Personal, Social and Humanities Education Key Learning Area

Geography
Curriculum and Assessment Guide (Secondary 4 - 6)

Jointly prepared by the Curriculum Development Council and The Hong Kong Examinations and Assessment Authority

Recommended for use in schools by the Education Bureau HKSARG
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Preamble

The Education and Manpower Bureau (EMB, now renamed Education Bureau (EDB)) stated in its report[1] in 2005 that the implementation of a three-year senior secondary academic structure would commence at Secondary 4 in September 2009. The senior secondary academic structure is supported by a flexible, coherent and diversified senior secondary curriculum aimed at catering for students' varied interests, needs and abilities. This Curriculum and Assessment (C&A) Guide is one of the series of documents prepared for the senior secondary curriculum. It is based on the goals of senior secondary education and on other official documents related to the curriculum and assessment reform since 2000 including the Basic Education Curriculum Guide (2002) and the Senior Secondary Curriculum Guide (2009). To gain a full understanding of the connection between education at the senior secondary level and other key stages, and how effective learning, teaching and assessment can be achieved, it is strongly recommended that reference should be made to all related documents.

This C&A Guide is designed to provide the rationale and aims of the subject curriculum, followed by chapters on the curriculum framework, curriculum planning, pedagogy, assessment and use of learning and teaching resources. One key concept underlying the senior secondary curriculum is that curriculum, pedagogy and assessment should be well aligned. While learning and teaching strategies form an integral part of the curriculum and are conducive to promoting learning to learn and whole-person development, assessment should also be recognised not only as a means to gauge performance but also to improve learning. To understand the interplay between these three key components, all chapters in the C&A Guide should be read in a holistic manner.

The C&A Guide was jointly prepared by the Curriculum Development Council (CDC) and the Hong Kong Examinations and Assessment Authority (HKEAA) in 2007. The first updating was made in January 2014 to align with the short-term recommendations made on the senior secondary curriculum and assessment resulting from the New Academic Structure (NAS) review so that students and teachers could benefit at the earliest possible instance. This updating is made to align with the medium-term recommendations of the NAS review made on curriculum and assessment. The CDC is an advisory body that gives recommendations to the HKSAR Government on all matters relating to curriculum development for the school system from kindergarten to senior secondary level. Its membership includes heads of schools, practising teachers, parents, employers, academics from tertiary institutions, professionals from related fields/bodies, representatives from the HKEAA and the Vocational Training Council (VTC), as well as officers from the EDB. The HKEAA is an independent statutory body

[1] The report is *The New Academic Structure for Senior Secondary Education and Higher Education – Action Plan for Investing in the Future of Hong Kong*.

responsible for the conduct of public assessment, including the assessment for the Hong Kong Diploma of Secondary Education (HKDSE). Its governing council includes members drawn from the school sector, tertiary institutions and government bodies, as well as professionals and members of the business community.

The C&A Guide is recommended by the EDB for use in secondary schools. The subject curriculum forms the basis of the assessment designed and administered by the HKEAA. In this connection, the HKEAA will issue a handbook to provide information on the rules and regulations of the HKDSE Examination as well as the structure and format of public assessment for each subject.

The CDC and HKEAA will keep the subject curriculum under constant review and evaluation in the light of classroom experiences, students' performance in the public assessment, and the changing needs of students and society. All comments and suggestions on this C&A Guide may be sent to:

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Acronyms

AL	Advanced Level
ApL	Applied Learning
C&A	Curriculum and Assessment
CDC	Curriculum Development Council
CE	Certificate of Education
EC	Education Commission
EDB	Education Bureau
EMB	Education and Manpower Bureau
GIS	Geographic Information Systems
HKALE	Hong Kong Advanced Level Examination
HKCEE	Hong Kong Certificate of Education Examination
HKDSE	Hong Kong Diploma of Secondary Education
HKEAA	Hong Kong Examinations and Assessment Authority
HKSAR	Hong Kong Special Administrative Region
IT	Information Technology
KLA	Key Learning Area
NGO	Non-governmental Organisation
PSHE	Personal, Social and Humanities Education
S1/2/3/4/5/6/7	Secondary 1/2/3/4/5/6/7
SBA	School-based Assessment
SRR	Standards-referenced Reporting
SS	Senior Secondary

Chapter 1 Introduction

This chapter provides the background, rationale and aims of Geography as an elective subject in the three-year senior secondary curriculum, and highlights how it articulates with the junior secondary curriculum, post-secondary education, and future career pathways.

1.1 Background

The senior secondary (SS) Geography curriculum is developed on the basis of the recommendations made in *The New Academic Structure for Senior Secondary Education and Higher Education – Action Plan for Investing in the Future of Hong Kong* (EMB, 2005) and the *Senior Secondary Curriculum Guide* (CDC, 2009). These two documents provide the overall direction for the development of senior secondary education in Hong Kong. They stipulated a combination of core and elective subjects, Applied Learning courses and other learning experiences to suit individual interests and aptitudes.

The curriculum is also built on the Secondary 4–5 Geography Curriculum (implemented in 2003) and the Sixth-form Geography Curriculum (implemented in 1992). It follows the general directions set out in the *Personal, Social and Humanities Education Key Learning Area Curriculum Guide (Primary 1–Secondary 3)* (CDC, 2002) and extends the knowledge, skills and values and attitudes learners develop through the Personal, Social and Humanities Education (PSHE) Curriculum for basic education.

This curriculum guide includes the rationale, aims, objectives and design principles of the SS Geography curriculum. It also provides detailed guidelines, recommendations and examples to assist teachers to plan, develop and manage the Geography curriculum in their schools, as well as to promote effective learning, teaching and assessment practices for enhancing student learning.

1.2 Rationale

Geography as a discipline enables us to understand the Earth we are living in from a spatial perspective. It offers a systematic framework for enquiry into questions about the world that surrounds us. Geography forms a bridge between the social sciences and the physical sciences, providing an understanding of the dynamics of cultures, societies and economies on the one hand, and those of physical landscapes and environmental processes on the other.

Geography as a secondary school subject enables students to explore and understand the relationship between human beings and the Earth through the study of space, place and environment – the three elements (or macro-concepts) which form the core of Geography in secondary school education. In this process, the geographical questions of "What", "Where", "How", "Why" and "What if" form the basic constructs for developing a geographical framework for enquiry.

As an elective PSHE subject in the senior secondary curriculum, Geography aims to provide students with an understanding of the Earth and the modern world. Through examining the inter-relationships among people, places and the environment, Geography helps students to acquire an in-depth understanding of the changing contemporary world in terms of space and environment.

As an international metropolitan city, Hong Kong provides a rich context for Geography students to develop a global outlook, an awareness of the influence of globalisation and an appreciation of the importance of international cooperation in tackling global issues. Senior secondary geographical education seeks to use this rich context to enable students to gain a deeper understanding of the changing world. It also helps students to develop a sound knowledge of the ever-increasing challenges for our nation and the world posed by natural hazards, environmental pollution, regional disparity, and resource depletion.

Moreover, the study of geography also provides opportunities for students to develop their general intellectual capacity for lifelong learning, and for generic skills such as critical thinking, communication, information-processing, problem-solving, and decision-making. The enquiry approach adopted in SS Geography enables students to develop the important abilities involved in values clarification and value judgments, which are fundamental to whole-person development. Geographical education provides students with learning experiences which enable them to see the relationships between the individual, society and the environment, and through this to develop skills which can be transferred to other learning and life situations.

In brief, senior secondary geographical education equips our students to become geographically informed and inquiring people who see meaning in the arrangement of things in space; understand the relations between people, place and environment; ask geographical questions and find answers through enquiry; use geographic knowledge and skills in solving problems; and apply spatial and ecological perspectives to life contexts.

1.3 Interface with Junior Secondary Education and Post-secondary Pathways

The study of Geography at the senior secondary level is built on the knowledge and skills students have developed in the junior secondary curriculum. These include the essential elements for learning stated in the *PSHE KLA Curriculum Guide (P1-S3)* (CDC, 2002), especially those embedded in Strand 4 "Place and Environment". Students who have completed the junior secondary Geography curriculum will also have developed basic enquiry and generic skills, and have had experience of making value judgments through investigating issues from a geographical perspective.

The study of Geography in senior secondary schools provides students who will study Geography in the universities with a solid conceptual foundation. For those who will enter university to study other subjects (such as Arts or Social and Environmental Sciences), it will have provided exposure to higher order thinking. For all students, it provides a spatial perspective on socio-economic and environmental issues, a focus on citizenship and on national and global identity, and opportunities for developing generic skills such as the ability to analyse and synthesise, to solve problems, to communicate and to use information technology. The subject also prepares students for a range of career choices in which a global perspective, environmental ethics and awareness, and a sound sense of space and region are needed. The most obvious examples of such careers include urban and transport planning, resources and environmental management, tourism and recreation and, at a broader level, administration and business.

1.4 Curriculum Aims

The aims of this curriculum are to enable students to:

(a) understand the Earth they inhabit, and enable them to recognise and interpret, from a spatial perspective, the arrangement of phenomena and features on Earth, the processes at work, the interactions that occur, the changes that result, and the issues and management responses that arise;
(b) develop the general intellectual capacity and generic skills needed for lifelong learning through geographical enquiry, and the ability to apply these in life situations;
(c) appreciate the wonder, interdependence and fragility of the local and global environment, and the importance of promoting sustainable development; and
(d) develop a sense of citizenship, a global outlook, and readiness to take action for the betterment of society, the nation and the world.

1.5 Curriculum Objectives

1.5.1 Knowledge and understanding

Students are expected to develop knowledge and understanding of:

(a) how natural environments influence human activities, and how human activities alter natural environments;

(b) the changing development of geographical phenomena and issues in terms of space and time;

(c) the characteristics and functioning of major natural environments, through analysing the processes and interactions within and between them;

(d) the characteristics and development of major human activities, in order to achieve a sense of "region"; and

(e) the issues arising from people-environment interactions and the human responses to such issues, as well as the implications of these human responses for resource management.

1.5.2 Skills

Students are expected to develop:

(a) geographical enquiry skills, including the ability to:

  (i) identify and ask questions from a geographical perspective;

  (ii) locate, select and extract appropriate information and data from primary and secondary sources (e.g. the field, surveys, documents, maps, charts, ground and aerial photos and Geographic Information System [GIS] data), which require the ability to observe and record data systematically and accurately;

  (iii) present and organise information and data, which involves the ability to:

    - use appropriate techniques for summarising (e.g. descriptive statistics such as measures of central tendency and variability);
    - use appropriate formats, such as texts (e.g. reports, tables, summaries, etc.) and illustrations (such as maps, diagrams, models, sketches, and graphs);

  (iv) compare, analyse, synthesise and evaluate, in order to interpret information and data for making inferences and drawing conclusions, which includes:

    - the use of appropriate statistical techniques (e.g. correlation);
    - analysis of spatial patterns using GIS.

  (v) evaluate the findings, solutions or conclusions drawn from enquiry.

(b) generic skills of communication, critical thinking, problem-solving and creativity through geographical enquiry, in particular the ability to:
    (i) select appropriate means of effective communication;
    (ii) draw out meaning from information, and determine what and what not to believe;
    (iii) analyse problems through logical reasoning, and determine the optimal course of action from a number of alternatives;
    (iv) view situations from different perspectives and adopt appropriate approaches to analyse problems.

1.5.3 Values and attitudes

Students are expected to develop values and attitudes that will enable them to:

(a) have a sense of wonder and curiosity about peoples, places and environments;
(b) show respect for all peoples, and their cultures, values and ways of life;
(c) recognise environmental problems and take appropriate action to promote sustainable development;
(d) cultivate a sense of belonging to society and the nation and become active and responsible citizens; and
(e) be aware of the increasing global interdependence of peoples and nations, and appreciate the importance of international solidarity and cooperation.

1.6 Broad Learning Outcomes

By the end of the course, students are expected to become geographically informed and inquisitive, and be capable of demonstrating the following:

(a) an understanding of how natural environments influence human activities, and how human activities alter natural environments;
(b) an ability to describe the major characteristics of the chosen places and environments and to explain how these characteristics are created by the interactions within and between a range of physical and human processes;
(c) an ability to describe how the interactions within and between physical and human processes create geographical patterns of different scales and lead to changes in places and environments over space and time;
(d) an ability to understand and critically evaluate the concept of regional identity;
(e) an understanding of “sustainable development”;

(f) an ability to recognise the role of perceptions, values and attitudes in decision-making about places and environments, and to use this understanding to explain the resulting changes;
(g) an ability to recognise how conflicting demands on the environment may arise and evaluate the different strategies for managing the environment;
(h) an ability to appreciate the increasing global interdependency in influencing their lives, their nation and the environment;
(i) an ability to identify geographical questions and issues and develop a logical sequence of enquiry based on their knowledge and understanding of Geography; and
(j) an ability to select and use appropriate geographical and generic skills for investigating geographical questions and issues, to present and interpret their findings in an effective way, and to draw conclusions based on evidence.

Chapter 2 Curriculum Framework

The curriculum framework for Geography embodies the key knowledge, skills, values and attitudes that students should develop at senior secondary level. It forms the basis on which schools and teachers can plan their school-based curriculum, and design appropriate learning, teaching and assessment activities.

2.1 Design Principles

The design of this curriculum is based on the following principles that are derived from those recommended in Chapter 3 of *The New Academic Structure for Senior Secondary Education and Higher Education — Action Plan for Investing in the Future of Hong Kong* (EMB, 2005). This curriculum should:

(a) build on the knowledge, skills, values and attitudes, and learning experience acquired and developed by students through their study of the PSHE curriculum in basic education and junior secondary Geography curriculum;
(b)achieve a balance between breadth and depth in the study of Geography to facilitate students' preparation for further studies, entry into the workforce and whole-person development;
(c) achieve a balance between the learning of theoretical knowledge and its application to real-life situations by giving equal emphasis to the development of systematic, conceptual knowledge of Geography and a better understanding of prominent geographical issues and problems relevant to students' present and future lives;
(d) provide a flexible and diversified framework capable of catering for student diversity in abilities, needs and interests;
(e) provide a recommended progression pathway to facilitate school-based curriculum planning and allow insights into the various aspects of learning that students will be exposed to at various year levels;
(f) foster greater coherence between Geography and the other PSHE and non-PSHE subjects through encouraging cross-curricular collaboration;
(g) help develop independent and lifelong learning skills in students through promoting student-centred enquiry; and
(h) ensure that assessment is aligned with learning.

2.2 Curriculum Structure and Organisation

The SS Geography curriculum is developed on the basis of the Secondary 4-5 Geography Curriculum (implemented in 2003). The contents of six themes and six issues are retained as far as possible, with an appropriate updating of knowledge and information, an increase in depth in some specific areas, and a reduction of content to provide sufficient time for implementing enquiry learning in class.

The curriculum comprises a compulsory part and an elective part. The Compulsory Part accounts for 68% of total lesson time. It aims to assist students to acquire fundamental geographical concepts and knowledge and to develop a framework of thinking and enquiry essential for further study, career development and lifelong learning. The Elective Part, which takes up 20% of lesson time, comprises four electives to cater for the varied aptitudes, interests and needs of students.

The remaining 12% of lesson time is assigned for fieldwork (including spatial data enquiry). This arrangement ensures that sufficient curriculum time will be allocated for carrying out geographical enquiry both inside and outside the classroom, and also allows the essential briefings and debriefings for various types of out-of-classroom activities to be conducted more thoroughly and effectively. Making fieldwork (including spatial data enquiry) a formal part of the time-table, rather than an "add on", helps to reduce the workload of teachers and students in general.

Curriculum Framework	**Lesson Time**[2] (Total lesson time: 250 hours)
Compulsory Part	
7 geographical issues and problems	68% (around 170 hours)
Elective Part	
2 out of 4 electives	20% (around 50 hours)
Fieldwork (including spatial data enquiry) [Should be infused in the learning and teaching of the Compulsory and Elective Parts]	12% (around 30 hours)

[2] The lesson time for Liberal Studies and each elective subject is 250 hours (or 10% of the total allocation time) for planning purpose, and schools have the flexibility to allocate lesson time at their discretion in order to enhance learning and teaching effectiveness and cater for students' needs.

"250 hours" is the planning parameter for each elective subject to meet local curriculum needs as well as requirements of international benchmarking. In view of the need to cater for schools with students of various abilities and interests, particularly the lower achievers, "270 hours" was recommended to facilitate schools' planning at the initial stage and to provide more time for teachers to attempt various teaching methods for the NSS curriculum. Based on the calculation of each elective subject taking up 10% of the total allocation time, 2500 hours is the basis for planning the 3-year senior secondary curriculum. This concurs with the reality check and feedback collected from schools in the short-term review, and a flexible range of 2400±200 hours is recommended to further cater for school and learner diversity.

As always, the amount of time spent in learning and teaching is governed by a variety of factors, including whole-school curriculum planning, learners' abilities and needs, students' prior knowledge, teaching and assessment strategies, teaching styles and the number of subjects offered. Schools should exercise professional judgement and flexibility over time allocation to achieve specific curriculum aims and objectives as well as to suit students' specific needs and the school context.

The Compulsory Part comprises seven geographical issues and problems that have strong relevance for Hong Kong students and are expected to be of considerable public concern for a reasonable period of time. They are structured around three major themes, namely "Living with our physical environment", "Facing changes in the human environment" and "Confronting global challenges".

Living with our physical environment

(1) Opportunities and Risks – Is it rational to live in hazard-prone areas?
(2) Managing Rivers and Coastal Environments: A continuing challenge

Facing changes in the human environment

(3) Changing Industrial Location – How and why does it change over space and time?
(4) Building a Sustainable City – Are environmental conservation and urban development mutually exclusive?

Confronting global challenges

(5) Combating Famine – Is technology a panacea for food shortage?
(6) Disappearing Green Canopy – Who should pay for the massive deforestation in rainforest regions?
(7) Climate Change – Long-term fluctuation or irreversible trend?

These three themes are developed from patterns, problems and issues arising from various aspects of our natural and human environments and their respective interactions. All the modules developed in these three themes are designed to incorporate key geographical concepts of "location and distribution", "place and region", "people-environment interaction and interrelationship", "change and development in physical and human environments" and "environmental management and sustainable development". This design also aims to enhance students' understanding of the planning and management aspects, as well as of the decision-making processes, in relation to the geographical issues and problems included in the modules.

The Elective Part is designed to cater for the senior secondary students who are expected to have a wider range of abilities, interests and needs. The four electives, out of which students study two, range in nature from those which place a stronger emphasis on academic rigour and conceptual frameworks to those with a more career-related focus and a greater relevance to recent developments in Hong Kong and its neighbouring regions. The electives serve as an extension to the Compulsory Part of the curriculum. In some cases, such as "Weather and Climate", they develop further the basic geographical concepts and knowledge included in the Compulsory Part. Others, such as "Transport Development, Planning and Management", aim at broadening

the scope of study by introducing other major branches of Geography that have not been incorporated into the Compulsory Part of the curriculum. The four electives are as follows:

(1) Dynamic Earth: the building of Hong Kong
(2) Weather and Climate
(3) Transport Development, Planning and Management
(4) Regional Study of Zhujiang (Pearl River) Delta

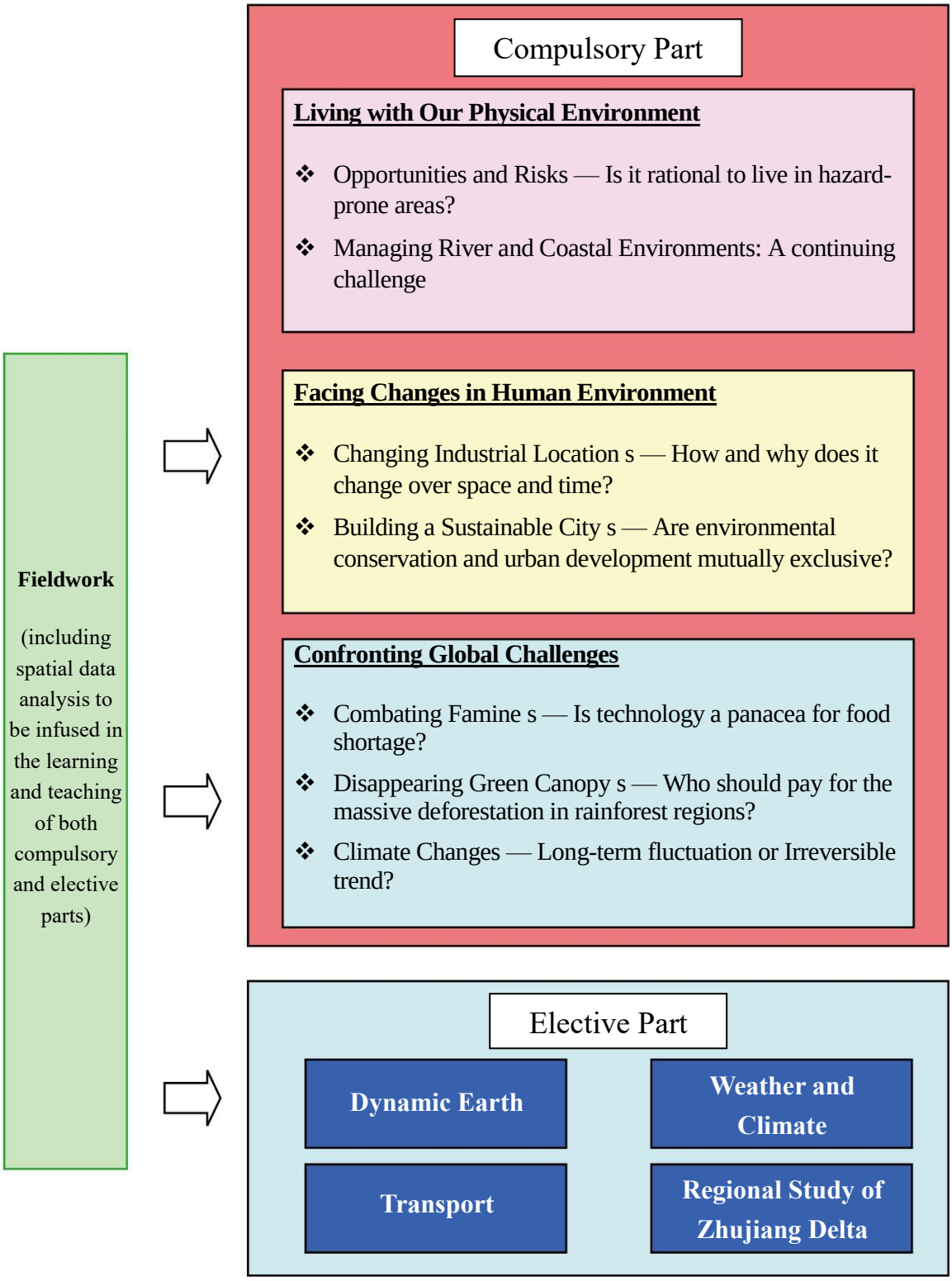

Figure 2.1 The Structure of the Senior Secondary Geography Curriculum

2.2.1 Curriculum Content of the Compulsory Part

1. Opportunities and Risks — Is it rational to live in hazard-prone areas?

This module examines three major types of natural hazard — earthquakes, volcanic eruptions and tsunamis. In examining the spatial patterns of these natural hazards and why such patterns exist, students are led to explore the concepts of plate tectonics and to understand how plate movements resulting from internal earth processes create mountain systems, some large-scale landform features and tectonic hazards around the world. With this understanding, students examine how and why the impact of these tectonic hazards vary greatly from place to place, and consider the complex decision-making process that makes some people decide to remain in hazard-prone areas. Through this, students gain an appreciation and respect for the rationale behind the different choices made by people in the same situation.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. What has happened to areas with active tectonic activities? 2. What areas have been frequently affected by earthquakes, volcanic eruptions and tsunamis? 3. What spatial patterns exist in these natural hazards? 4. Why are there such patterns? How is it related to the global distribution of plates and plate boundaries?	• Natural hazards commonly found in areas with active tectonic activities (including earthquakes, volcanic eruptions and tsunamis) • Global distribution patterns of these natural hazards • Relationship between the distribution pattern of these natural hazards and that of tectonic activities	Location and spatial distribution Place and region Natural hazard People-environment interrelationship	• Collect and study newspaper clippings about tectonic activities and summarise their impact on people's lives and their responses to them. • Search for updated information and statistics from the Internet and plot a map (paper or using GIS) to show the spatial distribution of earthquakes, volcanic eruptions and tsunamis in the world. • Identify the common distribution patterns of these natural hazards.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
5. What and where are the major plates and plate boundaries? 6. What are the related landform features found at plate boundaries? How are they formed? 7. How does plate movement create natural hazards that develop with these features? 8. Why are some earthquake and volcanic zones far away from plate boundaries?	• Brief description of the internal structure of the earth • The names and types of major plates and plate boundaries in the world, as well as their location • The major landform features at plate boundaries (fold mountain, island arc, ocean trench, volcano, mid-oceanic ridge and rift valley) and their formation • The relationship between plate movement and natural hazards • Earthquake and volcanic zones far away from plate boundaries, e.g. hot spots	Plate tectonics Natural hazard Location and spatial distribution	• Use a map overlay or GIS to show the relationship between plate boundaries and the global distribution of geological hazards. • Draw a concept map to show the relationships among the major endogenetic processes, plate movement, the formation and distribution of major tectonic landform features and the distribution of tectonic hazards. • Visit Ma Shi Chau to identify various geological features related to faulting and folding in Hong Kong. • Identify on a map some earthquake and volcanic zones which are far away from plate boundaries. • Explain their spatial locations with reference to information on the Internet or in books.
9. What are the effects of earthquakes, volcanic eruptions and tsunamis? 10. How do these natural hazards affect the lives of human beings? 11. What has been done to reduce the impact of these natural hazards?	• Effects of earthquakes (primary and secondary effects), volcanic eruptions and tsunamis on human beings and the environment • Measures used to reduce the effects of earthquakes, volcanic eruptions and tsunamis (e.g. monitoring, predicting and warning systems for natural hazards, various disaster mitigation and preparation strategies, land use zoning) • Effectiveness of the above measures	Natural hazards People-environment interrelationship Impact of technology Limitation of technology	• Discuss and present the effects of earthquakes, volcanic eruptions and tsunamis in groups. • Display and analyse the major measures which have been used to reduce the impact of natural hazards.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
12. Why are less developed areas more vulnerable to these natural hazards than more developed areas? 13. Should people move away from hazard-prone areas? 14. Why do some people still live in hazard-prone areas? 15. Is their choice rational?	• The reasons for less developed areas being more vulnerable to natural hazards than more developed areas (e.g. literacy level and awareness of the people, and socio-economic and technological gaps) • The advantages and disadvantages of people living in hazard-prone areas	Natural hazard Region Degree of damage and level of development People-environment interrelationship	• Select and study two contrasting case studies of earthquakes / volcanic eruptions / tsunamis from the Internet / newspapers, one from a less developed area and the other from a more developed area. • Compare and contrast the vulnerability of these two areas in facing hazards and explain their differences. • Summarise information about the advantages and disadvantages of living in hazard-prone areas. • Decide whether or not it is rational to live in hazard-prone areas with reference to a case study.

