

*Pleasurable & Effective Learning Series*

# **Teaching Thinking for Effective Learning**



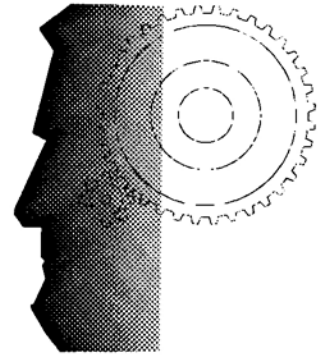
**Humanities Unit  
Curriculum Development Institute  
Education Department  
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## Foreword

In *School Education in Hong Kong: A Statement of Aims*, published by the Education and Manpower Branch, Hong Kong Government, Aim(9) states that:



*"Schools should help students to think logically, independently and creatively; to make rational decisions; to solve problems independently and in cooperation with others; and to cope with stress and change."*

Clearly the role of teachers should not be only teaching students factual knowledge, but also the skills to think and learn. On the other hand, students should not be given excessive pressure in school, rather, they should find learning pleasant, enjoyable and effective.

The purpose of this handbook is to put together some ways of teaching thinking skills which have been proposed by experts and tried out in many places, in lessons or outside the classrooms. While some theoretical ideas about thinking are outlined, the emphasis is on suggesting practical ways to develop students' thinking skills, so as to enhance effective learning in schools. It is hoped that this handbook will help teachers in organizing and conducting their lessons or activities which are geared to this purpose. It is also hoped that further ideas and discussions along this line will be generated.

This pamphlet is one in a series of the publications prepared in line with the objectives of the project on "Towards More Pleasurable And Effective Learning". Teachers are welcome to make suggestions or comments by writing to

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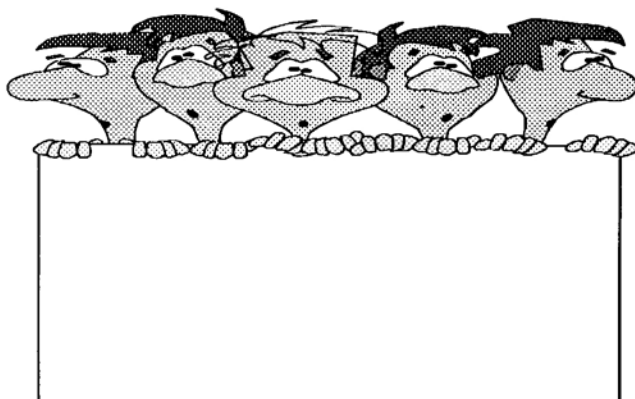


# I. Introduction

We are living in an age of information explosion. No matter how hard we aspire to learn, we will never be able to master all the information that floods in everyday. On the other hand, the fruits of education are really the thought processes which result from the study of a subject, and not the information itself. Hence, as teachers, our essential task is to help our students to acquire the ability to think critically, to solve problems wisely and to make appropriate decisions. Training in thinking can be made possible through all learning processes, either during lessons or outside the classroom, for all subjects.

Thinking skills should be an integral part of the school curriculum, and should not be regarded as an isolated aspect of learning. Therefore thinking skills should be integrated within subjects and across different levels. Teaching methods should be employed in the course of learning to improve students' power in reasoning, problem solving and decision making.

Thinking skills, just like any other skills, require constant practice to develop. Students must be given ample opportunities to practise by progressing through a series of increasingly complex thinking processes. To do that, we need some background knowledge on the process of thinking.





## II. The Thinking Process

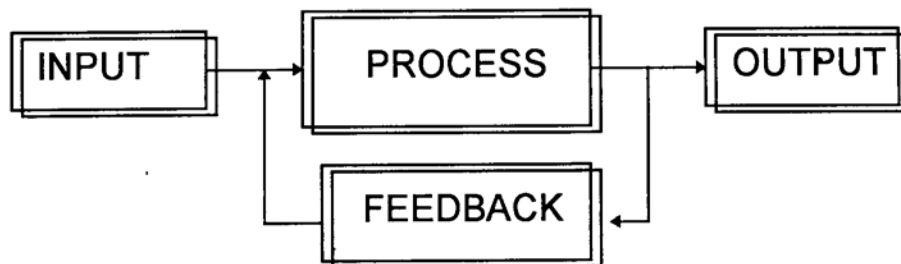
Learning occurs inside and outside the classroom. As a matter of fact, everyone learns throughout one's life. The fundamental point is that some processes of thinking will be involved in whatever form of learning.



In the thinking process, students have to identify the problem, its nature, and ways of coping with the problem. In order to arrive at viable solutions, they have to apply a series of thinking skills like classifying, organizing, analysing, evaluating, etc. to handle the problem. Each time when students employ a new skill and achieve in solving the problem, they will have acquired that particular skill. In future, when they come across a similar problem, they will employ the similar skill. In this way students acquire useful experience and skills in handling problems.

### II.1. A Model of the Thinking Process

The thinking process may be represented diagrammatically below. It involves four stages, namely, input, process, feedback, and output.



An input of information initiates the communication process. Once the information is received (INPUT), the thinking process is activated. Various thinking skills are applied to process the information (PROCESS). At this stage, the input of external stimulus will activate the thinking mechanism to search for prior knowledge or experience to react to this challenge. When new responses are called for, the thinking mechanism will develop new responses to accommodate to this new challenge. Having gone through the processing stage, initial decision (OUTPUT) will be made. However, such a decision will often be reprocessed again (FEEDBACK) to try to produce the most appropriate action.

## II.2. The Major Thinking Processes

There are four main types of thinking processes:

- (i) Critical Thinking
- (ii) Creative Thinking
- (iii) Problem Solving
- (iv) Decision Making

	What is it?
<b>Critical Thinking</b>	Critical thinking is to draw out meaning from given data or statements. It is also concerned with the accuracy of given statements. Hence it involves interpretation and logical reasoning.
<b>Creative Thinking</b>	Creative thinking is to develop new ideas or products, basing on given data or statements. It stresses initiative skills to generate alternatives or new action.
<b>Problem Solving</b>	Problem solving involves using thinking skills to resolve a difficulty. It assembles facts about the problem and determines the best course of action.
<b>Decision Making</b>	Decision making is to choose the best response from several options.

The four thinking processes all consist of subordinate skills which help develop meaningful and purposeful thinking, formulate concepts, solve problems, make decisions, etc.

