areas/low latitudes and the deficit in temperate and polar areas/high latitudes. Thus, while the separate questions set at A Level, for the 1997-1999 period, together covered many of the elements of the model, no single question provided candidates with an opportunity to show their understanding of the complexity and structure of the energy stores, flows and exchanges which maintain the overall heat balance of the atmosphere.

Assessment of candidates' knowledge and understanding of the atmospheric circulation (Table 4.18) ranged from the meaning of terms referring to individual features of the circulation (Questions 1-3a), to descriptions and explanations of the main features over

particular parts of the Earth's surface, and how these affect climatic patterns (Questions 3b-6). Most of the questions were about regions in the tropics and subtropics which have

1. Briefly describe how the Coriolis force and pressure gradient can influence surface winds. (4) Cambridge Linear, 1999.
2. Define the terms polar front and jet stream. (4) Cambridge Linear, 1997.
3. a. Describe and explain the following terms: 1. Hadley Cell; 2. Rossby Waves. (10)
b. By reference to a specific continent or sub-continent, describe and explain the seasonal movement of the Inter Tropical Convergence Zone (ITCZ) and outline its influence on the area over which it moves. (15) Oxford, 1997.
4. Describe the main features of the atmospheric circulation within the tropics and explain briefly how they contribute to climatic variation in tropical regions. (8) Cambridge Modular, 1998.
5. Show how seasonal changes in atmospheric circulation have led to the wet and dry seasons found in:
either (a) the Mediterranean regions of Europe and North Africa;
or (b) the tropical regions of Africa which experience wet and dry seasons. (8) NEAB, 1998.
6. Describe the climatic consequences of the migration of the ITCZ over the Indian sub-continent. (25) Oxford, 1997.

Table 4.18. A Level Questions. Describing and Explaining the Global Atmospheric Circulation.

a strong seasonal climatic pattern linked to movements of pressure and wind belts. There are similarities between some of these questions and those included in Subtheme 4 (Types of Climate), except that the latter do not refer specifically to the atmospheric circulation.

The part-questions about individual features - the Coriolis force, pressure gradient, polar front, jet streams, Hadley cell, Rossby waves - were presented as isolated tasks. They varied in the extent to which they required explanations. The definitions of 'polar front' and 'jet stream' expected for Question 2 (Cambridge Linear) were largely descriptive. For example, the mark scheme summarised the polar front as 'a well defined frontal zone at the poleward limit of the surface westerly circulation where the tropical and polar air masses meet, such that there is a large horizontal difference in temperature over relatively short distances', although it was recognised that the definition might be presented in more explanatory terms. The mark scheme for Question 1 (Cambridge Linear) illustrates how the instruction to 'describe how' may be intended to include an explanatory dimension, for its comment on how the Coriolis force influences surface winds referred to: 'deflection

of air particles due to the earth's rotation thus affecting the direction of the wind'.

Question 3a (Oxford) asks specifically for explanation as well as description, and both were reflected in its mark scheme, where, for example, Rossby waves were described as 'wave motions in the atmosphere of planetary scale (which) form vast meanders of airflow around a hemisphere'; and explained as 'basically due to the Coriolis force', and 'formed by three principal mechanisms - orographic forcing; thermal forcing; (and) interactions with smaller-scale disturbances, such as extra tropical cyclones'.

The content in questions asking how the atmospheric circulation affects climatic patterns range from specified regions or sub-continent for Questions 5 and 6; to an open choice of continent or sub-continent, within the tropics, for Question 3b; and a broad overall coverage of tropical regions in Question 4. The details included in the mark schemes appear to indicate that examiners expected candidates to be familiar with the traditional cell model. This is well illustrated by the NEAB mark scheme for Question 5b, which is about those tropical regions of Africa which experience wet and dry seasons (Table 4.19). High quality answers to this question were expected to 'include a thorough account of the reasons for the wet and dry seasons, with clear links established between individual factors - pressure changes and wind patterns, and rainfall amounts'. But surprisingly, the mark scheme did not indicate any expectation that answers would refer to specific features of the atmospheric circulation of the tropical regions of Africa, although the study of those regions was prescribed in the syllabus. Questions 3b and 6, set by the Oxford Delegacy, similarly asked about the influence of the atmospheric circulation, at a continental or subcontinental scale, but the mark scheme conveyed little idea of the quality of knowledge and understanding expected. As with the questions about the global energy balance, none of the questions about the atmospheric circulation addressed the global pattern.

Although the two conceptual models discussed here are not usually introduced into the geography curriculum until A Level, some of the underpinning ideas could be developed much earlier. For example, it is reasonable to assume that students would find it easier to make sense of the global energy balance if they already understood that:

The Savanna climate is related to the seasonal movement of the ITCZ and the descending limb of the Hadley Cell which creates the Sub-Tropical High pressure areas

Dry Season - Sub-tropical high moves over the desert margins of the area. The ITCZ is on the equatorial side - an area affected by the trade winds off shore and high pressures (sub-tropical highs). Subsiding air gives clear skies and high day-time temperatures, convection is suppressed. Dry Tc air often from hot deserts (Harmattan) - very low moisture content.

Wet Season - the migration polewards of the descending limb of the Hadley cell results in the poleward movement of the ITCZ. As it moves it brings rainfall. Uplift and convection are fed by moist unstable Tm air. Areas of the poleward limit of the ITCZ are only briefly affected, thus they have only a brief wet season and low annual totals. Nearer the equator the wet season lasts while the ITCZ is poleward, and the area is under the influence of the Tm air mass. Maximum precipitation occurs with the passage polewards of the ITCZ and its return, thus giving a double maximum in some areas.

Table 4.19. Extract from the NEAB A Level Mark Scheme (1998). Relationships between the Atmospheric Circulation and the Wet and Dry Seasons in Tropical Regions of Africa.

1. solar energy heats the Earth's surface, which in turn heats the atmosphere;
2. different surfaces and materials gain and lose heat at different rates - an idea which might first be investigated at the local scale, and later be related to larger scale features;
3. cloud cover can reduce surface temperatures during the day, and reduce loss of heat during the night; and
4. heat and cold can be redistributed by wind systems and ocean currents.

Similarly, understanding of the global atmospheric circulation could be built upon earlier studies of: the effects of the curvature of the Earth's surface on the intensity of solar energy received at different latitudes; the effects of the tilt of the Earth's axis and of the Earth's orbit around the sun on the seasons; the prevailing wind and pressure systems operating in a variety of climatic regions; and the basic patterns of air movement within high and low pressure systems. But neither the programme of study for KS3 nor syllabuses for GCSE appear to have been designed to provide such preparation.

Subtheme 4. Types of climate

Although the term ‘climate’ is less commonly used in everyday language than ‘weather’, it is part of our vernacular vocabulary, representing a much less technical/scientific idea (op. cit. pp. 40-41) than ‘energy budget’, ‘atmospheric circulation’, ‘air mass’ or even ‘anticyclone’. Nevertheless, the concept of climate has an abstract quality, which is often given concrete expression through the use of statistics. While weather is the state of the atmosphere over a short time scale, ranging from minutes to a few months, climate is about long term atmospheric patterns and processes, measured over a period of many years. Records of meteorological elements, especially temperature and precipitation (but also pressure, humidity, cloud cover, wind direction and strength) are analysed to reveal mean conditions (e.g. monthly averages), frequency of occurrences, variations from the norm, and extreme events; which, in turn, can be used to describe broad temporal and spatial patterns.

There is a tension between the comprehensive view of climate as ‘the total experience of the weather at any place over some specific period of time’ (Lamb, 1995, p.8) and the classificatory approach, which seeks to identify different types by focusing on a limited number of characteristic features. The main attraction of classifying types of climate has been to make sense of the great variety of weather conditions experienced over the Earth’s surface; and such classifications have been much used for teaching purposes. Climatic classifications have provided convenient frameworks within which to study the relationships between climate and other aspects of the physical world, and between climate and some forms of economic activity. But students may need to understand the rationale behind a classification, the range of climatic conditions that exist within a given climatic region, and how a particular climatic type is influenced by different factors in different parts of the world.

There has been a significant shift in the approach of geographers towards the explanation of global patterns of climatic types, which has been made possible by improved scientific understanding of the functioning of the atmosphere. Rather than rely on a comparatively static approach which emphasised controlling factors [e.g. latitude, the distribution of land

and sea, altitude and relief features, ocean currents, and seasonal patterns of pressure and wind systems], more recent approaches have given greater attention to the dynamics of the atmospheric circulation and, thereby, provided more powerful explanations.

Potential content that can be borne in mind when reviewing the subtheme includes:

- the importance of types of climate in the geography curriculum;
- the concept of climate, as presented in different phases of secondary education;
- classifying types of climate - describing their characteristics and distribution patterns;
- explaining the distribution patterns of different types of climate;
- climate as a component of the physical environment - the relationships between types of climate and other physical systems;
- climate as a component in the relationships between people and physical environments;

Climate is fairly prominent in the KS3 programme of study and in GCSE and A Level syllabuses. While there was no specific reference to types of climate in the 1995 Order for KS3, the requirement that students should be taught ‘how weather and climate differ’ and ‘how and why aspects of weather and climate vary between places’ could encourage comparisons between the general features of the climate of different locations. At GCSE, 7 of the 11 syllabuses give specific attention to types of climate (Table 4.1), in most cases focusing on two or three types. Some provide a degree of choice: for example, MEG Syllabus C requires candidates to compare the climate of the British Isles with ‘one other contrasting type’; while SEG Syllabus B requires them to compare the climate of the UK with an ‘example from the tropical world’. In contrast, London Syllabus A specifies equatorial, tropical desert and continental interior types; and WJEC specifies three types from particular areas of Europe (Table 4.3). Several of the syllabuses also give attention to factors affecting climates, but only MEG Syllabus B and MEG Syllabus C provide a link between climate and atmospheric systems, in both cases through questions designed to give direction to enquiry. Thus, one of the ‘questions for enquiry’ in MEG Syllabus C asks ‘how does the global atmospheric system affect the climate in particular places’.

At A Level, types of climate were included in 7 of the 9 syllabuses (Table 4.4). In many cases, climatic types were introduced in the context of 'a chosen physical environment', which was one of the requirements for the geography A/AS subject core. Many of the syllabuses offered a choice of physical environments, not all of which included a strong climatic dimension. The nature and influence of the climate was strongly emphasised in several units which focused on arid and semi-arid environments. As at GCSE, therefore, treatment of this subtheme was often restricted to a few types. Hardly any attention was given to the issues associated with classifying climates and mapping their distributions.

Tropical Environments - arid, semi-arid, sub-humid and humid tropical climates.

- air masses and their characteristics, migration of the solar energy, the ITCZ, the Hadley cell, winds, ocean currents, and the resulting climates of the tropics (including the Asian monsoonal climate), their characteristics and distribution;
- climatic parameters of temperature and rainfall for tropical stations in different climatic zones;
- diurnal, seasonal, and annual variation in climatic parameters;
- origin, development, movement and character of tropical cyclones (hurricanes);
- water balance, water surplus and water deficits;
- runoff regimes and their relationship to climate.

Table 4.20. Types of Climate. Extract from the Oxford A Level Syllabus.

While the Cambridge Modular Syllabus specified 'a broad climatic classification to include the main features of tropical climates (equatorial, savanna, monsoon, desert), Mediterranean and cool temperate climates (maritime and continental)', it did not appear to require a comprehensive classification and gave no indication of the understanding expected. In comparison, two sections of content in the Oxford Syllabus, one in a compulsory module on 'temperate environments' and the other in an option unit on 'tropical environments' appear designed to encourage a greater depth of study. The extract from the unit on tropical environments (Table 4.20), reveals an interest in the parameters of different types of climate, which prepares the ground for a more systematic approach towards classification, and a concern to link types of climate to the general circulation of the atmosphere.

Formal assessment tasks at KS3, GCSE and A Level provide some additional insights into the understanding of types of climate expected at each stage. At **KS3**, such evidence is restricted to Unit 4 of the ACAC Optional Test and Task Materials - 'Comparing Development: Wales and The Gambia' (ACAC, 1997). One of the tasks in this unit requires students to describe several of the features of each country, including weather and climate. Students can obtain information about the climate of The Gambia from resource materials in the Unit, and these include a climate graph of Banjul. But they must use their own knowledge or research for comparable information about Wales. The task is as much an assessment of skills and knowledge as of understanding. A description of the climate of The Gambia, which is presented as an example of a response that would demonstrate conceptual understanding, simply states that 'The climate is sub-tropical and has only two seasons - the wet and the dry season. Both seasons are hot'. The identification and brief description of the seasons could be based solely on the evidence of the graph supplied. However, given that the graph shows that the mean monthly temperatures of Banjul range from 23 C to 27 C, it is not obvious why the climate should be classed as sub-tropical, rather than tropical. No examples are presented of appropriate KS3 explanations for features of the weather and climate of either country.

In the 1997-99 **GCSE** papers, the questions about types of climate were characteristically part-questions requiring fairly brief answers. Most required skills or knowledge, rather than understanding. Some of the former are included in Table 4.21 because they are relevant to other parts which ask for descriptions or explanations. Five of the questions in the table are supported by maps and climate graphs. The only questions which require a general account of a climate are Question 2b (SEG Syllabus B), which asks for a description of a tropical climate of the candidate's choice; and Question 3a (SEG Syllabus A), which asks candidates to describe the main features of one of three specified types - 'equatorial' or 'hot desert' or 'continental interior'. The mark scheme for Question 2b drew attention to the possible breadth of answers, noting that 'descriptions should include reference to temperatures, precipitation, seasonal variations, diurnal variations, humidity, winds etc. as appropriate to the chosen case'. A Level 3 response for this question was expected to provide an 'organised description', which covered a range of aspects and

1. a. Calculate the temperature range in Figure 1 [climate graph for Amazonia] (1)
b. Explain why this climate has constant high temperatures. (4)
c. Describe two other features of this climate. (4) NEAB B, 1999.
2. a. Tropical areas of the world have high temperatures throughout the year. Explain why this is so. (4)
b. Name one tropical climate you have studied. Describe the climate. (6) SEG B, 1999.
3. a. Choose one of the climatic regions shown. Describe the main features of its distribution and climate. (3)
b. Explain why temperatures are colder at Irkutsk than at Manaus in the Amazon Basin. [map and climate graphs for three types of climate] (2) SEG A, 1999.
4. a. Explain why the average January temperatures at Valentia, Moscow and Tomsk are different. [map and January temperatures]. (4)
b. Describe and explain the pattern of precipitation of Tomsk throughout the year. [climate graph]. (5) London A, 1999.
5. Explain fully how latitude and continentality help to account for the differences in temperature between Blackpool and Madrid [maps and temperature graph] (3 + 4) WJEC, 1999.
6. a. What are the July temperatures in Berlin and Rome? (1)
b. Give a reason for the difference between the two temperatures. (2)
c. Which of the three places shown has the highest amount of precipitation? (3)
d. Give a reason for this high precipitation. (2)
e. The difference between the summer and winter temperatures is larger at Berlin than at Shannon. Explain why. (4) [map and climate graphs] MEG D, 1997.
7. Explain how one of the following influences the climate in either the British Isles or another place you have studied: latitude, relief, ocean currents. (4) MEG C, 1999.

Table 4.21. GCSE Questions. Describing and Explaining Types of Climate.

referred to some statistics, for example with regard to temperatures and precipitation.

The mark scheme for Question 3a, which had a smaller allocation of marks, appeared to indicate that a brief description would suffice, and that this could be based entirely on information provided in accompanying stimulus materials.

The questions requiring explanations are not directed at any general overview of individual climatic types; most focus on temperature, two on precipitation, and two refer to specific climatic factors. The explanations of temperature patterns or contrasts being sought were mainly in terms of latitude and continental or oceanic influences. It was expected that fuller explanations of the effects of latitude would refer to the curvature of the Earth's surface, the angle of the (midday) sun, and the effect of these on the concentration of energy received at different latitudes. The complexity of

continental/oceanic influences was recognised in the London Syllabus A mark scheme for Question 4a, which asks candidates to explain the differences in the average January temperatures at Valencia, Moscow and Tomsk. The mark scheme referred to:

- distance from the sea linked to decreasing impact of the westerlies;
- the influence of the North Atlantic Drift upon the westerlies;
- high pressure, clear skies, low temperature;
- specific heat, volume and albedo of land and sea.

While the first two ideas could be obtained from the stimulus materials provided, the other two would require the candidates to go beyond the information given, and apply their general understanding of oceanic and continental influences to the three locations. But neither of the last two sets of ideas was specified as essential for a Level 3 response. The reference to specific heat and albedo is perhaps the more surprising, given the abstract nature of these concepts. Their inclusion may simply have been a reminder to examiners that a fuller explanation of the reasons why land warms and cools more rapidly than sea would be worthy of marks, rather than an expectation that many candidates were likely to introduce these terms.

In comparison with GCSE, the **A Level** questions on types of climate had greater breadth of content and required more extended answers. Four of the nine questions in [Table 4.22](#) were allocated 25 marks each, and the marks allocated to the remainder ranged from 8 to 10, sufficient to encourage extended responses. A second difference is that only one of the A Level questions (Question 3) was accompanied by supporting data, in this case climatic statistics; none of the questions was supported by a map or diagram. Most of the questions are either about the different types of climate to be found within a large area, on a global or continental scale; or about the variety of climatic conditions that exist within a particular type of climate (e.g. tropical arid or tropical wet and dry) or type of environment (e.g. desert or periglacial). All but the first two questions in [Table 4.22](#) ask for explanations; and the mark scheme for Question 1, which is expressed in terms of *describing* distributions and *outlining* characteristics, instructed examiners to ‘mark on degree of detail and *level of explanation*’. Mark schemes tended to be brief and, while

1.	Describe the distribution of the major world climatic zones and outline their broad characteristics. (25) Oxford, 1997.
2.	Describe the main criteria for identifying different climatic types in the tropics. (8) Cambridge M., 1997
3.	Describe the features of these 3 climates and explain the contrasts between them. [climatic statistics for three locations, representative of the 'considerable variety of conditions in areas classified as periglacial'] (25) O & C, 1997.
4.	Major climatic contrasts are found within and between different deserts. Using actual examples, explain why these contrasts occur. (25) O & C, 1997.
5.	Describe and explain the reasons for the aridity of named desert environments. (25) O & C, 1998
6.	Describe the climatic characteristics of your named chosen physical environment [hot arid or semi-arid] and identify the main causes of its aridity. (9) Cambridge L., 1997.
7.	With reference to the tropical regions of Africa which experience wet and dry seasons. a. describe the seasonal characteristics of temperature and precipitation; b. with the aid of sketch maps and/or diagrams, explain how seasonal changes in atmospheric circulation have led to seasonal variations in the climate. (9) NEAB, 1997.
8.	Using examples on a continental scale, assess the relative importance of the factors responsible for climatic variation in the mid-latitudes. (10) Cambridge M., 1998.
9.	With reference to either a chosen country or a located large area within a climatic zone: explain how air masses can influence the seasonal variations in temperature and precipitation. (10) London B, 1999.

Table 4.22. A Level Questions. Describing and Explaining Types of Climate.

emphasising the importance of breadth of content and accurate recall of detail, gave little indication of the depth of understanding required. This was especially so for the essay-style questions in the Oxford and O & C papers. A good example of the high level of generality of some of the guidance given to examiners, is provided by the criteria for a top level response (21-25 marks) for Question 5 (O&C), which asks about the reasons for the aridity of desert environments:

The candidate is free to use many examples or few. Whichever are used a range of types can be expected. Essentially there must be an accurate coverage of the climatological and meteorological reasons for aridity and due consideration where relevant of ocean currents. The examples chosen may not demand the latter. The process work must be accurate.

No guidance was provided as to the nature and quality of understanding of the climatological conditions and meteorological processes responsible for aridity which it would be reasonable to expect from a good A Level candidate. Slightly more specific indication of the sort of knowledge expected by O & C was provided by their mark scheme for Question 4, which noted that top level explanations of 'major climatic contrasts within and between different deserts' would be expected to include permanent high pressure zones, offshore winds, cold currents, continentality and rainshadow effects; to locate examples of different types of desert accurately; to quote some actual temperature and precipitation figures; and to give some attention to variation within deserts. But again, it is unclear what level of understanding was expected. A similar list of the causes of aridity in an hot arid or semi-arid environment was provided in the Cambridge Linear mark scheme for Question 3, with the addition that 'in semi-arid areas it may be argued that human agency has added to the problems of aridity'; but once again, there was no guidance about the quality of understanding required.

The emphasis on the occurrence of different types of climate, and the variety of conditions that can be encompassed by an individual category, suggests that A Level candidates are expected to deal with some of the complexities of climatic patterns and their classification. However, only Question 2 asks directly about criteria for identifying types, and no question addressed the problems associated with devising a rationale for a climatic classification and determining the boundaries between climatic types. While several mark schemes referred to air masses and pressure and wind systems, in their explanations of climatic types, only Question 9 focuses directly on the role of air masses and only Question 7 on the role of the general atmospheric circulation. The mark scheme for Question 9 emphasised that a clearly structured overview of the impact of air masses on the seasonal patterns, within a located area, needed to take account of the effects of the source areas and tracks of different air masses on their characteristics, including their stability or instability. The NEAB mark scheme for Question 7 presented a detailed account of relevant content. The explanation given of the links between the seasonal changes of the atmospheric circulation and seasonal variations in the climate, was almost identical to that presented for Question 5b in Table 4.17 (p. 110), not surprisingly given

that these questions, which link the two sub-themes, are so similar. Because Questions 7 and 9 focus on atmospheric systems, their mark schemes gave rather more attention to processes, than did the mark schemes for most of the other questions in Table 4.22.

Subtheme 5. Natural hazards associated with weather and climate.

A ‘natural hazard’ has been defined as ‘any extreme event or condition in the natural environment causing harm to people or property’ (Burton, 1997, p. 348). Although the causes of such hazards are many and varied, weather and climate are prominent among them. Very strong winds, such as those associated with intense depressions, tropical cyclones and tornadoes; heavy precipitation, whether of rain, snow or hail; intense heat or cold; the occurrence of fog or lightening; and prolonged periods of drought can all threaten people, their property and their environment. Whittow (1987, p. 307) has commented that ‘any study of hazards will necessarily involve an understanding of both human and physical systems and of their interaction with each other, since no hazard can exist unless it is perceived and in turn provokes a human response’. The inclusion of atmospheric natural hazards within this study, as a subtheme, is partly because it represents a good example of the ‘people and environment’ perspective within the

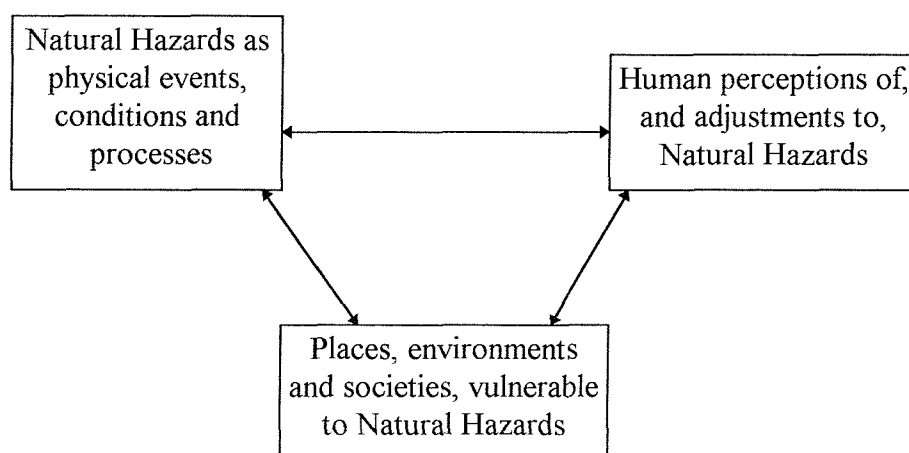


Figure 4.3. Basic Elements and Interrelations within the Geographical Study of Natural Hazards.

discipline. However, other geographical perspectives can also be recognised; many natural hazards display strong spatial patterns, and pose a greater threat to some places, environments and societies than to others (Figure 4.3).

Hazard research is a fairly recent development in geography, much of it stemming from the pioneer work carried out in the USA during the 1950s and 1960s, notably by G. F. White and R. W. Kates (Whittow, 1987, pp. 309-311). The topic was introduced into the secondary school geography curriculum fairly rapidly, not least because it appeared to be a promising way of interesting pupils in various aspects of physical geography. Furthermore, accounts of current 'natural disasters', reported in newspapers and on television, could be used to supplement the source materials available in textbooks and other educational publications. Some ideas have been developed which can be applied to natural hazards generally. They are mainly to do with such broad qualities of natural hazards as their magnitude, frequency and predictability; and with broad aspects of human responses, such as hazard perception, risk assessment and adjustments to hazards. Other ideas are linked specifically to the characteristics of individual types of hazard. Some hazards associated with weather and climate may, at least in part, be a consequence of human activities, for example, smog, acid rain and global warming. These have not been included in this analysis of this subtheme.

Potential content that can be borne in mind when reviewing the subtheme includes:

- the different types of natural hazard. and the characteristics of each type;
- the distribution patterns of different types;
- the conditions and processes that lead to particular types;
- the impact of natural hazards on people, places and environments;
- factors influencing human responses to natural hazards;
- strategies adopted to cope with natural hazards;

There are no references to natural hazards in the KS3 programme of study. In contrast, they are included in the content of most GCSE and A Level syllabuses. While some do

not refer specifically to hazards associated with weather and climate, the majority do. At GCSE, this is so in 7 of the 11 syllabuses (Table 4.1). In several syllabuses, the overall content framework supports the inclusion of natural hazards: MEG Syllabus C has a theme on 'Natural Hazards and People'; NEAB Syllabus A, a theme on 'Managing Natural Environments'; NEAB Syllabus C, a 'key area of content' on 'Natural Hazards'; and London Syllabus B, a unit on 'Environmental Hazards', within the broader theme of 'Issues in Natural Environments'. However, most syllabuses only comment briefly on the subtheme, and few give much guidance about the understanding expected. MEG Syllabus C has questions for enquiry and content under three headings: (a) the nature and distribution of natural hazards; (b) the processes responsible for natural hazards; and (c) the effects of natural hazards on people. Under the first heading, the content refers to 'the severity, frequency and duration of hazards from short term local hazards, such as fog; (to) medium ones, such as drought; (and) long term hazards such as global warming'. Questions also figure in NEAB Syllabus C, where the study of storms, as a category of natural hazards, is addressed by three key questions: what are the main forms of storms?; why do storms occur?; and how do people manage the storm hazard? The focus of attention here is 'the nature and effects of extreme low pressure systems in temperate and tropical areas'. A useful distinction is drawn between primary effects (e.g. winds, storm waves) and secondary effects (e.g. disruption of water and electricity supplies). NEAB Syllabus A, which requires the study of tropical storms, points out that 'human responses to such hazards vary with differing degrees of economic development'.

The subtheme was even more prominent at A Level, being absent only from the O & C Syllabus (Table 3.4). As at GCSE, it was usually included within a broad treatment of hazards, which at A Level characteristically had a wide ranging content and rather more detailed guidance than at GCSE. In six of the syllabuses it was an optional section or unit. In London Syllabus A and in the NEAB Syllabus, where the study of hazards was compulsory, the topic was in each case part of a core section focusing on interactions between people and their environment. Several of the syllabuses presented a broad framework for the study of hazards. In the NEAB Syllabus, it was suggested that various key themes and detailed content specified for the hazards unit 'may be approached by reference to the following questions:

- (a) What hazards are there presented by the varying types of environments and how may they be classified?
- (b) What are the spatial and temporal distributions of the hazards?
- (c) What is the origin and nature of the hazard?
- (d) To what degree can the hazard be predicted, prevented and/or managed?
- (e) Does the perception of the hazard vary and does this perception affect people's responses?
- (f) What kinds of responses are there to the hazard and what effects do they have on the physical, built and human environments?

Much of the content on hazards specified in the NEAB syllabus was about the effects of hazards, and human responses to them. This was also the main emphasis in the 'key ideas' in the London Syllabus B unit on 'hazard management'.

The GCSE and A Level examination questions on natural hazards, selected for analysis here, are: (a) general questions which are applicable to at least one weather or climatic hazard; and (b) questions directed specifically at tropical storms (hurricanes, tropical cyclones, typhoons).

Each of the **GCSE** questions in [Table 4.23](#) offers a choice of environmental hazards, either from a list which is not limited to hazards associated with weather and climate (Questions 1 and 2), or in the form of an open choice (Questions 3 and 4). Questions 1 and 2 include hurricanes and droughts in their lists. Overall, the questions ask candidates to locate the chosen hazard; explain its causes; and describe its effects, the scope to predict its occurrence, and the measures which were taken, or could have been taken, to reduce its impact. The marks allocated suggest that examiners were not expecting extended answers. The mark schemes gave very little guidance on the quality of understanding expected in relation to specific types of hazard. For example, while the mark scheme for Question 2 (NEAB) showed that examiners expected candidates to state the causes of hurricanes in terms of warm seas, hot air rising, low pressure and

1. Choose a natural hazard you have studied such as an earthquake, a hurricane, a volcanic eruption, a flood or a drought.
 - a. What was the hazard and where did it happen?
 - b. Describe the effects of the hazard on the local area and the population.
 - c. Suggest what measures could have been taken to reduce the effects of the hazard.
 (6) MEG D, 1997.
2. Choose one hazard from the following list: soil erosion, earthquake, volcanic eruption, hurricane, locusts, drought, disease.
State a location where the hazard occurs and say what causes the hazard. (5)
NEAB C, 1997.
3. Extreme weather conditions can cause hazards for people. Choose one weather hazard you have studied. Explain fully what causes the hazard and the problems it brings. (5) London B, 1998.
4.
 - a. Name and describe the location of a natural hazard you have studied, other than flooding.
 - b. Explain the causes of the hazard.
 - c. Describe how the hazard has been or could be predicted and its effects controlled.
 (8) MEG C, 1998.

Table 4.23. GCSE Questions. General Questions on Hazards.

condensation, it did not illustrate what a satisfactory explanation involving these elements might look like. This suggests that examiners were seeking evidence that candidates could recall the conditions associated with the development of hurricanes, rather than evidence that they understood the causal relationships.

The questions focusing on 'tropical storms' (Table 4.24) are of two types. Questions 1 to 3 are multiple choice questions from NEAB Syllabus B, Paper 1. These are concerned with identifying areas where such storms occur, and recognising features of their structure and the conditions under which they form. They appear to emphasise recall of knowledge, rather than understanding. Questions 4 to 6, on the other hand, are mainly to do with the impact of hurricanes and human responses to them. While most of the second type of questions require candidates to go beyond the information given, recall of knowledge again appears to be a priority. The mark scheme for Question 5, which asked for reasons why so many people in the Ganges Delta die as a result of tropical storms, consisted of a long list of individual points, rather than a coherent explanation which recognised the relevance of the nature of the storms approaching from the Bay of Bengal,

1. a. Complete each sentence by choosing the correct word or phrase.....
 - ai. Tropical storms start over (the sea / the land / the coastline).
 - aii. Cyclones are tropical storms that form over (India / Central America / the Bay of Bengal / Northern Australia).
 - aiii. Tropical storms begin when the sea's surface temperature is (at least 27 F / at least 27 C / below 27 C}).
 - aiv. Tropical storms start (at the equator / at the tropics / below the tropics).
 - av. The winds in a tropical storm always blow (from north to south / from east to west / in a spiral pattern) (5)
- b. At which of these points [on the cross section] would you expect to find each of the following features: the 'eye'; the strongest wind; wind getting less strong; gentle wind just starting to increase? (4) NEAB A, 1997.
2. Which one of the pairs of areas (A to E) on the map is regularly affected by cyclones or hurricanes) (1) [world map] NEAB A, 1999.
3. Tropical storms:
 - a. need sea temperatures below 27 C to develop.
 - b. bring high winds and heavy rain to all parts of the world.
 - c. produce sea surges that may cause structural damage to coastal settlements.
 Which is correct: A. (1) alone; B. (1) and (2) alone; C. (1), (2) and (3); D. (2) and (3) alone; E. (3) alone? NEAB A, 1999.
4. a. Suggest why supermarkets and DIY stores were so busy just before Hurricane Andrew struck Florida City. (4)
- b. Why did the authorities decide that clearing roads and airport runways was the first thing to be done after the hurricane passed? (1)
- c. Suggest, with reasons, how the director of Florida City Tourist Board may have felt about the hurricane. (3)
- d. Suggest, with reasons, how the owners of construction firms in Florida City may have felt about the hurricane. (3)
- e. If Hurricane Andrew had struck the economically developing countries of Cuba or Haiti it is likely that damage and loss of life would have been far greater. Explain why (5) [A chronological account of the hurricane and its effects] MEG C, 1997.
5. Suggest reasons why so many people in the Ganges Delta die as a result of tropical storms. (5) [short extract from a newspaper article] NEAB B, 1999.
6. a. Comment on the differences between the strength and the impact of the two storms. (4) [Table comparing the windspeed, death toll and cost of damage of two storms, one affecting an LEDC and the other a MEDC]
- b. Using one or more examples, describe how local people and governments respond to tropical storms. (6) SEG A, 1999.

Table 4.24. GCSE Questions. Hurricanes and Tropical Cyclones ('Tropical Storms').

the physical character of the Ganges Delta, and constraints on the responses that a very poor country, such as Bangladesh, could make. Neither the question nor the mark scheme appears to have been designed to assess understanding. Questions 4 and 6 provide more opportunity for candidates to display some understanding of the different

impact a hurricane or cyclone can have on different countries, and the different responses that are possible at individual and national levels.

1.	Discuss the ways in which people respond to the threat of hazards and, with reference to one hazard, explain how and why the response to it may vary (25) London B, 1997.
2.	'People's responses to hazards are related to levels of economic development'. Examine this statement with reference to two contrasting types of hazard. (50) London B., 1998.
3.	With reference to two contrasting types of hazard, illustrate how an understanding of the physical processes involved in their formation has enabled people to both assess and manage the risk. (50) London B., 1998.
4.	Explain why the same type of hazard may have different impacts. (50) London B., 1999.
5.	To what extent does hazard perception affect hazard management. (50) London B., 1999.
6.	a. Explain the methods employed to predict and/or monitor an environmental hazard in your chosen hazardous environment. (9) b. What measures have been taken to limit the effects of this hazard and how successful have they been? (16) Cambridge L., 1997.
7.	Retreat, acceptance, protection and prevention are four different ways of responding to hazards. Using examples, discuss the use of any two of these responses. (10) Cambridge L., 1999.

Table 4.25. A Level Questions. General Questions on Hazards.

The general questions on hazards at **A Level** are from the London Syllabus B and Cambridge Linear Syllabus examinations (Table 4.25). The former were based on an optional unit on 'hazard management', and the latter on an optional unit on 'hazardous environments'. All of these questions emphasise human responses to hazards. They all required extended answers, especially those for London Syllabus B, where the form of the assessment for the module containing this unit explains the high allocation of marks. The assessment was based on an essay, to be written in 90 minutes under examination conditions. At the examination, candidates were given a choice between two essay titles; but, at least 14 days before the examination, they are informed which two of ten key ideas presented in the syllabus would underpin the questions. It was an intention of this part of the syllabus that 'candidates will spend substantial periods on their own research, investigating issues and enquiry questions'; and the assessment is described as a 'research-based essay'. Largely, perhaps, because of the broad and open nature of the questions in

Table 4.25, the mark schemes offered only very general guidance about the quality of understanding expected. It was widely recognised that specific detail would depend on the case studies that candidates had researched, and that some case studies would be more useful than others for particular questions. There was a general emphasis on the complexity of the impact of hazards and of human responses to them, with attention being drawn to the relevance of the magnitude and frequency of the threat; and the ability of governments and social groups to monitor the hazard and to take effective action. There were references to the distinction between short term and long term responses; and to the contrast between the responses possible in less economically developed and more economically developed countries. The mark schemes for Questions 2 and 4 suggested that better answers might relate responses to a gradation of economic development; and that for Question 3 noted that management and risk assessment takes place at a variety of levels from the individual and the city to levels of government and the insurance industry.