Values and attitudes	• Appreciate the interdependence between human beings and the natural environment • Appreciate the beauty of nature • Show concern for those affected by natural hazards

Time allocation: 24 hours

Case / Specific Examples: No specific case is required but teachers are requested to quote appropriate examples from around the world, in particular the Asia-Pacific region.

2. Managing River and Coastal Environments: A continuing challenge

This module aims at introducing how the work of fresh and sea water creates a variety of fluvial and coastal environments. Through the study of the work of water and the resulting landform features, students should be equipped with the basic understanding of the interaction of various physical factors in shaping the surface of our Earth, and the management issues that arise from increasing human interference in fluvial and coastal environments. Teachers should also aim at ensuring that students have a thorough understanding of the geographical concepts related to erosion, transportation and deposition, such that they can transfer and apply these concepts to the study of landform features in other environments.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. Where does water come from and go?	• A brief introduction of hydrological cycle: characteristics, stores and transfers	Hydrological cycle	• Draw a diagram of hydrological cycle to highlight the key components, including inputs, outputs, flows and stores.
2. How does water shape the landform in a drainage basin? 3. What are the major landform features created by the work of running water?	• Features of a drainage basin, including watershed, source, mouth, channel network • Major erosional, transportation and depositional processes • Factors influencing the above processes • Major landform features, including gorges, waterfalls and rapids, meanders and associated landform features, flood plains, levees, braids and deltas (using appropriate examples of the Mainland, e.g. Chang Jiang)	Drainage basin Fluvial process and landform	• Delimit the boundary of a river basin on a map. • Annotate photographs to describe the characteristics of the different parts of a river. • Draw cross-sections to illustrate the features of rivers.
4. How does water operate along coasts? 5. What are the major landform features created by the work of wave?	• Wave generation and characteristics (constructive and destructive waves) • Major erosion, transportation and deposition processes • Factors influencing the above processes • Major landform features, including sea cliff, sea cave, sea arch and stack, wave-cut platform, beach, spit and bar, tombolo	Coastal process and landform	• Identify coastal features shown in maps. • Construct annotated diagrams to illustrate the formation of coastal features. • Use appropriate forms of presentation (e.g. tables, diagrams, statistical charts) to explain how coastal processes of erosion and deposition are influenced by various marine, atmospheric and geological factors.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
6. How do human activities influence river and coastal environments and what are the resulting consequences? 7. How does the management of river and coastal systems pose a continuing challenge for people?	• Human activities on river and coastal environments: e.g. drainage, reclamation and recreation • Impact and consequences: e.g. flooding, erosion and mass wasting, pollution, and disturbance / damage to the ecosystem • "Hard" and "soft" management strategies e.g. channelisation, building breakwaters, land use zoning, beach nourishment. • Management issues, including evaluation of methods and strategies used, and their possible impact	People-environment interaction Conflict Management	• Use GIS, aerial photographs and/or satellite images to analyse the change of fluvial and coastal environments over time owing to human activities. • Conduct a field visit to a river or a coastal area in Hong Kong to observe and identify the various management strategies implemented. • Survey people's views on the management of river / coast in Hong Kong.

Values and attitudes	• Appreciate the beauty of nature • Be aware of the changing nature of our physical environment and its possible impact on human activities • Recognise the need for sustainable management of our physical environment

Time allocation: 24 hours

Case / Specific Examples: River and coastal environment in Hong Kong

3. Changing Industrial Location – How and why does it change over space and time?

Location change is a characteristic of industry in the 21st century. The study of various factors influencing industrial location, and particularly those leading to changing location, remains an important topic in Geography. This module aims to study the factors affecting industrial location using the iron and steel industry and the information technology industry as examples. The iron and steel industry serves as a typical example for studying the location of an industry through time. The location of this industry has experienced several major changes as a result of technological breakthroughs. These changes in location have mainly been due to the replacement of one dominating factor by another, although the production is still being concentrated on a particular site (single-point production). Location changes have brought new industries to some areas and "rust belts" to others. The study of the location of the information technology industry introduces another group of location factors, in particular human resources, and research and development, in addition to the traditional ones such as power, raw materials and market. In general, the location of the information technology industry is not dominated by any particular location factor and its production site is not confined to a particular city or region (multi-point production). This industry has been developing towards a transnational enterprise model characterised by cross-regional or cross-national production.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. Where was the manufacturing industry of Hong Kong located in the past? Where is it now? 2. Is the same phenomenon happening in other industrial regions?	• Location of Hong Kong manufacturing industry in the past decades (1950s– 1970s) • Relocation of the Hong Kong manufacturing industries to the Zhujiang (Pearl River) Delta Region – name and locate the major manufacturing centres in the region	Location and distribution Industrial relocation	• Use map overlays, GIS or other representations to show the changing location pattern of the manufacturing industry in Hong Kong and the Zhujiang (Pearl River) Delta Region.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
3. Where are the major iron and steel industrial centres in China? 4. Why are they there?	• Distribution pattern of the iron and steel industry in China • Major factors affecting the location of industry, e.g. raw materials, power, market, labour, technology, transport, government policy and land • Factors affecting the location of the iron and steel industry in China, with a specific focus on government policy	Location and distribution Industrial system Location factor Spatial association	• Collect information on the iron and steel industry in China. • Draw maps to illustrate the location of the iron and steel industry. • Overlay transparencies of the location of the iron and steel industry and the location of power and raw materials (or using GIS) to identify the location factors for this industry. • Interpret information from maps, graphs, data or diagrams to derive the location factors of the iron and steel industry.
5. How has the location of China's iron and steel industry changed over time? 6. Why do some plants still stick to their original locations?	• Changing location of the iron and steel industry in China, including the shift from the coast to the interior and the tendency to be located near large cities • Role of technology and other factors, especially government policy in leading to such changes • Reasons for industrial inertia in the iron and steel industry	Change over time Impact of technology Government policy Industrial inertia	• Locate the new iron and steel plants on the map and describe the changes in location pattern. • Group discussion: Causes of industrial inertia.
7. Why does the same group of factors not influence the location of the US IT industry? 8. What determines its location there?	• Location of the US IT industry • Factors affecting the location of the US IT industry, especially research and development, labour quality and agglomeration economies	Location and distribution Location factor	• Collect information on the IT industry in the US • Draw maps to illustrate the location of this industry. • Contrast the main location factors of iron and steel industry and information technology industry using various appropriate presentation modes (such as tables, graphs and computer presentations). • Field trip to Cyberport / Hong Kong Science Park to look at the factors which favour the development of the IT industry in these areas.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
9. What impacts have globalisation and technological advances had on the location of manufacturing industry and its mode of production?	• Location of factories and headquarters of the US IT industry • Multi-point and transnational production in the IT industry • Definition of globalisation • The effect of globalisation and technological advances on its location and mode of production	Location and distribution Globalisation Change over time	• Browse through the Internet to search for examples of the multi-point location of the IT industry. • Using an example of an IT industry collected from different sources of data, summarise the reasons for its changing location and mode of production, and present these reasons to the class.
10. What are the likely social, economic and environmental impact of changes in industrial location and modes of production? 11. What can be done to alleviate the problems caused by this changing mode of production and changes in industrial location?	• Impact of changes in industrial location and mode of production, e.g. flow of technology, changes in employment structure, impact on economy, etc. • Measures taken to alleviate the problems caused by this changing mode of production and changes in industrial location, e.g. retraining of labour, an improved social security system, and the development of other industries / economic sectors • Possibility of carrying out these measures • Effectiveness of these measures and problems encountered when carrying them out.	Socio-economic impact	• Organise the first- and second-hand materials collected in order to analyse the impact of industrial relocation on workers and society. • Group discussion: Discuss the types of measures that can be adopted and evaluate the possibility and effectiveness of carrying them out.

Values and attitudes	• Recognise the efforts human beings have made in the development of modern industry • Appreciate the far-reaching impact of technological development • Recognise the trend of globalisation • Understand and show concern for problems caused by the changes in industrial location

Time allocation: 24 hours

Case / Specific Examples: China’s iron and steel industry and the US information technology industry.

4. Building a Sustainable City — Are environmental conservation and urban development mutually exclusive?

Like many cities in the Asia-Pacific region, Hong Kong has grown rapidly with a high urban population density. It is also a city with serious environmental problems. This module examines the reasons why a city like Hong Kong keeps on growing and the problems which result from such growth. It also focuses on how the economic prosperity and vitality of a city can be maintained without sacrificing its environmental quality based on the concept of "sustainable development". This module will equip students with a basic understanding of the concept of sustainable development and the possible ways of developing Hong Kong into a sustainable city. They will also learn about the price for developing Hong Kong into a sustainable city.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. What is wrong with our growing city? 2. Why do cities keep growing?	• Brief description of urban problems in Hong Kong (e.g. housing problems, transport problems and pollution) • Definition of urban growth and urbanisation • Causes of urban growth and urbanisation (e.g. natural increase of urban population, rural-urban migration, reclassification of areas previously defined as rural, changing employment opportunities, and economic and transport development)	Urban problem Change over time Location Place Urban growth Urbanisation	• Collect photographs showing the environmental conditions of a growing city, identify the urban problems shown in them, and evaluate their impact on the people living in the city. • Analyse the census data and a map showing the urban area of Hong Kong in different time periods. • Investigate with secondary data in the library and explain why there was rapid urban growth and urbanisation in Hong Kong over the past few decades (i.e. causes of change).

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
3. How does the internal structure of a city change as it grows? 4. What are the processes involved in such a change?	• Urban growth, urbanisation and the related change in the internal structure of a city • Cycle of urbanisation, suburbanisation, counter-urbanisation and reurbanisation • Processes involved in urban growth and development, including urban decay, urban sprawl and encroachment, urban redevelopment and renewal	Location Place Change over time Internal structure of a city Competition and succession Urban encroachment Urban renewal	• Identify on a map of Hong Kong one old urban / inner city district (e.g. Wan Chai) and one rural area in the New Territories several decades ago (e.g. Tsuen Wan). Conduct questionnaire surveys to investigate how these two places evolved with urban development. • Conduct a survey on the land use and urban problems of the area near the school.
5. What problems does a growing city bring? 6. What solutions are there for these problems? 7. What kinds of conflict will be created when solving the above problems? 8. In what ways and with what success are these conflicts being dealt with? 9. Why is the concept of "sustainable development" helpful in dealing with these conflicts?	• Problems arising from a growing city: − Housing: insufficiency, substandard conditions − Movement: traffic congestion − Environment: waste, pollution, and the environmental health of the inhabitants • Measures to alleviate or solve the urban problems, including: − Provision of public housing and building of new towns − Urban planning − Environmental conservation measures • Conflicts arising from solving urban problems • Sustainable development and methods to solve the conflicts arising from urban problems	People-environment interrelationship Urban problem Conflict Sustainable development	• Visit the two areas mentioned above and identify the urban problems in these areas. • Discuss and present in groups: − the types of conflicts related to solving urban problems in Hong Kong; and − the methods for dealing with these conflicts.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
10. What would make a sustainable city? 11. What are the characteristics of such a city? 12. How can we make a city sustainable? 13. What is the price for developing a sustainable city?	• Definitions of "sustainable development" and a "sustainable city" • Characteristics of a sustainable city • Methods of developing a city into a sustainable one, e.g. better and careful planning of the city, regenerating and re-imaging the city • Price for developing a sustainable city	Sustainable development Environment Change over time	• Browse the information on the Internet and summarise the characteristics or indicators of a sustainable city. • Re-design the development of a selected area in Hong Kong based on the sustainable indicators compiled from various sources and construct a land use map using appropriate IT tools (e.g. GIS).
14. Is environmental degradation a necessary evil for improving living standards in a growing city? 15. How should we choose? Can we afford not to choose a sustainable future in the long run?	• Relationship between urban development, socio-economic development, living standards and environmental conditions • Consequences of not developing a city in a sustainable way in the long run (i.e. aggravation of urban problems and the impact on human beings and the environment)	Change over time People-environment interrelationship Sustainable development Environment	• Conduct a role-play to demonstrate how different stakeholders perceive the need to keep a balance between environmental conservation and urban development. • Discuss in groups the consequences of not choosing a sustainable future in the long run. Use a type of graphic organiser to organise the main points being discussed.

Values and attitudes	• Show sensitivity to the development of the surrounding environment • Show concern for the problems caused by urban development • Develop a sense of responsibility and willingness to take action in protecting and improving the urban environment

Time allocation: 24 hours

Case / Specific Examples: Hong Kong (Teachers can consider making reference to some other examples of sustainable cities in the world in addition to Hong Kong.)

5. Combating Famine — Is technology a panacea for food shortage?

This module focuses on the issue of famine as a basis for geographical enquiry. Through exploring the causes of famine and why it occurs in some regions and not others, students develop a basic understanding of how various agricultural factors shape farming characteristics and determine farming yields. From this basic understanding, students can examine the extent to which famine is a naturally or human-induced disaster. The two case studies chosen for this topic allow students to identify how different factors lead to significant variation in the agricultural characteristics of regions with similar natural environmental settings. They also enable students to examine the role and influence of technology in agriculture, and the positive and negative effects of using agricultural technology in raising yields and combating the food shortage problem.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. Why do some regions have surplus food production whereas others are suffering from famine? 2. What is "famine"? 3. Where do most famines occur? What are the similarities found in regions frequently affected by famine?	• The availability of food supplies is uneven and does not match demand on a global scale − Global patterns of food production and consumption in relation to population − Global contrasts in diet and food consumption − Patterns of trade in food • Definition of "famine" • Causes of famine in relation to economic, technological, social and physical conditions	Location and distribution Spatial association Region Spatial variation People-environment interrelationship	• Select and record information from print sources, audio-visual and computer technologies, maps and photographic records to describe and define key issues and problems related to famine. • Read and draw maps (using GIS) from atlases or statistical data to highlight the location of areas suffering from famine. • Draw diagrams and graphs (e.g. bar, line, pie, scatter) using appropriate computer software to illustrate the spatial distribution of food availability based on statistical data collected from various sources. • Compare patterns from mapped data to identify how the interaction between physical and human environments affects food production and consumption.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
4. What are the factors that affect agricultural production in an area? How do these factors shape the characteristics of farming in an area?	• Physical, economic, social and political factors affecting agriculture (especially agricultural production and agricultural characteristics)	Agricultural system Agricultural factor Interaction	• Use graphic representations to display the major physical and human factors that affect agriculture.
5. Where is Sahel? Where is Southern California? What are the characteristics of their natural environments? 6. What are the agricultural characteristics of nomadic herding in Sahel? What are the agricultural characteristics of irrigation farming in Southern California?	• Location of Sahel and Southern California • Characteristics of the physical environments of Sahel and Southern California, in particular climate, soil, vegetation cover and relief • Agricultural characteristics of nomadic herding in Sahel and irrigation farming in Southern California, with a specific focus on the differences in their technological, economic, political and socio-cultural aspects	Location Place	• Correlate aerial photos / satellite images with maps and use the evidence to recognise the main characteristics and patterns of different agricultural activities. • Summarise the similarities and differences in the characteristics of nomadic herding and irrigation farming by means of graphic representation (e.g. using input-output model).
7. Why are agricultural characteristics so varied even in similar natural environmental settings? 8. How true is it to say that human factors are becoming more and more dominant than physical factors in influencing agriculture?	• Factors affecting agricultural characteristics in Sahel and Southern California, emphasising how the same set of factors operates so differently in creating such variation • The diminishing role of physical factors in influencing agriculture, particularly in more developed areas • The growing importance of human factors, especially technology, in influencing agriculture	Spatial variation Interaction between physical and human factors Physical system Human system	• Design a questionnaire for interviewing local farmers about how the natural environment and technology influence agricultural activities.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
9. To what extent can technology help to increase agricultural production and alleviate food shortage? Is genetically modified food a possible way out? 10. Have we really overcome most of the farming constraints imposed by the natural environment? What price do we have to pay for this "success"? 11. Is it possible for us to minimise the negative impact of using technology in agriculture, and at the same time produce enough food for everyone?	• Modern farming methods, e.g. the use of chemicals, irrigation, drainage and their effects on farming yields • A brief overview of the possible environmental, economic and social (including health) implications of genetically modified food • Consequences of misuse and overuse of agricultural technology, e.g. reduction of biodiversity, habitat loss, land degradation, soil erosion, chemical pollution of land and water courses, and the impact on the rural landscape • Measures taken to ensure sustainable agricultural development, e.g. multiple cropping, water and soil conservation methods, and organic farming	Impact of technology Change over time Limitation of technology Resource management in agriculture Sustainable agricultural development	• Rank the desirability of various technological solutions for overcoming farming constraints. • Summarise the positive and negative effects of technology on agriculture from the information collected from various sources. • Role-play stakeholders to enhance understanding of the current and alternative practices for raising food production and their impact on the environment. • Conduct a field visit to an organic farm in Hong Kong.

Values and attitudes	• Appreciate the limitations of agricultural technology • Be aware of the advantages and disadvantages of technology • Show concern about the difficulties encountered by people in other areas

Time allocation: 24 hours

Case / Specific Examples: Nomadic herding in Sahel and irrigation farming in Southern California

6. Disappearing Green Canopy— Who should pay for the massive deforestation in rainforest regions?

Tropical rainforest is a biome with the greatest number of plant and animal species. It is characterised by its complexity in structure and in the function of its ecosystem, and yet it is also a fragile ecosystem under threat. As such, tropical rainforest is a good illustration for demonstrating the concept of an ecosystem. In studying this module, students will understand the structure and function of a tropical rainforest ecosystem under threat. People-environment interrelationship is examined with particular reference to the loss of forest as a result of human action. The module also demonstrates how disturbance of one component of an ecosystem disturbs the equilibrium of the system. Through this study, students develop a sense of environmental protection and understand the need for sustainable development.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. What is happening to tropical rainforests?	• Global distribution of tropical rainforests • Deforestation in rainforest regions – rate and conditions	Deforestation Location and distribution	• Collect information from the Internet and other sources about the destruction rate of tropical rainforest. • Interpret related graphs and figures. • Construct maps to show the distribution of the tropical rainforest and its destruction rate using GIS or other IT tools.
2. What would a tropical rainforest look like before large-scale deforestation? 3. Why does it look like that? 4. What is the evidence for saying that tropical rainforest is a complex but fragile ecosystem?	• Definition of an ecosystem • Abiotic components and biotic components of a tropical rainforest ecosystem • Links and interrelationships between abiotic and biotic components, such as the influence of abiotic components on the characteristics of biotic components • Energy flow in a tropical rainforest ecosystem • Nutrient cycling in a tropical rainforest ecosystem	Ecosystem Abiotic and biotic components Spatial association Ecological equilibrium Energy flow Nutrient cycling	• Read climatic graphs. • Extract information from photos and pictures. • Field trip to Hong Kong Park or Tai Po Kau Nature Reserve to look at the characteristics of some tropical and sub-tropical plants. • Use graphic representation to show the interrelationships between abiotic and biotic components.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
5. Why are tropical rainforests all over the world disappearing at a faster rate in recent times?	• Types of destruction in the tropical rainforests • Reasons for such destruction – economic development, agricultural development and population growth	Human interference Scale of development	• Extract relevant information from photos and pictures. • Role play: How different parties can develop the potential of tropical rainforests.
6. What is the impact of large-scale deforestation in tropical rainforest regions? 7. How will it affect the local and global environments? 8. How will it affect the indigenous people? 9. How will it affect our lives in Hong Kong?	• Impact of large-scale deforestation in tropical rainforests on climate, biosphere and lithosphere at a local and global scale • Socio-economic impact on the local community and other places in the world	People-environment interrelationship Scale of impact	• By looking at graphs and newspaper cuttings, assess the impact of deforestation of tropical rainforests on the local and global natural environments. • Through a case-study investigation, evaluate the kinds of socio-economic impact on both the local community and people far from this place.
10. How can tropical rainforests be prevented from disappearing? 11. Will the protection of tropical rainforests hinder the development of the local economy? 12. Can we strike a balance? 13. What price has to be paid to protect tropical rainforests, and who should pay?	• Measures to protect tropical rainforests, such as afforestation, regulation on logging activities, setting up of national parks and natural reserves • Roles played by different parties, including native people and local dwellers, government officials, private developers and environmentalists, in developing and protecting rainforests • Problems of developing and protecting rainforests, such as conflict of interest among different parties (e.g. native people, local dwellers, private developers and environmentalists), the great debt borne by less developed countries and weak government control • Possible compromises between development and conservation and the consequences of different decisions made • Sustainable development of tropical rainforests	Environmental conservation and management Conflict of interest Sustainable development	• Discussion: Ask students to give suggestions on the measures that can be used. • Debate: “As the tropical rainforest is very valuable, we should, by all means and at all costs, protect it.” • Discussion: How to compromise between development and conservation?