## II.3. Thinking Processes and Their Skills

	Involved Skills
Critical Thinking	<ul style="list-style-type: none"><li>a. focus on a question;</li><li>b. analyze arguments or controversies;</li><li>c. judge the credibility of the statement;</li><li>d. interpret the statements; and</li><li>e. generalize ideas.</li></ul>
Creative Thinking	<ul style="list-style-type: none"><li>a. extend their pre-acquired skills to new or novel situations;</li><li>b. generate new strategies to face problems;</li><li>c. engage in tasks even when there is no obvious solutions;</li><li>d. elaborate given statements or data; and</li><li>e. confront questions with different answers.</li></ul>
Problem Solving	<ul style="list-style-type: none"><li>a. visualize the whole picture about a problem;</li><li>b. analyze problems;</li><li>c. systematize information;</li><li>d. generate action plans;</li><li>e. prioritize action; and</li><li>f. be flexible and try different approaches.</li></ul>
Decision Making	<ul style="list-style-type: none"><li>a. assemble various information relating to a topic or an issue;</li><li>b. compare the advantages or disadvantages of alternatives; and</li><li>c. decide on the most effective response or action.</li></ul>



### III. The Thinking Skills

#### III. 1. Core Thinking Skills

The Association for Supervision and Curriculum Development (ASCD), the U.S.A., in its publication entitled *Dimension of Thinking* (1988) considers that there are certain core thinking skills which frequently occur in the thinking processes. Twenty-one thinking skills have been identified by the ASCD and they are grouped into eight categories, as follows:

Thinking Skills	Description
Focusing	attending to selected information and ignoring others
Information-Gathering	bringing together information for further processing
Remembering	storing information in long-term memory and to retrieving it
Organizing	arranging information so that it can be understood or presented more effectively
Analysing	clarifying existing information by examining parts and relationships
Generating	using prior knowledge to add information beyond what is given
Integrating	putting together the relevant parts or aspects of a solution, understanding, principle formation or composition
Evaluating	assessing the reasonableness and quality of ideas

The ASCD considers that by employing these core thinking skills, students will be able to define a problem and set goals. At the same time, they will formulate sensible and logical questions; process and analyze the data collected; check their accuracies and explain their relationships. Eventually they will arrive at a solution or generate new ideas. Furthermore, they will be able to assess or verify the appropriateness of their decisions for future reference.

### III.2. Criteria for Consideration in the Teaching of Thinking Skills

In order to enhance the effectiveness of students' learning in school, a number of criteria related to the thinking activity have to be considered. These criteria may include:

(i) *What to think about?*

These could be issues or tasks for students. They are the problems students have to face.

(ii) *With what do they have to think about?*

These could be facts or opinion, observations, beliefs etc. Some basic data are involved.

(iii) *What are the skills students use to think?*

These are the various skills involved, e.g. recognizing, analysing, evaluating, etc. We usually use these skills to solve problems.

(iv) *What are the purposes of this thinking exercise?*

Students must be told that there is something worthwhile for them to think about, such as solving a problem, evaluating an issue, criticizing some tasks, setting goals etc.

### III.3. Relationship between the Thinking Process and the Issue-enquiry Approach

Issue-enquiry is a teaching approach adopted by many teachers to promote students' critical thinking. This particular teaching / learning methodology encourages students to be inquisitive, to visualize the complexity of issues and to develop their abilities in critical thinking. As such, there is a close relationship between the application of the thinking process and the use of issue-enquiry approach to promote effective learning.

In employing the issue-enquiry approach, teachers should help their students with the following strategies to achieve the intended learning outcomes :

1. Students should not treat the procedure as rigid steps in which each step must be completed before the next begins.
2. Students may go back to an earlier step or even work on several steps simultaneously.
3. It is vital that all the steps be considered or completed so that students will understand the whole picture about the issue.
4. Constant practice is necessary to reinforce the intended learning outcomes.

The procedure of issue-enquiry approach takes the following steps:

Steps	Functions	Remarks	Examples
1	Identifying the Issue	Students should become aware of what the issue is about.	What is the issue? Why does it arise?
2	Investigating and analyzing the related information	There could be different kinds of information related and relevant to the issue. A thorough understanding of the information is vital. Adequate and accurate information is essential to making judgements.	What is the information concerned?  How can it be distinguished?  How are they related to the issue?
3	Exploring possible strategies	Students should be encouraged to employ various strategies. They should be aware that there could be different approaches and alternative strategies. Not every problem can be solved in exactly the same way.	What are the possible strategies?  Are there alternative strategies?
4	Testing tentative conclusion	Students should be taught that their tentative conclusions should be assessed for validity before final decisions can be taken. They should also bear in mind that there could also be alternative solutions to the same problem.	Is the conclusion valid?  Have I missed out anything important?
5	Deciding on the proper action	Having considered all alternatives, the pros and cons of solutions, etc., students can make their decision for proper action.	Is this the best and necessary action?
6	Evaluating and refining the action taken	The objective is to evaluate the outcome of students' decision and take alternative courses of action, if necessary.	Have I made the right decision? Is there any better solution to the problem?



## IV. Integrating Thinking Skills into the Teaching Programme

The Inner London Education Authority (ILEA) states in its publication *Effective Learning Skills: A Teacher Guide (1983)* that "the greatest occurrence of skill transfer and continuity of learning experience is achieved when skills are embedded in the subject curriculum and treated as a normal component of teaching and learning."

Teaching thinking in a lesson emphasizes the processes and skills that are embedded in all subjects and thinking skills permeate through all subject teaching. For example, humanities subject can emphasize on concept formation and decision making; science subjects can concentrate on teaching principles and procedures of inductive reasoning, hypothesis testing, and qualitative analysis; similarly mathematics can focus on teaching deductive reasoning, and language classes can promote arguments and analysis as well as critical thinking, detecting bias, and distinguishing between facts and opinions, etc. When these skills are acquired by students through their studying of the subject, it will give much satisfaction to their effort. Research studies have shown that students are motivated to learn a skill when it is needed to achieve a subject matter-related goal. However, we can be sure that students who have mastered the above thinking skills should be able to apply such skills to deal with cross-curricular issues.



The next question is how to prepare a teaching programme with the thinking skills integrated into it, and then how to do it in class?