As at GCSE, many of the A Level questions which focus on tropical cyclones/hurricanes (Table 4.26) ask about the formation of such storms, as well as about the variable nature of their impact and human responses to them. The marks allocated to explanations of the storms ranged from 3 for Question 6 (Cambridge L.), which asks candidates to ‘briefly outline three necessary conditions’ for their development, to 12 for Question 1a (London A), which had the broader instruction, ‘explain the formation of hurricanes’. But, yet again, there was little correlation between the marks allocated and the depth of understanding articulated in mark schemes. The main emphases in the notes provided for examiners were: that these powerful storms develop from weaker low pressure systems; that they need a continuous supply of warm humid air, available from the surface of tropical oceans; that the Coriolis ‘force’, which is not effective close to the equator, is responsible for the circular winds around the centre of the storm; and that the main source of energy is the release of latent heat of condensation from the convective currents which produce the storms’ towering cumulo-nimbus clouds. Fewer mark schemes referred to the importance of conditions in the upper troposphere, or to the critical role of the development of the ‘eye’ of the storm. While the A Level mark schemes indicate a significant advance on the quality of explanation expected at GCSE, they do not reveal a clear consensus about what it is reasonable to expect at the higher level.

1. a. Explain the formation of hurricanes. (12)
b. Outline the impacts of hurricanes on human activities. (8) London A., 1997.
2. With reference to a specific example or examples, explain and illustrate the hazards to life and property posed by tropical cyclones. (25) Oxford, 1997.
3. Describe and give a reasoned explanation for the occurrence and distribution of tropical hurricanes. [map showing areas of tropical cyclone formation, approximate number in each area per year, and their main tracks] (8) Cambridge L., 1997
4. a. Outline the meteorological conditions that lead to the formation of hazards. (6)
b. Assess the extent to which the short term effects of tropical cyclones vary in different environments. (6) WJEC, 1997.
5. a. Identify two sources of evidence which could be used to indicate the approach of a tropical cyclone, and suggest how one of these sources would demonstrate the approach of such a storm (5)
b. Describe the effects of a tropical cyclone on the physical, built and human environments. (10)
c. Using a variety of examples, explain:
 1. Why the degree of damage caused by tropical cyclones varies among different countries.
 2. Why in different countries, human responses to tropical cyclones are not the same. (10) NEAB, 1997.
6. Briefly outline three conditions necessary for the development of hurricanes (tropical storms). (3) Cambridge L., 1999.
7. a. Draw an annotated diagram to show the main characteristics of a hurricane (tropical cyclone). (5)
b. Describe two factors which contribute to the development of hurricanes. (5)
c. The nature of hurricane damage varies considerably from country to country. Discuss the human and physical factors which may be responsible for this variation. (8)
d. Describe the effectiveness of hazard management in reducing the impact of hurricanes. (7) NEAB, 1999.

Table 4.26. A Level Questions. Hurricanes and Tropical Cyclones.

The questions concerned with the ‘effects’ or ‘impact’ of tropical cyclones, and the human responses to them, cover similar ground to that of the general questions on natural hazards in Table 4.25, though here again, the focus on a particular type of hazard appears to have encouraged some chief examiners to provide more detailed, content-specific notes in their mark schemes. For example, a distinction is drawn between primary effects, such as wind damage, and secondary effects, such as coastal flooding as a consequence of storm surges, and landslides following the torrential rain. Several questions focus on the reasons why the impact of such storms differs so greatly in different parts of the world,

and indicate in their mark schemes that they expect candidates to explain the consequences of differences in levels of economic development. The more detailed mark schemes reveal the greater breadth of understanding required at A Level. For example, the NEAB mark scheme for Question 7, presents separate lists of physical, economic and political factors, illustrating each with examples which are specifically related to hurricanes. Thus, physical damage is ascribed to:

- the intensity of the hurricane, measured on the Saffir-Simpson scale;
- the distance from the path of the hurricane - the 'storm corridor';
- the distance from the sea - hurricanes die as they move inland;
- the travel speed of the hurricane - the more slowly it moves the greater the destruction;
- high relief, which may result in increased rainfall and flooding, and greater risk of landslides;
- low relief, which makes areas more prone to storm surges and coastal flooding.

The same mark scheme commented on the methods which can be used to reduce the impact of a tropical cyclone under the headings of 'modify the weather system', noting that, as far as this type of tropical storm is concerned, there has so far been little success; 'avoidance', which it links to the problems of prediction and evacuation; and 'reduction of vulnerability', observing that 'hurricanes are an inconvenience (albeit an expensive one) to rich countries, while they remain a matter of life and death in the developing world'. In addition to such content-specific guidance, many of the mark schemes referred to general qualities, such as detail, accuracy, relevant exemplification and sound reasoning.

Conclusions

Weather and climate is one of the traditional branches of physical geography which can be recognised as a recurrent content theme in the geography curriculum of secondary schools. As a school subject, it contains a number of interrelated subthemes, of which five have been selected for analysis in this chapter. While 'types of climate' and 'water in the atmosphere' are studied from Key Stage 3, 'mid-latitude weather systems' and the

‘hazards associated with weather and climate’ are introduced for GCSE, and ‘the global energy balance and general atmospheric circulation’ for A Level. Weather and climate, therefore, illustrates how progression in a recurrent theme can be developed both within persistent subthemes and by adding new subthemes at successive stages. However, the scope for analysis is limited by the variable nature and quality of the evidence available from the specifications of the understanding of weather and climate required for KS3, GCSE and A Level; and from the guidance on assessment for KS3, and examination questions and mark schemes for GCSE and A Level.

At KS3, the only phase of secondary school education in which the study of geography is compulsory for virtually all students, the support for developing a strong foundation of understanding is greatly weakened by the highly generalised and vague definition of the knowledge and understanding required by the National Curriculum programme of study. This is especially so for the study of weather and climate, for which the specification is not only brief, but in part is also ambiguous. At GCSE and at A Level, different geography syllabuses gave different weightings to the theme, and differed significantly in the content which they covered (Tables 4.1 and 4.4). Less than half of the 11 GCSE syllabuses required all their candidates to undertake a broad study of the theme; and although the content on weather and climate in the A Level syllabuses was broader and richer, in many syllabuses that content was either wholly or partly in optional units. Such structures made it all the more difficult for teachers to plan for a well ordered progression in understanding in this particular theme.

The evidence from assessment tasks and mark schemes is similarly uneven. That at KS3 is limited to a small number of relevant exemplars, from guidance documents which give very little attention to weather and climate. Most of the GCSE tasks relating to weather and climate were data-response questions requiring fairly short answers. Although many more of the A Level tasks were open-ended questions providing scope for extended answers (Table 4.27), the mark schemes for some of these revealed little about the depth of understanding expected. However, at both GCSE and A Level, many questions based on weather maps and climate graphs provided scope for candidates to display their abilities to interpret and analyse information, and by so doing to reveal understanding.

- | |
|--|
| <ol style="list-style-type: none"> 1. Describe and explain the conditions and processes that may result in the condensation of water vapour in the atmosphere (Cambridge L). 2. Describe and explain global patterns of precipitation (Oxford). 3. Explain how different air masses and their modification in passage can affect the weather of Britain (Cambridge L). 4. Describe and explain the characteristics and properties of the major air masses that influence temperate climates (Oxford). 5. Using examples on a continental scale, assess the relative importance of the factors responsible for climatic variation in the middle-latitudes (Cambridge M). 6. Major climatic contrasts are found within and between different deserts. Using actual examples, explain why these contrasts occur (O&C). 7. Explain why the same type of hazard may have different impacts (London B). |
|--|

Table 4.27. Examples of A Level Questions about Weather and Climate requiring Extended Answers.

A large proportion of the questions about the physical characteristics of weather and climate, both at GCSE and at A Level asked for explanations. ‘Explain’, ‘explain why’, ‘explain how’ and ‘suggest reasons’ were all widely used as command terms. Many questions had a combined ‘describe and explain’ instruction, especially at A Level. Several A Level questions asked about the meaning of specific terms, but with an allocation of marks suggesting that only short definitions were intended. Some of the A Level questions relating to the impact of atmospheric hazards on people and to contrasts in human responses to hazards had a different tone to those concerned solely with physical conditions and processes, in that they asked candidates to ‘comment on’ or ‘discuss’, while such instructions as ‘to what extent does’ and ‘assess the extent to which’ required some degree of evaluation within candidates’ responses.

The signalling of progression in understanding within individual subthemes was complex.

1. Types of climate. The KS3 programme of study supported the development of an understanding of the meaning of the term ‘climate’, by expecting students to distinguish between climate and weather; and supported their introduction to different types, by requiring them to learn ‘how and why aspects of weather and climate vary from place to place’. But no guidance was offered about the depth of understanding expected. At GCSE, there was a widespread expectation that candidates would be able to describe and

explain different types of climate, and at A Level the capacity to differentiate was extended to different conditions within a particular type, but this was not in the specifications for all syllabuses. In general, A Level questions were more likely to address the complexity of climatic patterns, introduce more abstract parameters, and expect understanding of the role of global processes in producing distribution patterns. While there were some indications of the scope to develop progression in relation to the breadth of knowledge required, the meanings associated with the concept of climate, the detail and quality of description of climatic types, and the explanation of distribution patterns, no explicit attention was given to the difficulties of classifying climates and mapping their distributions.

2. Water in the atmosphere. In the KS3 programme of study, water in the atmosphere was referred to obliquely, by way of the water cycle; and it was covered by the broad instruction to study 'how and why weather and climate varies from place to place'. The examples in the ACAC assessment unit (ACAC, 1997) require some understanding of the conditions responsible for the high rainfall totals in the north and west of Britain. At GCSE, attention was given to frontal and convectional rainfall, as well as relief rainfall; and more direct attention was given to the processes associated with the uplift of moist air, leading to condensation and the formation of clouds. There was little recognition at this stage that precipitation requires additional processes. At A Level, understanding was extended to the formation of fog and snow; to complex distribution patterns, including patterns at the global scale; and to less direct parameters, such as rainfall reliability. But even more striking was the extent to which A Level involved the introduction of abstract ideas, necessary for a deeper treatment of processes.

3. Mid-latitude weather systems were studied at GCSE and A Level. Most of the GCSE questions required candidates to apply their knowledge of anticyclones and depressions to the interpretation of the specific conditions shown on weather maps. Each question was usually of limited scope and carried a fairly low allocation of marks. A Level data-response questions, based on weather maps, covered a wider range of synoptic situations, and candidates were often expected to recognise the variety of factors that might be operating within a given situation, and to comment more fully on processes, introducing

appropriate concepts. They were also expected to recognise the uncertainty that might accompany weather predictions. Other A Level questions, unsupported by maps or other data, required descriptions and explanations of weather patterns or focused on air masses. The introduction of the concept of air masses allowed a much deeper understanding of mid-latitude weather systems.

4. Atmospheric hazards were not required to be included as a topic in the geography curriculum until GCSE courses, although the idea of a natural hazard was introduced in KS3, in the context of earthquakes or volcanic eruptions, and of geomorphological processes, such as flooding and landslides. GCSE students should, therefore, have had some previous experience of studying the causes and effects of physical hazards, and human responses to them. The GCSE questions that provided greater opportunity to display understanding tended to focus on the different impact that a hazard, such as a hurricane, can have in different countries, and the different responses that can be anticipated, both at a personal and at a national level. While many of the A Level questions about hazards also focused on the human responses, they usually required more extended answers which were expected to comment on the complexities of the situations in which hazards occur. Some mark schemes revealed that explanations of hurricanes were expected to be significantly more advanced than at GCSE.

5. Studies of the global energy balance and atmospheric circulation were not introduced until A Level, not surprisingly in view of the complexity of the patterns and processes that are involved; and the abstract nature of the central ideas and of many of the subsidiary concepts, in the two models. That does not mean that particular components of the models cannot be introduced earlier. For example, students may already be familiar with the idea of solar radiation, and appreciate the effects of cloud cover and of different surfaces on air temperatures; they may already have some knowledge of some of the wind systems within the atmospheric circulation, and of the subsidence of air within high pressure systems and uplift within zones of convergence. The prime challenge which the models pose is probably not so much that of developing comprehensive overviews of these systems, with their many components and complex interactions, as of understanding the concept of dynamic equilibrium, and its significance for climatic patterns and climatic

change. Even at A Level, most of the examination questions focused upon specific parts of the models, and none explicitly tackled the critically important idea of dynamic equilibrium.

The progression in the nature and quality of the geographical understanding of weather and climate expected of students, between KS3, GCSE and A Level, can be analysed in terms of the 'dimensions' of progression described in Chapter 2, namely: distance from experience, complexity, abstraction, precision, and the involvement of attitudes and values (op. cit. pp. 42-44). There is little evidence that *distance from experience* was a significant criterion in the choice of content for the three stages, except perhaps for the emphasis on the British Isles for GCSE examples of weather conditions and weather events. Indeed, it could be argued that some features - such as the nature of different types of clouds, and the occurrence of notable weather events, such as fog, thunderstorms or snow - could be introduced earlier, because of the extent to which understanding of these features can be linked to direct experience. This might require some flexibility in the curriculum, to take advantage of local conditions and of events as they occur.

There is also little evidence in the documents examined that *precision* might be a quality relevant to understanding. As far as assessment criteria were concerned, it was accuracy rather than precision that was emphasised. In practice, the higher precision expected at A Level was implicit in the greater attention given to specialist terms, and to the types of measurements used to describe such qualities as absolute and relative humidity, and rainfall variability. However, few questions, at either GCSE or A Level, were designed to assess the meaning of terms and, even when they were set, it was often unclear whether precision was important or not.

A third dimension, focusing on the relevance of attitudes and values to particular aspects of understanding, was even less prominent, no doubt because the theme focuses on physical geography rather than on human behaviour. However, although GCSE and A Level questions gave attention to human responses to hazards, it was only at A Level that any explicit reference was made to the relevance of attitudes, values or perceptions.

In contrast to these three dimensions, the other two - the *increasing complexity* of what is studied and the *increasing use of abstract ideas* - feature strongly in the progression of understanding within the treatment of weather and climate in the secondary school curriculum. Table 4.28 lists some of the content included in GCSE syllabuses and examinations which involves a degree of complexity in what is to be understood, and introduces ideas which could be regarded as relatively abstract. Complexity is evident

Complex Patterns, Processes and Relationships	Abstract Ideas
<u>Water in the Atmosphere</u> factors responsible for spatial and seasonal patterns of rainfall in the British Isles	precipitation, types of rainfall; evaporation and condensation; rainshadow effect.
<u>Mid-latitude weather systems</u> the weather associated with anticyclones and depressions.	weather systems; the structure and functioning of anticyclones and depressions; air masses.
<u>Types of climate</u> factors influencing climate; global distribution patterns of climatic types.	distribution pattern; types of climate; continentality, prevailing winds.
<u>Hazards</u> causes and consequences of hazards; the different impact of hazards, and different responses to them, in rich and poor countries.	environmental hazard; primary and secondary effects.

Table 4.28. Examples of Complex Content and Abstract Ideas in Selected Subthemes of Weather and Climate, at GCSE.

mainly in the understanding of spatial distribution patterns, the various factors which influence weather conditions and different types of climate, and, in the case of hazards, the relationships between people and their environment. Relatively few abstract ideas are introduced, and even where they are, it is not always clear what level of understanding is expected. The concepts listed in the table are not present in all GCSE syllabuses. For example, air masses are referred to explicitly in one syllabus only. Most of the ideas about weather and climate included for GCSE examinations can be understood at a fairly simple level, and focus on phenomena that can be experienced, rather than on less tangible processes and relationships. The approach to types of rainfall, weather systems and types of climate tend to be descriptive rather than strongly explanatory.

Complex Patterns, Processes and Relationships	Abstract Ideas
<u>Water in the Atmosphere</u> different types of condensation and precipitation; precipitation regimes of different places/regions; processes involved in the formation of fog, clouds and precipitation; explanations of spatial patterns of precipitation.	atmospheric humidity (absolute and relative); conditions and processes leading to the formation of different forms of condensation and precipitation; adiabatic processes and lapse rates; stability, instability and conditional instability.
<u>Mid-latitude weather systems and air masses</u> the structures of depressions and anticyclones; the process involved in the development of weather systems; the source areas of different air masses and their characteristics in different seasons; the explanation of weather conditions associated with different air masses and different weather systems.	anticyclones and depressions; cyclogenesis and the development of cold, warm and occluded fronts; air masses (Am, Pm, Pc, Tm, Tc)
<u>The Global Energy Budget and the Global Atmospheric Circulation</u> the energy flows and transformations that contribute to the global energy/heat budget; the pressure and wind systems within the global atmospheric circulation; the relationships between air movements in the lower and upper atmosphere. the conditions and processes that maintain the global energy budget and atmospheric circulation.	the global energy budget model; solar radiation; long wave and short wave radiation; insolation; the scattering, reflection and absorption of radiant energy; albedo; counterradiation and the 'greenhouse effect'; sensible heat and latent heat; net radiation, energy surplus and energy deficit zones; general atmospheric circulation models; atmospheric cells (e.g. the Hadley Cell), fronts and eddies; Rossby waves and jet streams; pressure gradients, the coriolis effect, geostrophic wind and conservation of angular momentum; transfers of energy and momentum.
<u>Types of Climate</u> the location and characteristics of major climatic zones; explanations of climatic patterns; the relationships between climatic patterns and the atmospheric circulation.	the concept of climate; climatic parameters; the variability of climatic conditions.
<u>Hazards associated with Weather and Climate</u> the characteristics and distribution patterns of different types of atmospheric hazards; explanations for variations in the impact of hazards and human responses to them.	natural hazard; hazard magnitude and frequency of occurrence; hazard risk; hazard impact; human responses to hazards; hazard monitoring and prediction; risk assessment, prevention and management.

Table 4.29. Examples of Complex Content and Abstract Ideas in Selected Subthemes of Weather and Climate at A Level.

In comparison with GCSE, the requirements of A Level syllabuses and examinations include considerably more complex content, involving more comprehensive treatment of atmospheric systems, and a different order of abstract ideas, relating to phenomena which cannot be observed directly ([Table 4.29](#)). Among the more difficult concepts and models studied at A Level are those concerned with: adiabatic processes, lapse rates and atmospheric stability; the global energy budget, with its flows and transformations of energy; and the physical principles and processes governing air movements and the global atmospheric circulation. There is a gulf between the conceptual demands of weather and climate at GCSE and that at A Level.

The five general dimensions which have been applied here to selected subthemes of weather and climate do not form a comprehensive list of the qualities associated with progression in geographical understanding. Other dimensions might relate to the structuring of ideas, the spatial contexts in which geographical explanations are framed, and the treatment of conditions and processes in explanations. It is clear, from the evidence in this chapter, that progression in understanding involves not only the development of more abstract ideas, but also the linking of ideas within conceptual structures. The linking of significant ideas is a feature of intellectually demanding models, such as those describing the processes relevant to weather systems, the atmospheric balance, and global atmospheric circulation. Structure is also important to understanding classification systems, such as those which underpin our explanation of types of climate and types of air mass, and the relationships between air masses and climate. The association of the ability to recognise interrelationships with higher levels of cognitive ability is consistent with the SOLO model developed by Biggs and Collis (op. cit. p. 30).

Spatial scale is often mentioned as relevant to progression in geographical understanding, although the significance of spatial scale may be mainly a consequence of its common association with other dimensions, for example, remoteness from experience and the complexity of many large scale spatial patterns, especially at global and continental scales. Other problems may arise when explanations require an understanding of links between processes operating at different scales. This is illustrated by [Figure 4.4](#), which shows how

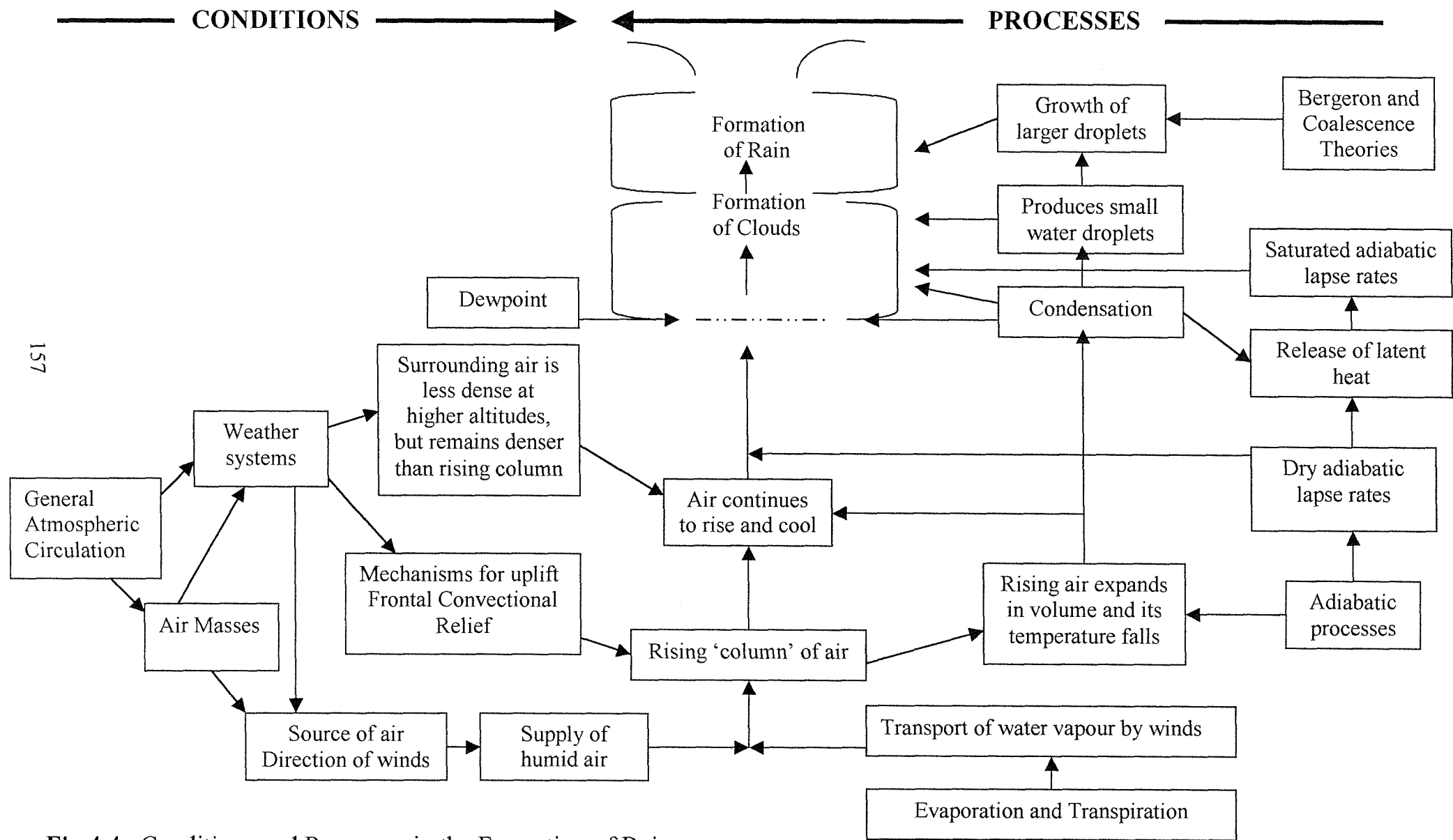


Fig 4.4. Conditions and Processes in the Formation of Rain

understanding the causes of rainfall involves two very different dimensions, one of which is directly linked to spatial scale. Most of the explanations of weather and climate, presented in the secondary school curriculum, are in terms of the conditions which give rise to a particular phenomena, or the processes involved in its development, or a combination of the two. In Figure 4.4, the ideas placed near the centre of the diagram describe the processes which produce clouds and rain in rising air. Advances in understanding are noted in terms of favourable conditions, towards the left; and in terms of processes, towards the right. A broadening and deepening of understanding is signalled as one moves outwards from the central vertical column. To a large extent, progression in understanding the geographical conditions that lead to rainfall involves placing the immediate processes, responsible for the formation of clouds and rain, within broader spatial and structural systems. Thus the mechanisms responsible for air rising (relief, convectional currents and frontal activity) can be placed in the context of weather systems, which can be linked to air masses, which in turn can be linked to the general atmospheric circulation. Each link represents a shift to a higher level of spatial scale. Progression in understanding the processes requires a grasp of abstract scientific concepts, principles and theories, such as adiabatic processes, latent heat of condensation and lapse rates for condensation; and coalescence and ice-crystal theories for precipitation. Models suitable for other subthemes may have different formats. Nevertheless, what are needed are conceptual structures that identify the main ideas relevant for understanding a particular subtheme, and help to clarify the relationships between them in a way which can assist planning for progression in understanding.

CHAPTER 5. THE SCOPE FOR PROGRESSION IN UNDERSTANDING IN THE STUDY OF SETTLEMENTS AT KS3, GCSE AND A LEVEL

Chapter 5 is concerned with the study of settlements, a well established branch of human geography which, like weather and climate, is a prominent recurrent theme in the geography curriculum of secondary schools. Indeed, the study of settlements, particularly towns, probably now receives more attention in the geography curriculum than does the study of weather and climate. The purposes and structure of the chapter are similar to those of Chapter 4, with attention again being given to a brief overview of the theme and its content structures, and an outline of the external specifications of content and provisions for assessment at KS3, GCSE and A Level. The detailed analysis of the opportunities for progression in understanding focuses on three themes: urban morphology; the suburbs and rural-urban fringe, and the processes of suburbanisation and counterurbanisation; and the processes and effects of rapid urbanisation in less economically developed countries.

Some features of the theme

The study of settlements is as diverse and dynamic as the study of weather and climate, perhaps even more so. Such diversity can be viewed in part as a consequence of the complexity of settlements and of the human activities which concentrate there. The factors which influence patterns and processes within and between settlements are varied and interrelated, often including significant economic, social, political, cultural, psychological, technological and historical dimensions, as well as the all-pervading geographical dimensions of space, place and environment. The operation of a wide range of interrelated factors is characteristic of much of human geography. The dynamic nature of settlement geography, especially urban geography, is probably due both to the pace of change in many large towns and cities, and to the vigour of research interest. Both the diversity and dynamism of approaches can also be linked to the variety of perspectives and shifting emphases within human geography; which, in turn, can be related to theoretical developments and approaches within the social sciences and humanities generally (Bassett and Short, 1989, pp. 175-193; Johnston, 1991; Johnston et al., 1994

pp. 657-660; Hall, T., 1998, pp. 19-29). This combination of complexity and dynamism, both within what is being studied and within the discipline itself, while being intellectually stimulating, militates against the development of a unified conceptual framework.

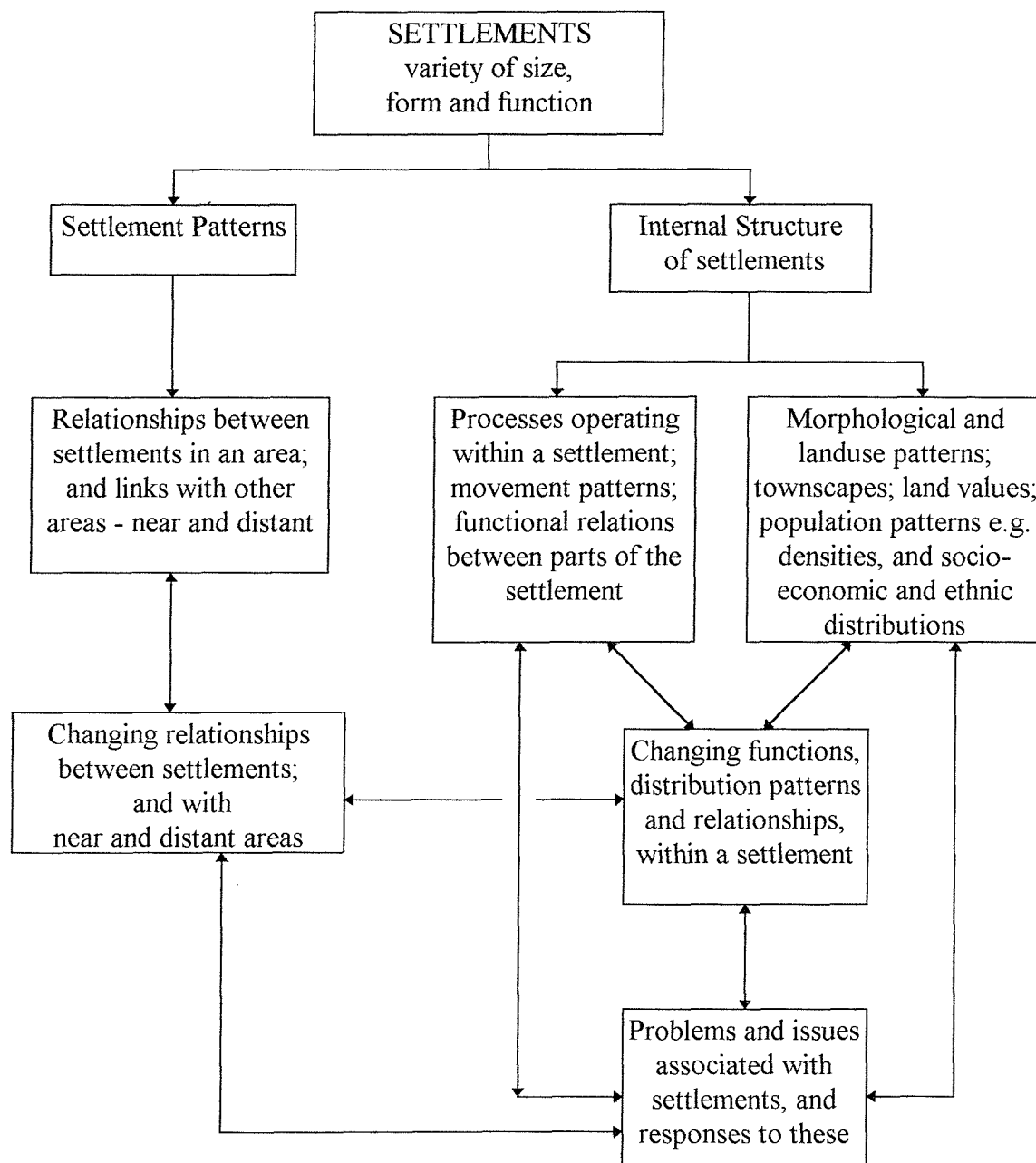


Figure 5.1. A Structure of important Elements of Content in the Study of Settlements

Content structures within the theme

It is open to question whether the geographical view of settlements can accurately be presented as a coherent structure, or whether it is more important for curriculum developers and teachers to recognise the variety of overlapping subthemes and research interests, and the different perspectives from which these can be approached. Figure 5.1 is an attempt to identify some of the important elements of the structure of the theme, and the links between them. Attention has already been given to the broad distinction between studies of settlement patterns (i.e. the spatial distributions of settlements of different sizes and types, within specified areas) and studies of the internal geography of individual settlements or types of settlement. Both settlement patterns and the internal character of settlements can be analysed as static, functional and dynamic systems. For example, in respect of an individual town or city:

- a static view could include its morphology (the layout of its buildings, roads and open spaces); townscapes; land use patterns; land values; and population distributions, based on demographic, socio-economic and ethnic characteristics;
- a functional view would emphasise the movement patterns and other functional relationships between different parts of the settlement, and between the settlement and its surrounding area;
- a dynamic view might consider the historical development of the settlement, current developments and future prospects.

Problems and issues may arise from the current conditions in a settlement or settlement pattern, or from changes that are either taking place or are proposed. Explanations for any of these - the patterns, processes, changes and problems - may need to draw upon the wide range of factors listed earlier.

However, the diagram in Figure 5.1 is not the only way of structuring the geography of settlements, and it is certainly not intended to suggest some sort of learning hierarchy or

hierarchies. It does not provide a map for planning progression in the curriculum. For example, there are no overriding reasons why enquiries into problems associated with settlements should be left to the end; nor is it necessary for a study focusing on urban changes to be preceded by studies of urban morphology and urban processes. A new development or a current issue within a settlement may provide a very suitable initial stimulus for an enquiry which leads to other aspects. Each of the categories identified in the diagram can be approached at different levels of understanding. This is probably even truer of the subfields within the theme of settlements than of those within the theme of weather and climate, because many of the features and activities characteristic of settlements are more familiar, more tangible and, even when they are unfamiliar, easier to portray and convey to students than some of the key elements and processes in atmospheric systems.

Because of the paucity of cross-age research into students' geographical understanding of settlements, teachers must rely mainly on their own judgements to match learning tasks to the age and capabilities of those whom they are teaching, and to decide what quality of understanding it is reasonable to expect. As with the theme of weather and climate, such judgements are likely to be based primarily on their personal teaching experience, and their own evaluation of the demands presented by specific ideas, activities and learning resources. They will need to relate such general criteria as the ability to deal effectively with complexity, abstraction and precision, to reason in particular ways, and to take account of the conflicting attitudes and values involved in issues, to specific content and specific situations.

The specification of content and provision for assessment

The specification of content for the thematic study of 'settlement' in the 1995 **KS3** National Curriculum programme of study is similar to that for weather and climate, in that it consists of a small number of very general statements which give no more than a broad indication of 'what pupils should be taught':

In investigating the characteristics of settlements and the impact of change, pupils should be taught:

- a. the reasons for the location, growth and nature of individual settlements;
- b. how the types and varieties of goods and services provided in settlements of different sizes vary;
- c. how changes in function of settlements occur and how these changes affect different groups of people, e.g. how a decline in village services affects car owners and non-car owners;
- d. about types and patterns of urban land use, how conflicts can arise over the use of land, and how they can be addressed.

The content which is covered in these statements initially gives the impression that the 1995 revision was less drastic in respect to the theme of settlement than it was to the theme of weather and climate. Interest was retained in individual settlements, land use patterns within settlements, the services which settlements provide, the dynamic nature of settlements and issues linked to them. But a closer examination of the differences between the revised specifications and the requirements of the programme of study in the original Order reveals significant changes. For example, 'reasons for the location, growth and nature of individual settlements' is much less specific, and less clear in intentions, than the corresponding section in the 1991 programme of study, which required attention to be given to 'the layout and functions of a small settlement, or part of a larger settlement' and listed various aspects to be investigated. Although the 1995 Order retained the reference to 'goods and services provided in settlements of different size', it did not link this in any specific way to 'the distribution of shopping centres', nor to applying 'the concept of a settlement hierarchy' to such distributions. The notion of spatial pattern was, therefore, lost from this part of the Order. Similarly, there was a loss of detail in the statement about urban land use and conflicts, for the 1991 programme of study included 'reasons.... for the location of different types of economic activities; and why economic activities may develop in different locations'; and 'the advantages and disadvantages of locating similar economic activities in the same places'. It also placed issues in the context of people's changing requirements and the ageing of settlements, rather than linking them solely to the use of land.