Values and attitudes	• Appreciate the interdependence of human beings and the natural environment • Show concern for the problems caused by deforestation • Develop a sense of responsibility and willingness to take action in protecting the tropical rainforests

Time allocation: 24 hours

Case / Specific Examples: No specific cases are required but teachers are advised to quote appropriate examples from around the world

7. Climate Change — Long-term fluctuation or irreversible trend?

This module introduces the issue of climate change as a typical example of the interaction between humans and the natural environment. The focus of the issue is on whether climate change, in particular global warming, is just a longer term climatic fluctuation. This module leads students to examine the evidence to investigate whether climate change is an irreversible phenomenon. In addition to studying the causes and impact of climate change at a global scale, this module also has a second focus on local climate change, mainly the combined influence of global warming and urbanisation. The investigation of the issue will also ensure that students acquire a basic understanding of the elements and associated patterns of the local and global climate. Moreover, they should be able to understand better how human activities affect our natural environment, and how resulting changes of the natural environment in turn affect us.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. What is weather? What is climate? 2. How is our climate like? 3. What evidence is there to prove that our climate is changing?	• Definition of 'weather' and 'climate' • A brief introduction of climate at local, national and global scale. • Evidence showing our climate is changing all over the world: e.g. sharp increase of mean global temperature in recent decades, heat waves and unusually warm weather, sea-level rise and coastal flooding, the melting of glaciers, more frequent extreme weather conditions	Weather and climate Pattern Change over time	• Read and interpret climatic graphs. • Identify climatic characteristics and distribution patterns from climatic maps and graphs. • Collect climatic data of Hong Kong by visiting the Hong Kong Observatory Resource Centre and interpret the trend of Hong Kong's climate change over a long period of time. • Construct thematic maps showing global climatic zones using GIS or other software programmes. • Collect evidence from various sources, including the Internet, to illustrate that the global climate is changing.
4. What is global warming? 5. Is global warming a long-term fluctuation of temperature, or is our Earth really heating up? 6. What are the causes of global warming? Is global warming a natural or human-induced climate change at global scale?	• Greenhouse Effect: the mechanism and the role of human activities (e.g. deforestation, burning of fossil fuels, garbage burning, emission of chlorofluorocarbons, agriculture) in enhancing the process • Natural and human causes of global warming • Supporting and opposing arguments for global warming is an irreversible trend	Long-term trend Climate change Interaction between physical and human systems People-environment interrelationship	• Debate the issue "Global warming is a long-term fluctuation of temperature". • Use a concept map or other graphic organisers to display the causes of global warming.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
7. Is our climate also changing at a local scale? 8. How is the climate of our urban areas different from our rural areas? Why is there such a difference? 9. What are the effects of urban growth and development on the climate of our city?	• Urban growth and development leading to local variations in climate, focusing on heat island effect • Effects of urban growth and development on microclimate, in terms of atmospheric composition, temperature, sunshine, precipitation, humidity and wind • Observed climate change in Hong Kong	Microclimate Urban climate Heat island effect Spatial variation	• Use data loggers / measuring meters / apps and software programmes in the field to collect data of microclimate. • Use GIS or other computer software to plot the data collected from a urban climate fieldwork onto a digital map. • Construct a map to show the spatial variation of microclimate in an urban area. • Construct a scatter diagram to show the correlation between an element of urban climate (e.g. temperature) and the distance from the urban centre.
10. What will be the impact of climate change? How will it affect our lives? 11. What can be done about it? 12. Why is it so difficult to reach a global agreement to deal with climate change?	• Consequences of climate change, focusing on winners and losers around the world, e.g. impact on sea level, flood frequency, new farming opportunities, health risks, climatic prediction becoming more difficult, and extreme weather events • Mitigation and adaptation measures at local and global levels • A brief review of the complexities of reaching a global agreement, in particular the conflicting views and roles of key players	Interdependence between human and physical environment International cooperation Individual interest and common good Conservation Sustainable development	• Use GIS or other computer programmes to simulate the impact of climate change, e.g. the flooding of coastal regions as a result of sea-level rising. • Study the potential impact of climate change on one country, including predicting the consequences of global warming and evaluating its plan for prevention and control of the negative impact.

Values and attitudes	• Show concern for the impact of climate change on the global environment • Be aware of the consequences of the interactions between human activities and the natural environment • Recognise the existence of uncertainty in explaining long-term change

Time allocation: 24 hours

Case / Specific Examples: No specific cases are required, but teachers are advised to quote appropriate examples from around the world for studying climate change at a global scale, while for local scale, teachers should consider using Hong Kong and the neighbouring region as examples.

2.2.2 Curriculum Content of the Elective Part

1. Dynamic Earth: The building of Hong Kong

This elective is for those students with a strong interest in geology and geomorphology. It aims to provide a conceptual framework and a better understanding of geology and geomorphology contained in the Compulsory Part of the curriculum.

The structure of this elective is based on the processes involved in shaping the Earth's surface. The focus is on a general understanding of the geology and geomorphology of Hong Kong and how the major internal and external processes shape its overall physical landscape. The management of geological resources and geological hazards are discussed in order to relate this knowledge to students' daily lives and help them to apply it.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. Earth's structure and processes	• How should we look at the Earth as a system? • What is the overall structure of the Earth? • How is rock formed?	• Earth systems: interaction between the atmosphere, the lithosphere and the hydrosphere • The internal structure of the Earth and crustal movement • Rock cycle and formation (volcanism, sedimentation, metamorphism)	Earth as a system Earth structure Plate Tectonics Crustal movement Rock cycle	• Use graphic organisers to show the relationship between different elements in the Earth system and rock cycle. • Use diagrams to illustrate the internal structure of the Earth. • Identify the major plates in the world map.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
2. Physical landscape of Hong Kong	• What is the general geomorphology and geology of Hong Kong? • What are the major landform features in Hong Kong?	• Geomorphology and geology of Hong Kong − Overall landform distribution − Rock types and their distribution in Hong Kong − Major geological features (folds and faults) in Hong Kong • Modification of Hong Kong landscapes by urban development	Landform Rock type Geological feature Spatial distribution Spatial association Pattern Impact of urbanisation	• Interpret different geological and relief maps to describe the distribution of various rock types, geological features and relief of Hong Kong. • Identify major geological features in Hong Kong from photographs or diagrams and describe their characteristics. • Conduct field trips to some of the geological sites in Hong Kong to identify these geological features. • Overlay the map that shows urban development with the relief map (or use GIS) to show how urban development has modified Hong Kong's landscape.
3. Processes shaping the physical landscape of Hong Kong	• What are the major internal and external processes shaping the present physical landscape of Hong Kong?	• Internal processes including: − Folding − Faulting − Volcanism • External processes including: − Weathering − Erosion − Mass wasting	Internal process External process Spatial association	• Overlay different maps (or use GIS) to show the relationship among geomorphology, rock types and geological features. • Use diagrams to explain how the internal and external processes have shaped Hong Kong's physical landscape.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
4. Management of geological resources and geological hazards	• How can people manage the geological resources and geological hazards in Hong Kong?	• Geological resources – Reclamation materials − Sources of materials and their distribution − Environmental impact of the extraction of reclamation materials − Local example: Hong Kong International Airport • Geological hazard – Landslides − Causes of landslides in Hong Kong, including natural and human factors. − Slope management and landslide prevention, e.g. strengthening slopes, restricting development on slopes, maintaining slopes, regular checking of slopes − Local example: Sham Wan Landslide	Geological resource Geological hazard People-environment interrelationship Interaction between physical and human factors	• Gather information to understand the types of reclamation materials and their distribution. • Group discussion: Environmental impact brought about by extraction of reclamation materials. • Interpret the climatic graphs, and relief and geological maps of Hong Kong to explore the causes of landslides. • Interpret the relief map of Hong Kong (or use GIS) to find out the sites where landslides may occur. • Conduct a field trip to Sham Wan to identify the measures that have been adopted to prevent landslides from happening again.

Values and attitudes	• Appreciate the beauty of nature • Appreciate the interdependence of human beings and the natural environment.

Time allocation: 24 hours

Case / Specific Examples: Hong Kong

2. Weather and Climate

This elective is for those students with a strong interest in weather and climate. It aims at providing a more academic and systematic foundation for students' further study pursuit in this field.

This elective introduces three fundamentally important properties of the atmosphere, namely heat, moisture and motion. By using Hong Kong and other places in the Mainland as examples, students learn about the basic weather elements and how climate varies with location and time. They also study the interrelationship between climate and human activities, specifically about how climate influences human activities and how human responds to these influences.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. Control factors of the climatic system	• What are the major control factors of the climatic system? • How does the operation of these factors result in global climatic pattern?	• Energy in the atmosphere − Energy budget − Factors affecting insolation − Global temperature distribution pattern • Atmospheric motion − The tri-cellular model − Global pressure pattern − Planetary wind systems • Moisture in the atmosphere − A brief introduction of humidity and condensation − Types of precipitation − Global precipitation distribution pattern • Major global climatic zones	Climatic system Energy budget Atmospheric circulation Humidity and condensation Climatic zone	• Construct annotated diagrams to show how the global circulation system works. • Construct a map using appropriate IT tools (e.g. GIS) to outline the major climatic zones.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
2. Climate of China	• How and why does the climate of different places vary? • How and why does the climate of a place varies over time?	• Factors affecting the climate of a location • An introduction of the climate and the major climatic zones of China • North-South and East-West variation of climate in China: causes and characteristics • Seasonal occurrence of weather systems in Hong Kong and the Zhujiang Delta Region: formation and impact − Cold fronts − Typhoons	Climatic factors Location and distribution Pattern Monsoon Spatial variation Weather system	• Collect various types of climatic data of different places from the Internet. • Construct a climatic graph. • Interpret climatic graphs and climatic data to explain the climatic conditions of a place. • Interpret weather charts to describe and explain the weather of a place. • Identify seasons and weather systems from weather charts. • Construct annotated diagrams to show the formation and characteristics of weather systems.
3. Relationship between weather hazards and human activities	• What kinds of weather hazards occur in China? • What is the impact of weather hazards on human activities in China? • How do people respond to these hazards in China?	• A brief introduction of the major types of weather hazards (e.g. floods, droughts, sandstorms, typhoons, cold surges and heat waves) and their distribution in China. • Causes and impact of drought in North China • Strategies adopted to combat droughts in North China, e.g. water transfer projects, improved farming methods, water conservation projects, proper water management • Evaluation of the effectiveness of these strategies	Weather hazards People-environment interrelationship Environmental management strategy	• Collect information about the major types of weather hazards found in China and summarise their impact on human activities. • Use GIS or other IT tools to construct map overlay to show the relationship between physical factors (e.g. relief, rainfall distribution, temperature distribution) and the occurrence of weather hazards. • Identify the distribution patterns of weather hazards from thematic maps. • Discuss the strategies that can be adopted to combat weather hazards and evaluate their effectiveness.

Values and attitudes	• Appreciate the beauty of nature • Show concern for those affected by weather hazards • Develop a better understanding of China through the enquiry study of weather hazards

Time allocation: 24 hours

Case / Specific Examples: Hong Kong and the Mainland

3. Transport Development, Planning and Management

This elective is for those students with an interest in knowing more about transport geography, and for those who want to broaden their scope of study. It has an academic focus and provides a foundation of knowledge for further studies in related fields. By providing students with a basic understanding of transport planning and management, this elective is also career-related and offers a more direct pathway for those who wish to plan ahead in terms of career development.

This elective aims at providing an introduction to the development of an urban transport system. It covers fundamentals in the geographical analysis of transport. The main focus is on studying the relationships of transport development, problems, planning and management, as well as their interrelationships with urban spatial forms and development. Local and national examples are used to explain the mechanism and dynamics of transport systems.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. The development of transport and logistics in Hong Kong	• What are the core elements of a transport system and major transport patterns? • What are the major transport modes in Hong Kong? • How have Hong Kong's transport system and logistics developed?	• Transport systems: demand, nodes, linkages, networks, locations, flows, and terminals • Transport patterns (including personal travel and freight transport) • Distance, transport cost, modal choice and modal competition • Unimodal transport and multimodal transport • Major transport modes in Hong Kong (including water transport, rail transport, road transport, air transport, pipelines) • The development of Hong Kong as a transport and logistics hub in the Zhujiang Delta Region	Transport system Node, linkage, network and flow Transport pattern Transport cost Modal choice and competition Location and distribution Change over time and space	• Describe the transport patterns and major transport modes in Hong Kong based on the information and data collected from the websites of the Transport and Housing Bureau and Transport Department. • Plot the routes and networks of two airline companies with Hong Kong International Airport as their hub / origin on world maps for comparison. • Choose an area near your school/home to conduct a traffic flow investigation, which includes counting the number of different types of vehicles passing through designed checkpoints with mobile devices and present and analyse the data collected with suitable cartographic (e.g. flow lines, bar charts and pie charts) and statistical methods (e.g. frequency table, mean, median and mode). • Conduct a survey on modal choice with survey apps. • Visit a logistics company in Hong Kong and / or browse the website of the Hong Kong Logistics Development Council to understand more about the development of logistics in Hong Kong.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
2. Transport problems in Hong Kong	• What are the transport problems in Hong Kong? • Why are there such problems?	• The relationship between transport, energy and environment • Traffic congestion, traffic accidents, car parking and environmental problems (e.g. noise pollution, air pollution, visual impact, effects on ecosystems) • The causes of transport problems in Hong Kong (e.g. lack of planning in the past, high concentration of population and economic activities)	Environment People-environment interrelationship Transport problem	• Collect news articles on Hong Kong's transport problems from various sources and summarise the causes, effects and possible solutions in tabular form / using a concept map.
3. Transport planning and traffic management in Hong Kong	• How does the Hong Kong government cope with the transport problems? To what extent are these measures effective? • What are the transport innovations adopted by the Mainland? To what extent can these innovations be used in Hong Kong to solve its transport problems?	• Improvement of transport infrastructure in Hong Kong (e.g. provision of additional road capacity) • Expansion and improvement of public transport in Hong Kong • Various measures involved in managing road use in Hong Kong • Development of a sustainable transport system in Hong Kong • Effectiveness of the transport planning and traffic management measures in Hong Kong • Transport innovations adopted by the Mainland (e.g. bus-rapid transit (BRT), Maglev train and high speed railway) and the feasibility of implementing them in Hong Kong to solve transport problems	Transport planning Traffic management Sustainable development Transport innovation	• Conduct an investigation to study the transport planning and traffic management measures of a chosen area in Hong Kong, which includes: − Identify and take photographs of the measures (with GPS locations); − Using mapping apps or software programmes to present relevant data collected; and − Evaluate the effectiveness of the measures.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
4. Transport development and urban morphology	• What are the interrelationships between transport development and urban forms? • To what extent the concepts of "transit-oriented development" help to develop a better urban and transport environment in Hong Kong?	• Evolution of transportation (including transport modes, routes, networks) and urban forms, including the space/time relationship of one-hour commuting with different transport modes • Impact of transport on urban land use (e.g. nodes and linkages, land rent theory, distance decay) • The impact of "transit-oriented development" on the transport and urban development of Hong Kong	Urban morphology Commuting Accessibility Distance decay Urban and transport planning Transit-oriented development (TOD)	• Construct a simple connectivity matrix (or geographic accessibility and potential accessibility) to show the accessibility of different nodes or locations in a region. • Choose a MTR station in Hong Kong to conduct a fieldwork to investigate the impact of "transit-oriented development" on the transport development and internal structure of the area near the chosen station.

Values and attitudes	• Be aware of the importance of transport and logistics development in Hong Kong. • Show concern about the problems caused by transport development, and appreciate the effectiveness of various transport planning and traffic management measures in alleviating the problems.

Time allocation: 24 hours

Case / Specific Examples: Hong Kong and the Mainland

4. Regional Study of Zhujiang (Pearl River) Delta

This module, which focuses on studying the socio-economic and environmental aspects of the Zhujiang (Pearl River) Delta Region, provides an opportunity for students to apply geographical concepts (e.g. region, change, people-environment interaction) and knowledge (e.g. factors affecting agricultural and industrial location, land use pattern, urban expansion) developed in the Compulsory Part of this curriculum in an integrative manner. The aims of this study are to study the significant changes and development that occurred in the region in the past decades, and to examine how the natural environment of the region is being affected and how the issue can be managed and resolved.

In developing lesson plans for this elective, teachers should ensure that their designs enable students to achieve the curriculum objective of 'acquiring knowledge and understanding' of the region. Teachers are also reminded that in-depth regional study in Geography provides a good opportunity for students to develop and apply both subject and generic skills, as well as to cultivate values and attitudes.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. Zhujiang (Pearl River) Delta as a region	• Where is Zhujiang (Pearl River) Delta? • What is a 'region'? Why is Zhujiang (Pearl River) Delta regarded as a region?	• Location of Zhujiang (Pearl River) Delta: site and situation • The environmental and socio-economic characteristics of Zhujiang (Pearl River) Delta as a region	Location Region	• Prepare a 10-minute computer presentation to briefly introduce the major environmental and socio-economic characteristics of the Zhujiang (Pearl River) Delta Region.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
2. Changing agricultural and industrial development	• What changes can be observed in agriculture and manufacturing industries since the 1980s? • What are the reasons for such changes?	• Changes and development in agriculture and manufacturing industries of Zhujiang (Pearl River) Delta − Agriculture: from subsistence to export-oriented and internal consumption − Manufacturing: from labour-intensive to capital and technology intensive • Reasons for such changes and development	Change over time Development Factors affecting agricultural and industrial development	• Construct maps (GIS as a tool for map making) to show the distribution of various types of agricultural and industrial activities to be found in the region. • Use map overlay to identify the changing agricultural and industrial pattern in the region over a period of time. • Draw a series of divided bar charts showing the changing pattern of different types of industries developed in the region.
3. Changing land use pattern	• What changes can be observed in the land use pattern since the 1980s? • What are the reasons for such changes?	• Changing land use pattern since the 1980s: from rural-agricultural dominant to urban-industrial dominant • Urban expansion as a result of economic development and urban growth • A brief introduction of the resulting features of urban expansion: city clusters and villages-in-the-city	Settlement pattern Urban expansion and urban growth Spatial interaction	• Identify the changing land use pattern of Zhujiang (Pearl River) Delta Region from a series of satellite images taken over a period of time. • Conduct a group project to study villages-in-the-city found in Shenzhen or Guangzhou.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
4. Change, development and the natural environment	• What are the consequences of the above changes and development on the natural environment? • What have been and should be done to alleviate the problem?	• Environmental pollution in Zhujiang (Pearl River) Delta: causes, types, spatial distribution and variation over time • Impact: e.g. social costs (health, quality of life), economic loss (costs for "clean-up" programmes, moving away of firms and companies) and the impact on Hong Kong (air and water pollution) • Management strategies: e.g. legislation, prevention, control, treatment, education (alternative life styles) and cross-border cooperation	Environmental degradation Pollution Conservation Environmental management	• Conduct a field trip to one of Hong Kong's inner city industrial districts of Hong Kong (e.g. San Po Kong, Kwun Tong) to study environmental degradation caused by industrial activities.

Values and attitudes	• Appreciate the inter-connectedness between Hong Kong and its neighbouring Zhujiang (Pearl River) Delta Region. • Show concern for the problems that affect both Hong Kong and other parts of the Zhujiang (Pearl River) Delta Region.

Time allocation: 24 hours

Case / Specific Examples: Zhujiang (Pearl River) Delta

Chapter 3 Curriculum Planning

This chapter provides guidelines to help schools and teachers to develop a flexible and balanced curriculum that suits the needs, interests and abilities of their students, and the context of their school, in accordance with the central framework provided in Chapter 2.

3.1 Guiding Principles

Teachers are encouraged to plan and develop a balanced and coherent curriculum that will enable students to take an active role in geographical enquiry.

The following are some major curriculum planning principles for teachers' reference:

(a) The primary considerations teachers need to take into account throughout planning are: the curriculum rationale, students' needs, the school context and the characteristics of the discipline of Geography.

(b) Planning should be based on what students have already achieved in basic education. This prior knowledge and experience should determine the level at which modules are taught in the first months of the senior secondary education.

(c) It is important to help students to master the key geographical concepts and ideas that are essential for understanding other concepts and ideas in the first months of the senior secondary education. These key concepts have been listed in the previous part of this document (refer to Section 2.2).

(d) Curriculum modules should be sequenced so that earlier work lays the foundations for later study.

(e) The programme should provide sufficient challenge for students of different abilities at the senior secondary level.

(f) The programme should provide a coherent learning experience of Geography for students who leave the subject at the end of the third year and also prepare others to continue studying Geography at tertiary level.

3.2 Curriculum Planning Strategies

Based on the above guiding principles as well as the curriculum rationale and aims (refer to Pages 1 to 3 of this Guide), planning for the senior secondary geography should focus on (a) developing the curriculum in a logical sequence to ensure continuity and progression in student learning (refer to Section 3.3), (b) making learning more meaningful, and (c) catering for students with different learning abilities and inclinations. The adoption of an enquiry approach, and the incorporation of geographical issues and problems into this curriculum, aims to fulfil all these considerations.

3.2.1 Making learning more meaningful

One possible way of making learning more meaningful is to connect students' learning to their life experiences, and help them to derive meaning from them. To achieve this, teachers are advised to draw on students' experience of the real world and connect what they have learnt in the classroom with their daily life. In short, that means the promotion of "learning in life" and "learning for life", which is one of the key purposes of adopting an enquiry approach and incorporating geographical issues and problems into the SS Geography curriculum.

It is important to note that making learning meaningful does not imply the loss of concrete subject knowledge. In fact, the use of an enquiry approach and the incorporation of geographical issues/problems into the Compulsory Part are considered to be the most appropriate curriculum strategies for helping students to develop geographical knowledge and in-depth understanding of the changing contemporary world in terms of space and environment. Issue- and problem-based enquiry provides real-life contexts which make the learning of geographical concepts and knowledge more meaningful for students, and offers more opportunities for the cultivation of positive values and attitudes, and the development of a global perspective and civic awareness. Also, this type of curriculum design facilitates the development of students' geographical competencies, generic skills and general intellectual capacity better than other Geography curriculum frameworks. Its greater flexibility and stronger social relevance also help to cater for a wider range of students with more diverse abilities, interests and needs.

3.2.2 Catering for learning differences

The Compulsory Part of the curriculum aims to provide all students with the fundamental geographical concepts and knowledge and to help them develop a thinking and enquiry framework. To cater for the needs of those students with higher academic ability, teachers can consider extending the breadth and the depth of the Compulsory Part by adding a new case study to the one proposed in the curriculum. For example, in the module "Building a Sustainable City – Are environmental conservation and urban development mutually exclusive?", teachers could ask students to extend their investigation to another city after finishing the case of Hong Kong. By comparing and contrasting the two cases, students should be able to broaden their understanding of the controlling factors in urban development and the processes behind urban conflicts. Teachers can also promote a deeper understanding of urban geography and a higher level of enquiry skill by asking students to evaluate the different strategies used for managing urban conflicts in the two cities, and decide with justifications which management strategy they consider better.

The design of the Elective Part caters for learning differences by allowing them to select different directions for furthering their study of Geography according to their abilities, needs and interests. The two electives "The Dynamic Earth: The building of Hong Kong" and "Weather and Climate" provide an extension of the geographical knowledge and concepts included in the Compulsory Part. The design of the two electives also allows students to study Geography through a more systematic conceptual framework, which may be particularly appropriate for those who wish to pursue further academic study in the area. The other two electives "Transport Development, Planning and Management" and "Regional Study of Zhujiang (Pearl River) Delta" help to broaden the scope of study in Geography and offer a more career-related focus, with a greater emphasis on recent developments in Hong Kong and its neighbouring regions.

3.2.3 Considerations for offering electives

In offering electives from which students can choose, schools should consider the following points carefully:

(a) There should be a strong coherence between the Compulsory Part and the electives so that students can develop a solid foundation in basic geographical concepts and skills for their further study of the subject.

(b) Students' needs, interests and abilities should be fully considered to allow students with different abilities and inclinations to stretch their potential and enrich their learning experience.

(c) Consideration should be given to individual school conditions such as teachers' expertise and the availability of facilities, equipment and other resources. The best strategy will be one that strikes a balance between the requirements of school administration, teachers' strengths and interests and students' needs and abilities.

3.2.4 Integrating assessment with learning

Assessment is an integral part of the learning and teaching process. It provides a further opportunity for learning in addition to measuring achievement. Many geographical skills, such as fieldwork enquiry, are often more appropriately measured by formative assessment than by an externally set examination. Formative assessment provides students with immediate feedback on their performances, as well as indicating their progress to date and helping them to determine the focus of their future studies.

3.3 Progression

This curriculum comprises compulsory and elective parts. As explained in Chapter 2, the Compulsory Part aims to assist students to acquire fundamental geographical concepts and knowledge and to develop a framework of thinking and enquiry essential for academic study. As such, it is advisable for students to complete their study of the Compulsory Part before they start their chosen electives. However, teachers should also exercise their professional judgment in integrating the learning and teaching of issues with electives. For instance, they could consider starting with part of the elective "Weather and Climate" to give students a more systematic framework of theoretical knowledge before investigating the issue of "climate change". In developing a Geography curriculum in schools, there is more than one possible way of structuring progression. The key principle of all curriculum adaptation and tailoring should be the enhancement of student learning of the subject.

The seven issues/problems in the Compulsory Part do not have to be taught in any particular sequence. Teachers can start with any particular issue/problem, with reference to the prior experience and interests of their students, the issues of public concern in society, and their own teaching schedules. However, in view of the need to help students to explore their interest as far as possible in Secondary 4, and enable them to progress smoothly in their

chosen studies in Secondary 5 and Secondary 6, teachers are advised to start with local issues and then move on to national and finally global ones. For example, they can first start with the module "Building a Sustainable City – Are environmental conservation and urban development mutually exclusive?" which is about the urban environment of Hong Kong and "Managing rivers and coastal environments: a continuing challenge" using the river and coastal environments of Hong Kong as one of the cases. These two modules are expected to take up the first term of Secondary 4 and should be sufficient for students to gain a thorough understanding of the nature and characteristics of Geography as a senior secondary subject.