### IV.1. Preparing the Teaching Programme

In preparing the teaching programme, there are several key tasks which have to be considered. Teachers have to recognize that the fundamental need is to stimulate their students to think and to apply their strategies in a critical way. Since not all students will respond in the same way to a problem, teachers should select those strategies that meet students' needs, interests and abilities. Eight key

tasks are suggested below for teachers' consideration in preparing their teaching programmes.

	Key Tasks	Remarks
1	Setting the objectives	Specify the need for the programme
2	Deciding on the course of action	Determine what needs to be done
3	Preparing the teaching programme	The programme should be prepared with the needs of the students in mind
4	Determining the skills and strategies	Choose the thinking skills and strategies most suited to students
5	Executing the teaching programme	The programme should permeate the whole course of learning
6	Applying various strategies and aids	Use appropriate strategies related to thinking skills
7	Evaluating the teaching programme	Consider whether the programme has been effectively carried out
8	Revising the programme	Make necessary revision in the light of the results, and consider what can be done to refine the programme

## IV.2. Conducting the teaching programme

Having prepared the teaching programme, what needs to be done next is for teachers to execute the action plan. In this connection, teachers have to consider the following criteria which help to promote effectively students' thinking skills :

1. Present a problem to students who have been properly motivated. Make sure that the nature and difficulty of the problem are within students' ability.

2. Encourage students to raise as many questions as possible about the subject under discussion, and to explore and use various thinking skills in various situations in which the skills can be used successfully.
3. Teachers should play the role of a facilitator. Have students work out the conclusions and discover the principles concerned. Make sure that students receive immediate feedback on the remarks they make.
4. Have students form and test their own hypothesis.
5. Reward those students when they have made the proper response and make sure students receive feedback on how to perform the skill.
6. Encourage students to persevere in practising the skill which they have successfully employed.
7. Teachers make the conclusion and highlight the skill of thinking involved, explaining how they help to resolve the problems concerned.
8. To sustain students' ability in applying their thinking skills, teachers should provide instructions in, and transfer of, thinking skills to a variety of subject areas and contents, as well as to students' out-of-school life.

In conclusion, teaching thinking should not be confined to one particular subject, but should embrace all subjects and all levels. The ultimate goals of learning thinking are for students to better understand their subjects, to be able to function independently, and to cope with issues and difficulties confidently making use of relevant thinking skills. Teaching thinking skills should constitute a key element in the school's curriculum.



## V. Reading, Writing and Critical Thinking

Listening, speaking, reading and writing are the basic communicative skills students use in learning and expressing their views. Language and thought are inter-dependent processes. Various thinking skills are involved in presenting ideas logically and critically. In this context, teachers often make use of various kinds of reading and written assignments to develop students' thinking skills.

One of the purposes of setting reading and written assignments is to promote students' critical thinking which helps them to:

- i. sort things out sensibly;
- ii. explain issues reasonably;
- iii. build up concepts clearly;
- iv. ask questions logically;
- v. formulate judgements accurately; and
- vi. evaluate ideas critically.



### V.1. Reading enhances Critical Thinking

The essence of setting reading assignments is for teachers to guide their students to construct meaningful ideas from texts. Different kinds of reading activities can be used, ranging in intensity as follows:

a)	skimming	to get a general idea
b)	scanning	to look for particular information
c)	reading intensively	to focus attention for a specific purpose
d)	reading critically	to analyze, assess and evaluate the information

Making meaning out of textual information necessitates the application of different thinking strategies. Students should be encouraged to apply these strategies they have acquired to make the best sense out of the text and to arrive at a clear understanding about the passage. Reading exercises also help students to be analytical and develop their critical thinking skills.

Usually, reading exercises can be separated into three stages according to the sequence of the activities as (i) before reading, (ii) during reading, and (iii) after reading. At each stage students will apply different thinking skills to comprehend, analyze, evaluate, synthesize, etc. the information concerned.

Before reading the passage, students should be asked to preview the passage, skim headings, sub-headings, or illustrations to predict content of the passage. This will activate or recall prior knowledge related to the passage to identify key issues. Students should also be prepared to formulate questions or hypotheses related to the text.

When reading the passage students should apply various thinking skills to identify concepts, follow the line of thinking and trace the development of ideas and go over in their minds to pick out key points. At the same time, they should be able to distinguish between important and unimportant information, and be able to clarify, organize and evaluate the main ideas.

After reading the passage students should be able to summarize important ideas or generate overviews, and be able to raise further questions related to the given information.

## V.2. Writing and Critical Thinking

Thinking and writing are interactive processes, and completing written assignments involves different mental activities. It requires processing of concepts and issues in terms of one's own experience and understanding. In the process of writing, students have to translate their thoughts into words. In completing their written assignments, students have to ask these basic questions such as "What do I have to say?", "How to say it?", "Why do I say it this way?". All these involve critical thinking. Hence teachers usually make use of written assignments to provide students with the opportunities to:

- (i) comprehend and analyze issues;
- (ii) formulate their independent judgements;
- (iii) organize their thoughts;
- (iv) present ideas systematically and logically; and
- (v) evaluate critically their own ideas.

Same as for reading, thinking skills involved in written assignments are applied at three different stages; namely, (i) pre-writing (ii) writing, and (iii) post-writing.

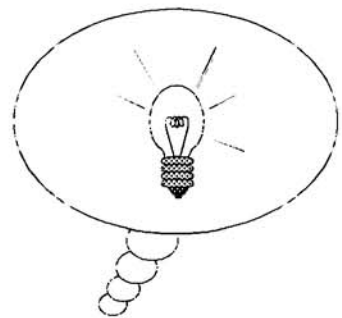
The pre-writing stage activates students for free flow of thought. It stimulates students to consider all thinking processes for presentation of ideas; so that they will focus on their specific tasks and formulate a well thought-out writing plan.

In the writing stage, students' thoughts are translated in words. In the process of writing, students communicate their ideas in logical sequence and in systematic manner. Other thinking skills such as classifying, organizing, synthesizing and hypothesizing are also involved.

In the post-writing stage when the written assignment has been completed, students have to critically assess the content to ensure that the content accurately represents the ideas and meets the criteria which have been assigned. Evaluation skills are also employed to ascertain the quality and appropriateness of the written material.

### V.3. Some Directive Terms Used in Reading and Written Assignments

To assist students in reading or writing, teachers may use various directive terms to guide students to develop their critical thinking. Some of these directive terms are given in the following table.