The only significant, official source of guidance for the assessment of this theme at KS3 is the Settlement Unit from SCAA's Key Stage 3 Geography Optional Tests and Tasks (1996b), which focuses on the development of Bradley Stoke, a new settlement near Bristol. The unit was planned to enable students to display skills and techniques relevant for geographical investigations; and to show knowledge and understanding of the reasons for the location, growth and nature of individual settlement, and about types and patterns of urban land use. It, therefore, addresses section (a) and the first part of section (d) of the content specified in the 1995 programme of study.

Settlements constitute one of the strongest geographical themes studied at **GCSE**. It is a substantial component in all the current syllabuses, and is compulsory in all but one, the single exception being SEG Syllabus A, in which settlement and population are alternative topics. In NEAB Syllabus A, 'the challenge of urban environments' is one of three themes through which the syllabus is structured. In MEG Syllabus B (Avery Hill), a unit on 'people and place', which accounts for a quarter of the overall content, is concerned mainly with settlements. In London Syllabus B, 'issues in urban environments' is one of four themes, and, in addition, the syllabus has a unit on 'rural-urban links' in a theme dealing with 'issues in rural environments'. In several other syllabuses, a significant section on settlements is combined with population. Even NEAB Syllabus B, which has a place-specific content structure, gives considerable attention to settlements, and identifies 'population and settlement' as one of five themes which are intended to link various compulsory topics.

Table 5.1 summarises the main aspects of settlements included within the content of the eleven GCSE syllabuses which became operative from September 1996. While there are different emphases between syllabuses, most cover a fairly wide range of content, which includes some treatment of patterns, processes, changes in form and function, and current issues. The most common elements are: current changes affecting settlements and settlement patterns; problems associated with settlements and how these are being addressed; the internal structure of towns and cities in more economically developed countries (MEDCs); and the development of shanty towns in less economically developed

	M			N			L		S		W
SETTLEMENTS - SUBTHEMES	A	B	C	A	B	C	A	B	A	B	A
Site and Location of Individual Settlements			√		√		√		√		
Settlement Patterns	√		√				√		√		
Urban Morphology/Internal structures	√	√	√	√	√		√	√	√		√
Suburbanisation/Rural-Urban Fringe				√	√	√		√	√		√
Urban Growth in LEDCs/ Shanty Towns	√	√			√	√	√	√	√	√	√
Inner City Areas in MEDCs				√	√	√			√	√	√
Shopping Centres/Service Functions	√	√	√	√				√			√
Changes to settlements and settlement patterns	√	√	√	√	√	√	√	√	√	√	√
Problems, Issues and Responses	√	√	√	√	√	√	√	√	√	√	√

Table 5.1. Aspects of Settlement included in GCSE Geography Syllabuses.

countries. In general, more emphasis is given to urban than to rural settlements, and to the internal characteristics of towns and cities than to settlement patterns. Despite the attention given to the rapid growth of large cities in LEDCs, and more particularly to shanty towns, much of the treatment of settlements and settlement patterns focuses on the UK. The table is not designed to provide a comprehensive content framework for the study of settlements at GCSE; and other topics, such as ‘traffic in urban areas’ and ‘inequalities in housing’, are prominent in individual syllabuses. There are strong links between some of the topics listed in Table 5.1, for example, ‘problems, issues and responses’ can be related to ‘settlement patterns’, particular areas within urban settlements (‘inner city areas in MEDCs’ and ‘shanty towns in LEDCs’) and ‘changes to settlements and settlement patterns’; while ‘suburbanisation’ can be linked to the decline of ‘inner city areas’.

The treatment of settlements in GCSE syllabuses tends to be more detailed than that of weather and climate, perhaps indicating a greater concern to take adequate account of the complexity of settlements, the many factors which influence their form and morphology, the processes which enable them to function and which change their character, and the problems and issues associated with them. As with other themes, a concern with explanations is sometimes revealed by ‘key questions’, or by reference to the main factors which influence a feature; while the understanding expected is often indicated by ‘key ideas’, and by the concepts which are included in accompanying commentaries.

References to case studies, whether mandatory or illustrative, add to the detail. Several of these features are exemplified in Table 5.2, which is an extract from a section on ‘Inequalities in Urban Areas’ in MEG Syllabus B. In this case, the ‘key questions’

Key Ideas	Key Questions
2. Within urban areas there are inequalities in housing and access to housing	2.1 How and why do people move? 2.2 How are different types of housing provided and allocated? 2.3 What factors determine people’s access to housing in different societies? 2.4 How and why do the opportunities and constraints in acquiring housing vary between different groups of people?
Illustrative Content An investigation of movement of people within a city, including (a) a consideration of the influence of such factors as housing prices, the role of housing agencies e.g. building societies, and local and national government policies; and (b) the way in which different groups of people (by social class, race, age/gender etc.) experience different housing opportunities and constraints, and the effect of this on residential location patterns and ‘quality of life’. A similar investigation of movement of people within a city in a contrasting context, e.g. a city in an LEDC.	

Table 5.2. Extract from the Section on ‘Inequalities in Urban Areas’ in MEG GCSE Syllabus B (Avery Hill).

introduce subsidiary ideas which help to extend and clarify the particular, broad generalisation that constitutes the ‘key idea’. Being expressed in the form of questions, they also indicate where explanations are required, and thereby provide pointers for enquiry. These particular questions contain three of the most common trigger-terms used in geography to indicate the type of explanation required: ‘how?’, which usually calls for a descriptive explanation of processes or procedures (Kerry, 1996); ‘what factors?’, which suggests that the conditions which influence a decision, behaviour, event or development should be described; and ‘why?’, which suggests a more direct account of causes and reasons, focusing on critical relationships between elements in a structure or system. The ‘illustrative content’ in the extract reveals the potential complexity of an investigation into the functioning of the housing market in a city, and the different opportunities available to different groups of people in their choice of housing and where they can afford to live.

In comparison, the extract from London Syllabus A (Table 5.3) relies on 'key ideas', supported by fairly detailed commentaries. While the former are again broad generalisations, the latter also have a strong conceptual content. The direct reference to the 'concentric' and 'sector' urban land use models, and the inclusion of 'range' and 'threshold' - two concepts which underpin 'central place theory' - is unusual in a GCSE syllabus. Such content appears to indicate a significant advance on the understanding expected at KS3.

Key Ideas	Commentary
3. Patterns of land use can be identified within towns and cities. These patterns change over time and this may lead to conflict.	The CBD, twilight zone and different residential zones should be identified and their location explained. 'Concentric' and 'sector' models should be considered. The causes and effects of change should be discussed. The nature of each zone changes, sometimes through planned re-development. The changes can be seen in every part of the city, although some areas show greater change than others. These changes effect people who may disagree about the need for and the nature of the change.
4. There are relationships between the number and size of settlements in an area.	The concept of a hierarchy of central places should be studied; the terms market area, range and threshold should be used.

Table 5.3. Extract from the Unit on 'Settlement', in London GCSE Syllabus A.

All the GCSE syllabuses make some reference to the behavioural context of the processes involved in the development of settlements, especially to the roles of individuals and groups in decisions affecting settlements, and the relevance of their values and attitudes; and to the particular significance of government policies and planning strategies.

Questions about settlements occurred in almost all of the geography GCSE examinations, during each of the three years from 1997 to 1999. They were overwhelmingly structured questions, supported by a range of stimulus materials, which could include maps, diagrams, photographs, sketches and text. While many of the part questions only required short responses, a few gave candidates opportunity for more extended writing. The latter often focused on specific problems associated with settlements in either MEDCs or LEDCs, and the ways in which these problems were being tackled or might be tackled.

These tended to be the questions which gave candidates greatest opportunity to reveal their understanding.

Settlements were equally important as a theme in the nine **A Level** syllabuses, being a compulsory component in eight of them. The exception was the AEB syllabus, for which 'Settlement Patterns and Processes' and 'Managing Cities - Challenges and Issues' were both optional topics. As the first was in a set of three topics from which two were to be selected, and the second was in a set of four, with again two to be studied, it seems likely that most schools and colleges would have included at least one of the settlement topics in its A Level course. In two of the syllabuses, Cambridge Modular and NEAB, while some content relating to settlements was included in core components, the main treatment of the theme was in optional units. In the other six syllabuses, the theme figured as a substantial component in compulsory sections; and in some, this provision was supplemented by additional topics in optional sections.

Table 5.4 shows that most A Level syllabuses supported a broad treatment of the theme. As with the corresponding GCSE table (Table 5.1), the A Level table is not intended to be comprehensive, and there are considerable differences between syllabuses in the attention given to individual aspects. Nevertheless, it is clear that, as far as the theme

	AEB	CAM		LON		N	O	OC	W
SETTLEMENTS - SUBTHEMES	L.M	L	M	A	B	L.M	L.M	M	L.M
Settlement Patterns	√	√	√	√	√		√	√	
Urban Morphology/Structures	√		√	√	√		√	√	√
Social and Ethnic Patterns	√	√				√	√	√	√
Service Functions/Shopping Centres	√				√	√	√	√	
Inner City Areas (MEDCs)	√	√			√	√	√	√	√
Suburbanisation/Rural-Urban Fringe	√	√	√		√	√	√	√	√
Counterurbanisation	√	√	√	√	√	√		√	√
Urban Growth/ Shanty T. (LEDGs).	√	√	√		√		√	√	√
Recent and Current Changes			√		√	√	√	√	
Historic Development			√	√	√	√		√	
Problems and Strategies	√	√	√	√	√	√	√	√	√

Table 5.4. Aspects of Settlement included in A Level Geography Syllabuses

of settlements was concerned, all the elements of content prominent at GCSE - settlement patterns, urban morphology, suburbanisation and the rural-urban fringe, inner city areas, shopping centres, rapid urban growth and the development of shanty towns, changes to settlements and settlement patterns, and problems associated with settlements - continued to be important at A Level, although every one of these was not specified in every syllabus. Social and ethnic patterns within urban settlements, and the historical development of settlements, also became significant at the higher level; while other topics, not sufficiently widespread to be specified in Table 5.4, included patterns of urban inequality, and managing urban settlements. As at GCSE, more emphasis was given to urban than to rural settlements; and to conditions and processes in England and Wales than to other parts of the world.

In general, the sections on settlements and settlement patterns within A Level syllabuses were more detailed, and had a much stronger conceptual content, than those at GCSE. These characteristics are evident in the extract on 'settlement processes' from the AEB syllabus (Table 5.5), where the content is organised in relation to urbanisation, suburbanisation, counterurbanisation and re-urbanisation; and explicit attention is given to

<p>Settlement Processes</p> <p>(1). <u>Urbanisation</u> - causes and patterns, noting the differences between the developed and developing worlds. Within the urban area, functions including office activities, tourism, industry, as well as retailing should be considered.</p> <p>(2). <u>Suburbanisation</u> - causes and patterns. Different spatial patterns to note public and private housing variants and the decentralisation of many urban functions. Impact on rural-urban fringe, to include developed and developing world cases e.g. the growth of shanties. A variety of models illustrate the effects of these processes over a period of time and in relation to particular cultural influences. Candidates should be aware of the classic models (e.g. Burgess, Hoyt, Harris & Ullman) and the modern variants which relate to Britain, e.g. Mann, Robson as well as those relating to the developing world, e.g. Clarke's model for an African city.</p> <p>(3). <u>Counterurbanisation</u> - causes of this movement into the countryside - 'urbanisation of the countryside'. Rural settlement patterns and functions before this process occurred. Changes in form and function. Model of the suburbanised village.</p> <p>(4). <u>Reurbanisation</u> - return to the city - causes of this latest wave/process. The concept of gentrification. Candidates should be aware of the economic, social, political, cultural and physical influences of these processes. Planning plays an increasingly important role here.</p>
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Table 5.5. Extract from the Section on 'Settlement Patterns and Processes in the AEB A Level Syllabus.

conceptual models. This extract also illustrates how a concern with explanations is often signalled by references to ‘causes’ and ‘influences’: in this case, the causes of the four broad processes; and the importance of economic, social, political, cultural and physical influences. In most of the syllabuses, the importance of explanations was implicit rather than explicit. Key questions were identified in London Syllabus B and the Cambridge Modular Syllabus. For example, the unit on ‘The Challenge of Urbanisation’, in London Syllabus B, was introduced in terms of:

An investigation of the following questions:

- What are the demographic, economic, political, environmental and social impacts of urbanisation, and how do they vary over time and space?
- In what ways do changing urban settlements lead to different conflicts, issues and consequences for the environment and for the quality of life?
- How do planners and political decision-makers alter and control change in urban areas?
- What are the issues arising from the changing demands for urban land use in city centres and urban fringes?

These questions, which give direction to enquiry, were complemented by generalisations, which were in turn amplified and accompanied by possible examples. Taken at face value, however, the key questions appear to point towards descriptions of processes and consequences, rather than explanations. There are no ‘why’ questions in this set, although the second question might be interpreted as such. The third question appears to require a description of the methods used by planners and political decision-makers to manage change in urban areas, rather than an explanation why various policies and methods are considered to be appropriate. Table 5.6, with its extract from the NEAB Syllabus, illustrates the complexity of understanding which can be required for a given topic, and the need for students to understand the roles taken by different interest groups and decision makers. In this example, focusing on the decline and rejuvenation of inner areas of cities, attention is given to the relevance of government policies and strategies, private enterprise and the activities of the voluntary sector. However, this is not

dissimilar to the sort of understanding which appears to be signalled in the GCSE MEG Syllabus B (Table 5.2).

Inner Area Decline and Regeneration

Key Themes

- The varying effects of the same policies from city to city.
- The varying effects of the same policies on different groups of people in the same city.
- Different attitudes to regeneration.
- Identification and significance of key decision makers in inner area regeneration.

Detailed Material

- The nature of the problems of decline.
- The nature of policies aimed at inner area improvement: the changing priorities between economic, social and environmental policies (e.g. job creation, training, industry-school links, housing improvement, community and environmental projects).
- Property-led regeneration by redeveloping the built environment and the social issues associated with such development.
- Mechanisms of change: partnership between local and central government, between the private and public sectors, between the public and voluntary sectors.
- The changing importance and diversity of the voluntary sector, such as housing associations and their importance in regeneration.
- Types of policy initiatives such as, in the early 1990s in the UK, enterprise zones, task forces, urban development corporations, city challenges.

Table 5.6. Section on 'Inner Area Decline and Regeneration in Cities of 50,000 or more in Population', from the Option Unit on 'Recent Urban Changes' in the NEAB A Level Syllabus.

Questions about settlements occurred in the examinations for all the A Level syllabuses, although because of the complex patterns of options, between and within papers, they could in some cases be avoided altogether. This was so in each year for the AEB examinations, and in some years was also the situation for syllabuses, such as Cambridge M and London B, in which the theme was only a fairly weak component within the core papers. Several examinations had optional papers which focused strongly on settlements. Papers vary in the extent to which they relied on structured questions requiring short answers and questions requiring extended writing. The latter, which were often not supported by stimulus materials, tended to be more common in optional papers designed to explore themes in greater depth.

The selection of Subthemes

The subthemes selected for a deeper analysis of the support for progression in students' understanding of settlements, provided by the requirements of the National Curriculum, GCSE and A Level, are:

- urban morphology;
- suburbs, the rural-urban fringe, and the processes of suburbanisation and counterurbanisation in more economically developed countries;
- the processes and effects of the recent, rapid urbanisation in less economically developed countries.

While these subthemes primarily address aspects of urban geography, studies of the rural-urban fringe and counterurbanisation in MEDCs and of rapid urbanisation in LEDCs necessarily involve some consideration of the effects that urban developments can have on rural settlements, and of the wider relationships between rural and urban areas. Between them, they involve studies of static patterns, complex processes, recent and current changes, and current issues. Furthermore, they are well represented in assessment tasks set for GCSE and A Level examinations.

Subtheme 1. Urban Morphology

The term 'urban morphology' is being used here in the broad sense of the internal structure of a town or city. The concept focuses on: (a) physical attributes of the urban environment - built-up areas, open spaces, and the routeways, mainly streets, which link the various parts; and (b) the spatial patterns which these create. There are various ways in which a town's morphology can be described. A plan or layout, such as that shown on a street map, is a simple, two-dimensional representation of a settlement's basic spatial form; a functional map shows the purposes for which land and buildings are used; while a description of 'townscapes' takes account of the settlement's three-dimensional appearance, including the architectural styles of its buildings. Urban morphology may be influenced by site conditions, by the historical development of the settlement, and by

economic, social, cultural, political and technological factors. Taken together, these features suggest that urban morphology is a potentially complex field of study.

The conceptual models of urban land use structures, which have been introduced into the secondary school curriculum to help students understand urban morphology, are primarily from the USA: the zonal/concentric model (Burgess et al, 1925); the sector model (Hoyt, 1939); the multiple nuclei model (Harris and Ullman, 1945); and bid rent theory (Alonso, 1964), which provided an economic rationale for the concentric model. They express ideas about the growth and transformation of North American industrial cities during the nineteenth century and first part of the twentieth century, but do not address cities in other cultures, nor more recent changes such as those associated with post industrial cities (Hall, 1998).

Potential content that can be borne in mind while reviewing the subtheme includes:

- spatial patterns of urban morphology, e.g. patterns of land use, age of buildings and townscapes;
- factors that influence morphological patterns, e.g. the site of the settlement, its historical development, and the relevance of economic, social, cultural, political and technological processes;
- recent and current changes to the morphology of urban settlements;
- the role of different groups and decision makers in the development of an urban settlement's morphology; and the relevance of their aspirations, values, attitudes, perceptions and power;
- the contribution of conceptual models to an understanding of urban morphology.

This subtheme figures prominently in the KS3 programme of study, and in GCSE and A Level syllabuses. The **KS3 programme of study** refers directly to 'types and patterns of urban land use', in a brief statement which also refers to conflicts arising over the use of land. Nine of the eleven **GCSE syllabuses** include the subtheme as an element of content. Here, again, the emphasis is mainly on candidates recognising that there are spatial patterns of land use within towns, and that particular zones have specific

characteristics, although several of the GCSE syllabuses offer much more detailed guidance. While London Syllabus B refers to ‘residential, commercial, recreational and industrial zones’, other syllabuses specify such areas as the Central Business District (CBD), inner city areas and outer suburbs. MEG Syllabus B focuses on the inequalities between residential areas in different parts of a city, and on the opportunities available to different social groups to acquire housing in different areas (Table 5.2). It, therefore, makes a direct link between housing areas and social distribution patterns. Only London Syllabus A, among the GCSE syllabuses, states that its candidates are expected to study models of urban land use (Table 5.3). London Syllabus B (Table 5.7) points out the consequences of residential segregation, as well as suggesting causes of land use patterns and of the differences between residential areas. A number of important concepts are highlighted in the extract from this syllabus, including site, accessibility, land values, land

Key Ideas	Commentary
1. Similar land uses tend to concentrate in distinct areas within an urban area. This produces basic patterns of land use	Residential, commercial, recreational and industrial zones can be recognised. The patterns may be related to the physical site, land values, accessibility or planning decisions.
2. There are often marked differences between residential areas within an urban area.	There are differences in environmental quality and types of accommodation within towns and cities. Zones include inner city areas, new council developments and owner occupied suburbs in towns in MEDCs, and shanty developments and improved areas in towns in LEDCs. The differences can reflect time of development, land values, land ownership and policies of city authorities.
3. There is residential segregation between different groups of the population within many urban areas.	The cost of accommodation separates groups according to their income and/or means. A consequence of this is the differential access to work, shopping and leisure facilities. There is an outward movement of population from inner areas to the suburbs.
4. Changes to the internal structure of urban areas are brought about by various agencies. Ultimately decisions on change are political.	Property developers, financial institutions, urban authorities and governments may be involved in changes. Individuals or pressure groups may bring pressure. Changes will bring gains for some but losses for others.

Table 5.7. Extract from the Unit on ‘Internal Structure of Urban Areas’, in London GCSE Syllabus B.

values, land ownership, environmental quality and residential segregation. The extract also draws attention to various agencies who have a role in changing the internal structure of urban areas and, thereby, introduces a political dimension to the study of the processes which result in change. Several GCSE syllabuses refer to changes in urban land use, and to issues associated with change patterns or with particular types of urban area. Such elements provide opportunities for progression from KS3, especially when presented in the sort of detail exemplified by the London syllabuses and MEG Syllabus B. However, there remains the persistent problem that the programme of study for KS3 does not offer a comparable level of guidance to support its brief, generalised statements of content; and, therefore, does not explain what understanding of urban morphology might reasonably be expected of students who are about to start a GCSE geography course.

The subtheme is clearly identifiable in eight of the nine **A Level syllabuses**. Many of the summaries of content at A Level were similar to the more detailed of the GCSE statements, in that they referred, in general terms, to the need to study urban land use patterns, the dynamic character of some urban areas, and issues associated with them. Many of the A Level syllabuses referred to a range of broad factors which influence urban morphology, an approach typified by the introductory generalisation to the relevant section in the WJEC Syllabus, which asserted that: 'the interaction between economic, social, cultural, political and physical processes produces distinctive spatial patterns in both urban and rural environments'. In comparison, the Cambridge Linear Syllabus included technological changes; the AEB Syllabus had a more varied list that included site, planning and land ownership; and London Syllabus B required its candidates to study a number of cities at a variety of scales 'to show that change is economically and politically determined, and the citizen is affected by market and state decisions causing change'. London Syllabus B's reduction of the factors to two could be perceived as being either more focused or narrower than the approaches in other syllabuses.

The most conspicuous difference between the GCSE and A Level syllabuses, in their treatment of urban morphology, is the prominence in the latter of abstract ideas, especially models and theories. While the AEB Syllabus referred to a fairly wide range of models (Table 5.5), and the O & C Syllabus referred in general terms to 'structure models for

western, socialist and Third World cities', most of the syllabuses gave priority to Alonso's bid-rent theory and to the 'ecological' models of Burgess and Hoyt. This is well illustrated in the extract from the Oxford Syllabus, in [Table 5.8](#), which not only lists these

Urban land-use in Britain:

- urban land-use patterns, competition between and change in urban land-use patterns in Britain since 1960; Alonso's urban land-use (bid-rent) theory;
- urban residential segregation (socio-economic, ethnic); 'ecological' theories of segregation (Burgess and Hoyt);
- evaluation of models of Alonso, Burgess and Hoyt with reference to urban settlements in Britain and the European Union.

Table 5.8. Extract from the Section on 'Settlement' in Module 2 of the Oxford A Level Syllabus.

conceptual structures, but also requires their evaluation in relation to urban settlements in Britain and the European Union. Evaluation of the usefulness of 'general theories of urban structure' was also given prominence in the Cambridge Modular Syllabus, but without specifying any particular models. However, this syllabus pointed out the variety of ways in which zones within urban areas can be categorised; and it introduced other ideas, such as 'neighbourhood', barriers (within settlements), 'intra-urban spaces' and 'personal mental maps' ([Table 5.9](#)). The O & C Syllabus similarly referred to several

Key Question

What are the characteristics of the internal morphology of towns, and how useful are general theories of urban structure?

Syllabus Content

- Methods of categorising zones within urban areas: historical, functional, ethnic, cultural, socio-economic, tenure, density of population.
- Selected related theories of urban structure and change.
- The significance of intra-urban spaces and barriers.
- The nature of 'problem areas' in cities; causes and characteristics.
- The nature of 'neighbourhood' and the significance of personal 'mental maps' for the urban dweller.
- Distinctive aspects of the urban morphology of non-Western cities.

Table 5.9. Extract from the Module: Towns and Cities: Evolution and Change, in the Cambridge Modular A Level Syllabus.

psychologically related concepts - perception, decision-making, mental maps and residential desirability - in this case, in the context of social patterns in urban areas.

Several syllabuses, at GCSE and A Level, draw attention to the relationship between the distribution of social groups and the character of different housing areas, and to the significance of residential segregation. There would appear, from the evidence of external examination syllabuses, to be significant scope for content-specific progression between GCSE and A Level, in students' understanding of urban morphology.

Assessment tasks at KS3, GCSE and A Level provide further insights into the understanding of urban morphology which students are expected to develop. Most of the relevant questions are concerned with differences in the layout, type of housing and quality of environment in different urban areas; or with the over-all land use patterns characteristic of urban settlements in MEDCs (More Economically Developed Countries).

KS3. The assessment task in the Settlement Unit (Unit 3) of SCAA's 'Optional Tests and Tasks' (1996b) requires each student to write a 'newspaper article' about the development of Bradley Stoke, a new settlement located near Bristol. This task and a number of preparatory activities are supported by information provided in the unit. The tasks and sections of the assessment criteria which focus specifically on urban morphology, together with the relevant items of information provided for students, are listed in Table 5.10. According to the assessment criteria, the students' levels of understanding of the urban morphology of Bradley Stoke would be based on the quality of their descriptions and explanations of the land use pattern of the settlement. But the unit gives no guidance to teachers about what sort of descriptions and explanations it is reasonable to expect from students of this age. Their descriptions of the land use patterns would necessarily depend on their ability to apply relevant spatial concepts to the information provided. For example, they might need to distinguish between: central, inner and outer locations; concentrated and dispersed patterns; those uses which occupy large areas of land and those which do not; or those which appear to have a directional component. They might need to recognise associations of land use - the apparent separation of some land uses and the mixing of others; or the association of a particular land use with another geographical feature.

Information Provided

The unit includes: a generalised plan of the intended layout and land use of the settlement; a table summarising the amount of land allocated to particular purposes; and a map which shows the road pattern, completed developments, and developments still to be tackled.

Tasks

In their preparatory enquiry, students can use the information provided to 'produce a map of Bradley Stoke, from which they may describe and explain the patterns shown'.

For their assessment task, students have to produce a newspaper article about the development of Bradley Stoke, which must include a section on 'land use - the area of land used for different purposes and the pattern of land use'.

Assessment Criteria

The sections of the assessment criteria relevant to urban morphology are:

Levels 3-5. The main land uses of Bradley Stoke, e.g. housing, open space, are identified and the patterns of one or two of them are described.

Levels 5-6. Most of the land uses in Bradley Stoke are identified, patterns are described and explanations are attempted.

Levels 7-8. All the land uses are identified and patterns are explained accurately using the resources and the pupil's own geographical knowledge.

Table 5.10. Assessment of Understanding of Urban Morphology, in the Settlement Unit in SCAA's Optional Tests and Tasks (1996)

To explain the patterns identified students would have to apply their knowledge of the factors which can influence the location of particular types of land use. This could draw some of them towards more general and abstract ideas, such as: land use specialisation and zoning; accessibility; environmental quality; and land values. None of this is signposted in the guidance provided. Whether the task defined in the unit produces adequate evidence of understanding must depend, at least in part, on how the unit is taught, and under what conditions the assessment is carried out.

The **GCSE** questions on urban morphology fall into two main groups: those that concentrate on particular residential areas (Table 5.11); and those that are about broader urban land use patterns (Table 5.12). The most common method used in the questions included in Table 5.11 is to ask candidates to compare two residential areas or neighbourhoods, from evidence presented in the form of maps, tables or photographs. Headings are provided to help them to structure their answers, the most frequently mentioned being the 'layout' or 'street pattern' of the area, the 'density of housing', and the 'type of housing'. Question 2 suggests a wider range of aspects - 'housing type, open

space, facilities and surrounding environment'; and Question 4a includes 'likely date of house building'. These questions assess skills as much as knowledge and understanding. Most had a small allocation of marks, suggesting that examiners were requiring short answers.

1. Describe the differences between areas A and B using the headings: 1. street layout 2. building density. [extract from OS map, 1:50,000] (4) NEAB B, 1997.
2. Describe the differences between housing areas A and B. You could mention housing type, open space, facilities and surrounding environment. [extract from OS map, 1:50,000] (8) SEG B, 1997.
3. a. Compare the layout of neighbourhoods A and C [street plans] (5)
b. Name a neighbourhood that you have studied.
i. Describe the pattern of land use. You may use a sketch if you wish.
ii. Suggest reasons for the pattern you have described. (7)
c. For the area you have described in (b) suggest any steps you think could be taken to improve the quality of life for the residents. Give reasons for your suggestions. (5) MEG D, 1997.
4. a. Complete the table to show some differences between the two urban areas identified on the 1:50,000 OS map extract [Table with headings of street pattern, housing density (high or low), likely type of houses, likely date of house building]. (6)
b. Choose either of the areas. Suggest two advantages and two disadvantages of living in that area. (4) London B, 1998.
5. [Aerial photographs and other information, mainly in the form of bar and pie graphs, about two contrasting residential areas]
a. i. Describe the type of housing and housing layout in photograph X. (2)
ii. Compare these with photograph Y. (2)
b. Using the tables:
i. Describe the quality of housing likely to exist in Area 1. (2)
ii. How does this compare with the quality of life likely to exist in Area 2. (4)
iii. Suggest which photograph is of Area 1 and which of Area 2. Explain your choices. (4)
c. Some people wish to migrate away from the area shown in photograph Y.
i. Suggest reasons why two different groups of people may wish to migrate away from the area shown in photograph Y. (2)
ii. Suggest ways in which the local council could improve the area shown in photograph Y to [encourage people to remain]. (6) MEG B, 1998
6. Using information [from the table], together with your own case study knowledge, describe and account for the variation of housing quality within cities of the more developed world [Table of information obtained from a housing quality survey of UK city] (9) NEAB A, 1999.

Table 5.11. GCSE Questions about Urban Residential Areas.

This is confirmed by the mark schemes. For example, comparisons of housing density were expected to be in terms of high or low densities, or based on the absence, presence or relative abundance of gardens; while comparisons between types of houses rested mainly on the distinction between detached or semi-detached houses, on one hand, and terrace housing, on the other. Differences in layout focused mainly on the contrasts between straight roads in geometric/grid patterns and curved roads in more irregular layouts; although the mark scheme for Question 3 distinguished between layouts with through roads and those with many cul-de-sacs, and recognised that answers might legitimately refer to the size and shape of plots, as well as to road patterns. Questions 3 and 6 also include parts which require candidates to draw upon knowledge which they have acquired from case studies. Both of these, together with Questions 4 and 5, give specific attention to the quality of housing or housing areas; and Questions 3 and 5 also ask how particular areas might be improved. They provide scope for candidates to exercise judgement, and to introduce information and ideas which go beyond the information given. These are open questions, which can generate a wide range of acceptable answers. Although not always easy to mark, such questions provide opportunities for candidates to display understanding, especially when they are required to offer explanations, as in Questions 5 and 6, or justify suggestions, as in Question 3.

The questions in [Table 5.12](#) are, in general, broader in their spatial scope than those in [Table 5.11](#). Most refer directly to land use patterns, although Questions 1 and 4 focus mainly on housing; and most relate to the morphology of a town or city as a whole, rather than to much smaller areas. Only two are stimulus-response questions; the others expect candidates' to recall relevant details from case studies. Most of the questions ask for explanations as well as descriptions, and provide some scope for extended writing. However, few of the mark schemes commented in any depth on either the descriptions or explanations required. While [Question 2](#) (MEG A) asks for an evaluation of a concentric model, which gives the impression of a more demanding question, the mark scheme reveals that the examiners were not looking for any depth of understanding. Candidates were expected to recognise that the diagram provided a general picture, 'although not all urban areas have developed along the same pattern'. Credit was to be given for applying the ideas in the model to particular urban areas and pointing out anomalies to the general

1. Choose a large town or city you have studied.
 - a. Describe the differences in housing and quality of the environment within the city.
 - b. Give reasons for these differences. (8) London B, 1997.
2. To what extent is this diagram useful in describing land use in towns and cities? You should refer to examples which you have studied. [diagram of land use zones - showing a concentric pattern within a wedge-shaped sector] (4) MEG A, 1997.
3. Use evidence from the map to describe how the land use changes from close to the CBD (Central Business District) to the edge of the town. You should refer to housing, roads and other land uses. [annotated street map] (6) MEG A, 1999.
4. Describe and explain how the type of housing changes with distance from the Central Business District in a named UK city or town. (5) NEAB B, 1998.
5. Name a New Town that you have studied.
 - a. Describe the main features of its lay-out and land use pattern. You may show this by a sketch map if you wish. (4)
 - b. Explain the advantages of the New Town's design. (4) London B, 1998.
6. Describe and explain the differences in the land use pattern between a city in a MEDC and a city in a LEDC. (8) WJEC, 1998.

Table 5.12. GCSE Questions about Urban Land Use Patterns.

pattern, but the only points suggested as being worthy of marks were that: the diagram only showed one segment; it showed the idea of concentric circles; it showed the CBD in the centre; it doesn't fit New Towns; and it doesn't fit LEDC cities. There was no suggestion that candidates would be able to give any rationale for the concentric pattern; nor be able to explain how the model might be used. The most detailed, content-specific guidance, in this group of questions, was that given by WJEC for Question 6, which asked candidates to describe and explain the differences in the land use pattern between a city in a MEDC and a city in a LEDC. The 'background information', prepared for the markers, noted that:

Anticipated responses will name two appropriate cities and describe the main contrasts in land use patterns. These may include location and extent of shanty housing, contrasts in location of high class housing, location of industry, including proximity to road and rail, and the size and nature of the CBD. Explanations of differences will refer to growth rates, effectiveness of planning policies, contrasts in the mobility of city inhabitants, contrasts in wealth.

No links were made between the descriptive and explanatory points; nor was there any recognition that some differences, for example in the location of high class housing and in the nature of some city centres, might be a consequence of historical and cultural factors. The 'levels of response' guidance for this question was that a top level answer should contain 'a very detailed description' of the land use patterns, for both cities, and a 'thorough explanation' as to the differences - perhaps, somewhat overstated expectations for a GCSE part-question with a fairly modest allocation of marks. The mark schemes for most of the other questions gave little indication of the quality of understanding expected.

Most of the **A Level** questions concerned with urban morphology are within broad structured questions. The marks allocated to individual tasks range widely, indicating the need for short and extended answers. While many do not refer directly to conceptual models or theory (Table 5.13), a significant number do (Table 5.16). In Table 5.13, Questions 1 and 2 focus on factors which have influenced land use patterns; while Questions 3 to 7 give attention to changes in urban morphology, especially in the context of rapid urban growth. Although neither Questions 1 nor 2 refer directly to models, their mark schemes recognise that such conceptual structures may be relevant as sources of ideas, which can be applied to the land use patterns of specific towns or cities. Most of the questions in the second group seek some sort of explanation as well as description, the only exception being Question 5, which asks about the positive and negative effects of changes which have taken place. Only Question 3, with its map of the quality of housing in Merida, has data response tasks. In contrast, five of the seven questions require candidates to draw upon case studies which they have undertaken, in particular the 'named urban area' or 'named chosen city region', required by some syllabuses. Many of the mark schemes were sensitive to the fact that the details presented in individual answers would be strongly influenced by a candidate's choice of case study. In consequence, reliance was often placed on very broad guidance, which emphasised general qualities and avoided detailed comments on the type of geographical content expected. The criteria for a Level 3 response for Question 6 (O & C) is a good example of such a statement:

Answers show detailed, accurate and concise knowledge and understanding. They are supported by clear references to a specific urban area and emphasise the link between population growth and urban structure.