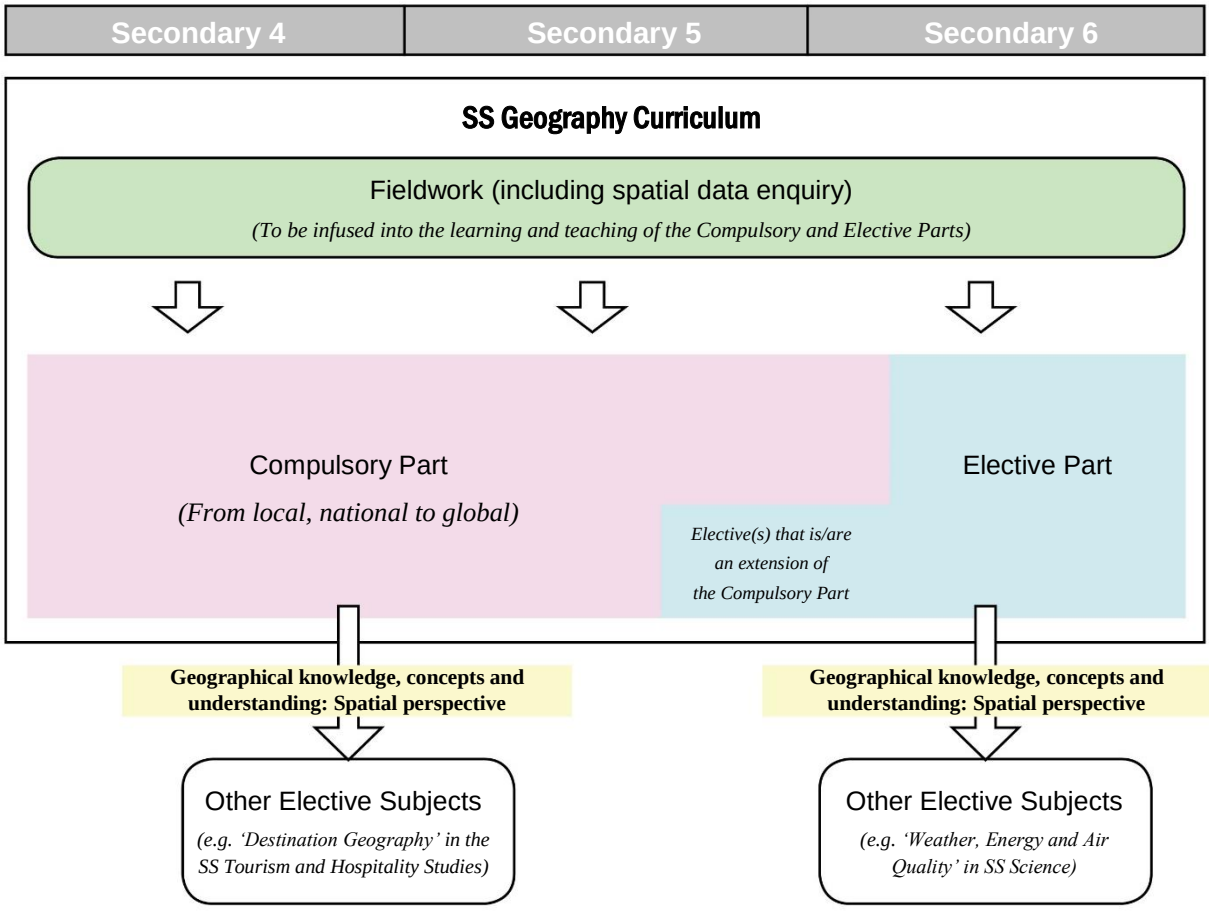

Figure 3.1 Progression

3.4 Managing the Curriculum

Good curriculum management enables schools to plan effectively and helps with curriculum implementation and the management of change. The following are important considerations in curriculum management.

3.4.1 Areas of work

(a) Understanding the curriculum and learning context

In planning their own Geography curriculum in schools, teachers are advised to study carefully the *Senior Secondary Curriculum Guide* (CDC, 2009) in addition to this Guide. This is to ensure that the SS Geography curriculum they develop for their own school is in line with the overall educational aims and directions of the senior secondary curriculum in Hong Kong. They should also understand the vision and mission of their school, its strengths and policies, and the characteristics of their students, especially their learning abilities, interests and needs. Teachers should also be aware of the culture and changing needs of the society, and adopt a flexible approach in planning and managing their Geography curriculum.

(b) Building capacity

For better management of the school Geography curriculum, Geography teachers, in particular Panel chairpersons, should consider working out a mechanism for more effective professional development through better curriculum management. One of the possible ways of doing so is to strengthen the collaboration among teachers in the panel. Collaboration can take the form of collaborative lesson preparation, team teaching and lesson observation among panel members. These practices often provide opportunities for mutual exchange of experiences and concerns. Collaboration in classrooms, through team teaching or lesson observation, usually helps to improve teachers' professional development if there is adequate trust and good communication and support. Introducing outsiders into the rather closed classroom environment can bring new insights. They can sometimes see things that are "blind spots" to class teachers. Through follow-up discussion and reflection, professional capacity can be enhanced.

(c) Cross-curricular collaboration

Owing to the specific nature of the subject, it is relatively easy for Geography teachers to cooperate with other subjects in developing cross-curricular learning. A popular partner is Economics / EPA. Nearly all the major themes in human geography, such as "urban land use conflict and urban problems", "industrial location and development", "agricultural

change and urban sprawl", can be integrated with the content of these two subjects. More physically-related themes such as "environmental conservation", "weather and climate", "plate tectonics and natural hazards" and "rock cycles and denudation" can be linked to topics in science subjects.

For larger-scale collaboration, themes like "pollution" and "tourism" offer good opportunities to link up subjects both within and outside the PSHE Key Learning Area. An example of how the theme "tourism" could be used for connecting the six PSHE strands, and in turn nearly every PSHE subject, can be found in the *PSHE Key Learning Area Curriculum Guide* (CDC, 2002) (Refer to Exemplar 5, Page 151). Teachers are also reminded that the elective "Weather and Climate" in this Curriculum supplements and complements the elective "Weather, Energy and Air Quality" in the senior secondary Science curriculum. This can serve as a possible starting point for Geography teachers to work with Science teachers.

Last but not least, the knowledge, concepts, and understanding of Geography – in particular "spatial perspective", "global outlook", "place and region", "environmental management", and "transport development" – can be used to strengthen students' learning in Applied Learning courses such as "Logistics Fundamentals" and "Introduction to Leisure and Tourism Studies".

(d) Better use of the geography room

The Geography Room is a great asset in learning and teaching Geography in schools. It provides the much-needed space for group work, discussion, role-play and many other less teacher-centred learning activities. When planning their daily learning and teaching schedules, therefore, Geography teachers should try to ensure the best use of the room by introducing more student-centred, interactive learning strategies. With the introduction of GIS in the SS Geography curriculum, Geography teachers, especially Panel chairpersons, should develop a detailed plan for equipping the room with the necessary computer and audio-visual facilities and equipment for students to make use of this new form of information technology for spatial data analysis. Information on the introduction of GIS in Geography and the use of the Geography Room for enhancing the learning and teaching of the subject can be found in Chapter 4 and Chapter 6 of this Guide.

(e) Soliciting external resources and support

When planning the curriculum, teachers should look for resources and support that are available outside schools. By establishing a close connection with parents, alumni and members of the local community, schools can obtain valuable sources of personnel, information and financial aid to offer students a greater variety of learning experiences, especially beyond the school premises. A typical example would be to ask parents and alumni to assist Geography teachers in fieldwork and visits. Not only can parents and alumni help in conducting the visits or trips, but their professional knowledge and experience may also be helpful in the planning and development of the relevant learning activities. Government departments and non-government organizations are another source of learning resources, in particular those that run exhibition halls and field centres. The Planning Department, the Hong Kong Observatory, Kadoorie Farm and the World Wide Fund for Nature are examples which are well known to Geography teachers.

(f) Managing change and monitoring progress

In order to sustain the Geography curriculum over time, it is important to monitor progress and evaluate the effectiveness of learning and teaching. The Geography panel can undertake action research or self-directed study for periodic reviews of the learning and teaching of the subject. These activities can provide valuable data and evidence on how to refine and enhance practices in implementing the Geography curriculum. Evaluation of the effectiveness of learning and teaching can also be conducted through the setting up of an internal assessment framework. Feedback on the learning and teaching strategies adopted by Geography teachers can also be obtained through monitoring the progress of student learning. Details on how an internal assessment framework can be developed for Geography are included in Chapter 5 of this Guide.

3.4.2 Roles of different stakeholders

Principals, KLA / subject Panel chairpersons, teachers and parents play different roles in the planning, development and implementation of the school curriculum. Collaboration is vital for effective and efficient planning and management of the Geography curriculum in schools.

(a) Geography Teachers should:

- Keep abreast of the latest changes in the curriculum, learning and teaching strategies and assessment practices;
- Involve themselves actively in the development, implementation and evaluation of the Geography curriculum, with the aim of promoting student-centred enquiry and enhancing learning effectiveness;

- Design and plan learning and teaching strategies and activities that offer an appropriate challenge to students to stretch their potential in learning Geography;
- Make the best use of the Geography Room and the latest geographical tools (e.g. GIS) to improve the learning and teaching of the subject;
- Participate actively in professional development, peer collaboration and professional exchange; and
- Participate in educational research and projects to enhance their own professional development.

(b) PSHE KLA Co-ordinators/ Geography Panel Chairpersons should:

- Lead and plan the development of the curriculum;
- Monitor the implementation of the curriculum, and make appropriate adjustments in strategies for learning, teaching and assessment, taking into account students' abilities, interests and needs;
- Facilitate professional development by encouraging panel members to participate in training courses and workshops;
- Hold regular meetings (both formal and informal) with panel members to strengthen coordination and communication among them;
- Liaise with other panel chairpersons to explore possible cross-subject collaboration;
- Promote professional exchange on subject knowledge and learning and teaching strategies; and
- Make the best use of resources available in the school and community.

(c) School Principals should:

- Develop a clear and sustainable direction for the development of the PSHE Curriculum in schools, and understand the role and importance of Geography in the curriculum;
- Take into consideration students' needs, teachers' strengths and expertise, the school context and the central curriculum framework in formulating the curriculum, and instructional and assessment policies;
- Coordinate the work of KLA leaders and subject panels, and set clear targets for curriculum development and management that facilitate cross-curricular collaboration;
- Support Geography panel chairpersons and teachers in promoting culture of collaboration among teachers;
- Support the implementation of fieldwork and other life-wide learning activities in Geography by providing administrative support and suitable time-table arrangements, resources and staff;

- Convey a clear message to parents regarding the importance of geographical education; and
- Build networks among schools, community organisations, and various institutions at management level to enhance the development of the Geography curriculum.

(d) Parents should:

- Understand the value of geographical education, and encourage and support their children to be conscientious in studying Geography; and
- Support the implementation of fieldwork and other life-wide learning activities in Geography by encouraging their children to participate actively in them.

Chapter 4 Learning and Teaching

This chapter provides guidelines for effective learning and teaching of the Geography curriculum. It is to be read in conjunction with Booklet 3 of the *Senior Secondary Curriculum Guide (CDC, 2009)* which provides the bases for the suggestions set out below.

4.1 Knowledge and Learning

Knowledge exists in different forms. While geography is an established discipline, teachers should understand that geographical knowledge is dynamically changing. The twentieth century has marked a shift in geographical education from a largely descriptive, regional approach to a positivist, scientific and systematic perspective, and now to a thematic, issue and enquiry-based orientation. Geography educators have also revised their views on knowledge acquisition — from "being able to remember and repeat information" to "being able to find and use it". It is recognised that knowledge is constructed by the learner through interaction with the world and with knowledgeable others.

The focus of learning in Geography, as in other subjects, is no longer limited to what students learn, but is also concerned with how they learn and with what brings learning about. Each learner has his/her unique style of learning, so a wide repertoire of learning and teaching strategies are needed to cater for differences in ways of learning, and to maintain a balanced emphasis on knowledge acquisition and skill development in the study of Geography.

4.2 Learning Communities

In the setting of whole-class teaching, each student rarely has the chance to talk or interact with the teacher. Pair or small group discussion, which can be viewed as a learning community formed among students, has much to offer. Research suggests that students engage in higher-order thinking when discussing questions or problems in groups. In talking through ideas, students test out their thoughts and improve their understanding. The learning gain can be impressive if discussion tasks are clear, a time limit for group work firmly established, reporting back procedures set up and teacher interventions timed correctly.

The following is from a discussion among four students on the design of a questionnaire for collecting the opinions of Wan Chai residents about the redevelopment of the district. It was the first time they were given a free hand in completing a task and the teacher gave them only a brief outline of what had to be done. The dialogue below shows the power of peer interaction in facilitating learning.
S1: "How to design our questionnaires?"
S2: "Follow the hypotheses".
S1: "What are our hypotheses?"
S2: "… such as 'Wan Chai Market is important to the residents of Wan Chai'…"
S1: "Jot down some notes about the hypotheses."
S2: "OK. I think it is better to combine hypothesis 1 and hypothesis 2 which we have set before into one."
S1: "Yes, of course. I think the questionnaires should be as simple as possible."
S3: "Yes, otherwise we'll waste the time of the interviewees."
S1: "I think we should use multiple-choice questions to make it easier to answer. For Question 2, I think the options should be the different proposals on how the Wan Chai Market could be redeveloped."
S2: "I think the second question should be about the economic benefits brought by the redevelopment of the Wan Chai Market. As suggested by S4 and S1, we should give the interviewees a list of suggestions proposed, such as those by the government."
S4: "The government? Or should it be the developer who proposed to change the Market into a commercial building? Some members of the Wanchai District Council suggested that it should be retained as a tourist attraction."
S2: "Any more?"
S1: "Some suggested that it might be used to promote traditional Chinese culture."

To build a successful learning community among students, the teacher must create a climate in which students can work with a sense of security and self confidence. Each student should be given the optimum opportunity to talk and the tasks undertaken should involve every member of the community. A spirit of cooperation and mutual respect among students is needed, and positive peer relationships are crucial.

A number of factors influence the success of a learning community. The first concern is the size and composition of student groupings. Teachers often use groups of between four and six students. However, some research findings show that at senior secondary level, the ideal group size is two, three or at the most four students. Larger groups may inhibit learning if students have to wait for a long time to give their views, or if some students dominate discussions leaving others as peripheral non-participants. The composition of groups in terms of ability is another important issue. High-ability students appear to perform well, irrespective of the type of group

in which they are placed, but when students of low ability are all put together in the same group, their learning may be jeopardised since none of the members may understand the task or have the skills or knowledge to offer the required explanation. Given this, mixed ability grouping seems at times to be the best choice.

With improved access to information technology (IT) for learning, students can use IT to build up a learning community with their teachers and classmates through, for example, e-mail, web-based instant messages and web journals. A convenient tool is the bulletin board at the Hong Kong Education City to which all Hong Kong teachers and students can gain access. As mentioned in Paragraph 4.6.4, the use of IT can remove barriers imposed on learning by time and space.

A learning community beyond school premises

The building of a learning community should not be confined to within the school premises. St. Catherine's School for Girls at Kwun Tong has established a learning community among its Geography teachers and students and those from other schools. For the past few years, local field camps and field trips, as well as an overseas field trip had been organized by students with teachers acting as advisors. Mixed grouping was introduced to allow students and teachers from different schools to interact and share their experience with one another. The students made substantial gain in subject knowledge and understanding, interpersonal and social skills and, most important of all, self-esteem and confidence. Teachers also reported that they had learned much from other teachers, as well as from the students.

The learning process in a learning community can appear to be slow when compared with direct teaching strategies because students make mistakes or become lost at times. They may need support and intervention from teachers before they can make breakthrough in their learning. In the long run, however, they become better learners, and they will have developed self-directed learning skills that those who received direct instruction will not possess. Students must take responsibility for their own learning and teachers have to provide time for them to build up their self-motivation, self-regulation and self-reflection. It is also essential to ensure that other teachers share the same ideology and are willing to cooperate. Only one teacher practising the strategy in one class is likely to end up in failure.

4.3 Catering for Learner Diversity

Since every learner has his/her own unique style of learning, there will always be variations in the ways students learn, the speed of learning, what they find difficult, and their level of attainment. The use of a variety of learning and teaching strategies is necessary in order to match learning opportunities to students' learning needs.

Differentiated learning strategies seek to create multiple paths for students with different abilities, interests or learning needs to experience equally appropriate types of learning. It requires students to take responsibility and ownership for their own learning, and provides opportunities for peer teaching and cooperative learning.

The following are principles that should be considered in planning for effective differentiation:

- Clear learning objectives and learning outcomes in terms of students' knowledge, understanding and skills need to be defined in advance;
- A variety of learning and teaching strategies to differentiate the learning experiences of students is required;
- A variety of resources is needed to support student learning;
- A variety of tasks and activities is required to provide different opportunities for student learning and for different learning outcomes;
- Opportunities which vary in the pace and depth of learning are needed;
- A range of strategies for the assessment of student learning is required; and
- Effective feedback on students' learning outcomes should be given and targets for students' future learning should be set.

Differentiation can be achieved by outcome, by pace, by level of demand in the tasks set, by the resources available or by any combination of these. Below are four categories of strategies for achieving differentiation in learning geography.

4.3.1 Differentiation by outcomes

Students are given common tasks developed around common resources. Differentiation occurs in students' different responses to the tasks. For example, they may be shown a series of photographs or a video clip on the inner city region of Hong Kong and asked to write a short report about life there. Some students may simply produce a brief description/summary of what they have seen; others may outline the positive and negative aspects of living in the inner city region; while some others may compare the inner city region of Hong Kong with that of another city with which they are familiar.

4.3.2 Differentiation by resources

All students work on the same tasks, but have access to different resources at different levels of complexity in line with their ability to read, understand and interpret the material. This can involve a range of textbooks and newspaper extracts with varying levels of readability, or different maps, diagrams and photographs. Different outcomes are obtained from the same tasks as a result of having access to different materials.

4.3.3 Differentiation by graded tasks and by outcomes

Students receive the same stimulus, materials and resources but follow a series of tasks or questions which become increasingly difficult and demanding. All of them should be able to finish the first task and then move on to progressively more difficult ones, until they reach their limit. It is expected that some students will not be able to progress beyond certain stage and complete all the tasks. For example, the first task might require students to describe the spatial distribution of earthquakes in Taiwan based on a map showing such a distribution. This might be followed by asking them to explain why earthquakes with a greater magnitude are found in the eastern part of the island. They might then be asked a question requiring higher-order thinking skills, such as to evaluate whether it is rational to continue the construction of a new nuclear power plant in the eastern part of Taiwan.

4.3.4 Differentiation by tasks and by resources

Specific tasks with different materials are designed for different ability groups. The material for the lower ability group might be a simple structured worksheet with some structured and some open-ended questions about, for example, the characteristics and major fluvial processes of the Tung Chung River. For the more able, it could be an assignment which

involves more complex materials and the testing of a hypothesis, such as the steeper the gradient the faster the flow of the river.

The key purpose of introducing such strategies in the learning and teaching of Geography is to enable teachers to understand the learning differences of individual students. Teachers can then introduce appropriate support, such as adjusting the teaching schedule or improving the learning activities, to help each student with diverse learning styles, ability, and needs to maximise her/his potential.

4.4 Classroom Interaction

4.4.1 Questioning and Feedback

Questioning and feedback are central to learning. By asking questions and building on students' response, teachers can help students to shape their thinking and learning. There are two major types of question. The first type is simple, lower-order, closed questions that are designed to check existing understanding quickly. They usually require recall and reporting of information and have answers that are right or wrong — for example, *"Can you tell me the name of the feature shown in this photo?"*, and *"Look at the climatic graph on Page 2. What is the coldest month in this city?"* Another type is complex, higher-order, open questions that are more challenging intellectually, and encourage speculation and deeper thinking. They usually require students to explain, to evaluate or to apply — for instance *"To what extent do you consider government policy is the key factor influencing the location of the iron and steel industry in China?"*, and *"Do you think Taiwan should go on building more nuclear power plants? Give at least three reasons to support your answer"*.

The choice of the type of question to be asked should depend on its purpose. Closed questions ask students to tell the teacher what they already known. The teacher wishes to find out if the student has learnt a particular piece of knowledge, rather than to find what the student is thinking about. If a whole dialogue is dominated by closed questions, students may eventually get bored and disengage from learning. Sometimes this is why students are so reluctant to answer questions in class; the task (the questions) is not sufficiently challenging. On the other hand, this does not imply that all questions asked by teachers need to be open and complex. A combination of different types of question is needed depending on topics and response of students.

4.4.2 Scaffolding

Scaffolding is a process for helping students to achieve more than they can on their own by providing support for learning. In scaffolded learning, a teacher engages students in complex tasks that they cannot perform fully without assistance. Errors are expected, and are corrected gradually through teacher re-direction and feedback. When implementing scaffolded instruction, sufficient, but not excessive, support is needed for the learner. Initially, the teacher assumes much of the control of the learning, but gradually withdraws as students become competent in accomplishing the task on their own. The table below illustrates how scaffolding can be incorporated into a lesson using a concept map on factors affecting industrial location.

Teacher-regulated	**First, the teacher does it.** • The teacher models the use of a concept map to demonstrate the various factors affecting the location of the iron and steel industry in China. • The teacher shows a partially completed concept map on an overhead transparency and "thinks aloud" as the map is constructed using commonly known factors such as raw materials and power.	I DO-YOU WATCH
Supportive joint practice (scaffolding)	**Second, the class does it.** • The teacher and students work together to expand the concept map. Students are prompted to suggest other factors, such as government policy, to be added to the concept map. • As the teacher notes the suggestions on the transparency, students complete their copies of the concept map.	I DO-YOU HELP

Supportive joint practice (scaffolding)	**Third, the group does it.** • Students work in pairs or in small groups to complete the concept map. • The teacher monitors the class to provide assistance or to intervene when necessary.	YOU DO-I HELP
Student-regulated	**Fourth, the individual does it.** • The teacher provides an information sheet on the location of the iron and steel industry in the UK. Students construct a concept map to demonstrate the various factors influencing the location of the industry in that country.	YOU DO-I WATCH

Scaffolding can be accomplished in many ways, such as through Socratic dialogue, coaching and Dewey's interactive concept of learning. Another common scaffolding technique is procedural facilitation, in which students are given prompts to encourage specific cognitive processes. Graphic organisers provide students with a prompt (a framework) for using information. In recognising relationships, outlining processes or identifying needed information, graphic organisers can provide the scaffolding needed to move a student from being a dependent to an independent learner.

4.5 Guiding Principles

The following are guiding principles for developing effective learning and teaching strategies in Geography at senior secondary level that can help actualise the views and theories on knowledge building and learning mentioned in the previous sections.

- A wide range of teaching styles, strategies and activities should be employed to cater for student diversity in learning abilities, needs and interests.
- Learning activities should be planned with students' prior knowledge and experience in mind.
- Each learning activity should have clear learning objectives and students should be informed of them at the outset.
- Student talk is an important means by which they actualise learning. Teachers should promote quality classroom interaction by the effective use of questioning and feedback, and a supportive classroom atmosphere.
- For effective geographical enquiry, student exploration should precede formal presentation by teachers and students' questions and comments should determine the focus of classroom discourse.
- Learning activities should be designed to develop generic skills and reflective thinking in the context of the curriculum content.
- Students should be encouraged to reflect critically on the procedures and methods they use in learning, and should take responsibility for their own learning.
- The roles of teachers and students in different learning activities should be clearly delineated, with both parties being well informed of their roles.
- Feedback and assessment are integral parts of learning and teaching, in particular in setting targets for future learning.
- A range of resources, especially those involving the use of information technology, should be used flexibly to support student learning.
- Student motivation is crucial and strategies should be adopted to arouse the interest in learning. The use of contemporary issues to stimulate geographical enquiry and fieldwork investigations are two effective ways of motivating students to learn Geography.
- In learning activities, students must be "on task" and focus on learning.
- Each student has unique learning abilities, interests and needs. Learning activities and tasks should allow for variation in the pace and depth of learning, and provide different opportunities for student learning and for different outcomes. Likewise, a variety of strategies for the assessment of student learning is needed.

4.6 Approaches and Strategies

As set out in Chapter 1 of this Guide, senior secondary Geography curriculum is focused, on the one hand, on disciplinary knowledge and skills for students going into further study or the workforce. On the other hand, this curriculum also helps students to develop generic skills and the general intellectual capacity for lifelong learning. Of equal importance is the cultivation of positive values and attitudes as senior secondary students grow into early adulthood. The following are the three common and intertwining pedagogical approaches that can be employed to facilitate the delivery of this curriculum.

- Teaching as direct instruction

  This approach, which involves the transmission of knowledge from teacher to student or the modelling of a skill, may be most relevant in contexts where explanation, demonstration or modelling is required to enable learners to gain knowledge and understanding of a specific aspect of the subject. Examples include the teaching of map skills and the formation processes of physical features that involve explicit procedures, concepts, or a body of knowledge.