Directive Terms	Remarks
<b>analyze</b>	To consider the passage in detail to make out its meaning
<b>assess</b>	To consider all available facts to arrive at a judgement
<b>categorize</b>	To arrange items in a certain manner into groups
<b>classify</b>	To sort into groups according to their common elements, factors or characteristics
<b>compare &amp; contrast</b>	To study the attributes that make them similar or different
<b>conclude</b>	To make an inference based on the given statements
<b>criticize</b>	To express opinion about a passage
<b>deduce</b>	To draw conclusions from given statement
<b>discriminate</b>	To identify a word, phrase or statement by stating its precise meaning or significance
<b>elaborate</b>	To expand concepts or ideas
<b>evaluate</b>	To make a judgement based on the given set of criteria
<b>hypothesize</b>	To develop or generate an assumption
<b>identify</b>	To determine, assess, recognize, or to point out the essential elements
<b>synthesize</b>	To unite different elements to formulate a whole picture

To serve their proper functions and to facilitate critical thinking, assignments in reading and writing should be:

1. issue-based;
2. able to activate students' critical thinking;
3. getting progressively complex;
4. used as a foundation for further critical thinking; and
5. practised regularly.

Humanities, such as History and Liberal Studies, provide ample opportunities for students to analyse and evaluate data which helps promote their critical understanding of historical events and formulate objective and impartial judgments. Given in Appendix I are three different tasks related to the study of *the achievements of the governorship of Sir Murray Macle hose (1971-82)*. These tasks are meant to be examples to illustrate how the thinking skills mentioned in the foregoing paragraphs can be employed. Teachers may use these illustrations flexibly to suit their students' abilities. Teachers are encouraged to go through these exercises with their students.



## VI. Fostering Positive Thinking Climate in the Classroom

It is necessary for teachers to realize that to promote critical thinking, an interactive classroom atmosphere, whereby students are encouraged to take active participation, is essential. There should be plenty of opportunities for students to actively practise the art of critical thinking.

Students will feel more confident in their own thinking and become more skilful in thinking when their ideas are valued and considered by others. Teachers play a vital role in promoting students' critical thinking. Hence they should design activities and use strategies to build up students' confidence, and to provide opportunities for students to develop their critical thinking.

Teachers today assume a facilitative role more than a directive role. They have to make their lessons suited to students with a wide range of learning abilities. Instead of being mere disseminators of information, teachers in the classroom are expected to be mediators or collaborators of thinking.

Similarly, students' role has changed from a passive recipient of information to an active learner. They are encouraged to be discoverers and analytical organizers. They should not be contented with what they are given; but should aspire to active learning. One way of achieving this is for teachers to start each lessons with something that is a problem or a cause for wonder.



## VI.1. Creating A Stimulating Learning Environment

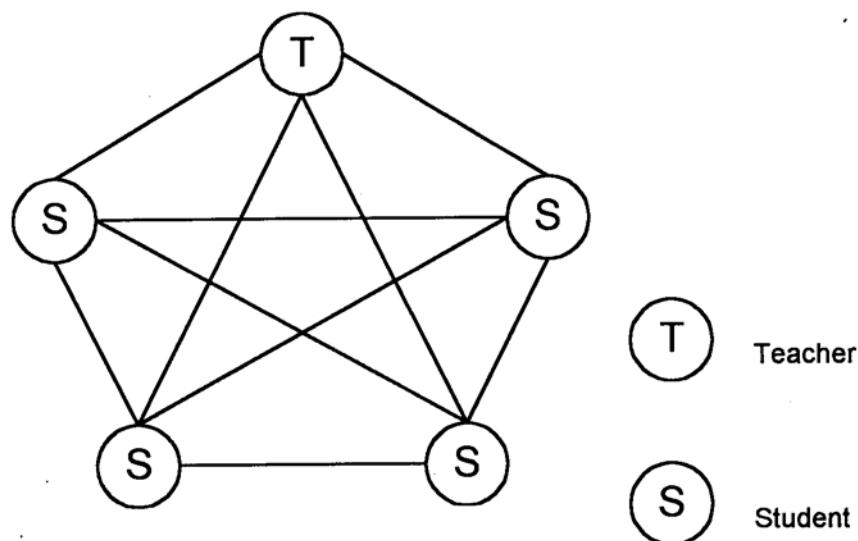
The basic requirement is to provide a classroom climate conducive to and supportive of the conditions of good thinking. The following are some criteria helpful to building up a stimulating learning environment:

<b>Adequate motivation</b>	Teachers should perform the role of facilitators to promote active participation by students. Teachers have to help students develop analytical thinking and to make sense of the available information.
<b>Open-mindedness</b>	Teachers should maintain a two-way communication so that students could freely express their views which may not necessarily agree with those of the teacher. Both the teacher and student should be receptive to each other's view.
<b>Emphasizing on problem-solving</b>	Teachers nurture students' problem-solving abilities by encouraging them to ask questions, not just to answer them. Teachers should give immediate feedback and clarify students' faulty responses. When the central issues and problems are identified, appropriate data or information can be selected to exemplify and clarify these issues and problems.
<b>Allowing adequate time</b>	Students need time to ponder, analyze, and respond to questions posed to them.
<b>Giving appropriate encouragement</b>	Teachers should build up students' confidence in their abilities, reinforce their confidence and provide chances for students to develop their own critical thinking and ability to analyze and solve problems.
<b>Employing various strategies</b>	To make the classroom atmosphere lively, teachers have to resort to various teaching strategies.
<b>Meeting students' level of ability</b>	Teachers should ensure that their questions or assignments will meet students' level of ability. While it is necessary to ask thought-provoking questions, care must be taken not to begin with too abstract concepts or demanding problems beyond students' experience or their existing mental structures

## VI.2. Creating An Interactive Learning Environment

Teaching and learning is a two-way process. This is particularly so in the case of lessons which aim at promoting critical thinking. Feedback from students is as essential as teachers' presentation. The following are some suggestions to promote an interactive environment for critical thinking:

1. It is essential that a cordial, hospitable environment is present whereby the teacher and students can freely exchange their views.