1.	a. Outline the social and economic factors which have influenced the patterns of land use in urban areas. (15)
	b. How may physical factors contribute to such patterns? (10) AEB, 1999.
2.	With reference to one or more cities or towns in the developed world, discuss the factors which have affected the zonation of land use in the urban area. (4) Cambridge Linear, 1999.
3.	[map of the quality of housing in Merida, a rapidly growing city in Mexico]
	a. Compare the distribution of high quality housing with that of low quality housing. (3)
	b. Suggest two possible reasons for distributions such as those described in (a). (4)
	c. Suggest why the distribution of high quality housing might be changing in less economically world cities such as Merida. (7) AEB, 1997.
4.	Outline how recent urban growth has modified the morphology of one named urban area. (7) AEB, 1998.
5.	a. Outline the main changes which have occurred in the character and zonation of residential and economic functions of your named chosen city region over the last 30 years. (9)
	b. Assess the positive and negative effects which these changes have had upon your chosen city region. (16) Cambridge Linear, June 1998.
6.	With reference to any named urban area that you have studied, describe and explain how its internal structure has been affected by rapid population growth. (6) O & C, 1998.
7.	With reference to a named urban area you have studied:
	a. describe the main growth phases evident in its built-up area;
	b. show how these growth phases may have been influenced by transport technology in the past. (6) O & C, 1999.

Table 5.13. A Level Questions about Urban Morphology (A).

Where the mark schemes provide more detailed guidance about relevant content, they indicate the potential complexity of the knowledge and understanding involved. For example, the AEB and Cambridge Linear mark schemes for Questions 1 and 2 include wide ranging lists of factors affecting land use patterns in urban areas (Tables 5.14 and 5.15). Although there are similarities between the lists, there are significant differences which only partly arise from the separation of the socio-economic and physical factors in the AEB question, and the fact that the Cambridge Linear question is restricted to the developed world. As far as the social and economic factors are concerned, both

mark schemes acknowledge the importance of historical factors, land values, and

Factors should include:

Social and Economic

- Bid-rent land values - the best will note that it possesses a three dimensional nature, and the reasons for this.
- Transport - as an attraction or otherwise. All forms could be included - estuarine industries, for example, to modern developments associated with airports.
- Planning - especially important in socialist variants, but also in Europe/UK, e.g. height of buildings in Central Paris, council estates to periphery, land use zoning, etc. South Africa still displays the role of strict political control. New Towns.
- History - old cores in UK/European cities and also the colonial core in South America, etc.
- Migration - inner cities and shanties.
- Economic decline or resurgence - inner city industries, urban regeneration, UDCS - time as a factor.
- Urban fringe developments and uses - attractions of this.

Physical

- E/W division of land use - Mann's model and link to prevailing winds.
- Modern riverfront developments, marinas - sometimes replacing older docks and industries. Flight of docks and industries downstream.
- High ground and coastal positions for high class housing.
- Impact of hills on development, e.g. Montreal's CBD.
- Coastal resorts - hotels, amusements along front, etc.
- Early concentration on valley sites - flight to higher ground for housing away from sources of pollution.
- physical attractions of the fringe.
- Shanties - fringe or physically unattractive sites, e.g. favelas in Rio.

(from the mark scheme for Question 1 in Table 5.13)

Table 5.14. Extract from the AEB A Level Mark Scheme for 1999. Factors influencing Patterns of Urban Land Use.

accessibility. But the AEB guidance refers to planning rather than to government policies and legislation; and includes 'migration', 'economic decline or resurgence' and 'urban fringe developments and uses', none of which are mentioned in the Cambridge Linear mark scheme. On the other hand, the Cambridge Linear scheme refers to 'the factors affecting the location of manufacturing and tertiary industries', the 'needs and desires of different groups in society', and the role of key players in the housing market, none of which are mentioned by AEB. Such differences are perhaps not surprising, given the

complexity of the conditions and processes influencing urban land use patterns and the different ways in which the various factors can be classified. The list of physical factors in the AEB scheme also illustrates the wide range of responses which candidates might offer to open-ended questions that can be applied to extremely varied situations and processes.

Factors relating to urban land use zoning in the developed world:

- historical processes of growth and decay / established open spaces / environmentally sensitive areas;
- the physical characteristics of the site and its immediate environs;
- accessibility and the pattern of land values;
- factors affecting the location of manufacturing and tertiary industry;
- policies and legislation of central and local governments;
- the needs and desires of different groups in society, perhaps developed in the context of ethnic minorities;
- factors associated with the housing market: the role of local authorities, building societies, landowners.

(from the mark scheme for Question 2 in Table 5.13)

Table 5.15. Extract from the Cambridge Linear A Level Mark Scheme for 1999.
A list of Factors which have affected Urban Land Use Zoning in the Developed World.

The questions in Table 5.16 differ markedly from those in the previous table. Their most striking feature is the extent to which they give attention to models or theory. Five of the six questions make explicit reference to such conceptual structures, and the link is implicit in Question 1, which is concerned with a concentric pattern of urban growth. The attention to models and theory within the questions serves a variety of purposes: to assess candidates' understanding of a particular conceptual construct (Questions 2a, 3a and 3b) or general understanding of the use of models to help explain a particular urban land use pattern (Question 6); to provide a comparison with a case study (Questions 2b, 4a, 5c and 6; and possibly Question 1); and to stimulate or guide explanations (Questions 4 and 5). Five of the six questions are supported by stimulus materials: a diagram, for Question 3; two-dimensional spatial models for Questions 2, 4 and 5; and maps of spatial patterns within a given city for Questions 1, 2 and 5. Questions 5 and 6 require candidates to apply their knowledge and understanding of models to what they can recall from case studies.

1. [map of urban growth in Dublin between 1798 and 1988 - 8 periods mapped]
 - a. Explain how the concentric pattern of urban growth may have been formed (2)
 - b. Using evidence [from the map] suggest two possible reasons why Dublin's growth phases are not fully concentric. (4)
 - c. Suggest two possible reasons why Dublin's built-up area, until 1876, was relatively small. (4) O & C, 1999.
2. a. i. Identify the original models for cities in the economically developed world upon which the model [of the morphology of an LEDC city] was based. (1)
 - ii. In what ways have these original models been adapted to make this model more appropriate to cities in the less economically developed world? (3)
 - iii. Outline two assumptions which may be made by geographers who devise models for urban morphology. (4)
- b. i. To what extent does the housing pattern in the model fit the pattern shown in Bogota? [map of 'social segregation in relation to income' in Bogota] (4)
 - ii. Outline two reasons why it is more difficult to design realistic models of land use for cities in the less economically developed world. (4) AEB, 1997.
3. [partly completed diagram of Alonso's land use theory, showing bid-rent curves]
 - a. Draw a diagram to show the land use zones within and around the urban centre that may be derived from these bid-rent curves. Clearly label each zone. (4)
 - b. Explain why bid-rent curves vary between different categories of land use under Alonso's theory. (6) Oxford, November 1996.
4. [models of urban land use structure for 1966 and 1996, and an undated land use map of Bedford]
 - a. Compare the urban structure of Bedford [as shown on the map] with that shown in the model for 1996. (8)
 - b. i. Suggest reasons for the changes during the last 30 years as shown in the models.
 - ii. Discuss the attitudes of different groups to the infrastructural developments which have occurred in many cities during the last 30 years. (12)
 - c. Describe the possible effects which communication changes such as telebanking, teleshopping, video conferencing and faxing, may have on urban structure. (5) NEAB, June, 1997.
5. [a land use model for an MEDC urban settlement, with strong sector components]
 - a. i. Suggest criteria you could use to identify: 1. high-class residential sectors; and 2. medium-class residential sectors. (4)
 - ii. Explain the location of the residential land use sectors. (5)
 - b. Suggest how, over time, the land use might change in: 1. Zone C [wholesale light manufacturing]; and 2. Zone D [the CBD] (6)
 - c. For a named urban area, explain the extent to which the land use differs from the model. (5) London A, 1998.
6. Examine how models help to explain the land use pattern in an urban area you have studied. (20) London A, 1999.

Table 5.16. A Level Questions about Urban Morphology (B)

Many of the questions assess candidates' depth of understanding, especially when they are required to explain the logic underpinning a theory or model, or apply ideas from a model

to help interpret empirical data, whether that data is supplied with the question or has to be recalled from case studies. Even when questions were supported by stimulus materials, candidates usually were expected to go beyond the information given. This was necessary to answer all three parts of Question 1 and the three parts of Question 2a, although none required an extended answer. The suggestions in the mark scheme for Question 2bii (AEB), which asks candidates to ‘outline two reasons why it is more difficult to design realistic models of land use for cities in the less economically developed world’, reveals the depth of knowledge and understanding of Third World cities, and the relevance of this to model building, which can be expected at A Level:

- Less planned; controls weaker or non existent so less chance of identification of zones.
- Rapid modern growth; speed at which growth has occurred means less organisation possible.
- Shanty towns/squatter settlements; large numbers live in informal residential areas, which are located more according to the chance of empty land existing.
- Historical/cultural differences between countries of Developing World, e.g. tightly packed Arab cities cf. Spanish grid layout in South America.

While parts (b) and (c) of Question 4 (NEAB) similarly required candidates to go beyond the information given, the mark scheme gave less indication of the understanding expected. For example, the guidance on that part of the question which asked about the attitudes of different groups of people to the infrastructural developments which have occurred in many UK cities during the last 30 years, was limited mainly to a list of types of development - road developments, bridges and tunnels, metrolink systems, and airport developments - all of which were to do with transport. The mark scheme neither addressed the concept of ‘infrastructure’, nor the focal point of the significance of the attitudes of different groups of people to various types of development. There was no recognition, for example, that:

- such developments are complex, in that they can have environmental, economic and social implications; and often have indirect, as well as direct, effects;
- the different groups with strong attitudes to such developments can include the developers (a diverse group), the regulators (i.e. the planning system) and those affected by the development (also a diverse group);
- attitudes can be influenced by personal as well as group interests and values - there is a danger of stereotyping groups;
- the attitude of an individual towards a development may be influenced by locational factors, such as where the individual lives, works or travels in relation to the development;
- the relationships between cognition, attitudes and behaviour are complex.

In this case, the mark scheme does not do justice to the possibilities inherent in the question.

Questions 3 and 5 provide opportunities for candidates to display their understanding of the rationale underpinning a theory/model. The completion of the diagram, presented in Question 3 (Oxford), by showing the land use zones which may be derived from a set of bid-rent curves, is likely to reveal candidates' knowledge of Alonso's urban land use theory, while an explanation of the bid-rent curves is more likely to reveal their understanding. The mark scheme for this question (Table 5.17) indicates that a high quality of understanding was expected. To obtain full marks, candidates had to explain the basic structure of the theory, and the relevance to that structure of a number of abstract concepts, in particular, accessibility, centrality, economic rent and bid-rent. They were also expected to recognise the simplifying initial assumptions of the theory, although they were not asked to compare the theory with the more complex conditions within a given city, nor to comment on the theory's value or limitations. The questions focus firmly on the content of the theory and its rationale. The mark scheme for Question 5a (London A) gave explanations for the location of the three classes of residential land use - high, medium and low - shown on a sector model for an MEDC settlement. For example, it was suggested that: the high class residential area had grown outwards from

For 6 marks, candidates should:

1. consider the initial assumptions of Alonso's theory (isotropic surface; competitive land market; accessibility related to centrality);
2. explore the differing needs of various land users for sites with high accessibility (and thus high centrality);
3. explore the differing abilities of various land users to extract 'value' ('economic rent') from a given area of land, and thus to bid highly (or lowly) for accessible (and centrally-located) land. There should be clear understanding of the relationship between variations in bid-rent curves and variations in the need for high accessibility and inability to pay. Evaluative discussion of the applicability of Alonso's theoretical ideas to real world conditions is irrelevant. The discussion need not be related to the land-use categories specified in (the Figure), but candidates should compare the bid-rent curves generally characteristic of at least two categories of land-use.

Reduce marks for lesser coverage on above lines; for failure to consider initial assumptions of Alonso's theory; for weaker quality of discussion of relationships between centrality, accessibility and land values (bid-rents); for failure to consider variations in need for, and ability to pay for, centrally-located land. Pass answers on this part question.....must show understanding that bid-rent curves reflect the varying valuations of sites at increasing distance from the urban centre by land users with differing need for accessible land.

Table 5.17. Extract from the Oxford A Level Mark Scheme (November, 1996). Explaining the rationale for bid-rent curves in Alonso's Urban Land Use Theory.

the CBD along a routeway; that the residents could live at a distance from their workplaces, because they had access to transport; that, despite the low density of housing, the high class residential [zone] takes up a small area of land, because of the small number of such residences; and that this area may be located 'away from the prevailing wind'. It appears that candidates were expected to apply their knowledge of the growth pattern of British towns to interpret the model. It can be assumed that, in doing so, they would also display their understanding of elements of the rationale for the model.

Question 6 (London Syllabus A), asking candidates to examine how models help to explain the land use pattern in an urban area which they have studied, is a broad, open-ended question, requiring a well structured, extended answer. The mark scheme reinforces the view that this is an intellectually demanding question, not only because it requires candidates to display accurate knowledge and good understanding of the models and case study chosen by the candidate, but also because of the analytical and evaluative

dimensions signalled by the term 'examine'. At the highest level of response, candidates were expected to link the principles and processes of the models to located features of the land use pattern of the urban area studied, and to evaluate 'to what extent' the models helped understanding. In addition, it was suggested that, at this level of response, they might 'conceptualise on the role of models'.

Subtheme 2. Suburbs, the Rural-Urban Fringe, and the Processes of Suburbanisation and Counterurbanisation in More Economically Developed Countries.

The second subtheme focuses on particular types of places and the processes involved in their development. It is a field in which definitions pose a challenge. The ideas of a 'suburb' and of the 'rural-urban fringe' are necessarily linked to our understanding of 'town and country', 'urban and rural' - all of which are familiar terms, but fuzzy concepts, viewed differently from different perspectives. In comparison, the terms introduced to identify the processes are technical and specialist, rather than vernacular. One of the challenges facing students here is to distinguish between a range of unfamiliar, but closely related, terms - such as urbanisation, suburbanisation, counterurbanisation and reurbanisation; deconcentration and decentralisation - which denote, in a very generalised form what are, in practice, very complex, interrelated processes. Developments in transport have been a leading factor in the rural-urban fringe becoming a dynamic area, or at least one which is subject to pressures for change. Various regarded as a desirable area in which to live, an area offering opportunities for economic development and an environment under threat, the fringe is a modern setting for social and environmental issues. (Johnson, 1967; Clout, 1972; Johnston et al, 1994; Hall T., 1998).

Potential content that can be borne in mind while reviewing the subtheme includes:

- the characteristics of suburbs and of the rural-urban fringe;
- reasons for the development of suburbs, especially the relevance of technological developments in public and private transport;
- the processes of suburbanisation and counterurbanisation;

- recent developments in the rural-urban fringe;
- issues associated with the rural-urban fringe;
- strategies to control and manage the rural-urban fringe.

While there is no specific mention of either suburbs or the rural-urban fringe in the **KS3** programme of study, some aspects could be accommodated within the very broad requirements of the settlement theme. For example, suburbs could be included within the study of the ‘growth and nature’ of an individual settlement; and a commuter village might provide a suitable example of ‘how changes in (the) function of settlements occur and how these changes affect different groups of people’. In these circumstances, such examples are more likely to be used by geography teachers when the catchment area of their school lies in a suburban area or in the commuter zone for a large town or city. The KS3 programme of study does not discourage the inclusion of content related to this subtheme, but nor does it provide any specific encouragements.

At **GCSE**, content relating to the subtheme occurs in 6 of the 11 syllabuses (Table 5.1). There is an emphasis on changes associated with suburbanisation and counterurbanisation, and the issues which arise from these, although the term ‘counterurbanisation’ is not used. The statements of content tend to be brief. NEAB Syllabus B provides an example of a terse statement, with its references to ‘modern housing estates, commuter villages and related issues’ and to the ‘urban fringe’, within a topic about urban growth and change in the UK. Statements about issues in the rural-urban fringe range from London Syllabus B’s broad generalisation that ‘competing demands in the countryside can create environmental, economic, social and political conflicts’ to SEG Syllabus A’s listing of conflicts and issues in such areas - ‘new roads, green belts, sprawl, conservation and hobby farming’. Both of these syllabuses assert the need for planning: in one case, to ‘resolve conflicting demands on the countryside’ (London B); in the other, to minimise the environmental impact of urban growth (SEG A). In most of the GCSE syllabuses, it is clear that the treatment of the rural-urban fringe is intended to focus on MEDCs, and especially on the UK. NEAB Syllabus C is exceptional in that it also includes LEDCs. This syllabus provides a fuller statement than most about ‘pressures at the rural-urban fringe’ (Table 5.18).

Pressures at the Rural-Urban Fringe

Key Question: In what ways are rural-urban fringes under pressure throughout the world?

Knowledge and Understanding:

Rural-urban fringes throughout the world are under threat from increasing competition for the land. Refer to the UK and a named LEDC to illustrate world-wide principles.

- MEDCs: economic activities seeking green field sites in rural-urban fringe; transport, housing, industry, retailing
- A named LEDC: continuing urbanisation and housing pressure.

Key Question: Why are rural-urban fringe locations under such pressure?

Knowledge and Understanding:

- Factors causing changes at the rural-urban fringe of the UK and a named LEDC

Key Question: How can these changes at the rural-urban change be managed?

Knowledge and Understanding:

- A named country of the UK: strategies to resolve competing interests of developers and conservationists
- A named LEDC: alternative approaches to improve housing and welfare

Table 5.18. Extract from the Topic on ‘Pressures at the Rural-Urban Fringe’ in GCSE NEAB Syllabus C.

The subtheme is included in all but one of the **A Level** syllabuses (Table 5.4), the single exception being London Syllabus A, which refers in general terms to ‘processes of urbanisation and counterurbanisation’ but not to suburbanisation nor to the rural-urban fringe. As at GCSE, statements of the content required are fairly brief, although at A Level there is a greater tendency to introduce more abstract concepts, such as counterurbanisation, decentralisation and functional interdependence, and to recognise more fully the variety of causes and consequences of the pressures on the rural-urban fringe. Many of the syllabuses mention specific types of industrial and commercial developments, such as science parks, business parks, leisure complexes, conference centres and, above all, out-of-town shopping centres. In comparison with GCSE, the A Level syllabuses tend to refer to ‘pressures’ on the rural-urban fringe and the ‘impact’ of recent developments, rather than to list specific ‘issues’. In general, the syllabus statements at GCSE and A Level reveal continuity of interest in this subtheme and provide considerable scope for progression in understanding.

The evidence available from formal assessment, about the understanding of the subtheme expected of students, is closely in line with the content requirements specified for each stage. There is very little which is directly relevant in the examples of assessment

provided for KS3; much more to be gleaned from the questions which have been set for GCSE and A Level examinations.

KS3. The Settlement Unit of ACAC's KS3 Optional Tests and Tasks (ACAC, 1997) has little to offer about the understanding of the rural-urban fringe, despite the fact that Bradley Stoke, the new settlement selected for investigation in the unit, is located within the urban fringe of Bristol and has suburban characteristics. While learning tasks suggested in the unit encourage pupils to find out where the settlement is located, why it was developed, why the early growth was less than intended, and how some of its younger residents feel about living there, little specific attention is given to the processes of suburbanisation and counterurbanisation. From the materials provided in the unit, it is possible to identify some of the key participants in the development of Bradley Stoke: the developers; the planners who grant or refuse permission to build; the home buyers who moved into the settlement; and the commercial firms who have settled there and provide employment, but their different roles in the process of development are not studied. The assessment task does not directly address the character of the rural-urban fringe, nor the environmental issues associated with the development of the new settlement.

The **GCSE** questions about the rural-urban fringe are all extracts from broader structured questions. Most are supported by stimulus materials, especially maps, the majority of which are extracts from OS sheets. About two-thirds of the questions ask for explanations, mainly about why the rural-urban fringe, or particular sites within fringe areas, attract developments; and why such developments can produce conflicting reactions from different groups of people. The comparatively high proportion of questions from NEAB Syllabus C examinations reflects the prominence of the subtheme in that syllabus (Table 5.16), and the fact that in 1999 the 'rural-urban fringe' was the focus for the 'Issues Evaluation Exercise', which occupies a whole paper in the terminal examination for NEAB C. In that year, the paper had three sections - the nature of pressures in the rural-urban fringe, the causes of those pressures, and managing the pressures - which matched the key questions in the relevant part of the syllabus. While some of the support materials for the examination questions were included in an advance information booklet, issued to candidates about six weeks before the day of the

examination, candidates were not allowed to take this booklet or any other information into the examination room.

For the purpose of this analysis, the treatment of GCSE questions will be considered in four groups, which are concerned with:

1. the reasons why people migrate to the suburbs and to the rural-urban fringe (Table 5.19);
2. the general attractions of the rural-urban fringe for development (Table 5.20);
3. the attractions of specific sites/locations in the rural-urban fringe for particular forms of development (Table 5.21); and
4. the effects of suburbanisation and counterurbanisation on rural areas, and the issues associated with these processes (Table 5.22).

Both of the questions in Table 5.19 make use of the push-pull model of migration (Lee, 1966) in their stimulus materials. Question 1 (London B) focuses more directly on the model itself, by asking how it helps understanding of this particular type of migration

1. Explain fully how this model helps us to understand the migration between inner city areas and the suburbs in developed countries. Include examples of the obstacles, push factors etc. in your answer [diagram of model]. (7)
London B, 1997.
2. Describe the characteristics of the migration from urban areas to the rural-urban fringe in the UK, and explain why it takes place [cartoon diagram]. (7)
NEAB B, 1998.

Table 5.19. GCSE Questions about Reasons why people Migrate to the Suburbs and to the Rural-Urban Fringe.

pattern. The diagram accompanying the question is more sophisticated than the basic push-pull concept, because it includes ‘obstacles’ and ‘reasons for return’, as well as ‘push factors’ and ‘pull factors’. The lists of examples, given in the mark scheme, illustrate the potential complexity of the contributory factors:

Push factors - e.g. noise pollution, crime, lack of garden, stress, congestion;

Pull factors - e.g. new housing, clean air, peaceful, near countryside, jobs;

Obstacles - cost of commuting to city centre, cost of housing;

Reasons for return - e.g. too costly, missing bright lights, divorce.

However, the mark scheme made no reference to the general value of the model in recognising that migration is encouraged by both 'push' and 'pull' factors, which are often complementary to one another- metaphorically two sides of the same coin - and may be discouraged or even reversed by other factors. The mark scheme for Question 2 (NEAB B, 1998) likewise presents lists of push and pull factors, and, additionally, includes a short list of 'general factors' which have been very important in encouraging people to move to the suburbs - greater wealth, improved transport systems and greater car ownership. Neither mark scheme suggested that candidates with deeper understanding might point out that the relative strength of the two groups of forces, the push and pull factors, can vary considerably in different circumstances and for different people. Such omissions suggest scope for further development in understanding.

All six questions in [Table 5.20](#) ask, in one way or another, for explanations of the attraction of the rural-urban fringe for development. Some are concerned mainly with residential housing; others with a wider range of development. Half of the questions are supported by extracts from Ordnance Survey maps, which focus attention on specific areas, but none of these questions are about individual sites. The mark schemes varied in the scale and specificity of their guidance. Some gave no indication of the sort of reasons candidates were expected to offer. Others emphasised the attraction of:

- the availability of space, suitable for development and future expansion;
- the accessibility of locations which are linked to the main road network;
- high quality environments, e.g. open country, little air pollution, attractive views, footpaths in the neighbouring countryside, areas relatively free of traffic;
- land usually cheaper than in urban areas.

The content-free principles, which underpinned the levels of response criteria for questions in this table, were mainly to do with: the number of valid reasons which the

candidates offered; the extent to which they developed these reasons; and the support which they gave for their explanations, whether derived from information provided or from prior knowledge. The mark scheme for Question 3 (NEAB C), which asks candidates to explain how increased leisure time and increased car ownership may each lead to increased competition in the rural-urban fringe, gave examples involving chains

1. Suggest two reasons why people and/or industry have been attracted to this area since 1911 [extracts from 1911 and 1990 OS maps of the area]. (2) NEAB D, 1997.
2. Name a town or city which has estates like this, and explain why they were built on the edge of the built up area [statement ref. post 1960 building of housing estates on the edge of towns]. (3) NEAB A, 1997.
3. Explain how, in the UK, each of the following may lead to increased competition for land, in the rural-urban fringe: (a) increased leisure time; (b) increased car ownership. (5) NEAB C, 1999.
4. The population of Rainford has increased in recent years as people have migrated from urban areas such as St. Helens. Use evidence from the OS map extract only to suggest the attractions of living in Rainford. (4) MEG A, 1999.
5. Suggest why sites like, rather than ones in the middle of towns, are chosen for new developments. You should include map evidence to support your answer [OS map]. (4) MEG C, 1999.
6. Discuss the reasons why developers often prefer to build new houses on greenfield sites rather on reclaimed land in large cities. (8) WJEC, 1999.

Table 5.20. GCSE Questions about the General Attractions of the Rural-Urban Fringe for Development.

of reasoning. It suggested that a Level 2 response might explain that the increased mobility [from increased car ownership] resulted in many places in the rural-urban fringe becoming more accessible to more people, who could travel from further afield; which led to leisure and retail businesses wanting to locate there; which, in turn, led to an increase in demands for new roads and car parks in those areas. The Level 3 example referred to ‘companies scrambling for sites in order to capitalise on increasing numbers of customers [at the rural-urban fringe] in order to maximise profit’. This question is a demanding one for GCSE candidates because it focuses on ‘increased competition for land’, rather than simply increased demand for land. To answer it properly, candidates would have to explain why, despite the potential availability of relatively cheap greenfield sites in the rural-urban fringe, there is strong competition for particular types of location. The mark scheme did not address this matter. The Level 3 illustration is heavily loaded with

abstract ideas, presented in a manner hardly typical of GCSE. Part of the difficulty with the mark scheme for this question was that, while it included illustrations of the types of answers that might be expected at each level, it did not clearly identify the criteria to be applied.

The questions in Table 5.21, which ask about the advantages of specific sites or locations within the rural-urban fringe for particular activities, are all data-response questions, supported by maps. Although three of the five questions refer to 'sites', many of the advantages relate to the locations of those sites. There is a distinct emphasis on retailing, with three of the questions asking about out-of-town shopping centres or hypermarkets; and another giving candidates the opportunity to focus on the advantages of a particular site for commercial use, for which retailing would be a satisfactory example. The

1. Using map evidence only, describe one advantage and one disadvantage of each site (A and B) for the building of a new superstore [OS map extract] (4) NEAB E, 1997.
2. What are the advantages of this site for future development of either industrial or commercial use? [sketch map of part of OS map extract] (6) NEAB A, 1998.
3. Since 1989 a large superstore has been built on grid square [OS map extract] What advantages does the location have for a superstore? Give map evidence where possible to support your answer. (4) NEAB C, 1998.
4. Name and describe other types of tertiary activity you may wish to locate in an area like Use examples from places in the UK that you have studied [sketch map of part of Greater Manchester and its fringe]. (4) NEAB C, 1999.
5. a. Why is a location such as (A) good for a development such as a large, modern shopping centre? (5)
 b. Why may a location such as (B) be a less likely choice for the location of a large, modern shopping centre? [sketch map] (5) NEAB C, 1999.

Table 5.21. GCSE Questions about the Attractions for Particular Forms of Development of Specific Sites/Locations in the Rural-Urban Fringe.

questions require map interpretation skills, to the extent that candidates have to apply their knowledge and understanding of the requirements of specific activities to information shown on maps. The advantages given in the mark schemes, for out-of-town shopping centres at the sites/locations shown on the maps, were similar in kind to the general attractions of the rural-urban fringe noted in relation to Table 5.20, particularly

space, accessibility and quality of environment. Points more specifically relevant to large, modern, out-of-town shopping centres and hypermarkets included: the importance of proximity to large urban populations which provide customers and labour; the value of good accessibility, for deliveries as well as for customers; the space required for large car parks; and the attraction of a pleasant environment to help draw customers to a centre.

1. In richer countries people are moving out of large cities to live in nearby rural areas. Give an example of this. Describe the effect that this movement has on rural areas. (5) NEAB C, 1997.
2. Using one or more examples, describe how the outward growth of a settlement can affect the surrounding countryside. (4) SEG A, 1999.
3. Describe the conflicts that developments in an area such as this may cause. [OS map extracts for the area, 1911 and 1990] (3) NEAB D, 1997.
4. a. Give reasons why some people are concerned by the change of rural land use to urban use.
b. Do you think that this change should be allowed? Explain your answer. (6) NEAB C, 1998.
5. How can the government manage the rural-urban fringe of towns and cities so as to revive and protect the countryside? Use examples you have studied. (6) NEAB C, 1998.
6. a. What is a 'Green Belt' and what is its purpose? [map showing Manchester Belt] (3)
b. How successful do you think 'Green Belt' policy has been? Give reasons for your opinion. (2)
c. i. Name a group which might support the building of a new development in a location such as , and a group which might oppose it. Explain why these groups might have conflicting views. (5)
ii. What could developers, or any other groups, do to try to reduce conflicts? (3) NEAB C, 1999.

Table 5.22. GCSE Questions about the Effects of Suburbanisation and Counterurbanisation on Rural Areas, and the Issues associated with these Processes.

The last set of questions for this subtheme (Table 5.22) are about the effects on the countryside of the outward growth of settlements and development of the rural-urban fringe, and the concerns and issues associated with these processes. While a few of the questions are supported by maps, these were not intended to be major sources of information for the answers required. For the most part, the candidates were expected to draw upon their prior knowledge and understanding. Several of the questions which focus on issues require candidates to explain opposing points of view, and in two cases

(Questions 4b and 6b) to express and explain their own opinions. None of the questions in the table had a large allocation of marks.

The mark schemes for most of the questions gave very general guidance, which shed little light on the nature and quality of the geographical understanding required. This was particularly so for those questions for which the guidance was restricted to a levels of response framework. High level responses were expected to be fuller, cover all required aspects of a question and contain some developed points. The mark scheme for Question 1 (NEAB C) accepted the following effects of people moving from large cities into nearby rural areas: villages growing, changing in character and becoming dormitory; an increase

<p>From the mark scheme for <u>Question 2</u> (SEG A) [Using one or more examples, describe how the outward growth of a settlement can effect the surrounding countryside]</p> <p>Level 1. Spread of housing; loss of farmland; more transport routes; pollution increases loss of wildlife; green belts etc. (1-2)</p> <p>Level 2. Housing estates sprawl over farmland making less open space; smaller estates also grow as access to the city improves/dormitory villages; roads become busier due to commuting, demand for goods, output from factories; more roads needed to motorway standards; use of farmland changes to horticulture, hobby farming etc. Land values increase as demand for land grows; more careful planning needed to ensure that open spaces are retained etc. Clear references to planning decisions as a result of urban sprawl. (3-4)</p> <p>From the mark scheme for <u>Question 6c</u> (NEAB C). [Name a group which might support the building of a new development in a location such as, and a group which might oppose it. Explain why these groups might have conflicting views]]</p> <p>Level 1. States groups for and against. Offers simplistic reason for the conflict or difference in views, e.g. Brings jobs, lowers unemployment, somewhere to shop, brings them money, destroys the environment, countryside, wildlife.</p> <p>Level 2. Develops the reasons to offer a more detailed explanation, e.g. Brings jobs, which boosts the local economy. Brings in business which has a multiplier effect. Specific examples of environmental damage - loss of habitats, ponds filled in, woods chopped down.</p> <p>Level 3. Thorough, clear, balanced explanation for and against, e.g. Attracts business, boosts economy as more people have jobs - more money to spend in local shops, may attract other industries, which creates more jobs, there is a cycle of growth. Detailed explanation of environmental or other problems - may use case studies (as) examples. (5)</p>
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Table 5.23. Extracts from GCSE Mark Schemes for Questions about the Effects of Developments and Attitudes towards Development in the Rural-Urban Fringe.

in spending; rises in house prices; increases in traffic; high pollution; and local people moving out - a wide ranging list which includes impacts on settlements and the rural environment, involving economic and social changes. That for Question 2 (SEG A), asking candidates to describe how the outward growth of a settlement can affect the surrounding countryside, included specific detail within a levels of response format (Table 5.23). The higher level list is not only much longer, but also contains a number of explanatory statements which enrich the quality of the description. Explanation was also prominent in the levels of response guidance for Question 6c (NEAB C), which asks candidates to explain conflicting views towards a new development and to suggest ameliorating actions which could be taken by developers or other groups. In this case, the mark scheme includes general criteria and illustrations of appropriate content. At the higher levels, it requires a balanced approach towards explanation, and introduces and develops the abstract concept of the *multiplier effect*.

The **A Level** questions about the rural-urban fringe tend to require more extended answers than those at GCSE, most having a substantial allocation of marks and some, mainly from O & C examinations, being full, essay-style questions. With very few exceptions, the A Level questions about the rural-urban fringe are not supported by stimulus materials, but require candidates to recall both general ideas and specific details about relevant examples or case studies. Most of the questions ask for explanations, while others require evaluations or discussion of complex matters. Three main aspects of the subtheme are addressed:

1. the causes and effects of developments in the rural-urban fringe (Table 5.24);
2. developing tertiary activities in the rural-urban fringe (Table 5.27); and
3. issues associated with developments in the rural-urban fringe (Table 5.28).

Each of these provides scope for progression in understanding from GCSE.

Table 5.24 has questions about the causes and the effects of developments in the rural-urban fringe, because in the A Level papers these two aspects are often linked. Questions 1 to 4 focus on suburbanisation, Questions 5 to 8 on counterurbanisation, and Question 9 deals more generally with the rural-urban fringe. While most of the questions are directed

1. By detailed reference to one or more examples, discuss the extent to which the suburbanisation of the countryside has had positive social and environmental consequences. (10) Cambridge Linear, 1997.
2. a. Outline the factors which help to explain the process of urbanisation. (15)
b. What impact does suburbanisation have on socio-economic patterns within an urban area? (10) AEB, 1998.
3. a. Outline the social and economic changes associated with the suburbanisation of a rural village. (5)
b. Illustrate and explain why suburbanisation affects some rural settlements more than others. (10)
c. Evaluate the effects of suburbanisation of one or more villages in your selected rural tributary area. (15) WJEC, 1998.
4. a. Describe the changes in land use in the Littledown area [on the outskirts of Bournemouth - maps provided]. (8)
b. Explain the urban processes which may have contributed to these changes. (8) London B, 1998.
5. a. Define the term 'counterurbanisation'. (3)
b. Explain why this process is taking place in the developed world. (4) Cambridge Modular, 1997.
6. a. Define the term counterurbanisation. (3)
b. Explain why counterurbanisation is a characteristic of many countries of the developed world. (4) Cambridge Linear, June 1998.
7. a. Suggest the economic and social reasons for counterurbanisation in First World countries. (10)
b. Describe the effects of counterurbanisation in both urban and rural areas. (10)
c. 'Counterurbanisation is running out of steam'. Give two sources of evidence which could be used either to support or contradict this statement, and show one of these sources of evidence does so. (5) NEAB, February 1997.
8. Describe the process of counterurbanisation and discuss its role in changing the functions and morphology of rural settlements in Britain since 1960. Illustrate your answer by reference to specific examples. (25) Oxford, 1998.
9. Compare the characteristics of the rural-urban fringe in the developing (less developed) countries with its characteristics in developed countries. (25) O & C, 1999.