Teaching the concept of "sustainable development" using a "direct instruction" approach

A teacher from a secondary school in Sai Kung introduced the concept of sustainable development. She prepared a brief outline of the work she intended to carry out with the students and gave it to them at the beginning of the lesson. Using the news about the damage done by visitors to the "Wishing Tree" of Lam Tsuen, the teacher explain to the class the meaning of sustainable development, summed up the principles of sustainable development and put them on the blackboard. She then made use of these principles to analyse other tourist destinations in Hong Kong that had suffered similar physical damage caused by visitors to ensure that the students had mastered the principles satisfactorily. At the end of the lesson, the teacher asked the students to prepare a checklist of the principles at home and matched these against their behavior in the recent school picnic to see if they complied with these principles. Students were also asked to suggest at least three ways to make the school picnic more environmentally friendly.

- Teaching as enquiry

  This approach engages learners in finding answers for themselves. It requires the use of higher-order thinking to investigate issues, suggest and evaluate alternatives, and communicate ideas, views, experiences and feelings appropriately. It may take place through interactive whole-class teaching or through peer interaction in pairs or groups.

Enquiry-based fieldwork or role-playing how environmental decisions are made by those concerned is a typical example of this approach.

Class debate for enquiry

A class debate was organised by a Geography teacher at the end of the unit on "climate change". The motion was "Global warming is nothing but a scientific myth". Teachers asked the students to form their own teams and decide whether they were for or against the motion. Instructions on how to prepare for a debate, relevant information sources for the motion, and a simple worksheet to guide students to develop their arguments were provided. Students then collected further information for the debate before the next lesson which focused on group discussion and preparation for the event. When the debate was held, the teacher selected two teams from the class to carry out the activity. To involve the rest of the class, the teacher designed another worksheet for them as "judges". The students had to jot down the main arguments put forward by the two sides. Each "judge" had to note on his/her worksheet which team he/she supported at the end of the debate, with justifications. Each student also summed up the arguments he/she had heard and wrote a short essay explaining his/her views on the motion.

- Teaching as co-construction

  This approach involves providing opportunities for students to discuss, to act and thus to learn together in a group. It stresses active interaction among students and between students and teachers. It enables students to learn how to "think for themselves" through contributing to the work of a group. Group discussions and role-play activities usually involve the use of this approach.

Using group discussion to conduct geographical enquiry

A teacher from a secondary school in Kowloon East made use of the topic "transport problem in Hong Kong" to facilitate her students to carry out geographical enquiry through group discussion. The lesson began with the reading of newspaper clippings, photographs and information sheets collected by different groups of students. Each group then discussed the information and extracted the key ideas of the materials. The teacher then identified and defined the issue, and this was followed by a class discussion on where and how further information could be found. Based on the articles, graphs and data prepared in advance, the whole class worked out the major causes of the transport problems in Hong Kong through interactive discussion. The lesson ended with the teacher summing up the points students developed in completing the last part of the worksheet which asked them to suggest possible solutions to the problems and evaluate their suggestions. During the lesson, the teacher did not dominate the classroom

dialogue; instead she became a partner of the students in the entire enquiry process and engaged in active interaction with them.

The suggested learning and teaching strategies set out in the following paragraphs seek to cater for the various modes of learning and teaching mentioned above. They are also considered to be appropriate for achieving the major roles of geographical education at senior secondary level. Teachers are encouraged to consider adopting them in senior secondary Geography lessons, where appropriate.

4.6.1 Learning through maps

Maps are an important tool for geographers, as they provide an effective medium for storing, displaying, analysing and communicating information about people and places. In geographical education, maps are used to help students study relationships between people, places and the environment. Students need to be able to read and use maps for presenting, describing and explaining spatial information, patterns and processes they observe. During their studies, students should be provided with ample opportunity to work with a wide variety of maps drawn for different purposes and of different scales.

The teaching of map skills should not be treated as a separate topic in Geography, but should be integrated into the learning and teaching of geographical issues and themes. Teachers should develop a planned and structured programme to familiarise their students with the following four essential properties of maps:

- plan view (perspective and relief)
- arrangement (location, direction and orientation)
- proportion (scale, distance and selection)
- map language (signs, symbols, words and numbers)

Also, in designing their map work activities, teachers should bear in mind that their tasks should enhance students' competency in one or more of the following aspects of map reading and interpretation:

- locating places;
- map drawing, to support description of the site and situation;
- route-display, to show how to get from one place to another;

- storing and displaying information, being able to isolate and sort information from a wide range of different items, and to identify patterns and relationships in selected information; and
- solving problems by interpreting or inferring from the information provided in maps and being able to "see" meanings behind the spatial information, patterns and processes stored in maps.

The example below from a local secondary school illustrates how the above principles and competencies of map reading and interpretation can be incorporated in map tasks. In addition to basic map skills, the example also demonstrates how map work can be an integral part of the learning and teaching of geographical concepts and knowledge.

Example: Developing Sham Chung into a golf resort

Refer to the map of Sham Chung and carry out the following:

(1) Measure the distance of the footpath from Sham Chung (209842) to Yung Shue O (214826).
(2) Calculate the time required for the villagers to walk from Sham Chung to Yung Shue O. (Assume the speed of walking is 4 km/ hr.)
(3) Draw a cross-section from the trigonometrical station 180 (grid reference 204848) to 210836 with a vertical scale of 1 cm to 50 m.
(4) Based on your cross-section and map evidence, describe the relief of Sham Chung and its surrounding area.
(5) A local developer plans to develop Sham Chung into a resort with a golf course and villa guesthouse. Can you explain why?
(6) What will be the positive and negative impacts on Sham Chung if the resort is developed? Do you support this development plan? Explain your answer.

4.6.2 Learning through enquiry

Enquiry learning can provide students with the capacity and motivation to become active learners, team workers, critical and creative thinkers, problem-solvers and decision makers. Through enquiry, students can acquire geographical concepts and knowledge in a challenging and authentic way. In this process, students are encouraged to ask geographical questions and to seek answers independently. The information and experience they gain enable them to look at issues or problems from different perspectives. Students are provided with opportunities to discuss and collaborate with one another in carrying out investigations and solving problems, which helps

them to become more open-minded, and to respect different views. They also learn to be more self-directed in their own learning.

Geographical enquiry starts with identifying an issue, a problem or an interesting phenomenon / pattern with a strong spatial and/or ecological perspective. Through using the five "W"s of geography – "What", "Where", "How", "Why" and "What if" — to examine issues, students establish a strong geographical perspective; and key geographical concepts and knowledge are then introduced to help them understand, interpret and analyse the issue. In the enquiry process, students have opportunities to develop a wide range of skills and abilities, clarify attitudes and values, and engage in an open exchange of ideas and opinions. Figure 4.1 shows a possible route for a geographical enquiry on the issue "Disappearing Green Canopy — Who should pay for massive deforestation in rainforest regions?" as an example.

Through using a real-life context, which makes learning more meaningful, a geographical enquiry on issues and problems strengthens students' learning of geographical concepts and knowledge. It involves them as active participants in a sequence of meaningful learning through enquiry in which there is a balance between teacher-directed work and more independent, self-directed student learning. In this process, students acquire geographical concepts and knowledge in a systematic way, and see meaning in the knowledge they have gained. Experience in Hong Kong junior secondary Geography lessons and in overseas countries suggests that meaningful knowledge consists of more than just a body of content. The activity of knowing, in which one tries to find answers to questions, is of fundamental importance. Learning derived from active participation in seeking answers is likely to be more easily retained and more meaningfully re-applied than knowledge acquired passively.

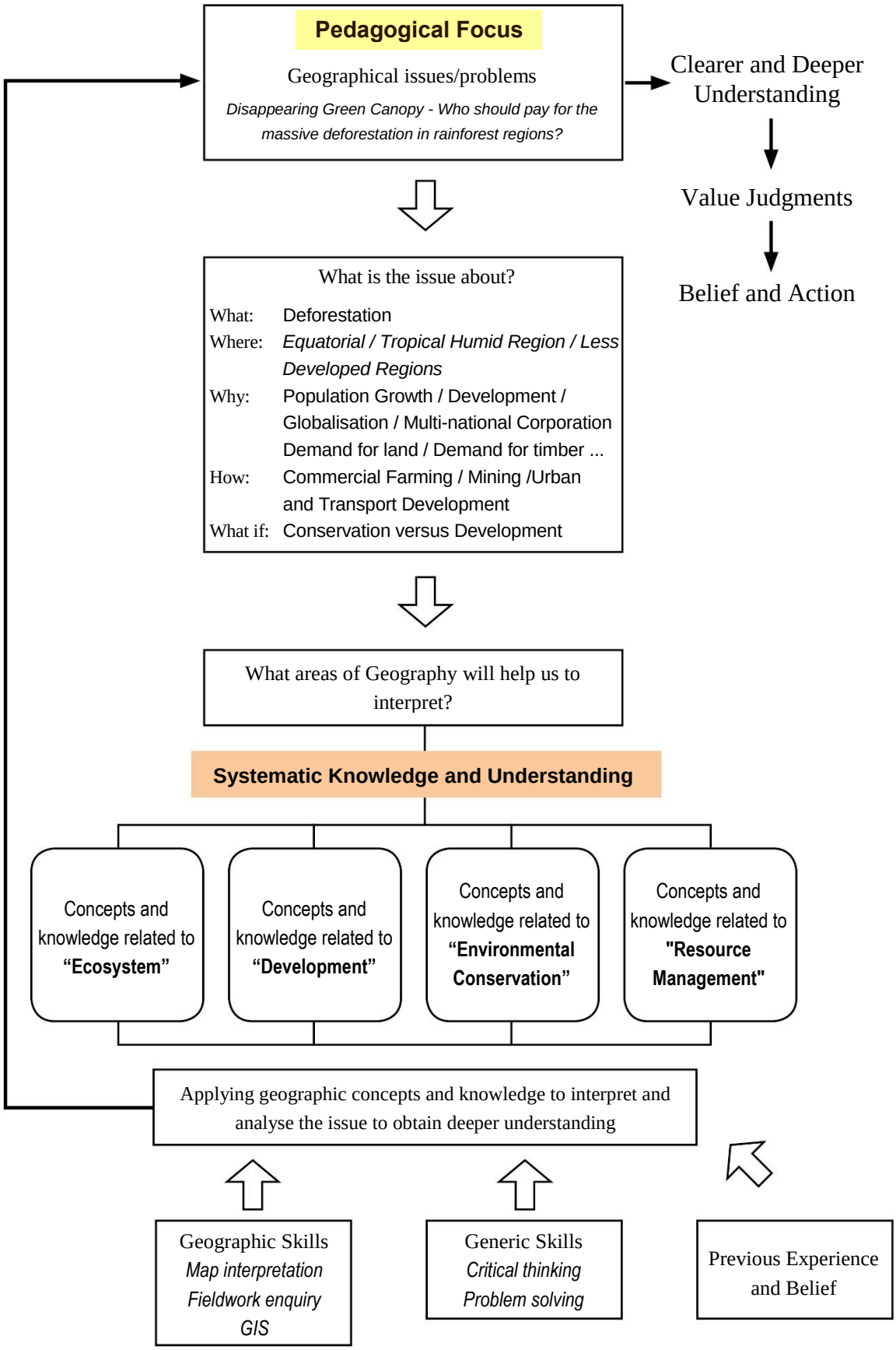

Figure 4.1 Route for a geographical enquiry

In the learning and teaching of senior secondary Geography through geographical enquiry, teachers extend their role from being knowledge transmitters to learning facilitators. As facilitators, Geography teachers:

- help students to formulate appropriate learning goals and identify the most appropriate means of achieving them;
- assist students to develop positive learning habits, master learning strategies and develop metacognitive skills to steer their learning;
- create a stimulating and motivating learning context so that students are intellectually curious; and
- develop a supportive, tolerant and mutually accepting learning community to allow students to participate actively in learning without the fear of being criticised.

Instead of being passive receivers of knowledge, students should:

- set meaningful and realistic goals for their own learning;
- collaborate closely with others and treat suggestions positively in conducting enquiry or other learning tasks;
- take the initiative to consult teachers, to share learning experiences with peers, and to gain feedback and insights into the ways of succeeding in further higher-order learning;
- develop a positive attitude towards learning Geography by engaging actively and confidently in learning, despite the risks of making mistakes or encountering difficulties; and
- reflect on their learning experiences, and monitor and evaluate their own learning progress.

4.6.3 Learning in the field

Fieldwork is a distinctive attribute of geography and has a long tradition as an established component of geographical education. It provides students with opportunities to apply the knowledge/concepts learned in the classroom to the real world, and through this to acquire new knowledge/concepts. In addition to knowledge acquisition and application, different subject-specific skills (such as field sketching and land use plotting) and generic skills (like problem-solving and critical thinking) can be developed through fieldwork. In the affective domain, fieldwork stresses the development of self-awareness and awareness of the needs and skills of others in the context of working cooperatively in a new environment.

To actualise these values and purposes, fieldwork should be viewed as a mode of "learning to learn" in addition to providing an opportunity to learn about a unique place or feature. The aim of fieldwork is to gain knowledge and enhance understanding. A focus on skills does not exclude knowledge and concepts; skills cannot be learned in a vacuum. Fieldwork activities should involve students in applying a range of practical, organisational and intellectual knowledge and skills to a "real world" problem or issue. Fieldwork should not be limited to be purely "field excursions" and "guided tours", in which the teacher dominates most of the talking and students concentrate solely on listening, observing, note-taking and photo-taking. Fieldwork should be enquiry-based as this aligns with the aims and objectives of the SS Geography curriculum. The starting point for such an approach is the identification of an issue or a problem related to the interaction of people and their environment in a specific locality. Strategies for identifying causes, processes and consequences are established by negotiation between students and teachers, leading to appropriate data collection, data analysis and presentation, and identification of possible management strategies / solutions. This approach involves the application of knowledge to real-life issues, and supports students in individual work. An example of enquiry-based fieldwork and a few student comments on this type of fieldwork can be found in Appendix 1.

Fieldwork may take the form of a large-scale, whole-day activity in a distant location. But, small-scale fieldwork conducted near the school premises should also be considered. The latter has the advantages of lower cost and risk, is easier to manage and can be completed within a short period of time. The value of fieldwork depends on whether it can help students to learn how to identify, observe, collect, apply and analyse, rather than on how long it takes or how much work the students have to complete.

4.6.4 Using information technology in learning

Information technology (IT) can be used to promote interactive learning both inside and outside classrooms. Students must be given appropriate opportunities to apply IT. With multimedia-enriched learning, abstract concepts, such as those of weather and climate, can be understood more clearly. IT links students to a vast network of knowledge and information outside their classrooms (e.g. through the Internet). Information in various websites provides updated data for discussion and research, which can greatly facilitate self-directed learning and enquiry learning. Also, students can share ideas, discuss various geographical issues and communicate with their teachers through the school intranet system and e-mail. Learning is thus no longer confined by time and space.

Of the many IT tools available, Geographic Information System (GIS) is perhaps the most geography-related. Geography is about understanding the Earth, and GIS is a technology that helps in organising, analysing and disseminating such information. It connects geographical information to location, and layers the information to give understanding of how it all interrelates. GIS organises geographical information to bring out spatial patterns. Some of the ideas and practises of GIS are not new; geographers have been using "GIS" for years on paper and transparent overlays. However, the recent rapid advances in information technology have turned GIS into a powerful IT tool.

At senior secondary level, GIS provides an aid to integrating maps. It allows learners to handle spatial data faster and more easily than before. Lesson time can be spent on the higher-order analysis of spatial patterns. Every student taking senior secondary Geography should know how to use this tool in studying the subject. Students who are competent in using GIS can also employ it for modelling and mapping of the world. GIS allows users to model scenarios, add in variables and conditions, and test hypotheses. It can help to answer the "What if" questions in geographical enquiry.

Virtual fieldwork is another use of IT in studying geography. By capturing the field environment on video, digitising relevant materials and uploading them onto a website, virtual fieldtrips allow student to experience the field environment, observe and identify geographical features, phenomena and patterns, and collect and interpret data — all in front of a computer screen. Virtual fieldtrips save time and cost compared with real fieldwork, as well as avoiding the demanding processes of risk assessment and care of students in potentially hazardous settings. They also permit the possibility of experiencing a wider range of field environments, including those distant and remote places that are inaccessible to students.

Nonetheless, while some of the investigative phases of fieldwork can be accomplished through "virtual" strategies, the sensory and emotional experience of whole landscapes and real people can never be replaced by any electronic simulation or representation. Virtual fieldwork takes place in an environment detached from the elements of the natural world, in a setting which is physically passive and often socially isolating. In view of this, virtual fieldwork should only be treated as a substitute when it is not possible to organise real fieldwork.

4.6.5 Concluding remarks

It is essential to reiterate that there is no single approach or strategy that can fit all learning purposes and all students. A wide repertoire of pedagogical approaches and strategies should be employed to suit different situations and different students. However, teachers need to understand clearly the rationale behind their choice of a particular approach or strategy and consider carefully whether there is a better alternative.

Traditional pedagogical strategies like “talk-and-chalk” and “mass lecture” can be effective for certain areas of learning. The key question in choosing a learning and teaching approach and strategy will always be: “Does this approach/strategy best fit my students and are there any better alternatives?”

Chapter 5 Assessment

This chapter discusses the role of assessment in learning and teaching Geography, the principles that should guide assessment of the subject and the need for both formative and summative assessment. It also provides guidance on internal assessment and details of the public assessment of Geography. Finally, information is given on how standards are established and maintained, and how results are reported with reference to these standards. General guidance on assessment can be found in the *Senior Secondary Curriculum Guide* (SSCG) (CDC, 2009).

5.1 The Roles of Assessment

Assessment is the practice of collecting evidence of student learning. It is a vital and integral part of classroom instruction, and serves several purposes and audiences.

First and foremost, it gives feedback to students, teachers, schools and parents on the effectiveness of teaching and on students' strengths and weaknesses in learning.

Second, it provides information to schools, school systems, government, tertiary institutions and employers to enable them to monitor standards and to facilitate selection decisions.

The most important role of assessment is in promoting learning and monitoring students' progress. However, in the senior secondary years, the more public roles of assessment in facilitating certification and selection come to the fore. Inevitably, these imply high-stake uses of assessment since the results are typically employed to make critical decisions about individuals.

The Hong Kong Diploma of Secondary Education (HKDSE) provides a common end-of-school credential that gives access to university study, work and further education and training. It summarises student performance in the four core subjects and in various elective subjects, including both discipline-oriented subjects and the new Applied Learning courses. It needs to be interpreted in conjunction with other information about students as shown in the Student Learning Profile.

5.2 Formative and Summative Assessment

It is useful to distinguish between the two main purposes of assessment, namely 'assessment *for* learning' and 'assessment *of* learning'.

"Assessment *for* learning" is concerned with obtaining feedback on learning, and utilizing this to make learning more effective and to introduce any necessary changes to teaching strategies. We refer to this kind of assessment as "formative assessment" because it is all about forming or shaping learning and teaching. Formative assessment is something that should take place on a daily basis and typically involves close attention to small "chunks" of learning.

"Assessment *of* learning" is concerned with making a determining progress in learning, and is referred to as "summative" assessment, because it is all about summarising how much learning has taken place. Summative assessment is normally undertaken at the conclusion of a significant period of instruction (e.g. at the end of the year, or at the end of a key stage of schooling) and reviews much larger "chunks" of learning.

In practice, a sharp distinction cannot always be made between formative and summative assessment, because the same assessment can in some circumstances serve both formative and summative purposes. Teachers can refer to the SSCG for further discussion of formative and summative assessment.

Formative assessment should be distinguished from continuous assessment. The former refers to the provision of feedback to improve learning and teaching based on formal or informal assessment of student performance, while the latter refers to the assessment of students' on-going work and may involve no provision of feedback that helps to promote better learning and teaching. For example, accumulating results in class tests carried out on a weekly basis, without giving students constructive feedback, may neither be effective formative assessment nor meaningful summative assessment.

There are good educational reasons why formative assessment should be given more attention and accorded a higher status than summative assessment, on which schools tended to place a greater emphasis in the past. There is research evidence indicating that formative assessment is beneficial when used for refining instructional decision-making in teaching and generating feedback to improve learning. For this reason, the CDC report *Learning to Learn – The Way Forward in Curriculum Development* (CDC, 2001) recommended that there should be a change in assessment practices, with schools placing due emphasis on formative assessment

to make assessment *for* learning an integral part of classroom instruction.

Another distinction to be made is between internal assessment and public assessment. Internal assessment refers to the assessment practices that teachers and schools employ as part of the ongoing learning and teaching process during the three years of senior secondary studies. In contrast, public assessment refers to the assessment conducted as part of the assessment process in place for all schools. Within the context of the HKDSE, this means the public examinations conducted by the HKEAA. On balance, internal assessment should be more formative whereas public assessment tends to be more summative. Nevertheless, this need not be seen as a simple dichotomy.

5.3 Assessment Objectives

The assessment objectives are closely aligned with the curriculum framework and the broad learning outcomes presented in earlier chapters.

When selecting appropriate tools for assessment, teachers should bear in mind that the assessment exercise should:

- help to identify students' needs and assess their progress in developing skills, understanding, attitudes and interests;
- measure attainment, and inform learning and teaching;
- make judgments on the learning processes and outcomes;
- cover appropriate learning objectives, generic skills, values and attitudes;
- be based on standards-referencing principles for grading and evaluating student performance;
- employ both formative and summative methods to facilitate understanding of student progress.

By the end of the course, students are expected to be able to:

- understand how natural environments influence human activities, and how human activities alter natural environments;
- describe the major characteristics of the chosen places and environments and explain how these characteristics are created by the interactions within and between a range of physical and human processes;
- describe how the interactions within and between physical and human processes create geographical patterns of different scales and lead to changes in places and environments over space and time;

- understand and critically evaluate the concept of regional identity;
- understand “sustainable development”;
- recognise the role of perceptions, values and attitudes in decision-making about places and environments, and use this understanding to explain the resulting changes;
- recognise how conflicting demands on the environment may arise and evaluate the different strategies for managing the environment;
- appreciate how increasing global interdependency influences their lives, their nation and the environment;
- identify geographical questions and issues and develop a logical sequence of enquiry based on their knowledge and understanding of geography;
- select and use appropriate geographical and generic skills for investigating geographical questions and issues, present and interpret their findings in an effective way, and draw conclusions based on evidence.

The majority of the above assessment objectives are applicable to both internal and public assessment, while some may not be applicable to public assessment. Those objectives applicable to public assessment are listed in the Regulations and Assessment Frameworks published by the HKEAA.

5.4 Internal Assessment

This section presents the guiding principles that can be used as the basis for designing internal assessment and some common assessment practices for geography for use in schools. Some of these principles are common to both internal and public assessment.

5.4.1 Guiding principles

Internal assessment practices should be aligned with curriculum planning, teaching progression, student abilities and the school context. The information collected will help to motivate, promote and monitor student learning, and will also help teachers to find ways of promoting more effective learning and teaching.

(a) Alignment with the learning objectives

A wide range of assessment practices should be used to assess the achievement of different learning objectives for whole-person development. The assessment of knowledge/concepts, skills, values and attitudes should be suitably balanced; and students' capacity to apply knowledge to real-life situations should be evaluated. The weighting given to different areas in assessment, the assessment purposes and the assessment criteria should be discussed and agreed among teachers, and then made known to students so that they can have a full understanding of what is expected of them.

(b) *Catering for the range of student abilities*

Assessment practices incorporating different levels of difficulty and in diverse modes should be used to cater for students with different aptitudes and abilities. This helps to ensure that the more able students are challenged to develop their full potential and the less-able ones encouraged to sustain their interest and sense of success in learning.

(c) Tracking progress over time

As internal assessment should not be a one-off exercise, schools are encouraged to use practices that can track learning progress over time (e.g. portfolios). Assessment practices of this kind allow students to set their own incremental targets and manage their own pace of learning, which will have a positive impact on their commitment to learning.

(d) Timely and encouraging feedback

Teachers should provide timely and encouraging feedback, through a variety of means such as constructive verbal comments during classroom activities and written remarks on assignments. Such feedback helps students to sustain their momentum in learning and identify their strengths and weaknesses.

(e) Making reference to the school's context

As learning is more meaningful when the content or process is linked to a setting which is familiar to students, schools are encouraged to design assessment tasks that make reference to the school's own context (e.g. location, relationship with the community and missions).

(f) Making reference to the current progress in student learning

Internal assessment tasks should be designed with reference to students' current progress in learning. This helps clear hurdles or obstacles that may have a cumulative negative impact on learning. Teachers should be mindful in particular of concepts and skills which form the bases for further development in learning.

(g) Encouraging peer assessment and self-assessment

In addition to giving feedback, teachers should also provide opportunities for peer assessment and self-assessment in student learning. The former enables students to learn among themselves, and the latter promotes reflective thinking which is vital for students' lifelong learning.

(h) Appropriate use of assessment information to provide feedback

Continuous assessment provides a rich source of data for providing feedback on learning in a formative manner. The appropriate use of assessment results helps to provide evidence-based feedback.

(i) Stages of assessment

Assessment in Geography should be divided into several distinguishable stages and teachers should adopt different modes of assessment to evaluate different learning outcomes.