2. Build up an interactive learning atmosphere by arranging the seating plan under a supportive and communicative environment.
3. For free exchange for views, everyone in the discussion group should be able to see each other. For large classes, it would be more convenient to split into smaller groups.
4. The views of every student should be respected. Students will naturally become frustrated if their views are immediately rejected. It is necessary to encourage full participation from all students concerned. Moreover, students must feel that they are part of the discussion group and will take part in the active roles of discussing, dialoguing, and problem solving.

### VI.3. Effective Questioning to Enhance Students' Thinking

Teachers play a significant role in promoting students' skills in critical thinking. Students should be guided to discover concepts through logical thinking in the course of the lesson. Questioning in the classroom is an important teaching technique that can be successfully employed to achieve this goal.

Through questioning, students become active learners rather than passive recipients. Questions can be effectively used to motivate students to focus their attention and to set the proper learning atmosphere. Likewise, short, brisk questioning used at the end of the lesson as a summing-up process, is very effective in bringing out the salient point of leaving.

Questioning techniques are based on a variety of thinking models designed to facilitate inquiry. It consists of a number of thinking processes, hierarchically arranged from simple to the increasingly complex ones. Benjamin Bloom's taxonomy educational objectives of the cognitive domain serves as a very appropriate illustration:

Level of Difficulty	Cognitive Process	Some Related Thinking Skills
<div>highest</div> <div>↑</div> <div>lowest</div>	Evaluation	Judging, Criticizing, Appraising, Examining, Formulating, Hypothesizing
	Synthesis	Composing, Classifying, Organizing, Categorizing
	Analysis	Inferring, Experimenting, Predicting
	Application	Solving, Explaining, Summarizing, Translating
	Comprehension	Interpreting, Defining, Understanding
	Knowledge	Recognising



To be effective, questions asked should be directive and purposeful. Sometimes the same question may have to be asked in different ways, or to be reworded until the intended learning outcome is achieved. Through effective questioning methods, students who have gained skills in solving problems would be in a better position to cope with various issues and be able to exercise their decision-making skills.

By way of summary, the following are salient features about effective questioning and teachers may find them useful in using these techniques to enhance students' thinking skills.

- (i) Questions should be precise, exact and thought-provoking.
- (ii) After posing a question, teachers should allow students time to ponder for a response. Teachers should not supply an immediate answer.
- (iii) Give immediate feedback to students' answers. Students' faulty responses should be immediately corrected and replaced by a proper answer.
- (iv) Allow every student in the class to have a chance to answer questions.

As an example, a Geography lesson on the topic of population distribution in a certain country or region is used here to illustrate how teachers can integrate thinking skills into their teaching programme. The purpose of the lesson is for students to understand how and why the population distribution of a certain place happens in that particular way. Questions can be raised to stimulate students' thinking and arouse their discussion in the class. Examples are given below.



## Questions

1. Where do people live?
2. Is there a pattern to the distribution of population?
3. Why do population densities differ throughout the country/region?
4. How is the population distribution related to the environment?
5. What problems are created by this uneven distribution?
6. How can these problems be solved or be alleviated?

## Thinking Skills

Recognizing  
Examining

Identifying  
Organizing

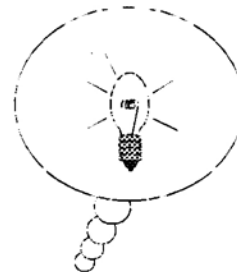
Analysing  
Evaluating

Integrating  
Inferring  
Synthesizing

Logical reasoning

Problem-solving  
Decision-making

In answering these questions, students will have to apply various thinking skills such as recognizing, analyzing, synthesizing or evaluating the problems posed by their teacher. In this way, besides introducing students to various geographical concepts, various skills of communicating, inquiring, reasoning, problem-solving, etc., will also be taught.



## VII. References

1. Beyer, Barry K. (1987), Practical Strategies for the Teaching of Thinking, Allyn and Bacon, Inc.
2. Beyer, Barry K. (1988), Developing a Thinking Skills Programme, Allyn and Bacon, Inc.
3. Bransford, J.D. & B.S. Stein (1984), The IDEAL Problem Solver, Freeman.
4. Browne, M.N. & Keeley, S.M. (1981), Asking the Right Questions: A Guide to Critical Thinking, Prentice Hall.
5. Chuska, Kenneth R. (1986), Teaching the Process of Thinking, K-12, Phi Delta Kappa Educational Foundation.
6. Durksen, Virigina & McCord, Barbara, (1990), Teaching Thinking: Enhancing Learning -- A Resource book for Schools ECS to Grade 12, Alberta Education Curriculum Branch, Canada.
7. Kurfman, D.G. (1977), Developing Decision-Making Skills, National Council for the Social Studies, U.S.A.
8. Marzano, Robert J. (1989), Dimensions of Thinking: A Framework for Curriculum and Instruction, Association for Supervision and Curriculum Development, U.S.A.
9. Mckeown, Sam (1983), Effective Learning Skills, a Teacher Guide, Inner London Education Authority.
10. Meyers, Chet (1986), Teaching Students to Think Critically, Jossey-Bass Incl., U.S.A.
11. Rothstein, Pamela R. (1990), Educational Psychology, McGraw-Hill.
12. Ruggiero, Vincent Ryan (1988), Teaching Thinking Across the Curriculum, Harper & Row.

## Appendix I. Thinking Skills in Humanities

Humanities such as History, Social Studies, Economic & Public Affairs and Geography are often regarded as suitable to teach thinking skills. The study of History, for example, provides ample opportunities for students to analyse and evaluate data which helps promote their critical understanding of historical events and formulate objective and impartial judgments. Given below are three tasks for S3 students related to the study of the achievements of the governorship of Sir Murray Maclehoose (1971-82). These tasks are meant to be examples to illustrate how the thinking skills mentioned in the foregoing paragraphs can be employed. Teachers can use these illustrations flexibly to suit their students' abilities.

### Objectives of the tasks:

By completing the following tasks, students will be able to

1. apply various thinking skills involved in comprehension, application, analysis, synthesis and evaluation;
2. understand and appreciate the achievements of the governorship of Sir Murray Maclehoose (1971 - 82).