Table 5.24. A Level Questions on the Causes and Effects of Developments in the Rural-Urban Fringe.

specifically at developments in MEDCs, Questions 1 and 2 can be applied to developing countries, and Questions 9 requires candidates to make comparisons between the rural-urban fringe in the developed and developing world.

It is evident from syllabus statements that A Level candidates are expected to make sense of such 'technical' concepts of urban processes as urbanisation, suburbanisation,

counterurbanisation, decentralisation and reurbanisation. However, as the mark schemes for several of the questions reveal, the scope for confusion between these terms is considerable. For example, although Question 2a (AEB) asks about ‘the factors which help to explain the process of urbanisation’, the points listed in the mark scheme are essentially about the causes of suburbanisation and counterurbanisation. The fact that most of the questions in Table 5.24 focus on either suburbanisation or counterurbanisation suggests that candidates are expected to understand the differences between the two ideas. But these ideas refer to very similar processes, which have developed for very similar reasons. The ease with which the critical distinction between the two concepts can be blurred is illustrated by the different accounts of *counterurbanisation* given in the mark schemes for Questions 5a and 6a. While the Cambridge Linear mark scheme for Question 6a emphasises that counterurbanisation is a ‘movement of people and employment from major cities to smaller settlements and rural areas, distinctly beyond the city margins’, the Cambridge Modular mark scheme for Question 5a refers more vaguely to ‘movement away from the urban area’ to ‘rural areas and smaller towns and villages’. Furthermore, in explaining why the process is taking place, the Cambridge Modular mark scheme refers to ‘new property built at the edge of cities’, which suggests suburbanisation. The term ‘counterurbanisation’ may itself be a source of confusion, in so far as it appears to imply a process which is the reverse of urbanisation. As Small and Witherick (1986, p.50-51) point out, the movements involved in the former have not reduced the level of the latter at a national level, and ‘indeed, it might be argued that counterurbanisation is encouraging a wider dissemination of urbanisation’. This helps to explain why, although Question 2a (AEB) asks about ‘the factors which help to explain the process of urbanisation’, its mark scheme lists points which are essentially about the causes of suburbanisation and counterurbanisation. But it is also a reminder that ‘urbanisation’ is a complex idea, and that individuals’ conceptions of urbanisation may influence their interpretation of suburbanisation and counterurbanisation.

The A Level questions and mark schemes about causes and effects of developments in the rural-urban fringe give some indication of the advances expected in students’ knowledge

and understanding, compared to GCSE. While the lists of causes presented in the A Level mark schemes for Questions 2a, 5, 6b and 7 contain elements similar to those

<p>Question 7a [Suggest the economic and social reasons for counterurbanisation in First World countries]</p> <p>Economic reasons largely reflect the reasons for employment opportunities to move out of large urban areas:</p> <ul style="list-style-type: none"> • urban-rural shift of manufacturing; more space at lower cost on greenfield sites; greater opportunity for purpose-built premises; the opportunity to 'leap frog' green belt areas, thereby avoiding restrictions on industrial development; • increasing decentralisation of 'back office' activities to areas of lower land values; • decentralisation of service activities; telecommuting. <p>Social reasons are mostly concerned with the movement of population from large urban areas:</p> <ul style="list-style-type: none"> • to escape from a physically declining area, old and unsuitable housing, industrial dereliction; • movement away from areas of social decline, areas of high concentrations of social disadvantage (high unemployment, difficult schools); • changing patterns of households; increasing demand for homes perhaps not able to be met in large urban areas. <p>Question 7b [Describe the effects of counterurbanisation in both urban and rural areas]</p> <p>Urban areas:</p> <ul style="list-style-type: none"> • decreasing population; decreasing demand for some aspects of social provision, e.g. school closures; falling property values and increased concentration of less advantaged groups; decline of community feeling, • increased commuting; increased road congestion and pollution, particularly in suburban areas along routes into the city, • loss of tax revenue in 'donor' cities; increasing difficulty for councils in meeting their obligations (education, social services), • increased pressure on green belt. <p>Rural areas:</p> <ul style="list-style-type: none"> • growth of villages, especially those with better access to the city, • increased property values; disadvantageous to local residents • changed demographic and socio-economic structure of villages, • potential loss of some village services (shop), but gain of others (restaurants, antique shops)

Table 5.25. Extract from the Mark Scheme for the A Level NEAB Question about Counterurbanisation (Table 5.25. Question 7).

specified in GCSE mark schemes, the lists tend to include more general ideas and cover a wider range of causes, thereby providing more comprehensive explanations. For example,

the AEB list for Question 2a includes various social, economic, political and technological factors, such as changing aspirations consequent upon increasing affluence; advances in transport; industrial and commercial developments; and government planning. Similar breadth is evident in the NEAB mark scheme for Question 7a (Table 5.25), which distinguishes between the economic and social reasons for counterurbanisation, and combines general ideas and more specific information.. A high quality answer for this question was expected to include a wide variety of reasons, described in some detail, and to point out links between the economic and social factors.

The mark scheme for Question 4 (London B) illustrates how tasks based on map interpretation can assess candidates' depth of understanding, by requiring them to go beyond the information given, which in this case consisted of maps showing features of the land use of an area on the outskirts of Bournemouth in 1972 and 1992. The guidance for the levels of response marking of candidates' explanations of the changes was in general terms, which emphasised the relevance of candidates' understanding of the processes, the detail of their explanations, how well they linked the processes to the specific changes which could be identified, and the structure and clarity of their explanations. However, the summary of the explanation presented in the mark scheme (Table 5.26) indicates that candidates were not only expected to identify the attractions of the area, as revealed by the maps - its location on the outskirts of Bournemouth, good communications, the availability of greenfield sites, and pleasant surroundings - but also to infer such broad economic factors as the increase in car ownership, the growth of the tertiary sector, and inward investment by multinational companies. The tone of the note suggests that candidates were also expected to recognise the limitations of the evidence provided; and that they therefore needed to be tentative about some parts of their explanation.

The A Level questions about the effects of suburbanisation and counterurbanisation processes are broad in scope and provide opportunity for thoughtful and carefully structured answers. Questions 1 (Cambridge Linear), 2b (AEB) and 3c (WJEC) ask for evaluations of the effects of these processes, and their mark schemes indicate that such evaluations should be balanced and well reasoned. Other questions, as well as these,

From the mark scheme for Question 4 (London B) [Explain the urban processes which may have contributed to the changes of land use on the outskirts of Bournemouth] The question specifically asks for an explanation of processes. The account should recognise the location of Littledown at the eastern outskirts of Bournemouth. Residential developments will be associated with urban *sprawl*, *suburbanisation* / *counterurbanisation* within the constraints provided by green belts/areas of high agricultural value. The sprawl will be areal growth, although because of good communications (road/rail), and pleasant park surroundings it may also be an area of *commuter* population growth. The development of services (hospital and supermarket) may reflect growing demand but more likely the *centrifugal* forces which have generated the move to large *greenfield* sites with advantages of road access, and attractive environment (note rising car ownership). The arrival of the large HQ can be looked at in a number of ways: *tertiarisation*, development of *inward investment* by multinationals, at prestigious greenfield locations. Good candidates may support their explanations with their own analogous exemplification. Interpret urban widely or narrowly when crediting processes.

Table 5.26. Extract from a GCSE Mark Scheme for a Question about Explaining Processes in the Rural-Urban Fringe (Table 5.24).

appear to require detailed knowledge of case studies and a good understanding of the variety and complexity of outcomes. For example, the WJEC mark scheme for Question 3b expected candidates to identify accessibility, planning policies, the initial size of a village and services available, and the scenic attractions of a settlement, as reasons why suburbanisation affects some rural settlements more than others; and to illustrate such reasons. The NEAB mark scheme for Question 7b (Table 5.26) shows that candidates were expected to have detailed knowledge of the variety of effects of counterurbanisation on both urban and rural areas. While the guidelines to examiners are primarily descriptive, as required by the question, the indications of explanatory relationships strengthen the descriptions and reveal deeper understanding. It is fairly clear that many of the points included in each of the lists are interrelated. A sound description is likely to be a structured account which recognises such links, even when explanation is not the main purpose of the assessment task.

Table 5.27 contains six questions which relate to the development of tertiary activities in the rural-urban fringe. While the first question refers broadly to the service sector, the next two focus on retailing, and the remaining three on offices. Most of these questions

seek explanations for recent changes in the location of these activities, and although Questions 4 to 6 do not refer specifically to any type of location, it is clear from some of the mark schemes that the examiners expected candidates to deal primarily with the process of decentralisation, from city centres to the fringe and beyond. None of the six questions had support materials, a contrast with the corresponding GCSE questions in Table 5.21, which were linked to specific locations shown on accompanying maps. The A Level questions are broader in scope than their GCSE counterparts, but there is little evidence of the nature and quality of understanding expected of candidates, partly because the mark schemes for Questions 1 and 2 are unavailable, and partly because the mark schemes for the four O&C questions offered only brief and general guidance, with hardly any reference to subject content. For example, a high level of response for Question 4, which asked candidates to ‘outline and attempt to explain the main changes in the location of offices in the past 30 years’, required ‘a thorough and systematic answer covering all

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| <ol style="list-style-type: none"> 1. What forces have brought about the increasing trend for the decentralisation of retailing, office and other service sector employment in the city? (8) Cambridge Modular, 1998. 2. ‘In recent years the movement of retailing to out-of-town-centre locations has become well-established and potentially irreversible’. Describe and suggest reasons for the rapid development of out-of-town-centre retail outlets. (10) NEAB, March 1998. 3. The growth of massive regional shopping centres in a few favoured locations is having a profound effect on the character and location of all other elements in the retailing hierarchy. Discuss this view. (25) O & C, 1999. 4. Outline and attempt to explain the main changes in the character and location of offices in the past 30 years. (25) O & C, 1997. 5. Consider some of the ways in which changes in technology, information systems and accessibility have brought about changes in the type and location of offices in the past 30 years. (25) O & C, 1998. 6. Show how changes in technology lead to changes in the location and character of offices. (25) O & C, 1999. |
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Table 5.27. A Level Questions relating to the Development of Tertiary Activities in the Rural-Urban Fringe.

the developments in time and space and providing an appropriate explanation of what has taken place. The mark scheme gave no indication of the sort of knowledge and understanding which candidates were expected to display. However, the section of the

O&C syllabus relevant to Questions 4 to 6 - part of an optional unit on 'Service Activities: Location and Change' - refers to:

- 'Changing patterns of retail organisation (growth of multiples and decline of independent retailers). The growth of producer services. The role of economies of scale, information and technological revolutions in inducing change.'
- 'Retailing and office location in the suburbs. Decentralisation. Impact on the traditional hierarchy of suburban shopping centres of hypermarkets, retail parks, regional shopping centres etc. Office parks and large scale projects'

The inclusion here of such ideas as 'producer services', 'economies of scale' and 'information and technological revolutions' suggests that candidates were expected to be familiar with, and to be able to apply, a number of broad, abstract concepts.

Nevertheless, even the combination of syllabus statement and mark schemes, does not provide a clear indication of the quality of understanding required to answer the question satisfactorily. It may have been assumed that explanations of the growth of the service sector and changes in its location patterns would take account of:

- changes in consumer demand for different kinds of services;
- advances in technology, especially information and communications technology;
- changes in the organisation and management of businesses, particularly in the more dynamic and competitive fields;
- the role of the financial sector in supporting investment, takeovers and mergers;
- land use planning policies and practices.

If so, such factors may be less tangible, and perhaps more complex, than those traditionally included in A Level explanations of the location patterns of, for example, types of manufacturing industry or types of farming. One of the challenges for students is to understand the complex nature of the interrelationships between the different factors, for the significance of any one of those listed above is only apparent when it is considered

in relation to several of the others. However, examiners may not have been looking for such sophisticated level of understanding.

1.	To what extent are developments in the urban fringe responsible for problems in developed world cities? Refer to examples you have studied. (10) Cambridge Modular, 1997
2.	Discuss reasons why the rural-urban fringe in developed countries has become an area of great change and frequently of environmental conflict. (25) O & C, 1997
3.	<p>a. Conflicting arguments continue to be used about whether new housing should be built on greenfield (urban fringe) or brownfield (usually inner area) sites. Discuss the advantages and disadvantages of each of these types of location for location for housing development. (10)</p> <p>b. Comment on the attitudes of the existing residents, in both the urban fringe and the inner areas, to the development of greenfield and brownfield sites. (7) NEAB, March 1999.</p>
4.	<p>'Planning has certainly not solved the urban-fringe landscape problems in First World cities.</p> <p>a. Identify two pieces of evidence which indicate that land on the urban fringe is under pressure. Show how one of these pieces indicates that pressure. (5)</p> <p>b. Suggest reasons why land at the urban fringe has been under pressure during the last 30 years. (10)</p> <p>c. Discuss the attitudes of different groups of people to policies designed to protect land at the urban fringe. (10) NEAB, June 1998.</p>
5.	What strategies can be used to control and limit growth around urban areas? (8) Cambridge Modular, 1997.
6.	<p>Answer the following with reference to a competition/conflict over the use of a resource in an area with one of the following characteristics [inc. 'urban fringe']:</p> <p>a. What is meant by each of the following terms? (i) market processes; (ii) planning processes. (7)</p> <p>b. Identify both the people who benefit, and the people who lose, from the eventual outcome of a competition/conflict. Discuss their attitudes to the competition/conflict. (8) NEAB, March 1999.</p>

Table 5.28. A Level Questions about Issues associated with the Development of the Rural-Urban Fringe.

Among the questions that focus on the social and environmental issues associated with the rural-urban fringe (Table 5.28), are those that ask for explanations of the general pressures on the fringe area and of the conflicts that arise from changes of land use (Questions 1, 2, 3a and 4b); those that ask about policies and strategies aimed at resolving the issues (Question 5 and, indirectly, Questions 4c and 6a); and those that are concerned

with attitudes towards either the conflicts or the policies (Questions 3b, 4c and 6b). The key elements and relationships in these questions are presented schematically in [Figure 5.2](#).

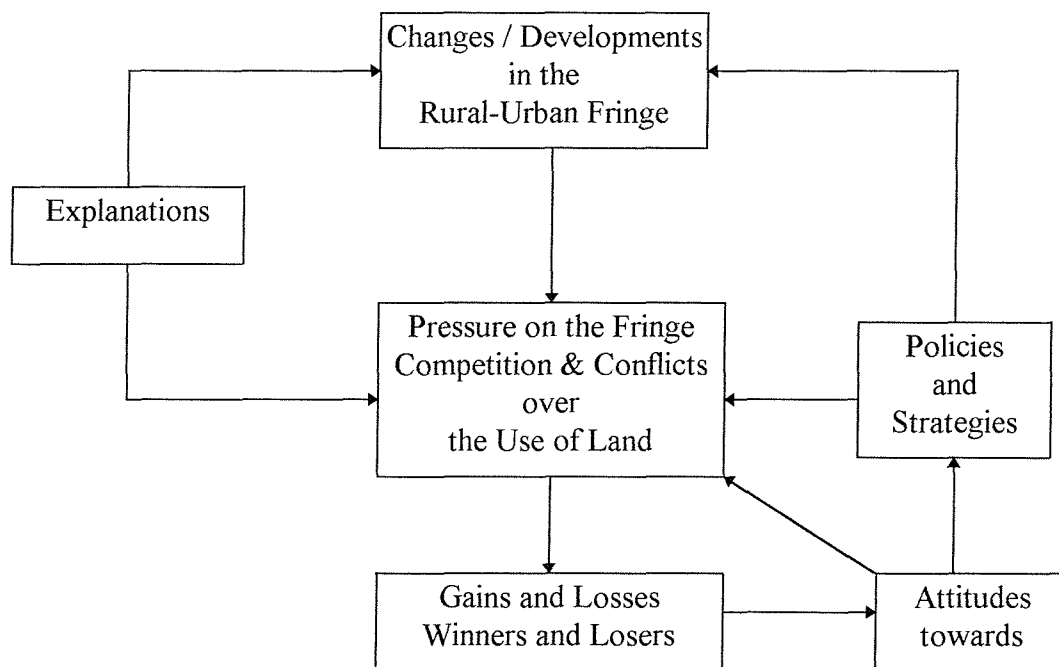


Figure 5.2. Key Elements and Relationships in the A Level Questions about Issues in the Rural-Urban Fringe (Table 5.27).

The mark schemes for the questions which sought explanations for the pressures on the rural-urban fringe, or for the conflicts over developments in such areas, tended to identify the types of development rather than comment on their underlying causes. For example, the mark scheme for [Question 2](#) (O & C), which asks candidates to discuss reasons for the changes and conflict in the urban fringe, listed new housing, sports and leisure facilities like riding stables, kennels, superstores, light industrial sites, office parks, farm conversions, vandalism affecting farms and waste disposal, as examples of the types of pressure on the urban fringe that planners have to deal with; and stipulated that a high mark would require ‘a full discussion of a number of key pressure points illustrated by well worked examples and squarely addressing the notions both of change and conflict’. But no guidance was offered on what sort of ‘discussion’ would be appropriate, in the context of the question. The NEAB mark schemes for Questions 3a (about building

houses on greenfield or brownfield sites) and 4b (about the reasons for pressure on the urban fringe) similarly listed relevant aspects of content, but offered little guidance about the type and quality of analyses and explanations required. Question 1 (AEB), which asks about the extent to which developments in the urban fringe are responsible for problems in developed world cities, was demanding, in so far as the examiners expected candidates to appreciate that such developments can create problems in other parts of cities as well as in the fringe itself. While the mark scheme described this as ‘a difficult question’, part of the difficulty may be that the question did not signal sufficiently clearly what sort of answer was required.

Question 5 (Cambridge Modular), the only question in Table 5.28 which is explicitly directed at strategies to control and limit growth around urban areas, is limited in scope, because it merely asks what strategies?. According to the mark scheme, candidates were expected to refer to ‘green belts, green wedges, new towns and town development schemes which try to divert development back to the inner areas of the city’; and, to obtain full marks, they were required to give some details about each type. Assessment of candidates’ understanding would have required a more penetrating question.

Questions 3b, 4c and 6b ask candidates to ‘comment on’ or ‘discuss’ the attitudes of different groups - towards developments, or conflicts, or policies relating to the urban fringe. Each of these questions, all of which are from NEAB papers, had a moderate allocation of marks (7-10), indicating that fairly extended answers were expected. Both ‘comment on’ and ‘discuss’ are open-ended instructions, in the sense that they appear to permit a wide range of possible responses. They convey the impression that something more is required than a matching of particular attitudes to specific groups, which would run the risk of stereotyping. Nevertheless, the mark scheme for Question 3b, which asks for comments on ‘the attitudes of the existing residents, in both the urban fringe and the inner areas, to the development of greenfield and brownfield sites’, assumed that those in fringe areas would tend to be negative (NIMBYism), while those in inner areas, where developments may result in the removal of dereliction and an upgrading of environmental quality, were more likely to be positive. Better responses were expected to consider both types of reaction in each area, but no examples were given of comments which would be

other than stereotypical; nor was there any indication whether ‘comment on’ might imply explanation as well as description. Similarly, the mark scheme for Question 6b provided little guidance on the qualities expected in a discussion of attitudes to competition/conflict over the use of a resource (in an urban fringe), other than that the discussion should be clear, and that there should be some recognition of the relevance of the different perceptions of winners and losers. What again was missing from the mark scheme was any indication of what sort of discussion was intended, and what understanding it was expected to reveal. The questions on attitudes do not appear to have been designed to probe understanding, either of reasons for differences in attitudes towards particular issues, or of the influence of attitudes on perceptions, decisions and behaviour.

The earlier part of Question 6 is intellectually demanding, in so far as it calls for an adequate understanding of three broad concepts: resource; market processes; and planning processes. Candidates were required to explain the meaning of market processes and planning processes, in relation to competition/conflict over the use of a resource in an area which had at least one of the following characteristics: an area of high landscape value; a coastline; an urban fringe. These, of course, are examples of environments which are often associated with competition over the use of land, and where there can be severe tension between the conflicting goals of development and conservation. If candidates chose an ‘urban fringe’, they could have focused on a particular *material resource*, such as a gravel deposit valued by the construction industry. Alternatively, they could have taken a much broader interpretation of resource, and based their answer on an area within an urban fringe which was attractive for development because of its *location* and *site*. The latter would be a more sophisticated interpretation of the concept of a resource. In practice, both market processes and planning processes are complicated, in ways that do not match the somewhat polarised presentation in the mark scheme. The mark scheme did not distinguish between professional planners and the local authorities or central government ministers that they advise, nor did it recognise that developers as well as government bodies can employ ‘town and country’ planners. It thereby oversimplified the relationship between the economic and political systems, and the different roles that planners can perform. Nevertheless, the question provided scope for candidates to reveal different levels of understanding of the key ideas.

Subtheme 3. The Processes and Effects of the recent, rapid Urbanisation in Less Economically Developed Countries.

The scale and character of recent urban development in LEDCs provide an obvious focus for geographical studies. While urban development is most advanced in MEDCs, most of the current rapid growth in the size of towns and cities, and the most rapid rates of *urbanisation* - the term used to denote the growth of the proportion of the total population of a country living in urban areas - is taking place in LEDCs. A significant part of that urban growth is a consequence of natural increase of population within towns and cities, but the growth is greatly increased by the migration of people from rural areas, where the natural increase is also high. Because most rural areas lack the economic base to support a rapidly growing population, people migrate to the towns, and especially to the largest towns, which they perceive to offer the best opportunities to improve their economic and social conditions. In practice, migration is influenced by a wide range of factors, which vary from place to place, and over time. In many of the smaller LEDCs which did not have a long urban tradition, and whose economic development has been influenced strongly by colonialism, there has been a tendency for much of the urban development to be concentrated in the largest settlement, which, consequently has become a *primate city* - one which is pre-eminent in the economic, social and political life of its country. The influx of large numbers of migrants to the largest city, or cities, of a relatively poor country creates enormous difficulties for the provision of satisfactory housing and services. Most of the poor migrants settle at first in overcrowded slums in the older parts of cities, or in '*squatter settlements*', which are also called 'shanty towns', or 'spontaneous settlements', and which have a wide variety of regional names. The squatter settlements are areas of makeshift, temporary dwellings, which are erected illegally on the edge of the city, on land which had not been developed, or within the city, on difficult sites which had been avoided by developers. Many of the occupants of such areas initially find work in the informal sectors of the economy. (Barke & O'Hare, 1984; Bromley & Bromley, 1982; Drakakis-Smith, 1987; Small & Witherick, 1986; Johnston et al, 1994; Clark, 2000).

Potential content that can be borne in mind while reviewing the subtheme includes:

- levels of urbanisation and rates of urban growth in LEDCs;
- the causes of the rural to urban migration patterns in such countries;
- primacy as a feature of settlement patterns in many LEDCs;
- the growth of squatter settlements in the largest cities, and their distribution patterns;
and
- strategies to improve the quality of life in squatter settlements.

There is no statement within the **KS3** programme of study to suggest that this subtheme should be included in the geography curriculum for Years 7 to 9. Although the content on ‘settlement’ for KS3 does not preclude study of a city in an LEDC, the elements of content specified are more likely to encourage treatment of the theme within the context of the UK. A requirement within the theme of ‘population’, that students be taught ‘about the causes and effects of migration’, is not linked specifically to the growth of settlements, nor to any particular type of migration. In contrast, the subtheme is commonly included in GCSE and A Level syllabuses.

All the **GCSE** syllabuses either refer directly to aspects of the subtheme or, include potentially relevant content within a wider topic, such as ‘the growth and decline of settlements’ (MEG Syllabus C) and ‘pressures at the rural-urban fringe’ (NEAB Syllabus A). Each syllabus includes content relevant to at least one of the key points of interest, and most of them have content relating to several. Migration from rural to urban areas often occurs in a section of the syllabus which focuses on the theme of population, rather than in a section about settlements. Several of the syllabuses provide opportunities to compare urban settlements in MEDCs and LEDCs. Squatter settlements are referred to specifically in more than half of the syllabuses. Most of the statements of content are brief, and some are expressed in very general terms. On the whole, they provide little guidance about the quality of understanding expected. A highly specific content is exemplified by NEAB Syllabus B, in which a topic on the Ganges Delta includes: ‘A city in an economically developing region - Calcutta: Its location and morphology. Migration from rural areas. Population structure. The problems of the city and attempted

<p><u>Key Idea</u>: Population movement is a response to perceived opportunities and problems;</p> <p><u>Commentary</u>: [migrations] ‘have effects on the areas people have left, and on the areas to which they move’;</p> <p><u>Required Studies</u>: ‘Population movement within a country, [including] rural to urban in an LEDC (e.g. N.E.Brazil to Recife/Belo Horizonte)’.</p>
<p><u>Key Idea</u>: ‘Urban growth is a world wide phenomenon. It creates both problems and opportunities, leading to a variety of responses’.</p> <p><u>Commentary</u>: ‘The term urbanisation should be used. Problems include shanty towns, water supply, waste disposal and movement within cities. Opportunities can include employment and greater access to services. Responses can be formal and informal. They include New Towns and green belts, local authority plans and self-help schemes. The values and attitudes of people involved can influence their decisions.</p> <p><u>Required Studies</u>: include ‘Contrasting studies of an urban area in an LEDC (e.g. new towns around Cairo, self help in Calcutta) with one in an MEDC’.</p>

Table 5. 29. Extracts from the Units on Population and Settlement, in London GCSE Syllabus A.

solutions’. While the attention to one city is restricting, it does enable students to investigate the relationships between various aspects of that settlement; and although there is no specific reference to squatter settlements, it would be reasonable to expect Calcutta’s *bustees* to be included in any study of the ‘problems of the city and attempted solutions’. SEG Syllabus A has an equally brief statement of relevant content, without specifying which place or places to study. Here the content is linked to two broad ‘key ideas’: ‘urbanisation is a global phenomenon’; and ‘planning strategies are often necessary to minimise the environmental impact of urban growth’ - both of which are applied to MEDCs and LEDCs. The ‘syllabus detail’ includes ‘issues related to urban growth in LEDCs, such as shanty towns’; and ‘solutions to problems of the shanty towns’, without specifying any further ideas or case studies. Table 5.29 illustrates a more detailed specification of content, from the units on ‘population’ and ‘settlement’ in London Syllabus A.

A Level syllabuses were remarkably similar to GCSE syllabuses in the attention which they gave to urbanisation in developing countries. The subtheme was present in eight of the syllabuses, being absent only from the NEAB scheme. The statements of content

tended to be brief, and referred mainly to the general process of urbanisation, and to the growth and characteristics of squatter settlements. As at GCSE, rural to urban migration was sometimes included in units focusing on population, without any explicit reference to the relationship between migration and urbanisation. Several A Level syllabuses required candidates to compare urban settlements in MEDCs and LEDCs. For example, London Syllabus A referred to 'the contrasts between urban settlements in the Developed and Developing Worlds, in terms of their size, social, economic and cultural characteristics', and noted that 'the factors affecting increasing or decreasing rates of urbanisation change', but it included no details about the characteristics, conditions or processes of change. Only three of the syllabuses referred explicitly to improving the quality of life in squatter settlements. One of these, the Cambridge Linear Syllabus, required candidates to evaluate attempts to alleviate problems arising from the 'spontaneous growth of squatter settlements'. The optional unit on 'Towns and Cities: Evolution and Change' in the Cambridge Modular Syllabus (Table 5.30) contained a more detailed statement which recognised that there are contrasting negative and positive views about 'Third World urbanisation', and listed a few of the strategies used to cope with the difficulties.

<p>Key Question: What are the effects of the hectic pace of urbanisation in developing countries?</p> <p>Syllabus Content:</p> <ul style="list-style-type: none"> • The changing global geography of urbanisation. • 'Push/pull' factors operating to generate rapid urbanisation in developing countries. • Physical and socio-economic characteristics of 'spontaneous settlements'. • Contrast the 'pathological' view of Third World urbanisation with more positive views. • Strategies for coping - legislative restriction, physical destruction/dispersal, site-and-services provision.
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Table 5.30. Extract on Urbanisation in Developing countries, from the Cambridge Modular A Level Syllabus.

The GCSE and A Level examination papers and mark schemes provide more specific indications of the understanding of urbanisation in developing countries expected from their candidates. The most common **GCSE** questions, within this subtheme, were those which asked about the reasons for the migration of people from rural to urban areas

(Table 5.31); the effects of such migrations on rural and urban areas (Table 5.32); the siting and location of squatter settlements (Table 5.33); the character of squatter settlements and the problems associated with them (Table 5.34); and the ways in which such problems are being tackled or could be tackled (Table 5.35).

Candidates at GCSE, were expected to think about rural to urban migration in terms of '*push and pull factors*'. Half of the questions in Table 5.31 (Questions 1, 2, 5, 6 and 7) refer specifically to these concepts, and while the other questions relied on more open formats, such as 'explain why' or 'what are the causes of ...', their mark schemes made use of the same broad idea that the reasons for migration can include hardships or disadvantages in the places from which the migrants depart (the negative 'push' factors) and better conditions or opportunities in the places to which they are attracted (the positive 'pull' factors). The questions in Table 5.31 are not about the processes of rural to urban migration in developing countries, but about the conditions that give rise to these movements. In the mark schemes, the push and pull factors were mainly presented in the form of lists. These varied in length and in specific content. The mark scheme for Question 7 (SEG B) listed drought, soil erosion, land inheritance problems and overpopulation, as examples of push factors, and the 'lure of town (greater chance of employment, services, etc.)', as the pull factors. On the other hand, the levels of response for this question emphasised the importance of candidates including a range of points, developing some of the reasons, and referring to specific examples. This is the only question in the table which asked candidates to use examples that they had studied. While Question 8, with its reference to 'a city in an LEDC' could be interpreted as requiring case study material, it is clear from its mark scheme that this was not intended. General lists of factors were the order of the day. The small number of factors referred to in the mark scheme for Question 7, can be compared with the longer and wider ranging lists presented in the mark schemes for Question 1 (MEG A) and Question 8 (NEAB A):

Question 1. Poor health care/hygiene; little wealth in rural area; few job opportunities; limited educational opportunities; difficult to produce food; infertile soil; natural hazards - e.g. drought, starvation/malnutrition; outbreaks of disease;

farmers lose land through policy of landowners; named disease; perception of improvement etc.

1. Explain why people migrate from rural to urban areas in economically developing countries like Swaziland [stimulus materials: bar graphs and photograph, relating to Swaziland]. (6) MEG A, 1997
2. Explain why people are moving away (from rural areas) in many less economically developed countries. (4) SEG B, 1997.
3. a. What is meant by push factors? Give an example from the pie chart. (1)
b. What is meant by pull factors? Give an example from the pie chart. (1)
WJEC, 1997.
5. a. State three different push factors. (3) Choose one of these and state why it pushes people away from their original home. (2)
b. State three different pull factors. (3) Choose one of these and explain why it pulls people towards the city. (2) NEAB B, 1997.
5. In less economically developed countries people leave the countryside and move into urban areas. What are the causes of this rural-urban migration? (4)
NEAB A, 1999.
6. Explain why many people move from rural areas to cities in LEDCs. (4)
MEG A, 1999.
7. In less economically developed countries (LEDCs) people migrate to cities. Using examples you have studied explain why they do this. (6) SEG B, 1998.
8. Explain the recent growth of a city in an LEDC or an MEDC using the headings: push factors causing growth; pull factors causing growth. (6) NEAB A, 1998.
9. a. What is migration? (1)
b. Explain how rural 'push' factors in a less economically developed country may cause people in rural areas to move to large cities. (4)
c. Complete [the diagram] by writing three more urban 'pull' factors in the boxes provided. [the factor supplied was 'hope for better health care'] (3)
NEAB C, 1999.
10. Explain fully how this model helps us to understand the migration between rural and urban areas in developing countries. Include examples of the obstacles, push factors etc. in your answer [diagram of model]. (7) London B, 1997.

Table 5.31. GCSE Questions about Reasons why People in Developing Countries Migrate from Rural to Urban Areas.

Question 8. Push Factors: unemployment, poverty, famine, disease, poor health care, no hospitals, civil war, low yield, poor living conditions.

Pull Factors: employment, 'hope' of better prospects, hospitals, schools, better housing, better security, sanitation.

These are simply lists. Although the questions ask for explanations of migration, the mark schemes give the impression that recall, rather than understanding, was required. The list for Question 1 is notably imbalanced, in that it consists mainly of push factors.

The only example of a pull factor in this list is 'perception of improvement'. Perhaps the examiners for Question 1 expected their candidates to identify the urban attractions in general terms which were simply the reverse of the rural conditions, such as more jobs in towns compared to the rural areas. Several of the mark schemes specifically excluded double crediting for opposites, which suggests that these examiners were thinking in terms of very brief statements rather than well reasoned explanations. The longer lists give an indication of the potential complexity of the explanations. But the lists were only to remind markers of the wide range of acceptable points, for high marks could be awarded without a candidate displaying such breadth of knowledge.

Question 10 (London B), which focuses on how a particular migration model can help understanding, is parallel to Question 1 in Table 5.19, as candidates were given the choice of applying the model to migrations, either from inner city areas to the suburbs in developed countries, or from rural to urban areas in developing countries. In the case of the latter, the mark scheme noted the relevant factors as:

- Push factors - e.g. landlessness, famine, other natural disasters, eviction,
poverty, war, drought, poor living standards;
- Pull factors - e.g. high earnings, job, bright lights, education;
- Obstacles - e.g. family ties, uncertainty, pass laws etc., distance/cost of
journeys.

While the model offers opportunities for a more sophisticated treatment of the migration pattern, this mark scheme, like others, presented little more than lists. It did note that 'migration occurs if the push and/or pull factors are strong enough to overcome the obstacles', but indicated that this idea was not essential to the answer. In general, the mark schemes for the questions in Table 5.31 do not give the impression that GCSE candidates were expected to have much depth of understanding of the causes of rural to

urban migrations in developing countries. For example, there was little indication that they might be expected to understand that:

- the factors influencing migration are varied;
- any particular migration may be influenced by a combination of factors;
- there can be significant differences between the specific circumstances and conditions influencing migrations in different LEDCs;
- the factors influencing a particular migration are often interrelated; and
- a decision to migrate may involve considering potential losses as well as gains.

The questions in Table 5.32, which are to do with the effects of the migrations, ask for descriptions rather than for explanations, and are therefore even less directed towards assessing candidates' understanding. Half of the questions focus specifically on the problems which are a consequence of migration. While their mark schemes were, for the most part, limited to lists of content, some included explanatory elements or structured the content in a way which implied some degree of understanding. For example, the mark scheme for Question 2 (WJEC) suggested that 'the quality of life of the people left behind in the rural villages' is likely to suffer because most of those who leave are the more active members of the community, and the services available in the villages decline as their populations decrease. The guidance for marking Question 5 (NEAB_A) included a structured list which distinguishes clearly between different types of problems:

Housing problems - shanty develops, no planning, poor amenities;

Economic problems - unemployment, begging, informal economy;

Environmental problems - pollution (specified), congestion;

Allow problems in rural areas e.g. unbalanced age structure;

Social problems - health, crime, unrest.