5.4.2 Internal assessment practices

A range of assessment practices – such as oral questioning, on-going marking, self-assessment and peer assessment, student portfolios and traditional tests and examinations – should be used to promote the attainment of the various learning outcomes. They should be an integral part of learning and teaching, not "add-on" activities.

(a) Oral questioning

Oral questioning need not be seen as a test used in the language subjects only – it may be helpful in other subjects. It allows teachers to discuss matters in depth with able students, to tease out the meaning of obscure statements, and to find out the reasons for conclusions. Teachers are encouraged to try using oral assessment as it can be a valuable supplement to conventional assessment methods.

Different types of question can be used in classrooms to assess different levels of learning and understanding. Teachers need to prepare questions, using guiding principles noted below. Teachers should:

- first clarify the purposes in asking the various questions, and ensure that they are relevant to the aims of assessment;
- phrase their questions carefully to ensure they are clear to students;
- avoid having too many "yes-or-no" questions – it is more appropriate to ask questions which require students to give extended responses, e.g.
  - ☒ Questions which can be answered 'yes' or 'no' only:
    Do regions of similar latitudes have a similar climate?
  - ☑ Questions that required extended responses:
    Why does climate vary in regions of similar latitudes?
- phrase their questions carefully so that the expected answers are not contained in the questions asked, e.g.
  - ☒ *Which types of factors, physical or human, are more important in influencing the agricultural characteristics of the Sahel?*
  - ☑ *What factors affect the agricultural characteristics of the Sahel?*
- try to anticipate students' possible responses when planning questions, e.g.
  - *What type of student's response do I expect – a solution or an example?*
  - *What type(s) of answer(s) will I accept – students' own expression or just wording from the textbook?*
  - *If students do not answer, what will I do? (You may need to re-phrase your question in this situation.)*
  - *If students give incorrect answers, what are my strategies then?*

(b) On-going marking

On-going marking involves dividing the marking of an assignment into several stages. Feedback is given to students after each part of the work is completed so that they know exactly what and how to improve. With clear and consistently applied criteria, this approach can evaluate students' work and provide feedback to them. Also, such marking practices can help to establish a fruitful dialogue between teachers and students, who can set targets for further improvement together.

(c) Feedback

Feedback by teachers is very helpful in improving students' learning. When giving feedback, teachers should focus on the following points:

- The feedback/comments to students about their work should be given promptly and regularly.
- Teachers should give constructive feedback to help students understand what the tasks require and how to improve their future work. Avoid giving critical comments that damage students' self-esteem as this will be demotivating.

(d) Self-assessment

Self-assessment involves students in examining their own learning performance to find out where they have done well and in which areas they need to improve. This process can take various forms, including teacher-student interviews, self-assessment checklists, reflection logs, writing conferences and group discussions among students. Whatever the method used, the students should be given enough time to consider their work thoughtfully and evaluate their progress.

It is also important to note that the better students understand the criteria for good work, the more likely they are to meet them. Teachers should therefore make the criteria clear, and ensure that students understand what is going to be looked for before the learning and teaching activities begin.

Getting students into the habit of reflecting regularly on their learning and recording their observations will make them more conscious of their learning processes and more capable of directing their own learning.

(e) Peer assessment

Another way of involving students in the assessment processes is through peer assessment. This can be very helpful for students because, as peer assessors, they can learn from seeing how others have approached tasks and improve their own work.

Teachers may worry about the "accuracy" and "fairness" of peer assessment, but numerous overseas and local research projects have shown that its reliability and validity are acceptable if it is implemented properly.

Peer assessment, as a learning process, is worthy of teachers' consideration, as it enables students to learn about the criteria of assessment, understand their teachers' expectations better, and know how to make judgments and give guidance – all of which can motivate learning.

(f) Student portfolios

A student portfolio – sometimes referred to as a 'record of learning outcomes' (ROLO) – is a systematic and organised selection of students' work which shows growth and progress in their knowledge, skills and attitudes over time. It may include, for example, students' written work, photographs, audiotapes/videotapes and self-assessment records (validated by the teachers), as well as extracts from teachers' records.

An important component in portfolios is student reflections on each learning experience, covering such questions as:

- What did I learn from it?
- What did I do well?
- Why did I choose this item (based on the agreed teacher-student assessment criteria)?
- What do I want to improve in the item?
- How do I feel about my performance?
- What were the problem areas?

(g) Internal tests and examinations

In preparing tests and examination papers, it is necessary to strike a balance in the types of questions asked. In addition to eliciting factual knowledge and skills, teachers should pay attention to components which involve the understanding of principles and relationships, generalisation and analysis.

Teachers are also reminded that data-response questions are particularly suitable for assessing abilities related to the interpretation and analysis of information and decision-making. It is advisable to incorporate a wide range of graphical and pictorial materials in the questions. Finally, questions which are directly copied from workbooks or textbook activities should not be used, to avoid situations in which students can score very high marks simply by rote memorisation of the answers given.

Tests and examinations should not be used simply to rank students' performance. Summative tests/examinations can be used in a formative way. For example, students can be encouraged to reflect on their performance, note where they have done well and what they need to improve, and then develop their own revision plans for future improvement. Another possible approach is to ask students to work collaboratively in class to re-work test/examination answers based on the criteria developed for peer assessment and self-assessment as this can help them to understand better the aims of their learning and how they can perform more effectively in the future.

5.5 Public Assessment

5.5.1 Guiding principles

The principles guiding public assessment are outlined below for teachers' reference.

(a) Alignment with the curriculum

The outcomes that are assessed and examined through the HKDSE should be aligned with the aims, objectives and intended learning outcomes of the senior secondary curriculum. To enhance the validity of the public assessment, the assessment procedures should address the range of valued learning outcomes and not just those that are assessable through external written examinations.

(b) Fairness, objectivity and reliability

Students should be assessed in ways that are fair and are not biased against particular groups of students. A characteristic of fair assessment is that it is objective and under the control of an independent examining authority that is impartial and open to public scrutiny. Fairness also implies that assessments provide a reliable measure of each student's performance in a given subject, so that if they were to be repeated, very similar results would be obtained.

(c) Inclusiveness

The assessments and examinations in the HKDSE need to accommodate the full spectrum of student aptitude and ability.

(d) Standards-referencing

The reporting system is 'standards-referenced', i.e. student performance is matched against standards, which indicate what students have to know and be able to do to merit a certain level of performance.

(e) Informativeness

The HKDSE qualification and the associated assessment and examinations system should provide useful information to all parties. First, it provides feedback to students on their performance and to teachers and schools on the quality of the instruction provided. Second, it communicates to parents, tertiary institutions, employers and the public at large what students know and are able to do, in terms of how their performance matches the standards. Third, it facilitates selection decisions that are fair and defensible.

5.5.2 Assessment design

The tables below show the assessment design of the subject with effect from the 2016 HKDSE Examination. The assessment design is subject to continual refinement in the light of feedback from live examinations. Full details are provided in the Regulations and Assessment Frameworks for the year of the examination and other supplementary documents, which are available on the HKEAA website (www.hkeaa.edu.hk/en/hkdse/assessment/assessment_framework/).

2016 to 2018 Examinations

Component	Part	Weighting	Duration
Public Examination	Paper 1 (Compulsory Part)		2½ hours
	Section A: Multiple-choice Questions	22%	
	Section B: Data/Skill-based/Structured Questions	36%	
	Section C: Short Essay Questions	12%	
	Paper 2 (Elective Part)		1¼ hours
	Section D: Data/Skill-based/Structured Questions	18%	
	Section E: Short Essay Questions	12%	

With effect from the 2019 Examination

Component	Part	Weighting	Duration
Public Examination	Paper 1 (Compulsory Part)		2¾ hours
	Section A: Multiple-choice Questions	20%	
	Section B: Fieldwork-based Question	15%	
	Section C: Data/Skill-based/Structured Questions	30%	
	Section D: Short Essay Questions	10%	
	Paper 2 (Elective Part)		1¼ hours
	Section E: Data/Skill-based/Structured Questions	15%	
	Section F: Short Essay Questions	10%	

5.5.3 Public examinations

The SS Geography curriculum focuses on using geographical concepts and knowledge within an enquiry framework to illuminate and interpret selected problems and issues arising out of the physical and human environment that people inhabit. Geographical enquiry requires an ability to understand concepts and knowledge, and the process skills involved in looking at the world in a geographical way; and it requires in particular higher-order thinking involving analysis, synthesis and evaluation. Also, the ability to weigh evidence and recognize contrasting viewpoints is important in developing ideas about the values dimension that underpins many geographical questions. All these skills and abilities need to be assessed in the new curriculum.

Different types of items will be used for the above purpose. Data/skill-based/structured questions and short open-ended essays are the major question types for the written examination as they are particularly appropriate for assessing students' geographical enquiry skills and ability to handle information and spatial data. Also, data/skill-based/structured questions are useful for testing students' technical skills, while open-ended essays allow them to demonstrate their ability to apply geographical concepts and knowledge in analysis, synthesis and evaluation. The latter is also one of the very few assessment modes that is capable of assessing students' ability to make decisions and values judgement.

The written paper of the public assessment will also include multiple-choice (MC) questions, which are capable of testing a wide range of learning objectives (from factual to evaluative understanding) and a rich variety of student knowledge and skills. They are also effective for assessing routine procedures (e.g. map-reading skills) and factual knowledge and, in particular, for distinguishing students who have mastered basic concepts from those who have not. MC questions permit a wide sampling and broad coverage of the content domain which is appropriate for a subject such as Geography which has rich content and a wide coverage. Besides, MC questions minimise possible bias in marking, and they offer students who are weak in writing skills a fair chance to demonstrate what they have learned.

Fieldwork-based question will be introduced to the public examination to assess students' fieldwork abilities. Students' knowledge and skills in different stages of Geography fieldwork are to be tested.

Schools may refer to the live examination papers regarding the format of the examination and the standards at which the questions are pitched.

5.5.4 Standards and reporting of results

Standards-referenced reporting is adopted for the HKDSE. What this means is that candidates' levels of performance are reported with reference to a set of standards as defined by cut scores on the mark scale for a given subject. Standards referencing relates to the way in which results are reported and does not involve any changes in how teachers or examiners mark student work. The set of standards for a given subject can be represented diagrammatically as shown in Figure 5.1.

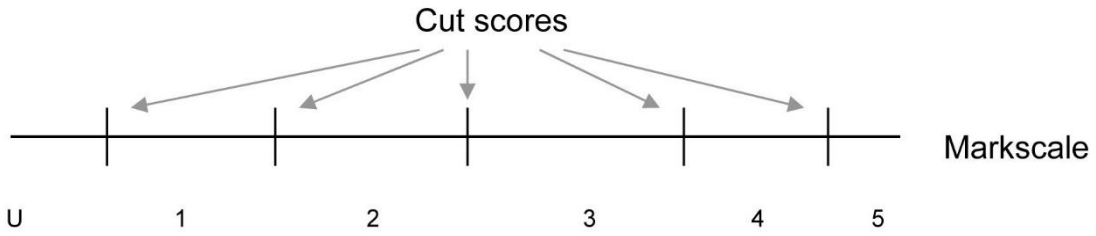

Figure 5.1 Defining levels of performance via cut scores on the mark scale for a given subject

Within the context of the HKDSE there are five cut scores, which are used to distinguish five levels of performance (1–5) with 5 being the highest. A performance below the cut score for Level 1 is labelled as "Unclassified" (U).

For each of the five levels, a set of written descriptors has been developed to describe what the typical candidate performing at this level is able to do. The principle behind these descriptors is that they describe what typical candidate *can* do, not what they *cannot* do. In other words, they will describe performance in positive rather than negative terms. These descriptors represent "on-average" statements and may not apply precisely to individuals, whose performance within a subject may be variable and span two or more levels. Samples of students' work at various levels of attainment are provided to illustrate the standards expected of them. These samples, when used together with the level descriptors, will clarify the standards expected at the various levels of attainment.

In setting standards for the HKDSE, Levels 4 and 5 are set with reference to the standards achieved by students awarded grades of A–D in the HKALE. It needs to be stressed, however, that the intention is that the standards will remain constant over time – not the percentages awarded different levels, as these are free to vary in line with variations in overall student performance. Referencing Levels 4 and 5 to the standards associated with the old grades A–D is important for ensuring a degree of continuity with past practice, for facilitating tertiary selection and for maintaining international recognition.

To provide finer discrimination for selection purposes, the Level 5 candidates with best performance have their result annotated with the symbols ** and the next top group with the symbol *. The HKDSE certificate itself records the Level awarded to each candidate.

Chapter 6 Learning and Teaching Resources

This chapter discusses the importance of selecting and making effective use of learning and teaching resources, including textbooks, to enhance student learning. Schools need to select, adapt and, where appropriate, develop the relevant resources to support student learning.

6.1 Function of Learning and Teaching Resources

The learning and teaching of Geography demand the use of a rich variety of resources in terms of both type and range of geographical content. In addition to textbooks, worksheets, audio-visual materials, maps and charts, models, the Internet and computer software such as the GIS, teachers should also consider the use of the media, resources in the natural environment, and even people. Such an extensive range of resources is seen by many students as one of the key attractions that Geography can offer.

The main purpose of developing such an extensive range of learning and teaching resources for Geography is to help broaden students' learning experiences and meet their varied learning needs. Their effective use enables students to: consolidate what they have learned; extend and construct knowledge for themselves; and develop appropriate learning strategies, generic skills, values and attitudes – and thus lays a solid foundation for lifelong learning.

6.2 Guiding Principles

When identifying and selecting resources, or designing and preparing new resource materials, it is very important for teachers to have a clear idea of the purpose for which they intend to use them. The development and use of resources should be determined by the nature of the learning and teaching strategies planned to achieve particular learning outcomes. Teachers are advised to refer to the principles for curriculum planning and for developing learning and teaching strategies included in Chapters 3 and 4 of this Guide.

Teachers should consider the following principles when preparing and selecting learning and teaching resources:

- The resource materials should be in line with the curriculum objectives and approach and contain essential learning elements of the curriculum;
- They should arouse students' motivation and engage them in active learning;
- They should provide a variety of pathways for students to progress in their learning and support students' access to knowledge through scaffolding;
- They should cater for learner diversity by providing a variety of learning activities at different levels of difficulty;
- They should provide ample opportunities for students to enquire and learn through interaction with other people; and
- They should promote independent learning by complementing and extending what students have learned in class.

Teachers should ensure that there is a clear purpose for using resource materials and that these materials are carefully planned and well presented. They also need to be careful not to over-use or rely too heavily on them – "resource fatigue" can have an adverse effect on students' motivation to learn.

6.3 Commonly Used Resources

6.3.1 Textbooks

Textbooks have remained a core resource in most schools. This is understandable, since they provide a rather comprehensive source of learning and teaching materials, as well as a framework on which teachers can easily develop their schemes of work. However, teachers should not assume that completing every chapter in a textbook is equivalent to covering the curriculum in full. Curriculum delivery involves far more than just the coverage of specific subject content. The advocacy of a more student-centred approach in the senior secondary curriculum implies that teachers have to give more thoughts to the ways in which learning activities, such as those found in textbooks, engage students in enquiry-based approaches to learning. Teachers should strive to enhance the quality of students' thinking, and other outcomes from learning the subject, rather than just occupying them with activities and tasks from textbooks.

In selecting textbooks, it is advisable for Geography teachers to consider the following questions:

(a) Content and organisation

- How clearly are the key concepts and ideas presented?
- Is the level of difficulty suitable for your students' abilities?
- Is the content organised in a logical sequence?
- Does the content relate well to your students' prior knowledge?
- Does the textbook promote independent learning?

(b) Learning activities

- Do the activities cater for diversity in students' abilities, interests and needs?
- Does the textbook include a wide range of learning activities to facilitate the adoption of different learning and teaching strategies?
- Are the activities challenging enough or are they limited largely to mechanical copying or reading comprehension?

(c) Language

- Is the level of difficulty of the language commensurate with the language ability of your students?

The following are some useful documents on the choice of textbooks for teachers' reference:

- *Recommended Textbook List*
- *Guiding Principles for Quality Textbooks*
- *Notes on Selection of Textbooks and Learning Materials for Use in Schools*

(http://www.edb.gov.hk/; then > Curriculum Development > Resources and Support > Textbook Information)

6.3.2 Technology and web-based resources

The rapid advances in technologies that can be used in education have changed the learning and teaching of Geography in an unprecedented way. The introduction of the Internet in particular enables students to study anywhere and at any time. As students and teachers have to search for and handle an enormous amount of information and data, Geography teaching without the use of technology is no longer desirable.

Information technology (IT) can contribute to the learning and teaching of Geography in many ways, e.g.

- It helps students to gain immediate access to richer information sources and a wider range of geographical knowledge.
- It allows them to work at their own pace by providing a safe and non-threatening environment for learning. Such an environment encourages students to try out different ideas and take risks, and engage more in analytical and divergent thinking.
- It provides an effective means to measure and model geographical features, spatial patterns and various physical and human environments. This can deepen students' understanding of the relationship between space and environment, and enable them to experience alternative images of people, places and the environment.

Overall, IT is an appropriate tool for learning a resource-based, enquiry-led subject such as Geography.

Outlined below are (a) some examples of the applications of IT, (b) the challenge it presents for Geography teachers, and (c) the use of the Geographic Information System (GIS).

(a) The application of information technology

The table below summarises some ways in which IT can contribute to and support the learning and teaching of the SS Geography curriculum.

Geographical learning activities	Information technology to be used	Examples of application
Enquiry and research • Statistical data • Information • Viewpoints	The Internet and CD-ROMs • Geography-related websites • Links to experts • Electronic atlases, encyclopedias and newspapers	• Collect climatic information about the Sahel region in Africa. • Find different viewpoints and arguments on the issue of climate change.
Mapping	Map-drawing programmes and the Geographic Information System (GIS)	• Investigate the traffic congestion at Nathan Road in Mongkok using a mapping package to present flow rates over time. • Use GIS software to demonstrate and analyse the changing coastal environment over time.

Geographical learning activities	Information technology to be used	Examples of application
Data recording and handling • Field study data • Data from research in secondary sources	Data-logging equipment Spreadsheet and database Digital camera, video recorder and scanner	• Use data-logging equipment to record and compare river flow along different sections of a local river. • Analyse the environmental impact of urban redevelopment on a number of sites in Hong Kong by using a spreadsheet to analyse and present fieldwork data.
Data and information presentation	Word processing, desktop Publishing Multimedia authoring Presentation software	• Use a word processor to extract and edit useful information from an article copied from the Internet. • Develop a website on the school Intranet to display information and photographs on natural hazards in different parts of the world.
Hypothesis testing, simulation and modelling	Spreadsheets: • Using statistical functions in models Simulation and modelling software	• Use a spreadsheet to calculate the changing employment figures in the manufacturing sector before and after industrial relocation. • Use a simulation package to investigate the effects of deforestation on the water cycle.
Communication and exchange of information	Electronic communication: • Email • The school Intranet • Chat rooms and bulletin boards on the Web	• Develop an e-learning platform in the school Intranet for teachers to communicate with students on a Geography project. • Exchange ideas, information and data with students from other schools via email.

(b) The challenge for Geography teachers

Geography is a subject that requires students to develop spatial awareness and skills, and to understand a wide range of concepts and ideas, many of which are rather abstract in nature and cannot be illustrated "live". In the past, this posed certain restrictions on the variety of learning and teaching strategies teachers could adopt – but with the technology now available, direct instruction by teachers is no longer the only way students can access geographical information and data and develop an understanding of geographical concepts and ideas. Technology provides a good opportunity for introducing geographical enquiry, in which learning of at least some of the background information and basic facts can be left to the students themselves, allowing teachers to concentrate more on the development of students' higher-order geographical competencies.

However, as already indicated in Chapter 4, teachers need to be aware that IT should be used only where it really adds value to the learning of Geography. The following three criteria may help them to review whether this is the case:

- Avoid using IT simply for the sake of using IT. The aim of using IT should be to enhance learning.

> For example, using spreadsheet software to turn some typed climatic figures into a graph, without considering the reasons for graphing and the type of graph selected, can be considered a trivial use of IT.

- IT should not be treated as a strategy that is applicable to all learning contexts. It is effective in delivering only certain groups of learning outcomes.

> For instance, using animation that simulates the various erosional processes of waves can help students to understand the concept better, but using computer presentation software to list the contrasting views of different stakeholders on an environmental issue is obviously not as effective and appropriate as using role-play.

- Under normal circumstances, using IT may require more learning and teaching time. Make sure that its use is efficient in terms of students' and teachers' time.

> For example, students can use GIS software to simulate how the internal structure of an inner city will change over time with the development of new transport networks. However, it is advisable for teachers to provide semi-finished data instead of raw data to avoid students spending a lot of time on map drawing. The focus of study should be the analysis of the changing spatial patterns, not technical skills in using the GIS.

(c) Using the Geographic Information System in Senior Secondary Geography

The Geographic Information System (GIS) is a subject-specific IT tool which students should use in studying the SS Geography curriculum, but careful consideration needs to be given on using GIS effectively. One possible method is to introduce GIS through a combination of teacher demonstrations and small group activities, followed by short revision and consolidation exercises. All the issues in the Compulsory Part and all the electives in the Elective Part of this curriculum can incorporate some GIS activities to promote geographical enquiry, spatial analysis and the study of the inter-relationships between people and the environment. Teachers are advised to consult the "Skills and suggested learning activities" column of the tables about curriculum content in Chapter 2 when deciding how and where to introduce the GIS in their lessons.

Since the GIS is capable of capturing, manipulating, analysing and displaying data collected from various sources, teachers can also consider using it as a tool for the analysis of fieldwork data. For instance, data collected in a survey of the environmental quality of an inner city district in Hong Kong can be mapped and correlated with a quality of life index derived from census data.

6.3.3 Maps and atlases

Besides being an essential tool for geographers, maps also play a role in students' intellectual development, as the ability to read and use maps contributes significantly to the development of graphicacy. In their geographical education, students should come across a wide variety of maps drawn for different purposes and at different scales. To cater for this need, teachers should try to collect examples of different types of maps for use in lessons; and they can try to classify them according to their functions – namely for locating and describing places, route-display, storing and displaying geographical information and solving problems. They can also develop

activities for students which involve identifying the main functions of a variety of maps, together with their strengths and limitations in relation to their properties.

Atlases help students to locate places within their regional, national and global contexts and study a wide range of geographical phenomena. To help students use atlases more effectively, teachers are advised to assist them in developing the following skills:

- locational skills – being able to use the index and system of coordinates and understand latitude and longitude;
- symbol skills – understanding the different uses of colour and point symbols and being able to use the key to interpret symbols;
- a sense of scale – being able to use scale to compare areas and estimate distance; and
- interpretation of data – being able to describe, retrieve and compare information about places shown on thematic maps.

The development of electronic and web-based atlases has extended the range of opportunities for using atlases to support learning. The digital data contained in them can be cross-examined, manipulated and presented cartographically, which allows students to use the geographical information contained in them in a more active way. The greater flexibility and interactivity of these atlases have considerable potential for enhancing student learning in Geography. However, teachers need to note that atlas materials found on the Web, like all other IT resources, should be evaluated carefully to ensure that they are accurate and relevant to students' learning. Also, teachers have to make sure that students have acquired the necessary skills for identifying, selecting and using appropriate information contained in these materials, as lack of them may not only jeopardise their effective use but also lead to the building of misconceptions.

6.3.4 Images

Aerial photographs are another important tool for geographers. They can help students to visualise the shape, scale and appearance of landforms, as well as to examine patterns in physical and human systems and relationships between different geographical features. When used in conjunction with maps of an appropriate scale, students can correlate the features contained in the two different sources to obtain a better understanding of the characteristics of the places shown. This can provide a successful start for further enquiry.