### Learning strategies and critical thinking skills involved

(Part of the following materials are adapted from the "Local History Package for S3" published by the Curriculum Development Institute, E. D. in 1992)

	Tasks to be performed	Critical Thinking Skills Involved in Completing These Tasks
1.	<u>Task 1:</u>  Firstly, students could be asked to read through Factsheet I on the achievements of Sir Murray Maclehoose as the Governor of Hong Kong (1971-82) .	In reading through the text, students have to apply the essential comprehension skills such as: <ul style="list-style-type: none"><li>- <u>identifying</u> the main issues/ideas (i.e. the achievements of Sir Murray) raised in the text;</li><li>- <u>summarizing and taking notes</u> of the main points from the text.</li></ul>

2.	<p><u>Task 2:</u></p> <p>Students could then be asked to read some comments on Factsheet II made by Sir Y. K Kan and Dr. Y. S. Cheng on the achievements of Sir Murray and then answer questions based on these comments.</p>	<p>In answering the questions, students have to use the skills of</p> <ul style="list-style-type: none"> <li>- <u>recognizing</u> the views of the commentators;</li> <li>- <u>making inferences</u> from the statements and background of the commentators;</li> <li>- <u>comparing and contrasting</u> the viewpoints of the commentators;</li> <li>- <u>detecting</u> any over-simplification or generalization and biases on the achievements of Sir Murray made by the commentators;</li> <li>- <u>determining</u> the strength of the arguments / interpretations put forth by the commentators;</li> <li>- <u>identifying</u> any significant information missing from the comments which can affect any assessment made on Sir Murray;</li> <li>- <u>applying</u> source materials to answer questions.</li> </ul>
3.	<p><u>Task 3:</u></p> <p>Finally, students could be asked to write an essay to evaluate the achievements of Sir Murray Macle hose.</p>	<p>In writing the essay, students have to use a lot of thinking skills such as:</p> <ul style="list-style-type: none"> <li>- <u>identifying</u> the issue(s) involved (i.e. the achievements of Sir Murray);</li> <li>- <u>summarizing</u> the achievements of Sir Murray as suggested in the texts;</li> <li>- <u>distinguishing</u> facts from opinions;</li> <li>- <u>judging</u> whether the statements made by other people are fair, valid and balanced;</li> <li>- <u>evaluating</u> on the overall performance of Sir Murray;</li> <li>- <u>developing own hypotheses/theses</u> with reference to the information collected;</li> <li>- <u>arguing for own hypotheses/theses</u> with support of adequate evidence;</li> <li>- <u>communicating</u> ideas and arguments in an appropriate way.</li> </ul>

## Task 1

### Factsheet I

## The achievements of Sir Murray Maclehorse (1971-82)

### Introduction

This article focuses on how Hong Kong developed into an international financial centre and the progress made in various aspects of the community, e.g. political, economic and social during the governorship of Sir Murray Maclehorse (1971-1982).

### The situation of Hong Kong in 1971

Sir Murray became the governor of Hong Kong in 1971. At that time, conditions in Hong Kong were rather unstable as a result of unfavorable relations with China and the riots of 1967. The population continued to increase due to further influxes of people from China and this created problems in housing, education and services of all kinds. Industrial growth was affected by social disturbances and there was a general demand for better communication between the government and the people. It was under this condition that Sir Murray took up the governorship of Hong Kong.

### I The major achievements of Sir Murray Maclehorse

#### 1. Economic Relations with China

Sir Murray worked towards building up Hong Kong as a worldwide commercial and financial centre, and maintaining stability and prosperity for the Hong Kong community. Better relationship with China was considered important. Over the years, relationship was improved particularly with the open-door economic policy adopted by the Chinese leaders in the 1970s. Sir Murray visited China in 1979 which marked a new era in Sino-British relation. The opening of Shenzhen as the Special Economic Zone attracted outside investors, including people from Hong Kong, to set up factories in the region. It is therefore not surprising that by 1988, re-export trade with China has increased by 30-40%, making Hong Kong the largest trading partner of China.

#### 2. Administration, Housing, Education, Social Welfare

To build up better communication between the government and people of Hong Kong, Sir Murray introduced the District Boards. These boards help to co-ordinate government policies at a district level and they are particularly important in the New Towns, which grow up since the 1970s. With the continuous growth in local



population, Sir Murray started the public housing program. This aimed at providing decent accommodation for all. The Home Ownership Scheme received massive support from the public and even today, the Scheme remains one of the important channels in providing inexpensive homes for the Hong Kong people. The quality of life of the people also improved during Sir Murray's time. Law and order was enforced through greater communal effort in support of the Fight Crime campaign started by Sir Murray. The Junior Police Call Club was also introduced to enlist support from the younger generation to fight crime. Corruption was checked with the establishment of the Independent Commission Against Corruption. More cultural facilities, such as theaters, stadiums and museums were provided for the community. Significant steps were also made in providing more welfare services for the needy including the old, the young and the disabled. In the field of education, attempt was made in establishing more technical colleges to provide Hong Kong with the work force in her development as an industrial centre. In 1979, the goal of providing education for all up to S3 was achieved with the introduction of nine-year education.

### 3. Transportation

Major projects were also undertaken during the governorship of Sir Murray. These help to develop Hong Kong not only as an industrial centre, but an international financial centre as well. Land transport was improved with the opening of the Cross Harbor Tunnel (1972), the introduction of the first phase of the Mass Transit Railway (1979), the completion of the Tuen Mun Highway and the Shatin - Taipo coastal highway. The Kai Tak airport runway was expanded. In Taipo and Yuen Long, industrial estates were set up. The container port facilities at Kwai Chung were expanded, making it in the years to come the second busiest container port in the world. Electrification of the Kowloon-Canton Railway began and rail traffic to China and the New Territories increased significantly. All these projects promoted industrial development in the territory.

### 4. Finance

On the other hand, it encouraged the expansion of financial institutions which were needed in meeting the demand of the growing trade. During Sir Murray's time, the government played a more active role in regulating bank operation. In 1981, the three-tier system composed of licensed banks, licensed deposit-taking companies (DTCs) and registered deposit-taking companies was established. Of these institutions, the increase in the number of banks was most significant. Many of the new banks established were foreign banks which obtained licenses to open branch offices in Hong Kong. The nearness of Hong Kong to China no doubt made her an ideal place

for foreign banks to set up their branch offices developing trade relations with China. Expansion in the field of commerce and finance created better and greater job opportunities for the local community. This was further promoted by Sir Murray who made several trips abroad to build up better trading relations with other countries. It is in these various aspects that Sir Murray was considered by many as one who gave Hong Kong her future stability and prosperity, and helped build up Hong Kong as a worldwide commercial and financial centre in the years to come.