The examiners expected candidates to describe at least some of the problems, and limited the maximum mark to 3 out of 6, if no example was given. But the scheme gave no indication of the quality of answer required. Nevertheless, both of these mark

schemes were clearer than the unstructured and confusing list presented for Question 3 (MEG A), which referred to 'unbalanced population structure if males or young

1. What effect does the movement of people into cities [in LEDCs] have on the population structure of the areas which they have left? (2) NEAB B, 1997.
2. Describe how [the migration from rural to urban areas in LEDCs] will affect the quality of life of the people left behind in the rural village [population pyramid, showing the age range most likely to migrate] (3) WJEC, 1997.
3. How does rural to urban migration [in LEDCs] affect the people left behind in the villages? (3) MEG A, 1999.
4. For a city [in an LEDC] you have studied, describe the problems caused by the arrival of large numbers of people from the countryside. (6) SEG B, 1997.
5. Using examples that you have studied, describe the problems caused by rural-urban migration. (6) NEAB A, 1999.
6. a. What problems are caused in urban areas in economically developing countries as a result of migration from rural areas? (5)
b. Describe the attempts which have been made to improve the quality of life in economically developing countries. You should refer to examples which you have studied. (5) MEG A, 1997.

Table 5.32. GCSE Questions about the Effects of Rural to Urban Migration in Less Economically Developing Countries.

migrate; shortage of people to farm; on the other hand it may relieve population structure; depend upon migrants for money; easier to implement land reforms; splits up families; less investment in rural area; send money back home'. This gives the impression of a list written in haste and with little thought given to quality of understanding.

1. State three facts about the location of the shanty town settlements [simplified land use map of Calcutta] (3) NEAB B, 1998.
2. a. Describe the pattern of shanty town growth in Guayaquil [map of urban growth] (2)
b. Suggest one way in which government aided housing projects have influenced the pattern of shanty town growth. (1) London A, 1997.
3. a. Describe the distribution of high density housing areas in the city [map of housing in 'a city in an LEDC']. (2)
b. High density housing is usually found on the edges of cities in LEDCs. Give one reason why this happens. (2) MEG B, 1998.
4. Describe sites and locations commonly used for squatter settlements (shanty towns) in LEDCs. (3) MEG A, 1999.

Table 5.33. GCSE Questions about the Siting and Location of Squatter Settlements.

The questions in Table 5.33, all of which have a low allocation of marks, are concerned mainly with identifying and describing the distribution patterns of squatter settlements. In the case of Questions 1, 2a and 3a these tasks depend on map reading and interpretation skills rather than knowledge and understanding. As the mark schemes reveal, description could be in terms of: location in relation to the outer edge of the city; direction from the city centre; and proximity to particular features such as railways, major roads, industrial areas and airports. The mark scheme for Question 4 (MEG A), which also requires a description, but is not supported by a map or other information, has a more comprehensive list of the types of sites and locations used for squatter settlements:

edge of city; along major railways and roads; where buildings have been knocked down; in or near CBDs; near to airports and factories; on marshland, river flood plains and steep hillsides; near to rubbish dumps and wasteland.

Only Questions 2b and 3b ask for explanations. The influence of government aided housing on the pattern of shanty town growth in Guayaquil (Question 2b, London A) could be inferred from information provided on the map accompanying the question. In contrast, the more general explanation for the occurrence of high density housing on the edge of cities in LEDCs expected for (Question 3b, (MEG B)) was more dependent on prior knowledge. The mark scheme for this question suggested that acceptable answers could relate to: the influx of people from the countryside, with these being the first places reached; the attraction, for many people who had very little money, of the cheaper land available; the policies of authorities who actively discouraged high density housing on sites close to the city centre; and the jobs provided by industrial areas close to the outskirts.

The questions in Table 5.34 focus on the problems of squatter settlements, although Question 5 is not restricted to squatter settlements as it can include older, inner city, slum areas. There is a general emphasis on description rather than explanation, especially in Questions 1, 2a and 4; but this can also apply to questions which on the surface appear to be asking for explanations. In practice, Question 3 requires candidates to describe, rather than explain, the photographic evidence which indicates a poor quality of life.

1. Describe the problems of areas such as the one shown in the photograph both for the people living there and for the city authorities. (6) NEAB C, 1997.
2. a. What does the photograph show about the problems associated with Smokey Mountain? (4)
b. Life expectancy in areas such as Smokey Mountain is low. Use the information provided [in pre-released booklet], the photograph and your own knowledge to suggest reasons why this is so. (4) NEAB E, 1997.
3. Using only evidence from the photograph suggest how the quality of life in this area is poor. (4) MEG A, 1999.
4. Describe the probable features of the recently built housing area at site Y. Use examples from a city in an LEDC that you have studied. [Map of Sao Paulo, showing the location of Y, which is labelled a squatter settlement]. (5) NEAB C, 1999.
5. There have been many attempts to improve living conditions in cities in the developing world. Explain the problems involved. Refer to places you have studied. (6) London A, 1997.

Table 5.34. GCSE Questions about the Character and Problems of Squatter Settlements.

Questions 1 to 3 require candidates to interpret information provided, although prior knowledge of the conditions characteristic of squatter settlements would be helpful. Both Questions 1 and 2b encourage candidates to go beyond the information given; and Questions 4 and 5 require them to refer to examples that they have studied. But the mark schemes for most of the questions in Table 5.34 give little indication of the understanding expected. Those for Questions 2b (NEAB E) and 5 (London A), which clearly ask for explanations, rely on very generalised 'levels of response' criteria and offer no content specific guidance. Most of the mark schemes for the questions requiring descriptions merely present content lists. However, some items on these lists appear to suggest that candidates were expected to go beyond describing what could be observed directly on photographs accompanying the questions. For example, 'breathing of toxic gases' (for Question 2a) and 'disease spreads quickly' (for Question 3) could only be inferred from photographs; while the phrase 'necessity related to poverty' (for Question 2a) is an interpretation with an explanatory dimension.

The only mark scheme which gave explicit attention to quality of description was the levels of response scheme for Question 4 (NEAB C), which requires candidates to

describe the probable features of a ‘recently built squatter settlement’, the location of which was shown on an accompanying map of Sao Paulo. No other information about the area or the settlement was provided. Candidates, therefore, had to rely mainly on their previously acquired, general knowledge and understanding of squatter settlements. The guidance to markers was in the form of very general criteria, supported by exemplars (Table 5.35) and introduced by a general instruction to ‘award marks for clarity and detail of description and knowledge of case study’. The description for Level 3, however,

<p>From the mark scheme for Question 4 (NEAB C). [Describe the probable features of the recently built housing area at site Y]</p> <p><u>Level 1.</u> Lists correct facts, e.g. ‘there are no proper roads’, there is no electricity’, ‘it is very dirty’, ‘there are no proper toilets’, ‘it is on the edge of the city’. May give a fuller description of one fact. (1-2 marks)</p> <p><u>Level 2.</u> Elaborates on more than one fact to give a fuller description, e.g. ‘houses are small and overcrowded’, ‘poor sanitation leads to disease’. (3-4 marks). Uses correct terms e.g. ‘Favela’. A maximum of 3 marks if the answer refers only to housing.</p> <p><u>Level 3.</u> A full, thorough and clear description of housing and other features, e.g. ‘houses are small, overcrowded and made from any available local materials as people cannot afford to buy other materials’; or clearly describes a recognisable shanty, i.e. [displays] a sense of place. (5 marks)</p>
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Table 5.35. Extract from a Mark Scheme for a GCSE Question (Table 5.34) about Features likely to be found in a Squatter Settlement.

however, introduces an element of explanation, by pointing out that the settlers’ use of any local materials available was a result of the fact that they could not afford to buy other materials.

Most of the questions in Table 5.36 ask how cities in LEDCs have attempted to improve the quality of life in their squatter settlements, or how the conditions in such areas might be improved. Questions 1 and 6 ask about a broad range of problems in LEDC cities, which are not necessarily limited to squatter areas: ‘economic, social and environmental problems’ in the case of Question 1, and ‘unemployment’ and ‘the spread of disease’, as well as ‘shanty towns’ in the case of Question 6. Question 3 is an example of a broad question, which could be answered in relation to disagreements about policies directed towards improving squatter settlements, although the latter are not mentioned in either

1. Rapid urban growth leads to many economic, social and environmental problems. Choose a city in an LEDC where people have tried to improve conditions. Describe the problems and how people have tried to solve them. (8) London A, 1999.
2. For a named city in an LEDC which you have studied describe the attempts which are being made to improve the quality of life of the residents [photograph] (6) MEG A, 1999.
3. Growing cities create problems, Governments try to solve these problems. Why do people not agree about the solutions chosen? Write about real places in your answer. (8) London A, 1998.
4. Describe the attempts made in some cities in LEDCs to try to improve the quality of life of those people living in the shanty town communities. (6) NEAB D, 1997.
5. Explain how the following possible solutions help to reduce people's concerns about the conditions in shanty towns: self help schemes; site and service schemes; improve health care; job training. (9) NEAB A, 1998.
6. The Calcutta authorities have tried to solve some of the city's problems. Choose one or more of the following problems and describe how the authorities have tried to solve them: unemployment; the spread of disease; shanty towns. (7) NEAB B, 1998.
7. Suggest how the city authorities might improve living conditions in this area [photograph showing high density housing]. (4) MEG B, 1998.
8. Use examples you have studied to explain how the problems of shanty towns can be reduced. (6) SEG A, 1998.
9. How can shanty towns be improved? (4) SEG A, 1999.
10. Give three reasons why people are concerned how to improve conditions in shanty towns. (6) NEAB A, 1998.
11. Give arguments for and against the opinion that squatter settlements should be bulldozed and the families evicted. Use examples of eviction from a city in an LEDC that you have studied. (5) NEAB C, 1999.

Table 5.36. GCSE Questions about Improving Squatter Settlements.

the question or the mark scheme. Four of the eleven questions are directed specifically at description (Questions 1, 2, 4 and 6); four at explanation (Questions 3, 5, 8 and 10); while Questions 7, 9 and 11 could be regarded as requiring either description alone or description combined with explanation. The marks allocated to individual questions range from 4 to 9, with eight questions having 6 or more marks, giving at least some scope for extended writing. In the majority of questions, candidates are asked to relate their answers to specific cities which they have studied. Calcutta, the focus of Question 6, is specified in the content for NEAB Syllabus B. While Questions 2, 7 and 11 have support materials, these are intended strictly as stimuli, rather than as direct sources of information for the answers required.

From the mark scheme for Question 2 (MEG A). [for a named city in an LEDC which you have studied, describe the attempts which have been made to improve the quality of life of the residents]

Self-help schemes: ideas such as self-built housing; inhabitants dig ditches for water/sewage pipes; community organisation to co-ordinate improvements; use of bricks; running water; electricity; etc.

City authority schemes: ideas such as provide basic services - e.g. water, sewage disposal, waste disposal, electricity; provide/subsidise building materials; build low cost housing; loans to self-help groups; give residents land ownership rights; education and training in building. (6 marks)

From the mark scheme for Question 9 (SEG A). [How can shanty towns be improved?]
provision of basic services such as water, sewage, power;
provision of building materials;
land ownership sorted out and planned provision made;
efficient transport to areas of employment;
support for self help groups/community action groups;
provision of health and education services, etc. (4 marks)

From the mark scheme for Question 7 (MEG B). [Suggest how the city authorities might improve living conditions in this area]

Two statements with qualifications.

e.g. Reduce incidence of disease (1) by providing reliable water supply/sewerage (1);

Provide a mains electricity supply (1) enables use of lighting cookers (1);

Provide building materials (1) for self help schemes (1).

(1+1) x 2. maximum 4 marks.

Table 5.37. Extracts from GCSE Mark Schemes for Questions about Improving Squatter Settlements (Table 5.36) which use Point Marking.

The mark schemes for the questions in Table 5.36 vary greatly in the extent to which they shed light on the understanding expected. Point marking was used for five of the questions and levels of response marking for the other six. Table 5.37 illustrates some of the differences in approach between different point marking schemes. In the guidance drawn up for marking Question 2 (MEG A), the scope for understanding is implicit in the ideas included in the lists, in the distinction between self-help and city authority schemes, and in the potential relationships between the two approaches, although these are not signalled in the question. Maximum marks were not awarded unless at least one example from each of the two approaches was included. In contrast, the list in the mark scheme for Question 9 (SEG A) emphasises various forms of help that can be provided by city

authorities, but only acknowledges self help groups in the context of the support that the authorities could provide for them. While the SEG A list is similar to that included in the

<p><u>From the mark scheme for Question 6 (NEAB B).</u> [Describe how the Calcutta authorities have tried to solve unemployment or the spread of diseases or shanty towns]</p> <p>Level 1 - simple descriptive statements. (1-2)</p> <p>Level 2 - some description and explanation of one or more solutions. (3-5)</p> <p>Level 3 - detailed description and explanation of one or more solutions. (6-7)</p> <p>Content: the Calcutta metropolitan development authority, self help schemes, new sewage pipes, clean water supplies, improved infrastructure, bulldozing bustees, more police, building new bridges over the Hooghly, improved refuse collection, more schools, clinics, hospitals, grants, foreign aid, sustainable development, appropriate technology, improvements in the countryside, attracting industry/multi-nationals, paved alleys.</p>
<p><u>From the mark scheme for Question 8 (SEG A).</u> [Explain how the problems of squatter settlements can be reduced]</p> <p><u>Level 1.</u> Basic. Improve the services, provide better building materials, build more homes etc. (1-2 marks)</p> <p><u>Level 2.</u> Clear. e.g. drainage, water supply, power supply schemes; building materials provided at low cost; basic infrastructure provided for new (and) regenerated schemes. (3-4 marks)</p> <p><u>Level 3.</u> Detailed. Must include references to examples (from any named LEDC or specific schemes). e.g. promotion of co-operative and self help building schemes; training programmes and education for inhabitants; enforcement of planning regulations to control developments; comprehensive redevelopment schemes etc. (5-6 marks)</p>
<p><u>From the mark scheme for Question 11 (NEAB C).</u> [Give arguments for and against the opinion that squatter settlements should be bulldozed and the families evicted]</p> <p>Level 1 - Agrees - 'they are dirty, health hazard' etc. (i.e. restates a problem) or Disagrees - 'people will have nowhere to go', 'not their fault'. (1-2)</p> <p>Level 2 - Offers a balanced view(s) i.e. agrees in some aspects but not in others and/or develops the argument for a single agree/disagree opinion, 'nowhere else to go because they have no jobs and are desperate. (3-4)</p> <p>Level 3 - Offers a detailed and complete argument for/against, or balanced, that is fully developed i.e. more than development of a point, e.g. description of vicious circles of decline <u>or</u> reaches Level 2 for/against and uses real LEDC case study examples <u>or</u> reaches Level 2 and offers suggestion of compromise'. (5)</p>

Table 5.38. Extracts from GCSE Mark Schemes for Questions about Improving Squatter Settlements (Table 5.36), which use Levels of Response Marking.

MEG A mark scheme, it is by no means identical, which illustrates the variety of valid answers which could be offered in response to such questions. The mark scheme for Question 7 (MEG B), has statements with an explanatory format, each making a link

between a particular action and the intended outcome. This gives a clearer indication of the type of understanding the examiners were looking for, and reflects the form of the question which asks 'how', rather than 'what' or 'why'. However, examiners were not looking for breadth of content in respect of this question.

The criteria for levels of response marking tended to be very general in character. By far the most common principle was that the higher the level, the greater the detail expected - presumably in terms of accurate and relevant information. Also prominent was the expectation that higher levels would make more effective use of relevant case studies or examples. Other criteria included: the attention given to explaining; clearly addressing the main point(s) of a question; the general clarity and coherence of answers; and, when relevant, providing a balanced answer. Only three of these levels of response mark schemes gave much attention to the specific content and ideas to which their general criteria would be applied ([Table 5.38](#)).

The mark scheme for [Question 6](#) (NEAB B) consisted of very general levels of response criteria and a separate list of possible content. The content list is long and varied, ranging from very specific, easily understood suggestions, such as new sewage pipes, more schools and paved alleys, to much broader, abstract concepts, such as improved infrastructure, sustainable development and appropriate technology. It is an unstructured collection of ideas, with no attempt to relate individual items to the particular problems specified in the question - unemployment, the spread of disease, and shanty towns - nor to give any indication how the content might be treated in relation to the levels of response criteria. The levels of response criteria merely emphasise the importance of detail and explanation, rather surprisingly in the case of the latter, as the question does not ask for explanations.

The mark scheme for [Question 8](#) (SEG A) incorporates content within its descriptions of levels, but in a form which implies that particular content would be associated with specific levels of response. The only indications given of criteria for judging the quality of candidates' answers are the rather crude labels (basic, clear, detailed); and perhaps an impression that the higher level responses were expected to include some elements of a

more general character, rather than be limited to a short list of the more obvious and immediate types of action, but no direct guidance is offered about quality of understanding or explanation.

The mark scheme for Question 11 (NEAB C), requiring candidates to give arguments for and against the controversial view that ‘squatter settlements should be bulldozed and the families evicted’, was the only one of the three which focused strongly on criteria for judging the quality of responses. The criteria emphasise the quality of candidates’ reasoning and the evidence which they present, rather than any conclusion which they might reach. However, the reference to ‘vicious circles of decline’ at Level 3 suggests a recognition that the best responses might include abstract ideas. The intellectual demands of the task and, therefore, the rigour of the mark scheme, were limited by the fact that candidates were not explicitly asked to evaluate the opinion given in the question, but merely to give arguments for and against. Nevertheless, the candidates’ use of examples, from a city in an LEDC which they had studied, might lead them to come to a view about a policy based on bulldozing and eviction.

The **A Level** questions concerned with understanding recent large-scale urbanisation in LEDCs deal mainly with:

1. the causes and effects of urbanisation in developing countries (Table 5.39);
2. urban primacy as a feature of the settlement pattern of developing countries (Table 5.41); and
3. the development of shanty towns/spontaneous settlements (Table 5.43).

The content emphasised in the first and third are a continuation of elements that have already been identified as significant at GCSE.

Within Table 5.39, a broad distinction can be made between those questions which focus on the causes of recent rapid urban growth and urbanisation (Questions 1 to 5) and those which focus on the effects (Questions 8 to 10); Questions 6 and 7 include both aspects. Only two of the questions were supported by stimulus materials, Question 2 having a

1. Describe the differences in urban change between First World and Third World countries during the last 30 years. Suggest reasons for these differences. (10) NEAB, June 1997.
2. a. The main reason for rapid urban growth is rural-urban migration. Study Lee's model of migration [diagram], then state and explain two possible intervening obstacles to migration. (4)
b. With reference to a named urban area which has grown rapidly in the last 30 years, describe and explain the positive factors which have attracted migrants to settle there. (6) O&C, 1997.
3. Describe, and suggest reasons for, the movement of people to cities in Third World countries. (10) NEAB, 1998.
4. Explain why the rates of urban growth and proportion of population living in urban areas are different from one part of the developing world to another. (5) WJEC, 1998.
5. With reference to a large named urban area in an LEDC, assess the importance of factors shown in influencing its rate of growth. [diagram naming 4 factors] (10) London B, June 1999.
6. a. What are the reasons for the rapid growth of major cities in the less developed (developing) countries? (15)
b. How does this process affect people living in rural and other urban areas? (10) O&C, 1997.
7. With reference to a large named urban area in an economically less developed area you have studied:
a. Outline the factors which have led to its recent rapid growth. (9)
b. Examine the environmental, social and economic impacts of this rapid growth. (9) London B, 1997.
8. With reference to one or more large cities or towns in the developing world, consider the social, economic and environmental effects on the surrounding rural area of continued and rapid urban growth. (10) Camb. L., June 1998.
9. a. define the term 'urbanisation'. (2)
b. How might a high rate of urbanisation affect the economy of rural areas of LEDCs? (5)
c. For any named urban area in an LEDC or MEDC, how has an increase in its population affected: 1. land use; 2. environmental quality. (8) London A., 1999.
10. Discuss the causes and consequences of the environmental problems associated with the growth of large cities in less economically developed countries. Illustrate your answer with reference to one or more examples. (9) AEB, 1999.

Table 5.39. A Level Questions about the Causes and Effects of Urbanisation in Economically Less Developed Countries.

diagram of Lee's model of migration, and Question 5, a diagram which identified broad factors influencing the growth of cities in ELDCs. In contrast, six of the ten questions ask

candidates to relate their answers to named case studies or examples. Most questions had a sufficient allocation of marks to allow extended answers. Widespread use was made of levels of response marking, the guidance for which was expressed in very general terms. The qualities most commonly emphasised were that candidates should: focus on, and cover all aspects of, the question asked; offer detailed treatment of the subject matter, which would provide evidence of sound knowledge and understanding; support general statements with appropriate examples; and make effective use of case studies of named places. Such guidance was sometimes accompanied by a general note about the type of content expected.

While the A Level questions about the causes of urban growth in LEDCs have some similarities with the GCSE questions in Table 5.31, they are more varied in character and in some cases are broader in scope. For example, they include questions about ‘differences in urban change between First World and Third World countries’ (Question 1), and about differences in rates of urban growth and levels of urbanisation within the developing world (Question 4). Most of the A Level questions are less narrowly focused on the push-pull model of migration. The only question which makes a specific reference to the push-pull model (Question 2, O&C) focuses on the concept of *intervening obstacles to migration*. These are defined in the mark scheme as ‘potential barriers to migration between the place of origin and place of destination’ - an interesting example of replacing one analogy (obstacle) with another (barrier). The mark scheme instructed examiners to allow as ‘obstacles’: long distance; time/costs of transport; mountain/oceanic/desert barriers; political boundaries; immigration laws/quotas; lack of information; misperception etc.’, which suggests that candidates were expected to have both breadth of knowledge and depth of conceptual understanding.

The emphasis on urban growth, rather than on rural to urban migration per se, encourages consideration of structural factors, which tend to be treated at a fairly high level of abstraction. For example, the scheme for Question 4 (WJEC) referred to ‘variations [in urban growth and the proportion of population living in urban areas] linked to: modernisation and industrialisation; dependence on agriculture; rates of natural increase;

From the mark scheme for Question 7b (London B). [Examine the environmental, social and economic problems associated with growth]

- Environmental - air pollution associated with rapid industrialisation, traffic growth, issues of waste disposal, sewage contamination of water in spontaneous settlements, loss of agricultural land.
- Social problems of homelessness, housing, shanty towns etc. Issues of crime (drugs), contrast between numerous poor and rich elite. Issues of prostitution, street children.
- Economic problems caused by unemployment, lack of job provision, problems of providing services (overwhelming numbers etc.).

From the mark scheme for Question 8 (Cambridge L). [Consider social, economic and environmental effects on the surrounding rural area]

- outmigration relieving the population pressure on the area;
- return income flows from migrants contributing to the rural economy in their home villages;
- the flow of ideas/technology/innovation from the cities to the rural localities, again via returning migrants [noted as ‘more apparent than real?’];
- outmigration leaving the villages with a depleted and aged population base;
- outmigration reducing natural increase in rural villages, leaving a population which is weighted towards females;
- demand for cash cropping to supply urban markets: can increase income, and introduce another uncertainty (the market price mechanism) into the rural sector;
- competition for land at the urban periphery, transgressing onto traditionally used and owned rural land.’

From the mark scheme for Question 6b (O&C). [How does rapid growth affect people living in rural and other urban areas]

- The ‘demonstration effect’ making certain groups aware of the perceived opportunities, and arguably drawing away from the most prosperous and innovative villagers or town dwellers, though on the positive side some of those left may benefit from cash remittances.
- Though the rural population may not fall significantly, because of high birth rates, the size of the local market remains small with low purchasing power and this is detrimental to the growth of local enterprise.
- Investment capital is generally drained away from the local areas as it is thought the gains are greater and more predictable in the expanding industries of the urban areas.
- Improved communications often speed up the loss of local opportunities - effects tend to be one way. Local producers are at the mercy of major urban markets, where competition keeps prices low, which means very low profits for local enterprise.

Table 5.40. Extracts from A Level Mark Schemes for Questions about the Effects of Rapid Urban Growth in Less Economically Developed Countries (Table 5.38)

environmental disasters, such as drought; political instability; and influence of colonisation’. The diagram accompanying Question 5 (London B), provided a structure by identifying four factors which could influence the rate of growth of a large urban area

in an LEDC: industrial development; improved communications; changes in farming practice; and quality of urban service. To assess the importance of the factors in relation to a place which they had studied, candidates had to make evaluative judgements based on their prior knowledge. While the mark scheme commented in general terms about each of the four factors, and recognised that other factors might also be very important, it gave no guidance about the nature and quality of evaluation expected.

The A Level questions about the effects of rural to urban migration in LEDCs, in Table 5.39, are less straightforward, and more demanding, than the GCSE questions in Table 5.32. While the GCSE questions emphasise description, the A Level questions suggest the need for some degree of explanation, as for example in those which focus on how the processes of urban growth (Question 6b) or urbanisation (Question 10b) affect the people and places left behind by those who migrate to the cities. Other questions use command terms which appear to imply that answers require more than description, for example: ‘*examine* the impacts’ (Question 7b); ‘*consider* the effects’ (Question 8); and ‘*discuss* the consequences’ (Question 10), although the precise implications of these terms were not clarified in the respective mark schemes. However, several of the A Level mark schemes indicated that candidates were expected to reveal an understanding of the complexity of outcomes, and of relevant abstract ideas (Table 5.40). The separate lists of environmental, social and economic problems, presented for Question 7b (London B), hint at the complexity of the consequences of rapid urban growth in LEDCs, without explicitly stating or explaining the point. In an additional comment, the mark scheme recognised that the problems emphasised by a candidate will depend on the city chosen, with some cities facing particular difficulties, such as Bangkok, with its flooding caused by subsidence, which in turn is a consequence of the scale of water extraction.

Answers to Question 8 (Cambridge L) are similarly dependent on the urban examples chosen by candidates. Here again, the question refers to social, economic and environmental effects but, in this case, the mark scheme summarised the ideas which candidates were expected to introduce in short statements, each of which contained an explanatory element. Nevertheless, these broad generalisations conceal the complex character of the activities and relationships involved in the processes of rapid and

sustained urban growth in LEDCs. Candidates require some understanding of these complexities, if they are to make meaningful responses to the question. Some of the ideas embodied in the statements, such as the influence on agriculture of an urban market, and the uncertainties associated with the operation of the market price mechanism, suggest a level of abstraction that has implications for the mode of thinking of candidates, as well as for their knowledge of the context to which the concepts are to be applied. Although the mark scheme for Question 6b (O&C) covers some similar ground to that for Question 8, its linked statements draw attention more effectively to the complex relationships between different factors, which in some cases pull in contrary directions, and in other cases operate together with the consequence that they reinforce a negative or positive effect.

In general, the statements in Table 5.40 address more complex relationships than is apparent in the GCSE treatment of the same topic. Nevertheless, some of the GCSE questions in Table 5.32 appear to open the door to enquiries that could prepare the way for the understanding expected at A Level. It is the GCSE mark schemes, rather than the questions, which suggest that only a modest level of understanding was expected.

The concept of *urban primacy* is not normally introduced until A Level, where it is specified in the content of a number of examination syllabuses. Several A Level questions

1. Explain the differences between a primate city and a non-primate city. (2)
O&C, 1997.
2. a. What do human geographers understand by the term 'urban primacy'? (2)
b. Why does urban primacy exist in many countries of the developing world? (5)
Cambridge L., 1997.
3. Give two reasons to explain the tendency for urban growth to concentrate in the largest cities of many developing countries. (6) WJEC, 1997.
4. a. Draw and label a line [on the graph] to show a primate pattern of settlement ordering. (2)
b. Outline the conditions under which primate patterns form. (4) London A, 1997.
5. a. Explain and illustrate why many developing countries contain one or two relatively large cities. (12) Oxford, June 1997,

Table 5.41. A Level Questions about Urban Primacy in Developing Countries.

have asked what the concept means and why primate settlement patterns are so common in developing countries (Table 5.41). The definitions provided in the mark schemes for Question 1 (O&C) and Question 2a (Cambridge L.) reveal that examiners expected candidates to go beyond the basic point that a primate city is one that has a much larger population than any other city in the country. While the O&C mark scheme asserted that a 'primate city is more than twice as big as any other city in a country', it only allowed one mark for an answer that simply described it as much larger than the second city. The Cambridge Linear mark scheme presented a broader account, describing urban primacy as 'the marked pre-eminence of the largest city within the country, in terms of economic, social and political affairs'; adding that, 'the extent of the difference in size between the first and second city should be made clear; traditionally, it is held that the primate city

From the mark scheme for Question 2b (Cambridge L.). [Why does urban primacy exist in many countries of the developing world?]

There needs to be reference to factors which cause extreme metropolitan dominance, in terms of:

- centralisation of government activity and bureaucracy;
- focus of economic activity generating cumulative causation/multiplier effects;
- concentration of trading, shipping, financial services in one location.

Candidates may talk of the evolution of the pattern in the past, in colonial times.

Equally, some candidates may discuss the notion that primacy reflects an earlier stage in the urbanisation process, where all the needs can adequately be met in one city, and that decentralisation from primacy can be a more mature stage in the urbanisation process.

From the mark scheme for Question 3 (WJEC). [Give two reasons to explain the tendency in many developing countries for urban growth to concentrate in the largest cities]

- Foreign investment may be concentrated to benefit from economic infrastructure;
- the concentration of social provision for health and education compared with smaller centres;
- the multiplier effect with firms being able to benefit from linkages and agglomeration.

Table 5.42. Extracts from A Level Mark Schemes explaining the prevalence of Urban Primacy in Developing Countries (Table 5.40).

must be at least three times as large as the second city, and five times as large as the third, but the candidates need not be as specific, as long as the difference is clearly understood'. The figures presented in the Cambridge Linear scheme are in line with Jefferson's (1939) original observation that the ratio between the populations of the three largest cities of

many countries approximated to the sequence of 100: 30: 20, but as Johnston has noted, although the concepts of primacy and a primate city are still widely referred to, 'the sequence that he identified is now largely ignored' (Johnston et al., 1994, p. 473). The precision implied in the mark schemes is only pertinent if related to the historical context of the formulation of the concept.

Questions 2b (Cambridge L), 3 (WJEC), and 5a (Oxford) are all concerned with the reasons for the development of primate cities in developing countries; while Question 4 (London A) asks more generally about the conditions under which primate patterns form. The mark schemes indicate the variety of factors involved, in particular, the importance of the concentration of political power and strength of economic activity in such cities. The explanations given are mainly in terms of structural conditions, and include abstract ideas. This is well illustrated by the Cambridge Linear and WJEC mark schemes (Table 5.42), with their references to the centralisation of government and bureaucracy; the benefit of the economic infrastructure; and the processes of cumulative causation/ multiplier effects, and agglomeration. Not all mark schemes commented on the relevance of colonial history to this centralisation of political and economic power leading to the common occurrence of primate patterns in the developing world.

The A Level questions about squatter settlements (Table 5.43) are similar in content to those at GCSE, in that they include definitions of such phenomena, descriptions and explanations of their distribution patterns within large cities, and consideration of the problems associated with them. Several questions ask about attitudes towards squatter settlements. Most of the questions had a low to medium allocation of marks, the only exceptions being Question 4 (Oxford), about the environmental problems associated with shanty towns, and Question 5 (O&C), about the consequences of changes in attitudes to spontaneous settlements and their inhabitants, both of which had much higher allocations.

The definitions provided in the mark schemes for Questions 1a, 4 and 7a, for the synonymous terms - spontaneous settlement, shanty town and squatter settlement - while broadly similar, had different emphases. The mark scheme for Question 7a (O&C) awarded one mark for 'an awareness that squatter settlements are unplanned or illegal'

and a second mark for one other relevant detail, such as the economic status of residents, the nature or quality of the built environment, and the service provision. The unplanned and illegal nature of the settlement was, therefore, identified as the core idea. In contrast, the mark scheme for Question 1a (London A) presented a more descriptive approach, explaining the meaning of the term ‘spontaneous settlement’ as ‘shanty settlements of makeshift housing built with rudimentary materials and absence of services; they appear and grow rapidly’. There was no reference to their unplanned character or illegality. The account of a shanty town given in the mark scheme for Question 4 (Oxford) combined both approaches:

An unplanned, unofficial settlement built of unconventional, poor quality materials and with none of the usual services - water, sewerage, electricity etc. Usually located on the edge of cities or in areas neglected/ignored by the formal city because of undesirable characteristics.

The fuller nature of this statement may reflect the fact that the Oxford mark scheme suggested that 5 marks be allocated to the definition, as compared to the two marks allocated to the corresponding questions in the O&C and London A papers. There was no suggestion in the Oxford scheme that some of the marks should be reserved for particular points. In this case, therefore, no core idea was identified.

The questions asking about the distribution of squatter settlements within a city (Questions 1b and c, 2, 6a and 7b) were each accompanied by a map or by a spatial model. Most of the questions required an explanation of the distribution pattern, even Question 6 (NEAB), where the instruction to ‘discuss the distribution of low-cost housing in Rio de Janeiro’ appears from the mark scheme to have been intended to signal to candidates that some attention should be given to explanation. The second part of Question 6, which asks candidates to predict the likely distribution of future low-cost housing in Rio de Janeiro, provides an opportunity to apply understanding of relevant general factors to evidence relating to a specific city. The factors influencing distribution patterns mentioned in the A Level mark schemes, were similar to those specified at GCSE, although it is likely that the A Level candidates were expected to offer more

detailed and comprehensive answers. Reference was made to the use of unattractive sites, such as steep slopes, poorly drained land subject to flooding, and polluted areas, avoided by other users; and to positive factors, such as proximity to employment and lines of communication providing access to the city centre. In particular, the advantages of the city fringe were contrasted with the conditions near the city centre, where economic and political factors militated against the provision of suitable accommodations for poor families.

1. a. Explain what is meant by the term 'spontaneous settlement' (2)
 b. Describe the distribution of spontaneous settlement shown [on the map provided] (3)
 c. Suggest three reasons for this distribution. (4) London A, 1997.
2. Explain the distribution of the shanty towns [shown on the model of a South American city]. (8) London B, 1997.
3. What is a shanty town? With reference to one or more cities in a developing country, discuss the environmental problems associated with shanty towns. (25) Oxford, 1997.
4. Comment on the view that there is little prospect for relieving the squalor, poverty and crime of spontaneous settlements. Illustrate using examples from the developing world. (10) Cambridge M., 1997.
5. a. What is meant by the term 'squatter settlement'? (2)
 b. Using evidence [from the map] state and explain three possible reasons for the location of squatter settlements in the Kariobangi district of Nairobi. (6)
 c. Give two reasons why squatter settlements are a feature of large urban areas in the developing (less developed) world. (4)
 d. Explain why many poor urban dwellers in the developing (less developed) world often prefer to live in squatter settlements rather than in purpose-built low-cost housing schemes such as Dandora [map]. (4) O&C, 1999.
6. a. (i) Discuss the distribution of low-cost housing in Rio de Janeiro, as shown on the map.
 (ii) Suggest, and give reasons for, the probable location of future low-cost housing growth in Rio de Janeiro. (8)
 b. Discuss the various attitudes towards the growth of low-cost housing in Third World cities. (7) NEAB, 1998.
7. a. How have attitudes to the growth of spontaneous settlements in developing (less developed) countries changed in the last twenty years? (8)
 b. What have been the consequences of these changes in attitudes to such settlements and their inhabitants? (17) O&C, 1998.

Table 5.43. A Level Questions about Squatter/Spontaneous Settlements.