Some students may encounter difficulties in interpreting aerial photographs. The following figure attempts to summarise one of the possible ways for progressive development of the skills required:

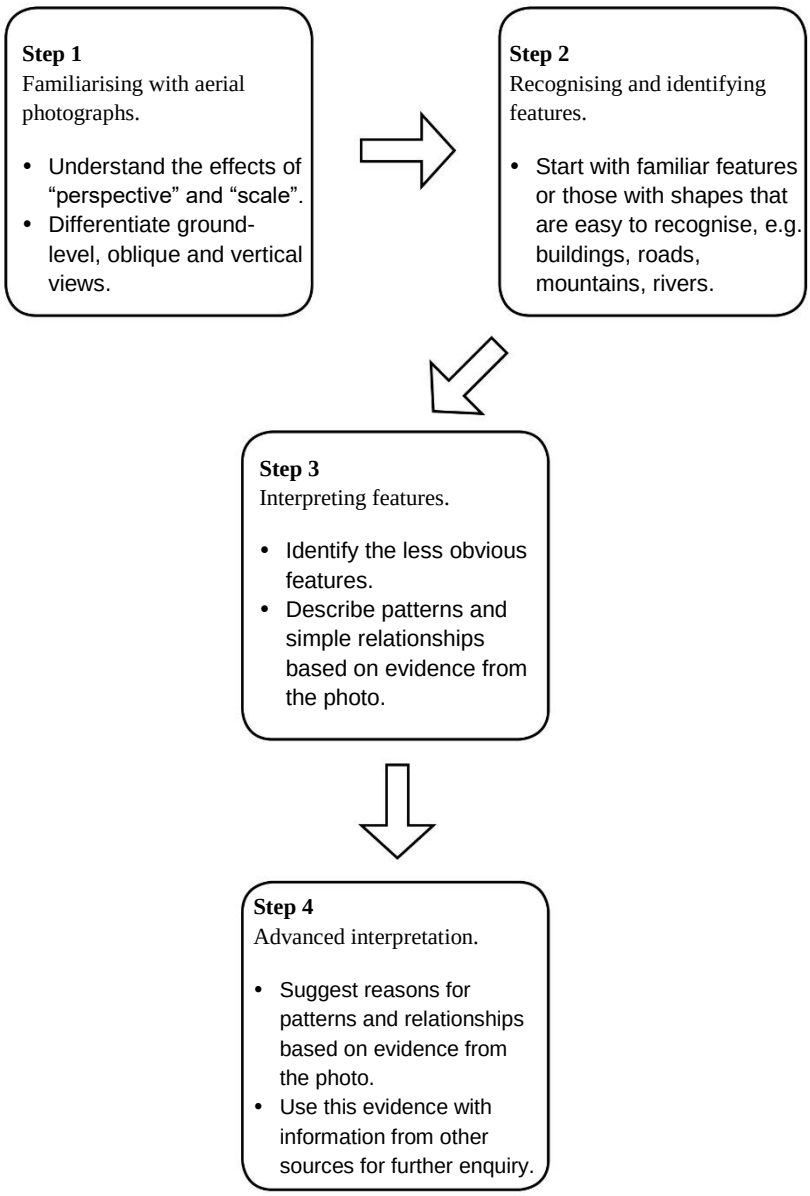

Figure 6.1 Progressive development of skills in interpreting aerial photographs

6.3.5 Newspaper resources

The adoption of an issue-based and enquiry approach in the SS Geography curriculum makes it much easier for teachers to use up-to-date materials from the mass media in classroom learning to bring immediacy and relevance to the subject. The use of news materials helps in developing case studies about people and places, and allows students to follow global trends and issues that are of current concern. They often supply teachers and students with information about the viewpoints of the different people involved in or affected by geographical issues. In addition, newspaper materials are valuable resources for developing students' reading skills. Appendix 2 contains an example of using "hot news" in the study of Geography.

News materials can be a lively and informative geographical resource. They are often accompanied by maps, diagrams and illustrations that are drawn for easy understanding, and contain updated information, data and case studies of current geographical issues – and so can serve as valuable background on which students can start geographical enquiry. News articles and commentaries containing contrasting viewpoints can stimulate interest and debate, and are particularly valuable for developing critical thinking, decision-making and value judgment in students.

Nevertheless, teachers need to be aware of the limitations of this type of resource. News materials are usually fairly brief and concise, and may therefore oversimplify information and explanations. Also, the language level may be too difficult for students to understand and the information and data (including maps and diagrams) may not always be accurate. Moreover, bias, stereotyping and prejudice may be found from time to time in this type of material, which can lead students to develop a partial or superficial understanding of the issue or case involved. From another angle, however, such limitations, if used wisely by teachers, can be turned into a valuable opportunity for developing higher-order thinking skills. In addition to helping students to distinguish between facts and opinions, teachers can also assist them in identifying which information is critical and relevant. They should also remind students to consider key ideas, facts and geographical terms, and any conflicting evidence or opinions that are not included in the materials.

Teachers should also recognise that news materials usually focus heavily on problems, which may lead some students to view Geography as a "doom-laden" subject and develop a pessimistic view of the world's future. It is therefore advisable for teachers to point out that mistakes and damage in the past can be remedied in the future, and to look out for some good news to present a more balanced perspective view.

6.3.6 Community resources

The practice of observing the local area and using personal knowledge and experience to understand the discipline has a long tradition in Geography. For Geography teachers, the importance of activities outside the classroom, most commonly fieldwork, needs no elaboration. As noted in Chapter 4, Geography teachers are encouraged to make full use of our local environment for the study of the subject; and even though some of the case studies suggested in Chapter 2 are from other countries, teachers can always start the enquiry by using similar examples in the local context. This could include, for example, a visit to the Hong Kong Park or Tai Po Kau to familiarise students with the characteristics of tropical vegetation for the study of tropical rainforests, or fieldwork on the urban microclimate of Hong Kong to study various climatic factors which can then be used as an introduction for enquiry on climate change.

Parents and a school's alumni can also be valuable assets for enhancing student learning. Details on how they can be used can be found in Chapter 4. However, teachers need to exercise due caution when soliciting support from the local community as many of the volunteers from non-government organisations, parent-teacher associations and alumni associations are not education professionals. It is therefore possible that their materials or their interpretations of geographical issues and problems may contain "hidden persuasion" or even biased viewpoints. Teachers should help students to identify these issues and, where necessary, maintain a balance by supplying alternative information and opinions.

6.4 Flexible Use of Learning and Teaching Resources

Geography teachers are used to developing their own learning and teaching resource materials – particularly worksheets – to cater for learning differences and supplement materials already available in the market. They should take the following guidelines into account when preparing school-based materials to ensure that the materials are effective in supporting learning.

School-based materials should:

- provide additional information and/or comprise alternative learning activities to supplement textbooks or resources already in use; and
- put more emphasis on catering for variations in student ability, as ready-made materials are often aimed at students of average or even higher ability. Details on the designing of differentiated learning activities can be found in Section 4.3.

Finally, it needs to be emphasised again that the materials selected, of whatever type, should have a clear purpose and adoption should be based primarily on whether they can enhance learning of the SS Geography curriculum.

6.5 Resource Management

6.5.1 Sharing of learning and teaching resources

A culture of sharing is the key to the success of knowledge management. Schools should make arrangements for:

- teachers and students to share learning and teaching resources through the Intranet or other means within the school;
- teachers to form professional development groups for the exchange of experience.

6.5.2 Managing the use of the geography room

Quality learning and teaching of Geography in secondary schools requires considerable resources and equipment which are unique to the subject, e.g. globes, meteorological instruments, field study instruments, and various kinds of maps and aerial photographs. The geography room should provide a spacious environment for their storage and effective use.

The room also supports fieldwork enquiry – an essential part of the SS Geography curriculum which should be carried out regularly – serving as a base for planning, preparation, briefing, data processing, discussion and debriefing, and for proper storage of various kinds of fieldwork equipment.

In view of the increasing use of information technology in Geography lessons, the room should be equipped with desktop computers, GIS software, printers, CD-ROMs and digital maps. It is advisable for teachers to plan in detail how the geography room can be used as a GIS learning and teaching centre not only for Geography but also for other subjects in which the GIS and other electronic resources can help to enhance learning. A special timetable should be prepared for the use of the geography room, so that its resources, equipment and furniture can be used as effectively as possible.

Students should also be encouraged to use these resources for self-study during lunch time or after school or for geography-related extra-curricular activities. The room can also be an appropriate place for cross-curricular activities, such as a joint workshop with science students on the use of GIS software for analysis of the microclimate of Hong Kong.

Two examples from two local secondary schools are given below to illustrate how some of the ideas mentioned above can be implemented.

Peer learning using the special equipment and news corner in the geography room at Clementi Secondary School

The geography room is specifically designed for various kinds of group work during Geography lessons. Students' desks are set out in groups of four to facilitate group work and discussion instead of being in rows. Commonly used resources, such as 3-D geography models and CD-ROMs, are readily available to both teachers and students. In addition, a sand table is connected to the water supply and fixed in the room to simulate fluvial processes in a drainage basin. Students can test their hypotheses about the operation of fluvial processes and the formation of fluvial landforms in groups using this sand table. They can also make use of the room for group discussion to analyse the results of their tests and present their findings.

A "newspaper clippings" corner is set up in the room. Newspaper clippings on various geographical themes and issues are categorised and stored separately for easy access. All the clippings are collected by students with teacher guidance. This kind of work helps them to understand more about different geographical concepts and their application in the real world. Students can share and exchange their geographical ideas through reading and discussing the issues in the clippings in this corner.

Learning and teaching Geography with information technology facilities in the geography room at Wah Yan College, Kowloon

The school's geography room is designed for the learning and teaching of Geography through information technology and interaction. It is equipped with a visualizer, various pieces of audio-visual equipment and computers connected to the Internet, with GIS software installed. A separate file server has been set up for the room and each group of students in a class can share a computer to conduct various group learning activities during their Geography lessons. At present, three students share a computer, but from the school year 2006–07, every student in a class will have a computer for various learning activities. They can search for geographical information on the Internet for enquiry and group discussion, and geographical enquiry is also promoted by using the GIS facilities installed in the room. Students are encouraged to use the resources for various learning activities outside lesson time (e.g. geography CD-ROMs and VCDs for self-study).

Appendix 1

Learning Outside Classrooms: Fieldwork investigation at Tung Chung (Pui Ching Middle School)

A Geography teacher at Pui Ching Middle School organised a fieldwork investigation in Tung Chung for three S4 Geography classes (about 120 students) in the second semester of the 2004-05 school year.

Tung Chung is a "rich" fieldwork site where fieldwork investigation of different geographical topics is possible at the same site. Four main areas for geographical investigation were chosen by the teacher:

(1)	**River:**	Characteristics of different courses of the Tung Chung River and the degree of human impact on them
(2)	**City:**	Urban encroachment and changes in land use
(3)	**Agriculture:**	Agricultural pattern and development
(4)	**Conservation:**	Environmental assessment of the Tung Chung River and its surrounding areas

The fieldwork was enquiry-based with the teacher acting as a facilitator. Briefing and group discussion sessions were arranged for students before they decided on their own research titles. The briefing session provided only background information on Tung Chung, without dictating which aspects students should study or the direction in which they should proceed. The students then planned and prepared for their fieldwork independently, with the teacher acting as an adviser and resource manager. A half-day fieldwork for data collection was conducted in groups of four to five students. The students processed, presented, analysed and interpreted data with other supplementary information they collected. A field report of about 2,500 words was submitted.

This fieldwork provided an opportunity for students to apply to the real world the knowledge and concepts they had learned. Before the field trip, students had already attended lessons on the topic "River", and so the fieldwork supplemented their learning by allowing them to see how a river basin operates. This fieldwork also provided a good starting point for a topic on "urban development", which followed the field trip.

S4 Geography students found this fieldwork valuable. The following quotations include some of their feelings and perceptions:

Student 1:

"… I learned how to use different types of fieldwork equipment during the fieldwork this time. Group members helped each other during the fieldwork … Many people have said that Arts students are only good at memorisation. Our performance in this fieldwork proved that they are wrong."

Student 2:

"This topic (river) was taught in the first semester of this school year. I did not like the topic at that time because it was boring and theoretical. After the fieldwork, I found that what I had learned in the classroom was real. I could also test the theories in the field. Although the results of the investigation may sometimes deviate from the concepts in textbooks, I enjoy searching for an explanation for such a deviation."

Student 3:

"The topics were chosen by us, and we were all interested in studying it. All of my classmates were motivated to learn, and the results were good."

Student 4:

"We needed additional information for our fieldwork and we found it from some reference books and websites. We learned more than by simply sitting in the classroom. "

Appendix 2

Designing Local Fieldwork based on "Hot" News

I. Identifying "hot" news or topics

Example: The Transport Department's "Nathan Road road safety improvement plan"

II. Teachers design local fieldwork activities

Teachers should:

- gather relevant secondary information;
- make pre-trip(s) before designing student handbooks;
- conduct pre-trips to identify geographical concepts (see Figure 3) that can be related to the fieldwork activities;
- decide on the mode of the fieldwork; and
- develop enquiry procedures and assessment criteria.

III. Teachers and students discuss in lessons

- Students collect supporting information and data about the topic;
- Based on the five "Ws" of geographical enquiry (i.e. "What", "Where", "How", "Why" and "What if"), students investigate and analyse the "hot" news (see Figure 2);
- Teachers help students to grasp the basic knowledge, and look at the issue from different perspectives; and
- After discussion, teachers help students to integrate what they have learned.

IV. Students prepare and plan for the field trip

Students need to plan for the whole fieldwork investigation by, for example:

- developing enquiry topics and deciding on the area of study (see the following example);
- clarifying the objectives of the enquiry;
- identifying the types of information and evidence (such as primary and secondary data) required;
- selecting appropriate equipment and methods for investigation;
- preparing for the enquiry, for example by developing questionnaires and record sheets; and
- developing the enquiry sequence.

Example:

A teacher assisted her students to define the area of study by setting the following geographical questions for enquiry.

With reference to the intersection of Peking Road and Kowloon Park Drive (Tsim Sha Tsui), is it possible and worthwhile to solve the traffic problems in Nathan Road by constructing similar pedestrian subways?

- What are the traffic problems in that particular section of Nathan Road?
- What are the causes of these problems?
- Can pedestrian subways such as those used at the intersection of Peking Road and Kowloon Park Drive in Tsim Sha Tsui help in tackling the problems?
- What would the impact of this measure be? How would it affect the shops at street level?
- What are the opinions of different stakeholders? Why do they support or oppose the measure?
- In your opinion, is this approach feasible? Why/why not?

V. Fieldwork (teachers and students)

- Students collect data in the field using different methods (e.g. observation, measurement).

VI. Students develop their fieldwork reports

- Students submit a written fieldwork report of not more than 2,000 words in Chinese or English.
- Information extracted from books or other secondary data sources must be acknowledged.

Figure 1 Suggested design procedures for local fieldwork based on "hot" news

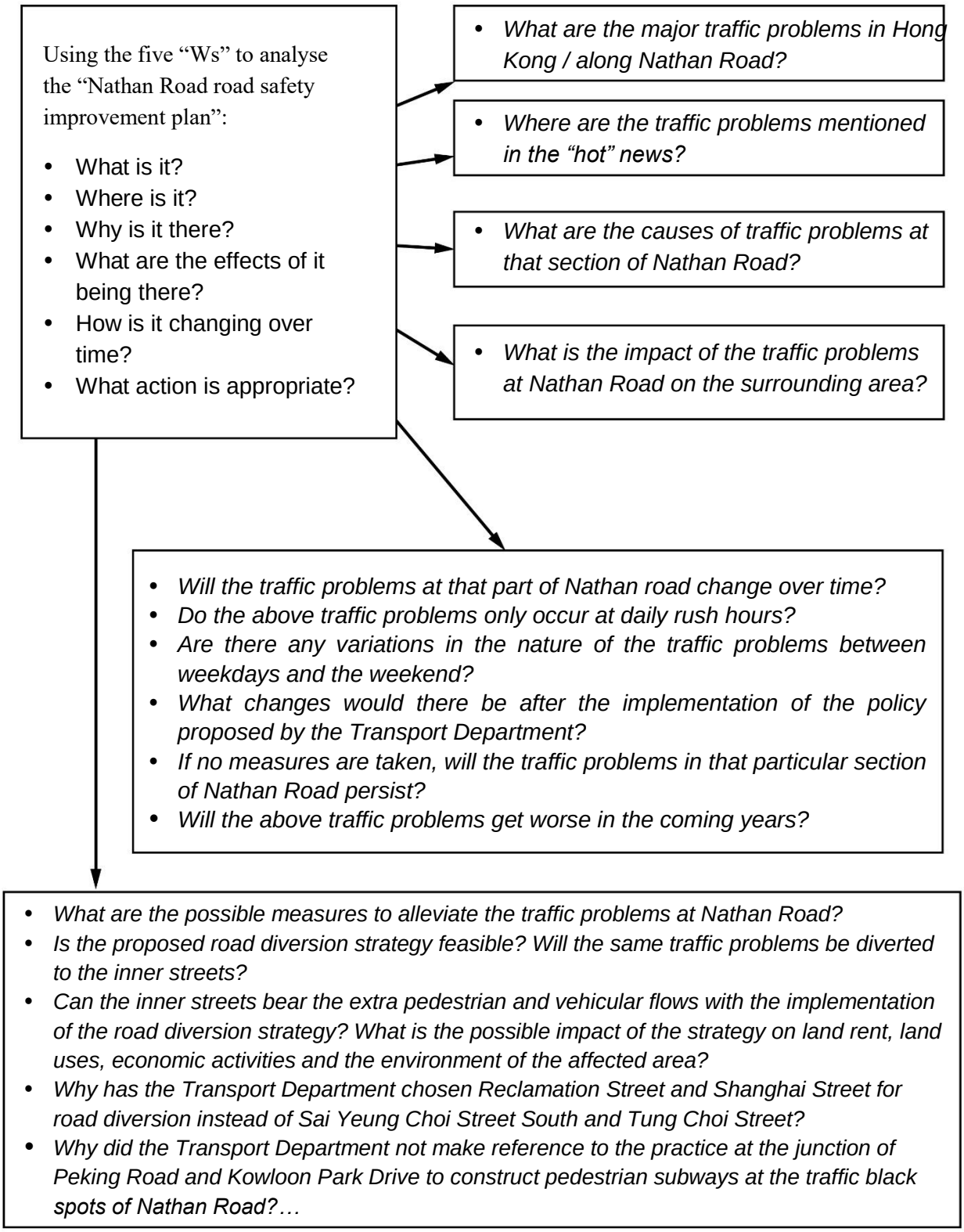

Figure 2 Examples of geographical questions related to the "Nathan Road road safety improvement plan"

Geographical concepts related to the "Nathan Road road safety improvement plan"

Transport problems	Urbanisation
Transport planning	Internal structure of a city
Traffic management	Types of land use
Sustainable development	Land rent and accessibility
Location and spatial distribution	Urban problems
Location factors	Competition and succession
Change over time	Agglomeration
Environment	Geographical inertia
People–environment interrelationship	…

Figure 3 Concepts related to the "Nathan Road road safety improvement plan"

Notes to teachers:

- Timing is a prime factor, as interest in news topics can decline quickly.
- Teachers need to modify the fieldwork activities according to the needs, interests and abilities of their students. For more able students, teachers can consider giving students only the framework of the fieldwork enquiry in Figure 1 and ask them to develop their own enquiry questions. For those who are less able, teachers could provide more assistance by giving them the sample questions listed in Figure 2.

Glossary

Term	Description
Applied Learning (ApL, formerly known as Career-oriented Studies)	Applied Learning (ApL, formerly known as Career-oriented Studies) is an essential component of the senior secondary curriculum. ApL uses broad professional and vocational fields as the learning platform, developing students' foundation skills, thinking skills, people skills, values & attitudes and career-related competencies, to prepare them for further studies and / or for work as well as for lifelong learning. ApL courses complement 24 NSS subjects, diversifying the senior secondary curriculum.
Co-construction	Different from the direct instruction and construction approaches to learning and teaching, the co-construction approach emphasises the class as a community of learners who contribute collectively to the creation of knowledge and the building of criteria for judging such knowledge.
Core subjects	Subjects recommended for all students to take at senior secondary level: Chinese Language, English Language, Mathematics and Liberal Studies.
Curriculum and Assessment (C&A) Guide	A guide prepared by the CDC-HKEAA Committee. It embraces curriculum aims / objectives / contents and learning outcomes, and assessment guidelines.
Curriculum interface	Curriculum interface refers to the interface between the different key stages/educational stages of the school curriculum (including individual subjects), e.g. the interface between Kindergarten and Primary; Primary and Secondary; and Junior Secondary and Senior Secondary. The Hong Kong school curriculum, made up of eight key learning areas (under which specific subjects are categorised), provides a coherent learning framework to enhance students' capabilities for whole-person development through engaging them in the five essential learning experiences and helping them develop the nine generic skills as well as positive values and attitudes. Thus when students move on to senior secondary education, they will already have developed the basic knowledge and skills that the study of various subjects requires. When designing the learning and teaching content and strategies, teachers should build on the knowledge and learning experiences students have gained in the previous key stages.

Term	Description
Elective subjects	A total of 20 subjects in the proposed new system from which students may choose according to their interests, abilities and aptitudes.
Generic skills	Generic skills are skills, abilities and attributes which are fundamental in helping students to acquire, construct and apply knowledge. They are developed through the learning and teaching that take place in different subjects or key learning areas, and are transferable to different learning situations. Nine types of generic skills are identified in the Hong Kong school curriculum, i.e. collaboration skills, communication skills, creativity, critical thinking skills, information technology skills, numeracy skills, problem solving skills, self-management skills and study skills.
Hong Kong Diploma of Secondary Education (HKDSE)	The qualification to be awarded to students after completing the three-year senior secondary curriculum and taking the public assessment.
Internal assessment	This refers to the assessment activities that are conducted regularly in school to assess students' performance in learning. Internal assessment is an inseparable part of the learning and teaching process, and it aims to make learning more effective. With the information that internal assessment provides, teachers will be able to understand students' progress in learning, provide them with appropriate feedback and make any adjustments to the learning objectives and teaching strategies they deem necessary.
Key Learning Area (KLA)	Organisation of the school curriculum structured around fundamental concepts of major knowledge domains. It aims at providing a broad, balanced and coherent curriculum for all students in the essential learning experiences. The Hong Kong curriculum has eight KLAs, namely, Chinese Language Education, English Language Education, Mathematics Education, Personal, Social and Humanities Education, Science Education, Technology Education, Arts Education and Physical Education.
Knowledge construction	This refers to the process of learning in which learners are involved not only in acquiring new knowledge, but also in actively relating it to their prior knowledge and experience so as to create and form their own knowledge.

Term	Description
Learner diversity	Learners are individuals with varied family, social, economic and cultural backgrounds and learning experience. They have different talents, personalities, intelligence and interests. Their learning abilities, interests and styles are, therefore, diverse.
Learning community	A learning community refers to a group of people who have shared values and goals, and who work closely together to generate knowledge and create new ways of learning through active participation, collaboration and reflection. Such a learning community may involve not only students and teachers, but also parents and other parties in the community.
Learning differences	This refers to the gaps in learning that exist in the learning process. Catering for learning differences does not mean rigidly reducing the distance between the learners in terms of progress and development but making full use of their different talents as invaluable resources to facilitate learning and teaching. To cater to learners' varied needs and abilities, it is important that flexibility be built into the learning and teaching process to help them recognise their unique talents and to provide ample opportunities to encourage them to fulfil their potential and strive for achievement.
Learning outcomes	Learning outcomes refer to what learners should be able to do by the end of a particular stage of learning. Learning outcomes are developed based on the learning targets and objectives of the curriculum for the purpose of evaluating learning effectiveness. Learning outcomes also describe the levels of performance that learners should attain after completing a particular key stage of learning and serve as a tool for promoting learning and teaching.
Level descriptors	A set of written descriptions that describe what the typical candidates performing a certain level is able to do in public assessments.
Other learning experiences	For whole person development of students, 'Other Learning Experiences' (OLE) is one of the three components that complement the examination subjects and Applied Learning (formerly named as Career-oriented Studies) under the Senior Secondary Curriculum. It includes Moral and Civic Education, Aesthetics Development, Physical Development, Community Service and Career-related Experiences.
Public assessment	The associated assessment and examination system for the Hong Kong Diploma of Secondary Education.

Term	Description
SBA Moderation Mechanism	The mechanism adopted by HKEAA to adjust SBA marks submitted by schools to iron out possible differences across schools in marking standards and without affecting the rank order determined by the school.
School-based assessment (SBA)	Assessments administered in schools as part of the teaching and learning process, with students being assessed by their subject teachers. Marks awarded will count towards students' public assessment results.
School-based curriculum	Schools and teachers are encouraged to adapt the central curriculum to develop their school-based curriculum to help their students achieve the subject targets and overall aims of education. Measures may include readjusting the learning targets, varying the organisation of contents, adding optional studies and adapting learning, teaching and assessment strategies. A school-based curriculum, hence, is the outcome of a balance between official recommendations and the autonomy of the schools and teachers.
Standards-referenced Reporting	Candidates' performance in public assessment is reported in terms of levels of performance matched against a set of standards.
Student learning profile	It is to provide supplementary information on the secondary school leavers' participation and specialties during senior secondary years, in addition to their academic performance as reported in the Hong Kong Diploma of Secondary Education, including the assessment results for Applied Learning courses, thus giving a fuller picture of the student's whole person development.
Values & attitudes	Values constitute the foundation of the attitudes and beliefs that influence one's behaviour and way of life. They help form principles underlying human conduct and critical judgment, and are qualities that learners should develop. Some examples of values are rights and responsibilities, commitment, honesty and national identity. Closely associated with values are attitudes. The latter supports motivation and cognitive functioning, and affects one's way of reacting to events or situations. Since both values and attitudes significantly affect the way a student learns, they form an important part of the school curriculum.