## II. An unresolved problem

However, population influx remained a problem unresolved. During the 1970s, illegal immigrants from China came by the thousands each year. The condition worsened with the arrival of the 'boat people' from Vietnam by the end of the 1970s. To control the problem various measures were taken. Regarding illegal immigrants from China, the 'touch-base' policy ( 抵壘政策 ) was introduced in the mid-1970s.\* However, the policy was scrapped in 1980 in view of the huge influx of illegal immigrants from China in that year. Furthermore, law was passed in September 1980 that all persons in Hong Kong were required to carry with them their identity cards. These measures were needed to stop Hong Kong from becoming impossibly overcrowded. However, the arrival of boat people from Vietnam grew in number and when Sir Murray left Hong Kong in 1982, many thousands of Vietnamese had already reached the Hong Kong shores, living in camps and waiting for resettlement elsewhere.

- \* The touch-base policy allowed illegal immigrants to stay in Hong Kong once they had reached their destination in the city.

Adapted from The Maclehoose Years 1971-82, S.C. M. P. April 1982

### Task 2

#### Factsheet II

#### Source A

'Looking back over the past decade, I think the most significant contributions that our Governor, Sir Murray Maclehoose, has made to Hong Kong are the establishment of a sound foundation and the creation of the right environment to ensure the future stability of the territory....His dedication to Hong Kong's economic well-being and the work he has done over the past 10 years will certainly benefit Hong Kong in the years to come'.

Sir Yuet-keung Kan, Chairman Trade Development Council 1982

## **Source B**

'Sir Murray will certainly be remembered for the District Board Scheme. In the past decade, the system of consultation has been broadening and the government has better claims to be a representative government'.

'In 1972, Sir Murray indicated that he would concentrate on housing, education and social welfare. No one could disagree with such emphasis. And while targets like "sufficient permanent self-contained accommodation for every inhabitant of Hong Kong" have not been reached, significant progress has been made in these important fields which is indispensable for Hong Kong's stability and prosperity'.

Dr. Joseph Y. S. Cheng, Lecturer  
Department of Government and Public administration,  
The Chinese University of Hong Kong 1982

With reference to the information given in Sources A and B in Factsheet II, students are asked to answer the following questions which aim to activate students' thinking skills related to assessing, interpreting and applying sources of information.

### **I. Referring to Source A**

1. Which aspect of Sir Murray's contribution did Sir Y. K. Kan consider most significant?
2. Which aspect of Sir Murray's work aroused the concern of Sir Y. K. Kan most? Why do you think this arouses the concern of Sir Y. K. Kan the most?

### **II. Referring to Source B**

3. Which aspect of Sir Murray's contribution did Dr. Cheng consider most significant?
4. Which aspect of Sir Murray's work did Dr. Cheng consider NOT too successful? In your opinion, why was this aspect of work unsuccessful?

### Task 3

To reinforce students' mastery of a large number of critical thinking skills, teachers can set the following written assignment to evaluate the work undertaken by Sir Murray Maclehoose as the Governor of Hong Kong (1971-82).

**"Give a brief account of and evaluate the work undertaken by Sir Murray Maclehoose as the governor of Hong Kong. In what ways were his work significant to the development of Hong Kong?"**

To help develop students' thinking skills, the following guidelines can be given:

a. Introduction

- 1 Give a short paragraph on various aspects of work undertaken by Sir Murray.
- 2 State writer's thesis on the performance of Sir Murray

b. Main parts of the arguments

1. Classify the description on various aspects of work into 'external' and 'internal' areas. Then provide elaboration on these two areas.
2. Suggest and argue with evidence why these areas of work were significant in the development of Hong Kong into an international financial and commercial centre, and how further development of manufacturing industries was promoted. Suggest also how Sir Murray's work provided stability and further prosperity for the Hong Kong community.
3. Argue with evidence some failures of Sir Murray.

c. Conclusion

- 1 Give a short concluding paragraph illustrating how future development of Hong Kong was made possible under Sir Murray's plan.

## Appendix II. Thinking Skills in Science

Subject: Science for Secondary One

Bloom's taxonomy of levels of thinking and ways to help develop these skills:

Level 2	Understanding information	Graphic organisers Generalising Summarising
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To understand a piece of information involves recalling it and applying a strategy that will help us understand it or gain meaning from it. A typical strategy is :

1. To draw a picture summary that displays the key concepts and how they are related to each other. It would be easier for students to form and store accurate mental pictures in their brains for later recall.
2. From the picture summary, students will be able to distinguish things and make generalisations, and sometimes, predictions as well.

A *graphic organiser* is a strategy to help students draw a picture summary of information. It provides a framework for displaying, in some kind of order, key concepts heard or read. It also displays the relationships between these concepts. This unit will focus on the various forms of graphic organiser as listed below:

- a) a Cycle map,
- b) an Overlapping cycle map,
- c) a Concept layer map,
- d) a Spider map,
- e) a Fish bone map,
- f) an Interaction map,
- g) a Network map, and
- h) a Table map.

(As examples, only cycle map and network map are included in this appendix)

# Cycle Map

## Life cycle of a butterfly/moth

There are four stages in the life of a butterfly or moth: egg, caterpillar, pupa, and adult. The caterpillar is the larva or young insect. It has a soft, worm-like body. There are three pairs of true legs behind the head and several pairs of prolegs, or false legs, at the rear end.



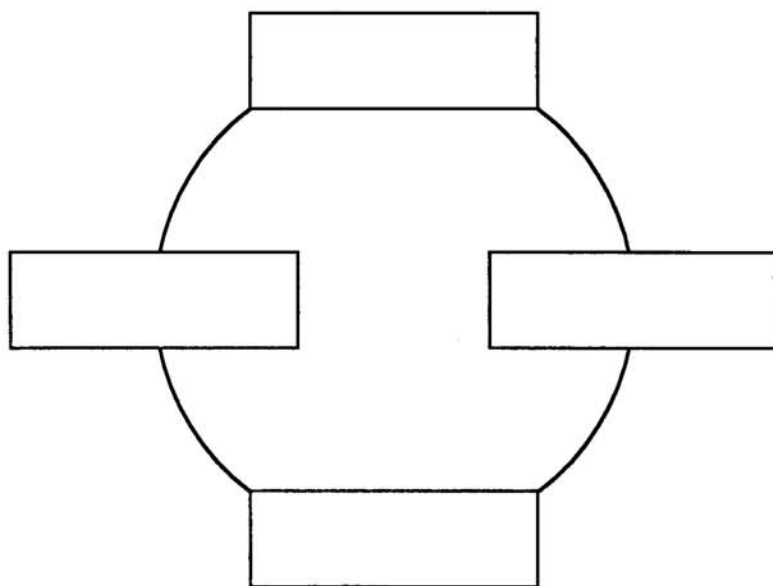
Most caterpillars eat leaves. Some can do great damage to crops. The caterpillar of the clothes moth eats wool, fur, and feathers. Some adult moths and butterflies sip nectar from flowers. Others do not feed and die soon after laying their eggs.