Most of the A Level questions about the problems associated with squatter settlements required a greater depth of knowledge and understanding than equivalent questions at GCSE, with many of the mark schemes revealing that examiners expected explanations of general conditions or trends, supported by relevant examples. The levels of response criteria were of a very general nature, and in most cases simply emphasised the importance of the quality of explanation, discussion and exemplification; and the need for detail, accuracy and relevance. As usual, the guidance on suitable content tended to be more informative (Tables 5.34 and 5.45).

<p><u>From the mark scheme for Question 3 (Oxford).</u> The environmental problems associated with shanty towns were listed as: ‘fire hazards, problems of access for emergency services, slope instability and slope failure, water quality, drainage and sewage disposal - leading to problems of disease, air pollution from cooking fires etc., [and] noise pollution’.</p> <p><u>From the mark scheme for Question 4 (Cambridge M).</u> It was suggested that comments on the view that ‘there is little prospect for relieving the squalor, poverty and crime of spontaneous settlements’ could include reference to:</p> <ul style="list-style-type: none"> • the rapid rate of growth of large cities in LEDCs, as a result of rural-urban migration and high birth rates - a growth which sometimes exceeds the rate of economic growth; • the poor quality of the invariably under-resourced local governments; • the exploitation of the poorest workers, who were then forced to remain in poverty.

Table 5.44. Extracts from A Level Mark Schemes that refer to Problems associated with Squatter Settlements.

The extracts in [Table 5.44](#) focus on negative aspects of the growth of shanty towns. That from the mark scheme for [Question 3 \(Oxford\)](#), indicates the variety of environmental problems associated with rapid growth. The mark scheme suggested that these problems all arise from a lack of planning. In other words, they are a consequence of the ‘spontaneous’ and uncontrolled nature of the development. The levels of response criteria for this question referred, in general terms, to the quality of ‘discussion’ - which could be ‘superficial and inadequate’, ‘weak’, ‘adequate but limited’ or ‘clear and relevant’ - but gave no indication what sort of ‘discussion’ was intended. Presumably, candidates were expected to present something more than a description, but the mark scheme does not shed light on whether this was intended to cover explanation or evaluation. The mark scheme for [Question 4 \(Cambridge Modular\)](#) presented a positive

as well as a negative view of the prospects for improving spontaneous settlements, with the former based on the ‘possibilities for up-grading shanty towns, site and service

From the mark scheme for Question 5 (O&C). [Explain why many poor urban dwellers in the less developed world prefer to live in squatter settlements]

The possible advantages of squatter settlements referred to were:

- already well established residents often having significant investment in them;
- upgrading schemes which may eventually provide essential services;
- legal title may be granted to residents;
- no rent to pay; and
- the situation may be close to the CBD or areas of employment.

From the mark scheme for Question 6b (NEAB). [Discuss the various attitudes towards the growth of low-cost housing in Third World cities]

Hostile perceptions of higher income groups; areas of low-cost housing seen as being associated with crime, primarily drug trafficking.

But, [city] authorities increasingly work with residents’ associations on basic improvements (drainage, refuse collection, road paving), recognising that they are unable to house the populations ‘officially’.

From the mark scheme for Question 7 (O&C). [How have attitudes towards the growth of spontaneous settlements changed, and with what consequences?]

(a) The main change is that it has been recognised that the process is effectively unstoppable; therefore it should be used and assisted in certain instances. The process is one that contributes to the politicisation of the rural immigrants. Within the spontaneous settlements socialisation occurs, the informal sector flourishes and, over time as basic services are improved, whole neighbourhoods can be incorporated into the urban and social fabric. It is not a simple nor always a positive process but increasingly it is being seen as a way forward not backward. The *Turner model* is likely to be most often quoted in answers.

(b) Here it will be necessary to refer ideally to both a model (preferably the *Turner model*) and some detailed examples. Improved mobility is the key to the success of the process as currently evaluated ‘*low income bridgeheaders*’ young, male and freshly arrived tend to settle briefly in central slum areas. ‘*Low income consolidators*’, usually couples with children who have some job stability move out to shanty towns for greater security; and with good fortune they become ‘*middle income status seekers*’ who aspire to move out of the shanty towns. By this process the status both of the migrants and of the spontaneous settlement is raised. The informality of the process, aided often by the church and the Left, is the key to its success. More formal schemes of improvement would not work at this scale.

Table 5.45. A Level Mark Scheme Guidance referring to Attitudes towards Squatter Settlements.

schemes, and the fact that they represent one stage in the social mobility of parts of the urban population'. A high level of response required sound treatment of both views, with examples.

The mark scheme extracts in [Table 5.45](#) relate to questions which focus more directly on attitudes towards the squatter settlements or low-cost housing, although in Questions 6 and 7 it is not clear whose attitudes are the subject of attention - the inhabitants of these areas, or particular social groups within the city, or the city authorities. However, it is clear for [Question 5 \(O&C\)](#), which asks why many poor urban dwellers prefer to live in squatter settlements, rather in purpose-built, low-cost housing schemes. The mark scheme referred to improvements which those living in squatter settlements might anticipate, such as schemes for upgrading essential services and the possibility of being granted legal rights to their occupance of sites, as well as advantages which they might already experience, such as no rent to pay and the benefits of the improvements which they had made to their dwellings. Although [Question 6b \(NEAB\)](#) asks candidates to 'discuss various attitudes' towards the growth of low-cost housing, its mark scheme focuses on the contrast between the possible views of high income groups (entirely negative) and the views of those city authorities which are co-operating with resident associations to bring about improvements. The mark scheme for [Question 7 \(O&C\)](#) describes changing attitudes to the growth of spontaneous settlements in terms of the Turner model (Lloyd, 1979), a process account with a strong political dimension. The language used in the mark scheme suggests that candidates were expected to understand a number of abstract ideas, such as the processes of *socialisation* and *politicalisation*, and the distinction between the concepts of '*low-income bridgeheaders*, *low-income consolidators*, and *middle-income status seekers*'. While this may suggest a sophisticated understanding of changing attitudes towards spontaneous settlements, it depends heavily on candidates' knowledge of a specific conceptual model which is not mentioned in the examination syllabus, although it may have been included in later guidance from the examining board. The mark scheme gives the impression of a commitment to the processes described in the model, rather than an evaluative stance which recognises that such policies are not universally accepted.

Conclusions

The prominence given to the theme of settlements in the programme of study for Key Stage 3 and in the examination syllabuses for GCSE and A Level provides a strong thread of continuity to support students' progression in knowledge and understanding. The theme is not only one of the ten geographical themes which all KS3 students are required to study, but it is also a compulsory element in almost all of the examination syllabuses. There is also a considerable degree of continuity in particular aspects of the theme, most notably within the study of urban settlements, where such topics as urban growth, urban morphology (especially residential spatial patterns), the distribution of shopping centres, changes in urban structure, and the problems and issues that are associated with towns and cities, are common recurrent elements. In addition to this pattern of recurrent elements, there is a general tendency for each successive stage to have a greater breadth of content relating to the theme, than the preceding stage. With settlements, as with weather and climate, the information available, from the KS3 programme of study, from examination syllabuses and from mark schemes, varies in quantity and quality. However, the specification of content for settlement at KS3, although brief, is more helpful than that for weather and climate; and the treatment of the theme in GCSE and A Level syllabuses tends to be fairly detailed. Most students who do continue with the subject are likely to give further attention to the theme. Therefore, it is not difficult to envisage the possibility of progression in students' understanding of settlements being developed within the framework of a spiral curriculum.

Of the three subthemes chosen for detailed analysis, urban morphology is prominent in all three stages; while developments in the rural-urban fringe of more economically developed countries, and rapid urbanisation in less economically developed countries, are strong elements in both GCSE and A Level courses. The last two subthemes are particularly concerned with processes involving migrations of people, in one case from towns towards or into the countryside, and in the other case from rural areas to towns. They are also much concerned with the consequences of these processes, including the problems and issues associated with them. Urbanisation in LEDCs, provides a contrast to

the focus on the UK which is characteristic of the studies of urban morphology and of developments in the rural-fringe of MEDCs.

Some important features of the assessment of students' understanding of settlements are similar to those noted for weather and climate. At KS3, where the evidence is limited to official guidance documents, the only significant exemplar is from the 'Settlement' unit in SCAA's Optional Tests and Tasks (1996b). In the GCSE examinations, the evidence is primarily from structured questions, most of which require fairly short responses linked to support materials; although there are a few questions, mainly focusing on problems associated with towns, which give greater opportunity for extended writing. At A Level, the range of marks allocated to questions is much wider, and there is much more opportunity for extended writing ([Table 5.46](#)). Although some of the questions about urban land use patterns and the distribution of squatter settlements are linked to maps, most of the A Level questions about settlements have no support materials. However, there are differences between the two themes in the balance of the command terms used within questions, especially at A Level. While many of the questions about settlements ask for explanations or descriptions, a significant proportion - much higher than in the case of weather and climate - use terms such as 'define', 'assess', 'evaluate', 'comment on' and 'discuss'. There are GCSE questions which ask about the meaning of migration, push and pull factors, and Green Belt; and at A Level the terms under scrutiny include urbanisation, counterurbanisation, primate city, spontaneous settlements, market processes and planning processes. The A Level terms which are the objects of such questions tend to be more technical. Those questions which ask for assessment or evaluation occur mainly at A Level. They require qualitative rather than quantitative analyses, and usually give candidates the opportunity to show that they recognise the complexity of cause and effect relationships, for example, that a range of factors may contribute to a particular development or problem, and that these can vary in importance in different situations; or that the effects of a process may in part be beneficial and in part detrimental. Instructions to 'comment on' or 'discuss' have been applied to causes, consequences and, above all, to attitudes. Their greater use in A Level questions about settlements, than in questions about weather and climate, may reflect an expectation that candidates will have a greater appreciation of the complexity and variability of human

1.	a. Outline the main changes which have occurred in the character and zonation of residential and economic functions of your named chosen city region over the last 30 years (9)
	b. Assess the positive and negative effects which these changes have had upon your chosen city region. (16) Cambridge Linear. (Table 5.14)
2.	Examine how models help to explain the land use pattern in an urban area you have studied. (20) London A. (Table 5.16)
3.	a. Outline the social and economic changes associated with the suburbanisation of a rural village. (5)
	b. Illustrate and explain why suburbanisation affects some rural settlements more than others. (10)
	c. Evaluate the effects of suburbanisation on one or more villages in your selected rural tributary area. (15) WJEC (Table 5.24)
4.	Describe the process of counterurbanisation and discuss its role in changing the functions and morphology of rural settlements in Britain since 1960. Illustrate your answer by reference to specific examples. (25) Oxford (Table 5.24)
5.	Compare the characteristics of the rural-urban fringe in the developing (less developed) countries with its characteristics in developed countries. (25) O&C (Table 5.24)
6.	The growth of massive regional shopping centres in a few favoured locations is having a profound effect on the character and location of all other elements in the retailing hierarchy. Discuss this view. (25) O&C (Table 5.27)
7.	Show how changes in technology lead to changes in the location and character of offices. (25) O&C (Table 5.27)
8.	Discuss reasons why the rural-urban fringe in developed countries has become an area of great change and frequently of environmental conflict. (25) O&C (Table 5.27)
9.	Explain and illustrate why many developing countries contain one or two relatively large cities. (12) Oxford (Table 5.40)
10.	Comment on the view that there is little prospect for relieving the squalor, poverty and crime of spontaneous settlements. Illustrate using examples from the developing world. (10) Cambridge M (Table 5.42)
11.	What is a shanty town? With reference to one or more cities in a developing country, discuss the environmental problems associated with shanty towns. (25) Oxford (Table 5.42)
12.	a. How have attitudes to the growth of spontaneous settlements in developing (less developed) countries changed in the last 20 years? (8)
	b. What have been the consequences of these changes in attitudes to such settlements and their inhabitants? (17) O&C (Table 5.42)

Table 5.46. Examples of A Level Questions about Settlements which provide Opportunities for Extended Answers

behaviour, and be able to make subtle evaluative distinctions of the ‘on the one hand, and on the other hand,’ kind, than when dealing with physical processes. This, of

course, is in line with the treatment of atmospheric hazards, which has to take account of the influence of human factors on the impact which a given hazard may have in different places, and on the ways in which different governments and communities are able to respond to a serious event when it occurs. The use of a wide range of command terms in questions about settlements is well illustrated in [Table 5.46](#), which gives examples of A Level questions that provide opportunities for extended answers.

The analysis of the three selected settlement subthemes reveal some evidence of the forms of progression expected in specific content areas. Urban morphology is a strong element in all three stages. The relevant exemplary material for KS3 focuses on the description and explanation of land use patterns in a case study, but gives little guidance on quality of understanding. Assessment items at GCSE required candidates to compare residential areas, based on evidence presented to them (Table 5.11); and to describe and explain broader land use patterns, primarily from memory (Table 5.12). In general, while the former are mainly dependent on skills and a limited amount of knowledge; the latter provide more scope to reveal understanding. A few of the questions indicate an expectation that candidates would be familiar with a concentric model of land use or residential patterns, and even be capable of comparing land use patterns between an MEDC and an LEDC city, but the mark schemes for these questions revealed little about the quality of understanding required. Many of the A Level questions ask for explanations of changes in urban morphology, with candidates being expected to recognise the variety of factors and complexity of conditions and processes that influence patterns. At this level, there is also a strong focus on spatial models and theories, including concentric and sector models and Alonso's urban land use theory. Although individual questions concentrate on specific aspects of a model or theory, many of them demand considerable depth of understanding. This is especially so when candidates are asked to explain the logic underpinning the model or theory, or to apply ideas from a model to empirical data, whether the latter is provided alongside the question or is dependent on recall of knowledge from previous study.

There is strong continuity of content between GCSE and A Level in the treatment of developments in the rural-urban fringe of MEDCs. Both give attention to the causes and

effects of suburbanisation and counterurbanisation. The questions about causes focus mainly on the attractions of the fringe, and many of those about consequences are concerned with the pressures on fringe areas and the issues associated with development. At both stages, a significant proportion of the questions ask for explanations, but while most of the GCSE questions require fairly short answers, many A Level questions provide scope for extended answers. Usually, the latter address broader and more complex matters, and require considerable recall of information as well as understanding. Among the A Level questions are also some which ask for evaluation or discussion, especially in relation to the issues. The more detailed mark schemes, in particular, indicate the greater complexity of understanding of the processes of suburbanisation and counterurbanisation expected at A Level. This includes the variety of interrelated factors which give rise to the processes, and influence their character; and the wide range of consequences, which affect different locations and different places in different ways. While there is no evidence of the use of any strong conceptual model to structure understanding of this subtheme, many ideas are introduced at both stages. Those at GCSE include concepts which are closely associated with the rural-urban fringe (e.g. suburb, green belt, greenfield site, dormitory settlement, out-of-town shopping centre) and more general concepts which have much wider applicability, for example, migration, accessibility, land costs, house prices, and environmental quality. Those introduced at A Level include such abstract ideas as decentralisation, tertiarisation, functional interdependence, and conservation (Table 5.48). However, in some cases, such as counterurbanisation, it may be the language rather than the idea which is abstract.

The potential, offered by GCSE and A Level, for progression in understanding the rapid urbanisation in LEDCs is very similar to that for the previous subtheme. There is strong continuity of content as a result of the attention given to the causes and effects of urbanisation and to the development of squatter settlements. At both stages, the treatment of squatter settlements include their distribution patterns within large cities, their characteristic features and problems, and strategies for dealing with these. However, there is a broad difference in the treatment of the causes of urbanisation, which at GCSE is approached largely through the topic of rural to urban migration, while at A Level consideration is also given to underlying structural reasons. The only conspicuous topic

added to the subtheme at A Level is that of urban primacy, which is required for some syllabuses. The differences between GCSE and A Level in the character of the questions relating to this subtheme are not significantly different from those relating to the rural-urban fringe, although slightly more of the GCSE questions about squatter settlements provide scope for moderate length answers. However, as with the previous subtheme, interpretation of the quality of understanding expected at GCSE and A Level, and therefore of the evidence which might indicate support for progression in learning, is severely limited by the brevity of many of the relevant statements in the syllabuses, and the lack of clear guidance about the criteria for judging quality of understanding in relation to specific questions. Many of the GCSE questions provide limited opportunities to display understanding or have mark schemes that do not appear to have been designed to award depth of understanding. The lists of push and pull factors influencing rural to urban migration and descriptions of the effects of rapid urbanisation suggest that examiners were expecting recall of knowledge rather than understanding; and the answers to most of the questions about the distribution and character of squatter settlements are primarily dependent on skills for interpreting maps or photographs. On the other hand, there are some questions which encourage candidates to go beyond the information provided and to apply prior knowledge to new situations. In comparison, some of the mark schemes for the A Level questions indicate that candidates are expected to be familiar with the variety of factors and complexity of conditions influencing the processes of rapid urbanisation and development of squatter settlements; and to make appropriate use of a range of broad and fairly abstract concepts, many of which can also be applied in other themes of human geography.

With settlements, as with weather and climate, the most prominent dimensions of progression in understanding are complexity and abstraction. The examples of 'complex patterns, processes and relations' in Tables 5.47 (GCSE) and 5.48 (A Level) reveal both the degree of continuity in many of the topics which can be studied at different levels of complexity, and the sort of detail included in A Level syllabuses and mark schemes which indicates the complexity expected. Particularly significant among the latter are the repeated references to the different broad groups of factors - the economic, social,

political, technological and environmental - which affect human activities and change the human habitat; and the recognition that these factors are often interrelated. Other examples include the influence of the historical legacy on urban morphologies; the relevance of the different interests, goals and attitudes of individuals and groups to issues; and the variety of policies and strategies employed to tackle problems. But, as with GCSE, the different styles of the GCSE and A Level syllabuses and mark schemes make it impossible to draw precise comparisons from these sources of evidence.

Complex Patterns, Processes and Relationships	Abstract ideas
<u>Urban Morphology</u> urban land use patterns; residential patterns in cities; changing morphologies; issues associated with urban morphology and current changes.	urban zones, e.g. CBD, inner city areas, suburbs; residential patterns - types of housing, housing densities, road patterns; housing market, housing opportunities and constraints, residential segregation; property developers, financial institutions, planning control; differential access to work, shopping and leisure facilities.
<u>The Rural-Urban Fringe</u> migration from inner city areas to the suburbs and beyond; attractions of the rural-urban fringe for development; changes occurring in the rural-urban fringe; issues associated with the rural-urban fringe.	suburbanisation, urban sprawl; rural-urban fringe, commuter villages, green belts, greenfield sites, land values; out-of-town shopping centres, accessibility, multiplier effect, environmental quality; competing interests of developers and conservationists.
<u>Rapid Urbanisation in LEDCs</u> migration from rural areas to cities; the development of squatter settlements; issues associated with rapid urban growth and the development of squatter settlements.	urbanisation; migration, push and pull factors; squatter settlements, improvement schemes - self help and city authority schemes; appropriate technology and sustainable development

Table 5.47. Examples of Complex Content and Abstract Ideas in the Treatment of Selected Subthemes of Settlements, at GCSE.

Complex Patterns, Processes and Relations	Abstract Ideas
<p><u>Urban Morphology</u> the complexity of the morphology of an individual large town or city; the variety of ways in which urban zones/areas can be categorised; the variety of factors affecting urban morphologies - economic, social, political, technological, environmental - and the interrelationships between them; factors influencing the distribution of different types of land use; the historical legacy - age of buildings, growth patterns; demographic, socio-economic and cultural/ethnic distribution patterns within urban settlements; differences between urban morphological patterns in different parts of the world.</p>	<p>urban land use models - Burgess, Hoyt, Mann, Alonso - and the concepts embedded in these; the rationale underpinning each model/theory - simplifying assumptions, internal logic, relationship to the 'real world'; evaluation of the model as an aid to understanding; accessibility, centrality; economic rent, bid rent, land values, bid rent curves; perception, residential desirability, mental maps; neighbourhood, residential segregation.</p>
<p><u>Rural-Urban Fringe and Associated Processes</u> the pressures on the rural-urban fringe, and the many issues associated with different forms of development; the combination of general causes (especially economic, social and technological) and specific conditions (specific to a given place); the complexity of the processes affecting the rural-urban fringe, including the decision making and mechanisms of change; and the variable impact of the processes on different settlements; contrasts in the processes operating in developed and developing countries; the complexity of the issues - the different interests, goals and attitudes of individuals and groups; the variety of policies, strategies and actions; and the significance of central and local authority planning.</p>	<p>the processes of urbanisation, suburbanisation, counterurbanisation, decentralisation, reurbanisation, tertiarisation, information and technological revolutions; accessibility, economies of scale, resource development, market processes, competition, economic investment processes, functional interdependence; planning policies and strategies - green belts, green wedges, development control, town development schemes, greenfield and brownfield sites, conservation.</p>
<p><u>Rapid Urbanisation in LECDs</u> the different rates of urban growth and different proportion of population living in urban areas, in different parts of the world; the range and variety of factors influencing rural to urban migration in the developing world (e.g. demographic, economic, social and environmental) and the differences in their relative importance in different places and under different conditions; the complex relationships between different factors; the variety of impacts on the rapidly growing large cities, and on areas losing population; the complex factors involved in the development of squatter settlements, the problems associated with such developments, and the strategies employed to solve them.</p>	<p>Lee's push-pull model of migration; processes of colonialisation, industrialisation and modernisation; political instability; environmental disasters; demographic and social aspects of migration; urban primacy, economic and political centralisation, cumulative causation and multiplier effects, agglomeration, investment policies, infrastructural advantages; Turner's model of the growth and transformation of squatter settlements; politicalisation and socialisation of migrant settlers, low-income bridge leaders, low-income consolidators, middle-income status seekers.</p>

Table 5. 48. Examples of Complex Content and Abstract Ideas in the Treatment of Selected Subthemes of Settlements, at A Level.

Again, as might be expected, abstract ideas are much more apparent at A Level than at GCSE, with such concepts as: centrality, economic rent and bid rent; counterurbanisation, reurbanisation, and tertiarisation; urban primacy, cumulative causation, agglomeration and infrastructural advantages. Some of the examination questions and mark schemes indicate that candidates are expected to have a depth of understanding of conceptual models, that includes an appreciation of the principles underpinning the models, and an awareness of their purposes and limitations. However, many of the ideas which are associated with the study of settlements have labels which are probably more familiar than the vocabulary that students have to make sense of when trying to understand atmospheric processes. More important, the processes themselves may be closer to their personal experience. The gap between the GCSE and A Level treatment of settlements may not be so formidable as that which appears to exist between the GCSE and A Level treatment of weather and climate.

There appear to be significant differences between the two themes, in the relative importance of the qualities of complexity and abstraction to their understanding, and in the character of the abstract ideas associated with each.

At GCSE, complexity in both themes is associated mainly with the variety of factors which influence particular conditions and patterns, rather than with processes. The more general ideas tend to be ones which are only moderately abstract and, therefore, can be understood at a fairly simple level. At this stage, comparatively few such ideas figure in the specified content for weather and climate (Table 3.28). Most of those that are included, are specific to the theme (e.g. precipitation, rainshadow, convectional rain, anticyclone, mid-latitude depression, hurricane). In contrast, the study of settlements for GCSE involves a much wider range of moderately abstract ideas (Table 4.47), which includes not only ones that are specific to the theme (e.g. CBD, suburbanisation, rural-urban fringe, squatter settlement), but also many others which are more widely applied (e.g. land use specialisation, land values, accessibility, migration, environmental quality, quality of life).

At A Level, both themes give considerable attention to processes, and many of the complexities and abstractions which students are expected to understand involve interactions and interrelationships. However, as at GCSE, most of the abstract ideas that

contribute to the better understanding of weather and climate are ‘technical’ concepts which are specific to the theme, while the better understanding of settlements involves abstract ideas which have much wider applicability, being used in other geographical themes and in other social sciences. This particular contrast between the themes of weather and climate and settlements may be an aspect of broader differences between physical geography and human geography, which in turn reflects differences between the physical sciences and the social sciences. While there is no evidence, from A Level syllabuses and examinations, of candidates being expected to understand the behaviour of the atmosphere in terms of meteorological properties and principles, derived from classical physics, the models and theories introduced at this level tend to have fairly tight structures linking ‘technical’ concepts. It seems likely that the main challenge of studying atmospheric processes at this level arises from the abstract nature of some of the concepts and relationships. In comparison, the study of human geography, and especially of urban settlements, tends to focus on more complex, open systems and, therefore, often has to take account of a wide range of factors. For example, explanations of human behaviour can involve demographic, economic, social, political and technological dimensions, which are invariably interrelated. Psychological factors, stemming from the experiences, values and attitudes of individuals and groups, may strongly influence perceptions, decisions and behaviour, and be critically important to understanding issues and conflicts. A further element in the geographical study of settlements is the historical dimension, which may be important in the explanation of its location, present morphology, or the distribution of ethnic or cultural groups. Complexity may be a greater challenge than abstraction in the understanding of settlements required at this level. However, little, if any, research appears to have been undertaken into students’ understanding of the conceptual models included in A Level geography syllabuses, whether of physical geography or of human geography; or of their understanding of key concepts in human geography, which may have different meanings or connotations in different contexts.

CHAPTER 6. CONCLUSIONS

This enquiry into the extent to which the external demands of Key Stage 3 of the National Curriculum and of GCSE and A Level examinations, support progression in geographical understanding, has addressed four key questions:

1. What are the distinctive characteristics of geographical understanding, and the role of assessment in defining students' progression in that understanding?
2. How is the geographical understanding required for KS3, GCSE and A Level signalled in the specifications for the National Curriculum and for the external examinations?
3. What evidence of progression in the geographical understanding required is provided by assessment tasks and mark schemes at successive stages?
4. To what extent do the external requirements for the geography curriculum provide a satisfactory framework for the development of progression in students' understanding?

The research has been based primarily on an analysis of documentary evidence, drawn from texts about the nature of understanding, progression and assessment, selected from the general body of educational literature; texts that are concerned more specifically with these aspects in relation to the geographical education of students in secondary schools in England and Wales; and official documents, in particular policy statements, curricular specifications and guidance on assessment for KS3; and subject criteria, assessment tasks and mark schemes for GCSE and A Level examinations. A detailed analysis of curricular specifications and assessment, across the three phases of secondary education, has focused on two recurrent content themes - weather and climate (Chapter 4) and settlements (Chapter 5) - the first being an example from physical geography and the second from human geography. Subthemes were selected from within each of the two themes, both to facilitate comparisons between the phases, and to ensure that the research was manageable. At GCSE and A Level, the sampling of relevant evidence was strengthened by drawing on questions from a wide range of examination papers, over a three year period from 1997 to 1999.

The purposes of the research, the complex nature of the curricular context which provides the setting for teaching and learning geography, and the source materials which are the focus of the research all favoured qualitative methods of analysis. Much of the research involves the interpretation of texts and the exercise of judgement. While care has been taken to present the empirical evidence underpinning the analyses, the interpretations and judgements are necessarily subjective. In this concluding chapter attention will be given to the main findings of the research, their practical and theoretical implications, and some of the issues which require further investigation.

The nature of understanding and progression, and the role of assessment in defining these for the curriculum

The first of the key research questions was addressed in Chapter 2, under the heading ‘preliminary considerations’. Such considerations are preliminary in the logical sense that it is necessary to have a good grasp of the meanings associated with such terms as understanding, geographical understanding and progression, and to appreciate how assessment in the National Curriculum and at GCSE and A Level functions, in order to make sense of the more detailed investigations reported in the two succeeding chapters and be able to place them within their broader educational context. This is not simply a matter of seeking ‘correct’ definitions and ‘accurate’ descriptions, because both the ideas and the situations to which they are being applied are complex and dynamic.

Understanding, progression and assessment are multi-faceted in character, for they each take various forms and involve various relationships in different contexts. What are described, in the context of the present thesis, as ‘preliminary considerations’, have been, and will no doubt continue to be, a considerable challenge to educationalists.

What it means to *understand* something depends in part on what that something is and, therefore, what might be involved in making sense of it. In any major field of knowledge and understanding, what is studied include objects, events, situations, forms of behaviour, patterns, processes, relationships, transformations, systems, and the innumerable ideas

which are associated with them . At the heart of understanding are the links that we develop between our experience and the ideas that we acquire or develop, a process which is dependent, to a significant extent, on our own mental activities (Figure 2.1, op. cit. p. 6). In general terms, this account of the development of understanding, which recognises the importance of each individual's involvement and contribution to his or her own learning, is in line with a constructivist viewpoint. However, an important distinction must be made between *personal meanings*, which are likely to be influenced by an individual's experience, interests, intentions and values; and *shared meanings*, which are social constructs. While geographical education is concerned mainly with enabling students to develop shared meanings which are prominent within the discipline and considered to be appropriate objectives for the school curriculum, the process of learning can be influenced strongly by the personal meanings which students have acquired previously. Ideas include concepts, generalisations, models and theories; and they can be expressed in linguistic, diagrammatic, symbolic and other forms. All such forms have an element of ambiguity; they can be interpreted in different ways and convey different meanings to different people. Important ideas are usually linked to other ideas within conceptual networks, which tend to extend, and often help to secure, meaning. The development of understanding therefore often involves induction into structures of meaning. However, meanings can be enriched by personal experience, just as new experiences tend to be interpreted in the light of existing ideas. The ability to make suitable use of appropriate ideas to interpret new experiences is among the most important criteria for assessing understanding.

The distinctive features of *geographical understanding* necessarily reflect the character of the discipline - a diverse and dynamic field of study, embracing a wide range of interests and a variety of perspectives; and characterised by an immensely complex structure, with many overlapping and interrelated subfields. Figure 2.2 (op. cit. p. 15) is an attempt to identify the more important elements within this structure. With such a range of interests, it is not surprising that geography makes use of a large number of ideas, some of which have been developed within the discipline, while others have their origins in neighbouring fields. Thus, geographical studies of weather and climate draw heavily on meteorological concepts, while studies of settlements make use of ideas from the social sciences, the

humanities and applied fields such as urban planning. More distinctive characteristics of the discipline tend to be linked to a number of persistent features. One of these is the importance attached to both the physical and the human branches of the discipline. Another is the recognition of particularly important perspectives, such as the study of places; the spatial analysis of features, patterns and processes on the Earth's surface; and the relationships between human activities and the environment. These persistent features can be recognised in the specifications for geography in the National Curriculum and at GCSE and A Level. The more complex substantive structures of geography, as a research discipline, do not and should not determine the selection and structuring of the subject at school level. What the discipline has to offer is a rich source of understanding, which can be drawn upon to inform curricular decisions and curriculum planning.

Progression is an important element in the planning of the structure of the curriculum and in the assessment of students' attainments. The concept focuses on the advances in learning made by students over a period of time. As those studying geography over three, five or seven years of secondary education extend their relevant experience and knowledge, and mature intellectually, it is reasonable to expect them to gain a much broader and deeper understanding of the subject. Such an advance must take account of the nature and quality of understanding that is achieved, as well as the aspects of content that are encountered. In practical terms, the concept is relevant to the determination and specification of objectives for a curriculum, the planning of schemes of work and preparation for lessons, the functioning of the curriculum, and the assessment of learning. The external specifications for the National Curriculum and for GCSE and A Level examinations bear on each of these, either directly or indirectly. At this stage, it is again useful to emphasise the distinction between the closely related curricular concepts of sequence and progression. The idea of sequence simply refers to the order in which content or activities are structured within a programme of study. While this can be significant in planning for progression, it does not necessarily involve an advance in the quality of learning, which is central to the notion of progression.

In Chapter 2, attention has been drawn to a number of broad and relatively simple ideas about progression in the curriculum; and several models, directly relevant to the concept, which have stimulated a great deal of empirical research. Among the first group are the ideas that:

1. planning for progression should take account of students' prior experience and learning, and support their future learning;
 2. the cognitive demands of the curriculum should match the capabilities of the students, providing them with suitable challenges to encourage and enable them to advance at an appropriate pace;
 3. some recurrent elements in the curriculum (e.g. recurrent themes, subthemes and key ideas) can provide suitable vehicles for progression in understanding. In Bruner's concept of a spiral curriculum, the recurrent elements which provide the means to extend and deepen understanding are represented as threads weaving through a programme and linking units of study;
 4. individual concepts, generalisations, models and theories are open to different levels of understanding;
 5. there are a number of general qualities that characterise progression in understanding.
- These have been described as the 'dimensions' of progression.

One of the main practical difficulties of applying such concepts successfully to the curriculum is the gap between the generality of the ideas and the necessary specificity of content and associated understandings within a curriculum.

Among the models potentially relevant to progression which were considered in Chapter 2 (op. cit. pp. 25-31 and 36-38), are those concerned with learning hierarchies (Gagne), stages of cognitive development (Piaget), levels of performance (Peel, Biggs and Collis, Rhys) and conceptual trajectories (Driver). Gagne's research into the *pre-requisites for specific learning tasks*, and the idea of *learning hierarchies*, appears to be applicable mainly to planning short sequences of learning activities within skills-based tasks, and to highly structured fields of knowledge such as mathematics and the physical sciences (Gagne, 1974). It was the assumption that specific attainments in most subjects, including

geography, could be organised hierarchically which proved to be one of the weaknesses of the TGAT assessment framework. Analysis of understanding in geography suggests that any large-scale conceptual map of the subject is likely to be very complex, and that there are many alternative routes along which progression can be developed. The models aiming to define general stages of development and levels of performance are at the other end of the specificity-generality spectrum. Piaget's model of *stages of cognitive development* addresses the issue of how children's capabilities develop over time. But serious doubts have been raised about his general theory, and more particularly about his claim for an invariant sequence of stages of cognitive development, his explanation of those stages, and the emphasis which he placed on logical forms of reasoning (Modgil and Modgil, 1982). Later researchers have tended to describe levels of performance in response to particular types of problem solving tasks, rather than general stages of development. While Peel (1971), and Biggs and Collis (1982), have described general features which characterise levels of performance, these acquire more precise meanings for teachers when they can be illustrated in relation to particular fields of knowledge and understanding, and to activities related directly to those fields which can reveal whether students are advancing in their understanding and modes of thinking. Despite the promising investigations of Rhys (1972, 1973), there is no extensive and coherent body of research about progression in students' geographical understanding, comparable to that carried out in science as, for example, in the research into children's' scientific ideas, conducted by the Leeds National Curriculum Science Support Project (Driver et al., 1994a, 1994b).

Assessment is a key component in the external curricular requirements for geography in all three phases of secondary education. At KS3, it is linked to the programme of study and level descriptions of the subject attainment target, and is supported by guidance on assessment. For GCSE and A Level courses, assessment is the prime focus; and the requirements are specified in the examination syllabuses, and translated into operational terms in examination papers and mark schemes.

There is a fundamental difference between assessment of geography at KS3 and assessment of the subject for GCSE and A Level. At present, the former is school-based

and, therefore, can be linked directly to the actual curricular experience of the students. Indeed, it can be an integral part of the curriculum, rather than a separate and, for some, a threatening activity. Use can be made of a suitably wide variety of assessment techniques that are appropriate for the capabilities of the students, for the teaching that is taking place, and for the learning intended. The findings of the assessment can be used for formative purposes - to improve both learning and teaching. In contrast, the summative form of assessment for GCSE and A Level has all the characteristics of high-stakes assessment, as outlined in Table 2.5 (op. cit. p. 56). The main declared purposes of these examinations are to certificate candidates, and make teachers and schools accountable for *their students' performances*. The system also has the effect of exercising considerable control over the curriculum in the upper years of secondary schooling. The concern for comparability of standards is reflected in the emphasis on formal methods of assessment, the external setting of question papers and marking of scripts, and the tight control over the conditions in which the examinations take place. These features distance the assessment from the context in which the candidates' learning has taken place.