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	Title	Publisher
1.	A Teacher's Guide to GIS Operations: Using Geographic Information System (GIS) for implementing enquiry learning in Geography	Education Bureau
2.	Air pollution & reclamation	CDI, Education Department
3.	CD-ROM FACTfinders – The Earth	Zigzag Publishing
4.	CD-ROM FACTfinders – The weather	Zigzag Publishing
5.	Climate Change—A Cross-curricular Learning and Teaching Resource Pack	Education Bureau
6.	Conducting Spatial Enquiry in the Senior Secondary Geography Curriculum	Education Bureau
7.	Curriculum Support Materials for Senior Secondary Geography (S4-6): Part 1—Learning through enquiry and catering for learner diversity	Education Bureau
8.	Curriculum Support Materials for Senior Secondary Geography (S4-6): Part 2—Using information technology in learning and teaching	Education Bureau

	Title	Publisher
9.	Curriculum Support Materials for Senior Secondary Geography (S4-6): Part 3—Enquiry-based fieldwork and reading to learn	Education Bureau
10.	Curriculum Support Materials for Senior Secondary Geography (S4-6): Part 4—Spatial data enquiry	Education Bureau
11.	Discovery Channel—Great quakes (3 VCDs)	Discovery Channel, King's Media, ERA
12.	e-Learning in Geography (Part 1)	Education Bureau
13.	Earth Quest	Dorling Kindersley
14.	Educational Package on Climate Change	Hong Kong Observatory
15.	Enquiry-based Fieldwork in Geography (Part 1)	Education Bureau
16.	Enquiry-based Fieldwork in Geography (Part 2): The study of sustainable agriculture at Kadoorie Farm and Botanic Garden	Education Bureau
17.	Enquiry-based Fieldwork in Geography (Part 3):Cross-border Fieldwork in Macau	Education Bureau
18.	Enquiry-based Fieldwork in Geography: Student Handbook (Part 1)	Education Bureau
19.	Enquiry-based Fieldwork in Geography: Student Handbook (Part 2)—Using different field study instruments	Education Bureau
20.	Environment, Hong Kong 1999	Environmental Protection Department
21.	Geography curriculum support materials (S4-S7)	Education and Manpower Bureau
22.	Geography Learning and Teaching Exemplars for the Teaching Support Materials Kit produced by Civil Engineering and Development Department	Education Bureau
23.	Hazards happen, elements of Australian natural hazards	Commonwealth of Australia and Queensland University of Technology
24.	Hothouse planet	EME
25.	Landslip Prevention and Migitation Programme	Civil Engineering and Development Department

	Title	Publisher
26.	Learning and Teaching Materials for Secondary School Geography: Geographic Information System Resource Kit (Part 1)	Education Bureau
27.	Learning and Teaching Video Programmes for Geography: Air Transport and Logistics in Hong Kong	Education Bureau
28.	Learning the Geography of China through Reading (Part 1): The physical environment	Education Bureau
29.	Learning the Geography of China through Reading (Part 2): The human environment	Education Bureau
30.	Microsoft Encarta interactive world atlas Microsoft	Microsoft
31.	S4-5 geography curriculum support materials (Part 1 and Part 2)	Education and Manpower Bureau
32.	S4-5 geography curriculum support materials—Location of information technology industry in Hong Kong	Education and Manpower Bureau
33.	S4-6 Geography Curriculum Support Materials: Learning and Teaching Resource Folder for the elective "Dynamic Earth: The building of Hong Kong"	Education Bureau
34.	Save your lives from tsunami!	Japan Meteorological Agency
35.	SimCity	Maxis
36.	Teaching Support Materials Kit for the New Senior Secondary (NSS) Geography & Chemistry Curriculum	Geotechnical Engineering Office, Civil Engineering and Development Department
37.	The theory of plate tectonics	Tasa Graphic Arts
38.	Urban fieldwork packages for Geography and Travel & Tourism	Education and Manpower Bureau
39.	Virtual Field Trips for Secondary School Geography (Part 1)	Education Bureau
40.	中學地理教學軟件集	中國教育學會地理教學研究會
41.	我們的環境	教育署課程發展處

L. World-Wide Web Site Addresses

(1) Websites about education

	Address	Name of Homepage	Details
(a)	http://www.thirteen.org/edonline/concept2class/inquiry/index.html	Inquiry-based learning	It contains a detailed explanation and demonstration (with video clips) on how inquiry learning can be implemented in schools.
(b)	http://www.thirteen.org/edonline/concept2class/coopcollab/index.html	Cooperative and collaborative learning	Information about the explanation, demonstration, exploration and implementation of cooperative and collaborative learning in schools can be found in this website.

(2) Websites about Geographical education

	Address	Name of Homepage	Details
(a)	http://www.qca.org.uk/geography/innovating/	Qualifications and Curriculum Authority—Innovating with geography	Official website containing comprehensive information on Geography curriculum and assessment in England and Wales.
(b)	http://www2.glos.ac.uk/gdn/seda/	Paper 89 published by Staff and Education Development Association, U.K.	A collection of articles on the title "Developing Skill-based Curricula through the Disciplines: Case Studies of Good Practice in Geography".
(c)	http://www.rgs.org/	Royal Geographical Society	The site contains update information about geographical education in U.K. and also some good articles on learning and teaching geography.
(d)	http://www.aag.org/	Association of American Geographers	Viewers should not miss the "Annals" Section of the website.
(e)	http://www.curriculum.wa.edu.au/	The Curriculum Council of Western Australia	The "Link" Section of the website provides a comprehensive collection of websites in Australia concerning curriculum and assessment.

(3) General websites about the learning and teaching of Geography

	Address	Name of Homepage	Details
(a)	http://members.aol.com/bowermanb/101.html	Geography World	This site covers many different parts of geography. It provides linkages to a large amount of learning and teaching resources in geography, e.g. geography games, quizzes and news etc.
(b)	http://geography.about.com/cs/basics/	Geography Basics	This homepage includes a lot of information and links of nearly all topics in geography. Besides, many maps, photos and clip arts (figures) related to geography are provided.
(c)	http://www.uwsp.edu/geo/internet/geog_geol_resources.html	Internet Resources for Geography and Geology	A great site which provides a lot of links to a wide range of geography-related topics. Lesson plans, educational software and online field trips around the world are also included.
(d)	http://www.ceismc.gatech.edu/BusyT/	Busy Teachers' website	This website is designed to provide different sources of materials for teachers. Many lesson plans and classroom activities related to geology and environmental conservation can be used directly
(e)	http://www.nationalgeographic.com	Geography Education, National Geographic Society	Geography-related lesson plans and classroom activities are provided in this homepage.
(f)	http://library.thinkquest.org/10157/geoglobe.html	Geo-Globe	The Geo-Globe site contains many games related to geography.
(g)	http://www.geographyinthenews.rgs.org	Geography in the News	This website contains geography-related news which is a good and updated resource for enquiry learning in Geography lessons.

(4) Specific websites about maps and map reading

Address	Name of Homepage	Details
(a) http://www.maps.com	Maps.com – The Place for Maps Online	Online world maps, online map games and information about map skills can be found in this website.
(b) http://www.centamap.com/	Centamap	A very useful website which contains maps of different parts of Hong Kong.
(c) http://www.ypmap.com/eng/	YP Map	This website contains a lot of useful maps of Hong Kong. Besides street maps, weather maps and census maps can also be found.
(d) http://maps.google.com/	Google Maps	A great website which includes maps and satellite photos of different parts of the world.
(e) http://www.nationalgeographic.com/maps	National Geographic—Maps and Geography	"MapMachine Online Atlas" is included in this website. It contains different types of digital maps, such as street-level maps, topographic maps and maps related to environment, natural hazards and weather.
(f) http://www.eduplace.com/ss/maps	Education Place—Outline Maps	This website provides various outline maps (pdf files) for printing and use in classrooms.
(g) http://www.landsd.gov.hk/	Lands Department	The part "maps and services" in this website introduces varies kinds of digital maps, paper maps and aerial photographs provided by the Department. Sample data (e.g. digital maps and aerial photographs) included in this part is useful for the learning and teaching of map interpretation.
(h) http://diy.fwg.hk/download/geog/map	Relief and Contour Maps—Web-based learning tool	This learning and teaching resource applies IT in a vivid manner to support the learning of relief features and contour maps, calculate slope gradient from a contour map, construct an annotated cross-section and calculate its vertical exaggeration. The resource has both "Teacher & Self-learning Version" and "Student Version" to enhance the learning effectiveness of students on map reading.

(5) Specific websites for the Compulsory Part:

a. Opportunities and Risks—Is it rational to live in hazard-prone areas?

	Address	Name of Homepage	Details
(i)	http://pubs.usgs.gov/publications/text/dynamic.html	This Dynamic Earth: the Story of Plate Tectonics	This site is an online textbook about plate tectonics. Many figures are included to facilitate teaching and learning.
(ii)	http://volcano.und.nodak.edu/vwdocs/vwlessons/plate_tectonics/introduction.html	Introduction to Plate Tectonics	A very useful website for the teaching and learning of "Plate Tectonics". Many interesting teaching activities and worksheets about plate tectonics are provided here.
(iii)	http://geology.com	Geology.com	It contains information about plate tectonics, earthquakes, tsunamis and volcanoes. There are also some interactive maps and online field trips.
(iv)	http://library.thinkquest.org/10131/javascriptmenu_final.html	Destination: Himalayas—Where Earth Meets Sky	Useful information, maps and figures about the formation of Himalayas and plate tectonics are found in this website.
(v)	http://www.peakware.com	Peakware—World Mountain Encyclopedia	Relief maps and information about Andes Mountain can be found here.
(vi)	http://library.thinkquest.org/17457/gather/comics/main.html	Volcanoes Online	The website contains nearly everything about volcanoes. Concepts about plate tectonics and volcanoes are explained in details. Games, comics and lesson plans related to volcanoes are also included.
(vii)	http://volcano.und.nodak.edu/	Volcano World	A resourceful website about volcanoes. Besides information about volcanoes of the world, volcano adventures and learning activities about volcanoes can also be found. There are materials for students to build their own volcano models.
(viii)	http://earthquake.usgs.gov/	USGS Earthquake Hazards Program	A resourceful website about earthquakes. Current earthquake activities are reported with maps. Besides, it provides many useful resources, e.g. graphics, photos, animations, lesson plans and learning activities, for the learning and teaching of earth structure, earthquakes and plate tectonics.

	Address	Name of Homepage	Details
(ix)	http://www.crustal.ucsb.edu/ics/understanding/	Understanding Earthquakes	This website contains earthquake information, quiz and animations.
(x)	http://www.tsunami.org/index.htm	Pacific Tsunami Museum Homepage	It contains many photos about tsunamis which can be used for the learning and teaching of tsunamis.
(xi)	http://walrus.wr.usgs.gov/tsunami/	Tsunamis & Earthquakes at the USGS	This homepage contains information and animations about tsunamis.
(xii)	http://www.drgeorgepc.com/Tsunami2004IndianOcean.html	Tsunamis of the Indian Ocean	It contains detailed information about the Indian Ocean Tsunamis in 2004.
(xiii)	http://ublib.buffalo.edu/libraries/asl/guides/Indian-ocean-disaster.html	Indian Ocean Tsunami Disaster December 2004: a Select Guide	Hyperlinks related to Indian Ocean Tsunami in 2004 are included in this website.
(xiv)	http://earth.fg.tp.edu.tw/learn/eq/main.htm	認識地震	This site provides information about earthquakes, especially the case of Taiwan.

b. Managing River and Coastal Environments: A continuing challenge

	Address	Name of Homepage	Details
(i)	http://library.thinkquest.org/28022/body.html	All Along A River	This website contains worksheets and case studies about rivers in the world. Teachers and students can have online trail along a river. Concepts, such as river erosion and transportation, are explained with animations in this website.
(ii)	http://www.ctgpc.com	China Three Gorges Project	This site provides nearly all necessary information for the learning of the Three Gorges Project, such as its benefits and measures of environmental protection.
(iii)	http://www.grdc.sr.unh.edu/html/Stn/B13.html	Chang Jiang - Asia	Data about Chang Jiang, such as its discharge and catchment areas, can be found. There are also hydrographs of different parts of Chang Jiang.

	Address	Name of Homepage	Details
(iv)	http://www.bbc.co.uk/schools/riversandcoasts/mainmenu.shtml	Rivers and Coasts	A great website in which all essential concepts of rivers and coasts are explained with photos and animations. Supplementary worksheets on rivers and coasts are also provided. It is a good self-study resource for geography students.
(v)	http://www.geography.learnontheinternet.co.uk/topics/waves.html	Internet Geography-GeoTopics-Coasts	Information about coastal erosion, deposition and management is included in this website. Besides, a detailed case study about Holderness Coast is provided.
(vi)	http://changjiang.whlib.ac.cn/sxgc/nkt.htm	長江三峽工程	It contains important information about the Three Gorges Project, such as the environmental impact and benefits of the Project.

c. Changing Industrial Location—How and why does it change over space and time?

	Address	Name of Homepage	Details
(i)	http://www.netvalley.com/lef5tint.htm	Internet Valley	The information about Silicon Valley, U.S.A. and IT history is provided here. Teachers can find useful information about IT companies and academic institutions in Silicon Valley for learning and teaching.
(ii)	http://www.siliconvalley-usa.com	The Silicon Valley Gateway	This website contains information about educational institutions, high-tech companies and history of Silicon Valley, U.S.A.
(iii)	http://www.cyberport.com.hk	Cyberport	Information, facilities and environment of CyberPort are introduced in this website.
(iv)	http://www.hkstp.org	Hong Kong Science and Technology Parks	Useful information and facilities about Hong Kong Science and Technology Parks can be found in this website.

d. Building a Sustainable City—Are environmental conservation and urban development mutually exclusive?

	Address	Name of Homepage	Details
(i)	http://www.ura.org.hk/html/c100000e1e.html	Urban Renewal Authority	Information about urban renewal in Hong Kong can be found in this website. Case studies are also included.
(ii)	http://www.plannersweb.com/sprawl/home.html	Sprawl Guide	This site contains lots of information and links about the concepts of "sprawl". Case studies about cities of U.S.A. are included.
(iii)	http://www.info.gov.hk/epd/eindex.html	Environment Protection Department	This is the official website of Environmental Protection Department in Hong Kong. Information, links, activities and videos about environmental protection in Hong Kong can be found.
(iv)	http://www.susdev.gov.hk/	Sustainable Development	This official site of the government of the Hong Kong SAR includes basic concepts and related policies of sustainable development in Hong Kong and other parts of the world. A "Sustainable Development Online Resource Centre" can be found on the site which includes a lot of information and educational materials for the learning and teaching of the concepts of sustainable development.
(v)	http://www.curb.com.cn	中國城市化	A good article about urbanization is included in this website.
(vi)	http://chd.region.waterloo.on.ca	Region of Waterloo —Reurbanization	Concepts and examples of reurbanization are included in this website.
(vii)	http://www.info.gov.hk/infrastructuregallery/	The Hong Kong Planning and Infrastructure Exhibition Gallery	This site introduces the major facilities and exhibits in the Gallery. It includes information of the three main areas of the Gallery—"Quality Living Environment", "Transportation and Logistics Centre" and "Strengthening Environmental Protection" which are related to the learning and teaching of this issue.

	Address	Name of Homepage	Details
(viii)	http://www.pland.gov.hk/	Planning Department	This is the official website of the Planning Department of the Hong Kong SAR. The "planning studies" in this site contains useful case studies for the learning and teaching about urban planning in Hong Kong.

e. Combating Famine—Is technology a panacea for food shortage?

	Address	Name of Homepage	Details
(i)	http://www.cfwc.com/	California Farm Water Coalition	A very useful website for the learning and teaching of "Irrigation farming in Southern California". It provides many great learning resources, such as photos, lesson plans, a 14-minute video about irrigated farming in California and a 67-page online reference book – "The Water Fact Book: California Agriculture and Its Use of Water".
(ii)	http://www.itrc.org/index.html	Irrigation Training and Research Centre	This homepage contains lots of impressive photos about irrigation facilities in California.
(iii)	http://www.fresnovalves.com/index.html	Fresno Valves & Castings, Inc. Irrigation Equipment	This is a website which provides some photos and slides about irrigation equipment in California. They are related to the teaching of irrigation farming in California.
(iv)	http://www.afcd.gov.hk/eindex.html	Agriculture, Fisheries and Conservation Department	This is the official website of Agriculture, Fisheries and Conservation Department of Hong Kong. Information about "Farming in Hong Kong" can be found here.
(v)	http://www.fews.net/	Famine Early Warning System Network	This homepage contains many reports and articles about famine in the world. Most of them are update and are useful in the learning and teaching of this issue.
(vi)	http://www.ucc.ie/famine/	International Famine Centre Homepage	It contains the latest famine news of the world. Links to other websites about "famine" are also included.

	Address	Name of Homepage	Details
(vii)	http://www.oxfam.org.hk	Oxfam	Information about development and poor can be found in this website.
(viii)	http://www.fehd.gov.hk/safefood/gmf/index1.html	Food and Environmental Hygiene Department —Genetically Modified Food	A resourceful website which includes a lot of essential information about GM foods.
(ix)	http://www.fao.org/index_en.htm	Food and Agriculture Organization of the United Nations	It contains useful information about food and agriculture in the world, such as the situation of food crisis and sustainable development.

f. Disappearing Green Canopy—Who should pay for the massive deforestation in rainforest regions?

	Address	Name of Homepage	Details
(i)	http://www.rainforestweb.org	World Rainforest Information Portal	It provides hyperlinks to other websites about rainforests in the world.
(ii)	http://www.cdli.ca/CITE/rforest.htm	Gander Academy's —Tropical Rainforest Theme	A useful website which includes classified links to other websites about tropical rainforests in the world.
(iii)	http://rainforest-australia.com	Rainforest-Australia	Photos and text about Australian rainforest can be found in this website.
(iv)	http://www.teachers.ash.org.au/jmresources/rainforest/links.html	Rainforest Links	This site provides links to other rainforest websites in the world. Besides basic information about rainforests, links to some interesting activities, games and puzzles related to rainforests are also included.
(v)	http://www.blueplanetbiomes.org/rainforest.htm	Tropical Rainforest	Detailed information about tropical rainforests can be found in this website.
(vi)	http://www.mongabay.com/home.htm	Tropical Rainforests	An excellent website for learning and teaching tropical rainforests. Detailed information and photographs about tropical rainforests in the world are provided.

	Address	Name of Homepage	Details
(vii)	http://www.srl.caltech.edu/personnel/krubal/rainforest/Edit560s6/www/what.html	Learning about Rainforests	This website includes all essential information about tropical rainforests.
(viii)	http://www.enchantedlearning.com/subjects/rainforest/animals/Rfbiomeanimals.shtml	Rainforest animals: Zoom Rainforests	Information about tropical rainforest animals is provided.
(ix)	http://www.rainforest.org/	Tropical Rainforest Coalition	Some conservation projects of tropical rainforests are introduced in this website.
(x)	http://studentweb.ncf.edu/EnvironmentalStudies/Rainforest/ractionitems.html	Rainforest Action Items	This site provides some ideas on what students can do to save the rainforests.

g. Climate Change – Long-term fluctuation or irreversible trend?

	Address	Name of Homepage	Details
(i)	http://www.epa.gov/globalwarming/	EPA Global Warming Site	The 'EPA Global Warming Site' contains a lot of information about global warming, such as causes of global warming and how to alleviate this problem.
(ii)	http://www.panda.org/climate/	WWF—Climate Change Campaign	This website includes information about causes, impact and solutions of global climate change.
(iii)	http://www.hko.gov.hk/contente.htm	Hong Kong Observatory	Besides weather reports and forecast, there are lots of educational resources in this homepage of Hong Kong Observatory. A detailed explanation about greenhouse effect and climate change can also be found here.
(iv)	http://assets.panda.org/custom/flash/our_climate_is_changing/	WWF—Our Climate is Changing	Case studies about the impact of global warming in different parts of the world are included.

(6) Specific websites for the Elective Part:

a. Dynamic Earth: the building of Hong Kong

(For websites about plate tectonics and volcanoes, please refer to Part 5a above.)

	Address	Name of Homepage	Details
(i)	http://hkss.cedd.gov.hk/hkss/index.htm	Hong Kong Slope Safety	It includes information, educational materials and interactive games concerning slope safety and maintenance.
(ii)	http://hkss.cedd.gov.hk/hkss/eng/education/bb_geology_gehk/lib_query.htm	Bibliography on geology and geotechnical engineering of Hong Kong	It contains a list of different reference materials of the geology, geomorphology, marine resources, reclamation and landslide information of Hong Kong.
(iii)	http://www.hknature.net/eng/resources/mscnt.htm	Ma Shi Chau Special Area	It provides information on the geology and geological structure of the area.
(iv)	http://www.priweb.org/ed/earthtrips/earthtrips.html	Paleontological Research Institution —Earthtrips	There are several virtual journeys to describe and explain geology of many parts in USA.
(v)	http://www.hku.hk/earthsci/tools/landslide/index.html	Large landslides in Hong Kong	It contains a map showing the locations where large landslides occurred in Hong Kong. There are also landslide data as references.
(vi)	http://www.csb.gov.hk/hkgcsb/doclib/showcasing_ced_e.pdf	Using IT to enhance slope safety	It introduces how information technology is used by Civil Engineering and Development Department to collect and disseminate information about slopes. In turn, the work on promoting slope safety can be enhanced.
(vii)	http://geology.usgs.gov/realtime.shtml	Geology Discipline —Real-time hazard information	It contains information about the different geological hazards such as landslides, volcanic eruptions and earthquakes.
(viii)	http://earth.leeds.ac.uk/learnstructure/index.htm	Teaching resources in structural geology —Leeds University	It contains information, photos, virtual fieldtrips and links which introduce different types of fold and fault.

b. Weather and Climate

	Address	Name of Homepage	Details
(i)	http://www.hko.gov.hk/contente.htm	Hong Kong Observatory	Besides weather reports and forecast, there are lots of educational resources in this homepage of Hong Kong Observatory. Newspaper articles by Hong Kong Observatory, various topics and instruments about meteorology, and a virtual tour of Hong Kong Observatory's Exhibition Hall can be found here.
(ii)	http://www.underground.org.hk/	Weather Underground of Hong Kong	Lots of weather maps, satellite images and links related to weather and climate can be found in this resourceful website. There is also a "Weather Discussion Forum" for people to discuss about current issues of weather.
(iii)	http://www.weatherbase.com	Weatherbase	This website contains weather data of the world, such as temperature and precipitation, for learning and teaching.
(iv)	http://www.cma.gov.cn/index.html	China Meteorological Administration	In this website of China Meteorological Administration, information about weather and climate of China and other parts of the world can be found.
(v)	http://www.met.tamu.edu/class/Metr304/WindandPressuredir/Wind-Press-2.html	Wind and Pressure	Some animations are provided to assist teachers to teach some difficult concepts about wind and pressure.

c. Transport Development, Planning and Management

	Address	Name of Homepage	Details
(i)	http://www.etwb.gov.hk/	Environment, Transport and Works Bureau	The site includes all recent transport-related publications and press releases published by the government of the Hong Kong Special Administrative Region.
(ii)	http://www.td.gov.hk/	Transport Department	Information and figures about transport and related infrastructure in Hong Kong can be found. Don't miss the part "Traffic CAM Online" which provides updated information about traffic flow in different parts of Hong Kong.
(iii)	http://logistics.tdctrade.com/	Hong Kong Trade Development Council—Industry Vertical: Transport & Logistics	Information about air transport, sea transport (including ports and container terminals), freight forwarding and express cargo can be found. There is also a "Photo Library" which includes downloadable photos of transportation facilities in Hong Kong.
(iv)	http://www.logisticshk.gov.hk/	Hong Kong Logistics Development Council	Information about logistics in Hong Kong can be found.
(v)	http://www.tripfree.com.tw	商務旅遊網	Maps of Guangdong Province with different layers of information, such as rivers, roads and railway networks, can be found in this website.
(vi)	http://www.pdc.gov.hk/eng/home/index.htm	Hong Kong Port Development Council	Information and statistics about ports in Hong Kong can be found in this website.
(vii)	http://www.pprd.org.cn/hongkong/	香港泛珠三角合作信息網	It contains information / news about transport and its development in the Zhujiang Delta Region.

d. Regional Study of Zhujiang Delta

	Address	Name of Homepage	Details
(i)	http://www.pprd.org.cn/hongkong/	香港泛珠三角合作信息網	It contains information / news about agriculture and environmental protection in the Region.
(ii)	http://www.hktrader.net/200411/prd/	Introducing the Pearl River Delta (tdctrade.com)	This website includes a brief introduction to the Region.
(iii)	http://www.cityu.edu.hk/lib/collect/prd/maps/map_prd.htm	Map of the Pearl River Delta	Maps of different parts of Pearl River Delta can be found in this website.

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