After it has been eating for some time, the caterpillar forms a pupa. The pupa of a butterfly is called a chrysalis. It is a hard case in which the adult develops. When the adult has developed, it crawls out of the pupa. Most moth caterpillars spin a silk cocoon around themselves before turning into a pupa. Cocoons of the silk moth are used for making silk fabrics.



Complete the following Cycle Map:





## Network Map

Read carefully the following information on rats and mice and then see if you can complete the following network map.

Many mammals belong to a group called rodents, or gnawing animals. They have front teeth shaped like chisels that they use to grow through tough food such as nuts, bark, and roots. Squirrels, porcupines, chipmunks, and guinea pigs are rodents, but the most common kinds are the rats and mice.



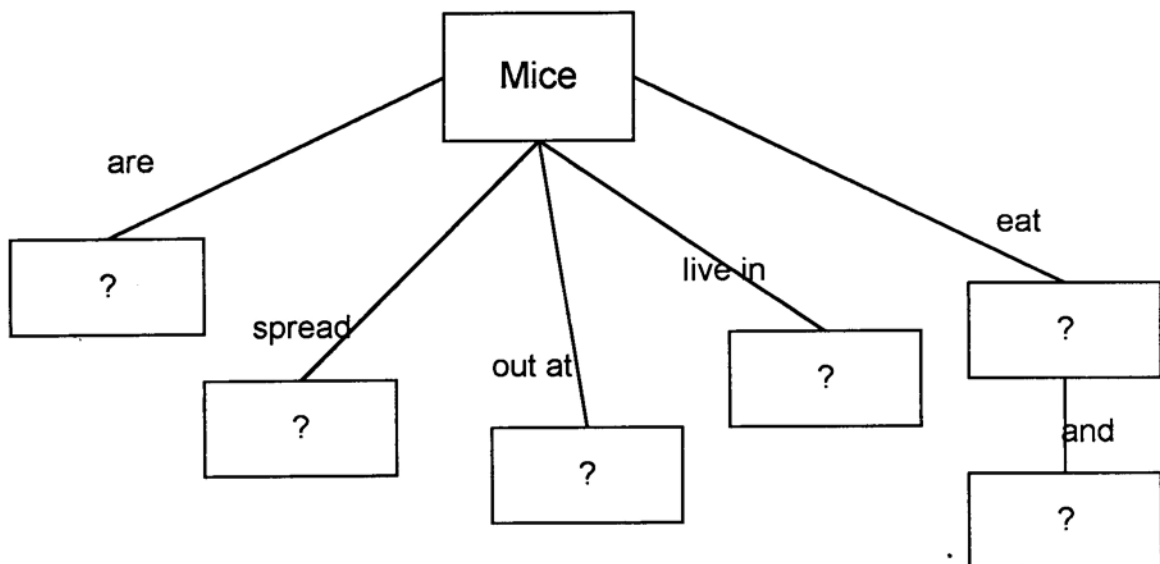
Rats and mice are pests. They eat our food and spread disease. The Black Death was a disease spread by the black rat, which came into Europe from central Asia in the Middle Ages.



Rats have climbed into ships, and have been carried all over the world. The house mouse is another rodent that once lived only in central Asia and is now found everywhere.



There are many other kinds of rats and mice in different parts of the world. They usually live in burrows or among plants and come out only at night. They are seldom seen by man. Yet if crops are grown nearby the rats and mice will probably eat them.



## Appendix III. Extracts from the CDC Syllabus for Liberal Studies

The following extracts from the CDC Syllabus for the subject Liberal Studies indicate some basic skills involved in the Issue-enquiry approach. Teachers will realise that a variety of thinking skills are involved.

### A. Skills that help students to understand an issue

- (i) identify the main ideas of an issue based on available information;
- (ii) consider the issue from different viewpoints;
- (iii) study specific examples relevant to the issue on which ideas are based and from which generalizations may be made;
- (iv) select relevant information and data from books, magazines, newspapers, audio-visual programmes, maps, diagrams, charts specific to a problem to support arguments and explanations;
- (v) interpret simple statistics such as mean, mode, median, ratio & indexes, simple diagrams, charts & maps that provide information related to the issue;
- (vi) be aware of the mode of presenting the information and the methods of investigation which provide the information obtained;
- (vii) analyze the sources of information and be able to evaluate alternative viewpoints and perspective;
- (viii) distinguish facts from opinions relating to an issue.

### B. Skills that help students to enquire into an issue:

- (i) collect relevant information related to an issue by various means such as library research, interview, survey, using the media, etc., for follow-up analysis;
- (ii) use and interpret selectively information from books, magazines, newspapers, reports, statistics, maps, diagrams, charts, radio and television programmes according to the validity;
- (iii) draw inferences from experience and encounters within their family, peer groups and the community.

C. Skills that help students to analyze and evaluate an issue and make decisions:

- (i) identify facts relevant to an opinion or argument concerning the issue;
- (ii) identify different or conflicting position, values and attitudes;
- (iii) determine the completeness and accuracy of information available for evaluation to determine the likely worth of judgement made;
- (iv) develop hypotheses with reference to the data collected;
- (v) evaluate the likely validity of generalization;
- (vi) suggest creative solutions to an issue and to be able to identify the pros and cons of each solution;
- (vii) organize and present information, facts or opinions related to an issue;
- (viii) decide on the possible courses of action and plan which would allow it to be carried out.

D. Skills that help students to communicate effectively in enquiring, analysing and evaluating an issue:

- (i) present ideas orally or in written form in clear and logical manner;
- (ii) present information in form of suitable diagrams, tables or charts.

- END -