Specific features of the GCSE and A Level examination papers and examination questions affect the assessment of understanding. For example, while the prominence of multi-part structured questions at GCSE may help examiners to sample the breadth of content and objectives of a syllabus, it can limit the opportunities for candidates to display their understanding of complex matters. The broad questions, which are more common at A Level, provide more opportunity for extended answers, but the evidence in such answers may not allow examiners to judge the extent to which candidates' responses reflect understanding or recall. High stakes, external assessment can encourage teaching to the test, with an overemphasis on recall of information, at the expense of understanding.

Signalling understanding in the specifications for KS3, GCSE and A Level

The specifications for KS3 of the National Curriculum and for the external examinations at GCSE and A Level are the official formulations of what students are required to study and learn in geography in the secondary school curriculum. As such, they are intended to

inform curriculum planning and assessment. However, there are significant differences in the content and style of the specifications, both between the phases and, in respect of GCSE and A Level, between different syllabuses.

At KS3, the accounts of understanding in the attainment target and the programme of study are fairly brief and of a generalised nature. The treatment of understanding in the level descriptions focuses on a limited number of very general ideas (Figure 2.6, *op. cit.* p. 65), which are linked to an implicit structure, based on 'places', 'patterns and processes' and 'environmental relationships and issues'. These are three of the four 'aspects of performance' highlighted in the guidance document on Exemplification of Standards in KS3 Geography, published by SCAA (1996a), the fourth aspect being 'geographical enquiry and skills'. The concepts which are included in the level descriptions are few in number, and are embedded in statements which are almost content free. Partly because of their level of generality, the treatment of understanding in the descriptions offers weak criteria for discriminating between levels, and presents no more than a crude indication of what progression in understanding might involve.

As far as demands on knowledge and understanding are concerned, the KS3 programme of study presents little more than a content framework, outlining in very brief terms the places and themes which should be studied. While the nine systematic themes - four from physical geography, four from human geography and one on environmental issues - provide a broad and fairly well balanced approach to the subject, the specifications for individual themes give little indication of the nature and quality of the understanding expected. The concepts that are included again tend to be very general, and similar to those contained in the level descriptions. There is an emphasis on distributions, patterns, processes, changes and relationships; and frequent references to causes, effects and human responses. The term 'spatial' is, for some reason, avoided, although in most cases the distributions and patterns appear to be spatial. A few statements are concerned with the meaning of terms, and the characteristics or nature of specific features; and there is implicit recognition of the significance of classification (e.g. types of land use, types of vegetation) although the term is not introduced. As the analyses of the requirements for 'weather and climate' and 'settlements' have revealed, the signalling of geographical

understanding in the attainment target and the programme of study is faint, and in some cases distinctly ambiguous.

The KS3 Scheme of Work for geography (QCA, 2000), with its 24 model units of study, offers little towards clarifying the understanding that students might develop. The most conspicuous feature of the units is the attention given to 'possible teaching activities'. Otherwise, there appears to be a preoccupation with ensuring that the various curriculum statements prepared for each unit- whether headed 'key aspects', 'expectations', 'learning objectives' or 'learning outcomes' - match what is specified in the Statutory Order. The consequence is a repeated reworking of a limited number of ideas. There is little analysis or development of these ideas in relation to the specific focus of a unit, and little attempt to introduce other ideas which would be relevant. The attainment target appears to have inhibited rather than encouraged thinking about students' understanding.

At GCSE and A Level, the specifications for geographical understanding in each of the examination syllabuses, include general statements, which are based mainly on the requirements prescribed by the GCSE Subject Criteria for Geography (SCAA, 1995a) and the A/AS Subject Core for Geography (SCAA, 1993); and more specific statements identifying relevant ideas, in the description of content within individual syllabuses. The general accounts of the understanding required are similar to those for KS3, which may well have been intended by the School Curriculum and Assessment Authority, in order to display a consistent approach across the three phases. Among the features which are common to each phase are: (a) recognition of the importance of understanding as an aim; (b) application of understanding to a broad range of content, which includes physical and human geography; (c) attention to ideas which are characteristic of the study of places, of spatial patterns and processes, and of the relationships between people and the environment - the traditional perspectives of the subject; and (d) emphasis on a common set of interrelated concepts, in particular: geographical patterns; physical and human processes; relationships and interactions; changes; issues, especially environmental ones; the relevance of attitudes and values to issues; and the use and management of environments. The general specifications are not particularly indicative of progression, although there is evidence of the higher expectations for understanding and intellectual

skills at A Level, for example, in the requirements that candidates should be able to use higher order skills, such as analysis and evaluation; and not only select and apply geographical concepts, principles and theories, but also demonstrate a critical awareness of the potential and limitations of such ideas (SCAA, 1993b).

The significant differences in the specification of geographical understanding, between the National Curriculum Order and the external examination syllabuses, are not in the general statements but in the treatment of content, which is much more detailed in both the GCSE and the A Level syllabuses. The content is presented in a variety of formats, which include: key questions; key ideas, in the form of generalisations; descriptions of content; and amplifications of the content, variously described as ‘commentaries’, ‘detailed material’, ‘notes of guidance’ and ‘possible learning outcomes’. The extent to which the requirements for understanding are detailed varies between syllabuses, especially at GCSE. In most cases, the guidance is more detailed at A Level than at GCSE. A Level syllabuses give more explicit attention to the ideas which should be explored, especially within the descriptions and amplifications of content. The ideas are often linked directly to specific content and specific contexts, and set within more coherent and tightly structured statements than those in many GCSE syllabuses, giving the impression that the authors had greater confidence in identifying and presenting the ideas to be studied. But the need to be clear about the sort of understanding required is just as great at KS3 and GCSE as at A Level.

Signalling progression in understanding in assessment tasks and mark schemes

Because of the limited nature of the KS3 assessment guidance about ‘weather and climate’ and ‘settlements’, the documentary evidence about progression in understanding available from assessment tasks and mark schemes was limited mainly to the GCSE and A Level examinations. Each GCSE and A Level question has a number of components, which usually include:

- a specific content focus - in the case of understanding this may involve an explicit reference to particular ideas or relationships, although it may simply identify a specific aspect of content within a broader subject field;
- instructions, including a 'command' term (e.g. 'describe' or 'explain') - which signal the type of action and type of answer required from the candidate; and
- an allocation of marks - which often indicates the length of answer expected and approximately how much time should be spent on the question.

In addition, a question may:

- supply information relevant to the answer - as a stimulus, steer, or data which needs to be used to answer the question;
- indicate what form the answer should take - e.g. label a diagram, illustrate with a sketch map, supply appropriate words for gaps in a text.

Chapters 4 and 5 reveal how some of these components, especially the content focus of a question, the command terms and the supporting information, can help to signal the geographical understanding that is required, and indicate the scope for progression between phases. Comparing the content of questions at GCSE and A Level helps to

GCSE	A Level
formation of relief rainfall; cause of convection rain; rainfall distribution pattern (cross section); annual pattern of precipitation (graph); relationships between rainfall and relief (cross section); altitude (cross section); wind direction (diagram); and pressure system (cross section).	windward and leeward slopes (diagram); distribution of thunderstorms and snowfall; global distribution pattern of precipitation; global precipitation distribution pattern (map); mean annual precipitation of selected locations (world map); variability of precipitation (world map)

Table 6.1. The Focus of Content in GCSE and A Level Questions about Precipitation

reveal the ideas which are given priority in each phase, and the extent to which there is continuity, extensions or shifts of interest between them. [Table 6.1](#) summarises the elements of content which are the main focus in GCSE and A Level questions about patterns and processes of precipitation. While the table reveals a continuity of interest in

precipitation, it is clear that the A Level questions cover a wider range of content, in that they include distribution patterns of snowfall and thunderstorms, and tend to ask about precipitation, rather than rainfall; they give attention to global distribution patterns; and they include the more abstract idea of precipitation variability, and technical terms such as windward and leeward slopes.

GCSE	A Level
characteristics of urban residential areas - e.g. housing type and density, street layout, open spaces, facilities, surrounding environment (maps); patterns of land use and quality of life in a neighbourhood; (map) comparisons between residential areas (tables, photographs); ways of improving residential areas; variations in housing and quality of environment within cities (table); concentric land use pattern (map; diagram); design of a New Town; the differences in land use patterns between MEDC and LEDC cities.	factors influencing land use patterns in urban areas; recent changes in land use patterns in a town and their effects (map and model); effects of rapid population growth on the internal structure of a named urban area; the influence of transport technology on the growth phases of a named urban area; the possible effects of telecommunication changes on urban structures; models of urban land use for LEDCs; Alonso's land use theory and bid rent curves; the use of models to help explain the land use pattern in a [named] urban area.

Table 6.2. The Focus of Content in GCSE and A Level Questions about Urban Morphology

Table 6.2, summarising the content focus of questions about urban structures, illustrates an expectation of comparable advances within a subtheme of human geography. Here the main thread of continuity is the attention given to land use patterns, but at GCSE this is limited mainly to residential patterns and at the scale of relatively small areas and neighbourhoods. In contrast, the A Level questions ask more broadly about the overall pattern within a town or city, and place greater emphasis on the causes and effects of changes and on the use of conceptual models. There is recognition of the historical dimension of urban structures; and specific attention is given to the influence of particular factors - transport technology and rapid population growth. But taken alone, the content focus of questions often convey little about the nature and quality of understanding required.

The *command terms* add an important dimension because they are intended to alert the candidates to what they are expected to do in relation to the content focus. But they likewise only give a limited indication of the quality of knowledge or understanding required. While a large number of terms are used, ranging from 'name' and 'identify' to 'describe', 'explain', and 'evaluate', these are not treated as categories within an agreed taxonomy, such as that produced by Bloom and his colleagues (Bloom et. al., 1971). Such terms as 'describe' and 'explain', which are the ones most commonly used, are open to widely different interpretations in relation to specific content. Furthermore, the wide range of vocabulary used to indicate some categories complicates the interpretation of questions. For example, among words and phrases used in GCSE and A Level questions to convey the need for an explanation are: 'why?', 'explain', 'explain why', 'explain how', 'what are the causes of?', 'show how helps to explain', 'show how have led to', 'give reasons for', 'suggest reasons for', 'suggest reasons why', 'outline the factors that have influenced', and 'consider some of the ways in which have brought about'. While distinctions might be made between those instructions that appear to require a full explanation and those which only require a partial explanation; and between those which appear to indicate that a confident explanation is expected and those that point towards more tentative conclusions, it is open to question whether these different forms of expression necessarily represent subtle differences in meaning. Command terms often need to be considered in the full context of a specific question or task. However, one distinction between GCSE and A Level papers is the greater frequency, within the latter, of questions that ask for an evaluation, which in many contexts requires higher order skills. Another, is the greater use at A Level of questions which ask candidates 'to discuss' or 'to comment on', usually in relation to complex developments or issues. These open instructions usually appear to imply that candidates are expected to explain such matters such as the significance of different viewpoints, or the need to balance the advantages and disadvantages of alternative actions or policies, which affect different groups in different ways.

The use of *supporting information* as an integral part of an examination question is conspicuous at GCSE and A Level, but especially at GCSE. Such information can reduce the extent to which candidates are dependent on their recall of specific data, although to

demonstrate understanding a candidate usually has to go beyond the information given. Nevertheless, the nature of the information provided and how it is displayed, as well as how candidates are expected to use it, can be significant factors in determining the difficulty of a question. As would be expected, A Level questions tend to present more complex information and more abstract ideas, for example, in the form of graphs. Tables 4.27 (op. cit. p.) and 5.46 (op. cit. p.) reveal that A Level questions requiring extended answers characteristically have no supporting information. While such questions provide good opportunities for candidates to draw upon their knowledge and understanding to produce well structured and well reasoned answers, anticipation of likely questions, as revealed by previous examination papers, can lead teachers to emphasise the preparation of model answers, and encourage candidates to place more reliance on recall than on depth of understanding. The progression that is achieved may be different from that which the designers of examination syllabuses and the setters of question papers intended. The analyses of question content, command terms and, even to some extent, the style of questions point to the same conclusion - that questions alone only give a very limited indication of the nature, let alone the quality, of the understanding required. It would be reasonable to expect both the nature and quality of understanding to be addressed in the mark schemes, prepared by senior examiners to secure consistency in marking (QCA, 1999).

While mark schemes for external examinations have become much more informative in recent years, there are considerable differences in the amount and type of guidance provided, in particular, in respect of notes of guidance about the specific content expected for each question, and the criteria for judging levels of responses. In some mark schemes, general criteria are stated as principles to guide levels of response marking; in others, they can be identified in the instructions or guidance for marking individual questions. From evidence based on these two sources it appears that higher quality answers, and therefore higher level responses, are characterised by:

1. detailed and accurate treatment of relevant subject matter - candidates answer questions more fully and provide more comprehensive explanations;

2. the introduction and appropriate use of relevant ideas (concepts, generalisations, models) and of relevant geographical vocabulary;
3. the effective use of appropriate examples, including case studies, to illustrate general ideas;
4. knowledge and understanding of complex links and interrelationships, for example, in relation to causes and effects, many processes, and conceptual structures;
5. ability to interpret information in a variety of forms, including maps and diagrams, by applying their understanding of relevant ideas and making effective use of higher order skills, such as analysis and evaluation;
6. evidence of sound reasoning, and of conclusions which take a balanced account of the evidence available;
7. clarity in the expression and presentation of information and ideas.

This broad list draws upon different types of evidence from different mark schemes.

There is no evidence of any agreement about general criteria for assessing understanding, to be applied across all GCSE and A Level geography schemes. A distinction can be made between those criteria that are independent of specific content, for example, the amount of accurate and relevant detail presented by a candidate, and the clarity of presentation; and those that usually need to be interpreted in the context of the content focus of a question, such as the appropriate use of relevant ideas, and the understanding of complex relationships. It is the second type of criteria which tends to address more directly the quality of understanding.

A framework for the development of progression in students' geographical understanding?

The documentary evidence for progression in geographical understanding, in the external requirements for the secondary school curriculum, lies mainly within the detailed specification of content for GCSE and A Level, and within examination questions and the more detailed schemes of work. Although the recurrence of particular themes in all three phases provide opportunities for progression, those opportunities are weakened by the

very generalised treatment of content and understanding in the KS3 specifications and in some GCSE syllabuses, and by the choices available in some syllabuses both at GCSE and A Level. While there is convincing evidence that the geographical understanding required of weather and climate and of settlements is progressively more demanding at each successive stage, there is no evidence of any coherent overall structure for geography, from 11 to 18 that defines, with a reasonable degree of specificity, the ideas and quality of understanding appropriate for each of the three stages.

Practical and Theoretical Implications of the Research Findings

Although this research has not addressed directly the issue of the impact of the external requirements of the National Curriculum and of GCSE and A Level examinations on the geography curriculum of secondary schools, the investigation has been concerned with matters which are very relevant to the planning and implementation of that curriculum. It is, therefore, reasonable to reflect on the possible practical implications that some of the research findings might have for decision making and practice at different levels in the educational system. Four levels are particularly relevant to this research: teachers of secondary school geography; the senior management in schools; the external examining groups; and central government and its educational agencies.

Perhaps the most important point for teachers, facing the external pressures that impinge on their work, is that they should operate as ‘professionals’ rather than as ‘technicians’. To teach effectively, they must take a responsible role in creating and shaping the geography curriculum, within whatever framework is imposed by central government or other authority. This implies that they must have an informed view of the geographical understanding which they intend their students to develop, and of the nature of progression within their subject. They need to consider how best to prepare their students for examinations, without distorting the wider educational aims of their teaching. In KS3, the content framework of the National Curriculum programme of study need not inhibit them from designing a stimulating course that takes account of the experiences and abilities of their students, nor discourage them from developing formative assessment as

an aid to teaching and learning. More specifically, geography departments need to develop a realistic strategy to build progression into their curriculum. Initially, this might involve using the model of a spiral curriculum: selecting a limited number of recurrent strands; identifying the ideas which are to be developed, and within which units the teaching of those ideas will be concentrated; deciding which links between ideas can be explored within the context of those units; and identifying the qualities which will be relevant for determining whether, and to what extent, progression is being achieved.

The implications for senior management in a school are of a very general nature, being concerned with the sort of practical support which they can provide for geography, as for any other subject, in the curriculum. Such support focuses on their role in determining: the extent to which the organisation of the curriculum and, in particular, the patterns of subject choice give students the opportunity to continue with the study of geography beyond KS3, and beyond GCSE; the allocation of resources, especially suitably qualified teachers, to the subject; and the encouragement and support given to the staff to enable them to enhance their professional capabilities. The last of these could include the sharing of ideas between subject teams, about such common interests as the relevance of curriculum planning and formative assessment to progression in students' learning.

Chapters 4 and 5 contain critical observations about the specifications for geographical understanding in examination syllabuses, the suitability of some examination questions for assessing understanding, and the lack of specificity in many mark schemes. These are directly relevant to the quality of summative assessment, and indirectly relevant to the planning of progression. One implication is that there is a need to identify good practice, by investigating what sort of examination specifications give the best support to teachers and to examiners; what types of questions are most effective in assessing understanding; and what sort of mark schemes are most helpful. At a broader level, there is need for research into the effect of different styles of specification and assessment on the teaching of a subject, which in turn is likely to have implications for progression.

The fourth and highest level to be considered is that of policy making by central government, and of advice and control by government agencies. Since the late 1980s,

central government has exercised a much stronger influence and control over the school curriculum in England and Wales, through its introduction of the National Curriculum, its increasing control over external examination systems, and the higher profile which it has given to the inspection of schools and teacher training. Two matters of policy which are especially pertinent to the development of progression in the curriculum are the nature of the specifications for the National Curriculum and assessment priorities. While the KS3 specifications for geography provide a broad curriculum framework, they offer very little guidance about the understanding expected at this stage, and therefore do not provide a clearly defined base upon which to plan later courses. Any requirement on GCSE examining groups to take account of the National Curriculum has little meaning in terms of the nature and quality of geographical understanding required for KS3. There is a much broader issue here of the effectiveness of very generalised statements, such as those in the level descriptions and grade descriptions for geography, as criteria for assessment. There is also the issue as to whether more detailed specifications for KS3 should be in the form of mandatory requirements, or would be better in the form of advisory or discussion documents, which are not linked directly to the authority of central government. The use by government of external examinations to certificate the performance of students and evaluate the performance of schools places a strong emphasis on summative assessment, to the detriment of formative assessment. The latter, however, would be more directly relevant to monitoring the progress of students and to informing them, as well as their teachers, about realistic advances to aim for. Although central government may at present be reluctant to even consider weakening the status of summative assessment, the educational case for improving and strengthening formative assessment needs to be made.

The theoretical implications of the research are less easily discernible than the practical.

The attempt has been made to:

(a) clarify the meaning and relevance of a number of broad ideas which underpin the research, in particular, the nature of understanding, geographical understanding, progression, and educational assessment;

- (b) distinguish between some closely related ideas, such as personal meanings and shared meanings, the curriculum as a programme of content and/or activities and the curriculum as a process, sequence and progression, and formative and summative assessment;
- (c) critically analyse some of the existing models relevant to progression; and
- (d) construct a few new models to help describe significant relationships and structures, whether about understanding (Figure 2.1), the substantive structure of geography (Figure 2.2), the modelling of progression (Figure 2.4); or contrasting approaches to assessment (Figure 2.5).

Although the research was not designed to test any of the concepts or models, it provided scope to develop and refine ideas. The idea of ‘dimensions’ of progression was directly addressed in Chapters 4 and 5, where the evidence highlighted the importance of complexity and abstraction. The experience of undertaking this research suggests that refinements to the model could include:

1. the addition of other dimensions which appear to be applicable in geography, as suggested in the concluding section of Chapter 4;
2. an appreciation that the dimensions do not progress in the form of a series of steps nor do they simply progress in one direction, but rather have a quality that is relative to the context in which they are used. In other words, it may often be useful to consider whether the ‘degree’ of abstraction or complexity or precision is appropriate to what is being studied and to the purpose of the study; and
3. a fuller analysis of how the various dimensions are interrelated.

Two very broad and related issues emerge from the research as theoretical and practical implications. One is the conspicuous gap that exists between the very generalised ideas that are used to describe progression - ranging from the notion of a spiral curriculum and the idea of ‘dimensions of progression’ to the level descriptions and grade descriptions used for examinations - and the very specific geographical experiences and information that students are expected to make sense of. The gap is one which needs to be bridged if teachers are to be helped to plan more effective curricula and raise the quality of their students’ understanding. It is tempting to assume that the solution lies in fuller specifications of the type and quality of understanding that students are expected to

develop, and to some extent this is probably partly true. But the second issue is that the tighter the specifications, the more rigid is the curriculum, and the greater the risk that many teachers will be inclined to operate as 'technicians' rather than as 'professionals', and that would almost certainly be counterproductive. A more complex 'solution' will be necessary.

National Curriculum Attainment Target for Geography (1995)

Level 1

Pupils recognise and make observations about physical and human features of places. They express their views on features of the environment of a locality that they find attractive or unattractive. They use resources provided and their own observations to respond to questions about places.

Level 2

Pupils describe physical and human features of places, recognising those features that give places their character. They show an awareness of places beyond their own locality. They express views on attractive and unattractive features of the environment of a locality. Pupils select information from resources provided. They use this information and their own observations to ask and respond to questions about places. They begin to use appropriate vocabulary.

Level 3

Pupils describe and make comparisons between the physical and human features of different localities. They offer explanations for the locations of some of those features. They show an awareness that different places may have both similar and different characteristics. They offer reasons for some of their observations and judgements about places. They use skills and sources of evidence to respond to a range of geographical questions.

Level 4

Pupils show their knowledge, understanding and skills in relation to studies of a range of places and themes, at more than one scale. They begin to describe geographical patterns and to appreciate the importance of location in understanding places. They recognise and describe physical and human processes. They begin to show understanding of how these processes can change the features of places, and that these changes affect the lives and activities of people living there. They describe how people can both improve and damage the environment. Pupils draw on their knowledge and understanding to suggest suitable geographical questions for study. They use a range of geographical skills drawn from the Key Stage 2 or Key Stage 3 Programme of Study, and evidence to investigate places and themes. They communicate their findings using appropriate vocabulary.

Level 5

Pupils show their knowledge, understanding and skills in relation to studies of a range of places and themes, at more than one scale. They describe and begin to offer explanations for geographical patterns and for a range of physical and human processes. They describe how these processes can lead to similarities and differences between places. Pupils describe ways in which places are linked through movements of goods and people. They offer explanations for ways in which human activities affect the environment and recognise that people attempt to manage and improve environments. Pupils identify relevant geographical questions. Drawing on their knowledge and understanding, they select and use appropriate skills (from the Key Stage 2 or Key Stage 3 Programme of Study) and evidence to help them investigate places and themes. They reach plausible conclusions and present their findings both graphically and in writing.

Level 6

Pupils show their knowledge, understanding and skills in relation to a wide range of studies of places and themes, at various scales. They explain a range of physical and human processes. They describe ways in which processes operating at different scales create geographical patterns and lead to changes in places. They describe and offer explanations for different approaches to managing environments and appreciate that different approaches have different effects on people and places. Drawing on their knowledge and understanding, pupils identify relevant geographical questions and suggest appropriate sequences of investigation. They select and make effective use of a wide range of skills (from the Key Stage 3 Programme of Study) and evidence in carrying out investigations. They present conclusions that are consistent with the evidence.

Level 7

Pupils show their knowledge, understanding and skills in relation to a wide range of studies of places and themes, at various scales. They describe the interactions within and between physical and human processes. They show how these interactions create geographical patterns and contribute to change in places and patterns. They show understanding that many factors influence decisions made about places, and use this to explain how places change. They appreciate that peoples' lives and environment in one place are affected by actions and events in other places. They recognise that human actions may have unintended environmental consequences and that change sometimes leads to conflict. With growing independence, pupils draw on their knowledge and understanding to identify geographical questions, establish a sequence of investigation, and select and use accurately a wide range of skills (from the Key Stage 3 Programme of Study) and evidence. They are beginning to reach substantiated conclusions.

Level 8

Pupils show their knowledge, understanding and skills in relation to a wide range of studies of places and themes, at various scales. They offer explanations for interactions within and between physical and human processes. They explain changes over time in the characteristics of places. They begin to account for disparities in development and show some understanding of the range and complexity of factors that contribute to the quality of life in different places. Pupils recognise the causes and consequences of environmental issues and show understanding of different approaches to tackling them. They understand and apply the concept of sustainable development. Drawing on their knowledge and understanding, pupils show independence in identifying appropriate geographical questions and implementing an effective sequence of investigation. They select and use effectively and accurately a wide range of skills (from the Key Stage 3 Programme of Study) and evidence, to reach substantiated conclusions.

Exceptional performance

Pupils show their knowledge, understanding and skills in relation to studies of places and themes across the full range of scales. They explain complex interactions within and between physical and human processes. They explain and predict change over time in the characteristics of places. Pupils show understanding of alternative approaches to development and the implications for the quality of life in different places. They assess the relative merits of different ways in which environmental issues are tackled and justify their own views about the different approaches. They understand and apply the concept of sustainable development in a range of contexts. Pupils draw selectively on geographical ideas and theories, and use accurately a wide range of skills (from the Key Stage 3 Programme of Study) and evidence to undertake geographical enquiries independently at different scales. They reach substantiated conclusions, which they present effectively and accurately. They evaluate their work by suggesting improvements in approach and further lines of enquiry.

Appendix B

Sources of Questions in Tables

Table	No.	Syllabus	Year	Exam.	Paper	Question
4.7	1	NEAB B	1999	GCSE	2161	1
	2	London A	1997		3P	2
	3	WJEC	1997		1	2
	4	NEAB D	1997		2	1
	5	WJEC	1999		1	2
	6	WJEC	1997		2	2
	7	WJEC	1999		1	4
	8	London A	1999		4H	D7
4.9	1	Cambridge Modular	1997	A Level	4542	2
	2	London B	1998		6211	3
	3	WJEC	1998		Unit 1	4
	4	Oxford	1997		34	1
	5	Cambridge Modular	1997		Foundation	2
	6	London A	1997		Module 2	3
4.10	1	Cambridge Linear	1997	A Level	1	3
	2	Cambridge Linear	1998		1	3
	3	London A	1997		Module 2	2
	4	NEAB	1998		GG06	1
4.11	1	Cambridge Linear	1998	A Level	1	6
	2	Cambridge Linear	1998		1	3
	3	WJEC	1997		1	2
4.12	1	WJEC	1997	GCSE	2	2
	2	SEG A	1997		2	7
	3	London A	1997		3P	1
	4	London A	1998		2F	D7
	5	London A	1999		4H	D7
4.13	1	MEG C	1998	GCSE	2	B4
	2	MEG B	1999		1	A1
	3	SEG B	1998		5	3
	4	SEG A	1998		3	9
4.14	1	Cambridge Linear	1997	A Level	1	3
	2	Oxford	1997		9945/1	3
	3	AEB	1997		3	2
	4	Cambridge Modular	1998		4542	2
4.15	1	Cambridge Linear	1997	A Level	4542	1
	2	NEAB	1997		GG03	4
	3	Cambridge Linear	1998		1	6
	4	Oxford	1998		6760	2
	5	NEAB	1997		GG03	4
	6	Oxford	1997		9945/1	4

Table	No.	Syllabus	Year	Exam.	Paper	Question
4.16	1	London B	1997	A Level	6211	3
	2	NEAB	1998		GG02	5
	3	AEB	1997		1	2
	4	O & C	1997		1	5
	5	London B	1997		6211	3
	6	Cambridge Linear	1997		1	3
	7	NEAB	1998		GG02	5
4.17	1	Cambridge Linear	1999	A Level	9050/1	3
	2	AEB	1997		1	6
	3	Cambridge Linear	1997		1	6
	4	Cambridge Modular	1997		4542	3
	5	O & C	1997		1	4
	6	London A	1999		Module 2	3
4.18	1	Cambridge Linear	1999	A Level	9050/1	3
	2	Cambridge Linear	1997		1	3
	3	Oxford	1997		9945/34	3
	4	Cambridge Modular	1998		4542	2
	5	NEAB	1998		GG03	6
	6	Oxford	1997		31	1
4.21	1	NEAB B	1999	GCSE	2158	1
	2	SEG B	1999		4	3
	3	SEG A	1999		2	9
	4	London A	1999		4H	D7
	5	WJEC	1999		1	2
	6	MEG D	1997		1	4
	7	MEG C	1999		2	B4
4.22	1	Oxford	1997	A Level	34	1B
	2	Cambridge Modular	1997		4542	3
	3	O & C	1997		34	1B
	4	O & C	1997		2	1
	5	O & C	1998		5692,192	12
	6	Cambridge Linear	1997		1	14
	7	NEAB	1997		3	5
	8	Cambridge Modular	1998		4542	1
	9	London B	1999		6211	4
4.23	1	MEG D	1997	GCSE	1	4
	2	NEAB C	1997		2	4
	3	London B	1998		1F	3
	4	MEG C	1998		2	B5
4.24	1	NEAB A	1997	GCSE	2	4
	2	NEAB A	1999		2145	36
	3	NEAB A	1999		2149	43
	4	MEG C	1997		2	4
	5	NEAB B	1999		2158	3
	6	SEG A	1999		2	9

Table	No.	Syllabus	Year	Exam.	Paper	Question
4.25	1	London B	1997	A Level	6216	2
	2	London B	1998		6216	1
	3	London B	1998		6216	2
	4	London B	1999		6216	1
	5	London B	1999		6216	2
	6	Cambridge Linear	1997		1	16
	7	Cambridge Linear	1999		9050/1	11
4.26	1	London A	1997	A Level	2	7
	2	Oxford	1997		52	1
	3	Cambridge Linear	1997		1	11
	4	WJEC	1997		Unit 3a	1
	5	NEAB	1997		GG04	2
	6	Cambridge Linear	1999		9050/1	11
	7	NEAB	1999		GG04	1
5.11	1	NEAB B	1997	GCSE	1	B6
	2	SEG B	1997		1	3
	3	MEG D	1997		2	2
	4	London B	1998		3H	6
	5	MEG B	1998		2	A2
	6	NEAB A	1999		2150	3
5.12	1	London B	1997	GCSE	2	3
	2	MEG A	1997		3	4
	3	MEG A	1999		4	f
	4	NEAB B	1998		1	3
	5	London B	1998		1F	5
	6	WJEC	1998		2	2
5.13	1	AEB	1999	A Level	3	5
	2	Cambridge Linear	1999		9050/2	2
	3	AEB	1997		2	6
	4	AEB	1998		1	9
	5	Cambridge Linear	1998		9050/2	4
	6	O & C	1998		5693, 193	1
	7	O & C	1999		5693, 8370/3	4
5.16	1	O & C	1999	A Level	5693, 8370/3	4
	2	AEB	1997		1	4
	3	Oxford	1996		9945/2	1
	4	NEAB	1997		GG10	1
	5	London A	1998		3	4
	6	London A	1999		3	7
5.19	1	London B	1997	GCSE	2	A1
	2	NEAB B	1998		1	3
5.20	1	NEAB D	1997	GCSE	1	2
	2	NEAB A	1997		2	6
	3	NEAB C	1999		2165	2
	4	MEG A	1999		4	1
	5	MEG C	1999		2	A1
	6	WJEC	1999		2	2

Table	No.	Syllabus	Year	Exam.	Paper	Question
5.21	1	NEAB E	1997	GCSE	1	2
	2	NEAB A	1998		2	1
	3	NEAB C	1998		2	4
	4	NEAB C	1999		2165	1
	5	NEAB C	1999		2165	2
5.22	1	NEAB C	1997	GCSE	1	5
	2	SEG A	1999		5	2
	3	NEAB D	1997		1	2
	4	NEAB C	1998		2	4
	5	NEAB C	1998		2	4
	6	NEAB C	1999		2165	3
5.24	1	Cambridge Linear	1997	A Level	2	2
	2	AEB	1998		3	5
	3	WJEC	1998		Unit 2	3
	4	London B	1998		6213	2
	5	Cambridge Modular	1997		4543	1
	6	Cambridge Linear	1998		2	2
	7	NEAB	1997		GG10	2
	8	Oxford	1998		6761	3
	9	O & C	1999		5694	17
5.27	1	Cambridge Modular	1998	A Level	4543	2
	2	NEAB	1998		GG10	4
	3	O & C	1999		5694	14
	4	O & C	1997		4	13
	5	O & C	1998		5694, 194	13
	6	O & C	1999		5694	13
5.28	1	Cambridge Modular	1997	A Level	4543	2
	2	O & C	1997		4	17
	3	NEAB	1999		GG10	1
	4	NEAB	1998		GG10	B3
	5	Cambridge Modular	1997		4543	3
	6	NEAB	1999		GG03	6
5.31	1	MEG A	1997	GCSE	3	2
	2	SEG B	1997		2	2
	3	WJEC	1997		2	5
	4	NEAB B	1997		2	2
	5	NEAB A	1999		2146	3
	6	MEG A	1999		2	4
	7	SEG B	1998		5	1
	8	NEAB A	1998		2	1
	9	NEAB C	1999		2169	2
	10	London B	1997		2	A1
5.32	1	NEAB B	1997	GCSE	2	2
	2	WJEC	1997		2	5
	3	MEG A	1999		2	4
	4	SEG B	1997		2	2
	5	NEAB A	1999		2150	3
	6	MEG A	1997		3	2

Table	No.	Syllabus	Year	Exam.	Paper	Question
5.33	1	NEAB B	1997	GCSE	2	2
	2	London A	1997		3A	B4
	3	MEG B	1998		2	A1
	4	MEG A	1999		2	4
5.34	1	NEAB C	1997	GCSE	2	2
	2	NEAB E	1997		2	4
	3	MEG A	1999		2	4
	4	NEAB C	1999		2165	1
	5	London A	1997		3A	B4
5.36	1	London A	1999	GCSE	4H	A2
	2	MEG A	1999		2	4
	3	London A	1998		2F	A2
	4	NEAB D	1997		2	7
	5	NEAB A	1998		2	4
	6	NEAB B	1998		2	3
	7	MEG B	1998		2	A1
	8	SEG A	1998		4	2
	9	SEG A	1999		5	2
	10	NEAB A	1998		2	4
	11	NEAB C	1999		2165	3
5.39	1	NEAB	1997	A Level	GG10	2
	2	O & C	1997		3	4
	3	NEAB	1998		GG10	1
	4	WJEC	1998		Unit 2	1
	5	London B	1999		6212	3
	6	O & C	1997		4	18
	7	London B	1997		6213	1
	8	Cambridge Linear	1998		2	2
	9	London A	1999		3	3
	10	AEB	1999		1	3
5.41	1	O & C	1997	A Level	3	4
	2	Cambridge Linear	1997		2	2
	3	WJEC	1997		Unit 2	1
	4	London A	1997		6203	4
	5	Oxford	1997		9945/41	1
5.43	1	London A	1997	A Level	3	3
	2	London B	1997		6213	1
	3	Oxford	1997		52	5
	4	Cambridge Modular	1997		4543	1
	5	O & C	1999		5693, 8370/3	2
	6	NEAB	1998		GG10	1
	7	O & C	1998		5694, 194	18

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