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# Thinking, Thinking Skills and Teaching Thinking Skills

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*Jessie Wong Yuk Yong*

**T**hinking can be defined as using the mind in an active way to form ideas. It is the mental manipulation of sensory input and recalled perceptions, in the form of information and thoughts stored in the memory, to make or find meaning, to reason about or with, to formulate thoughts and to judge. Why do we think? For simple reasons, for example, we need to resolve problems, we need to comprehend a lesson, we need to make decisions and we need to conceptualize something. Thinking helps us to fulfil these needs. It involves complicated mental activities that consist of multilevel processing which makes use of considerable knowledge and information.

All human beings are capable of thinking. I have something for you to think about now. Can animals think? To find the answer to this question, you need to perform a thinking process which requires particular skills which we call

thinking skills. Can we teach thinking skills directly? What are the thinking skills that we can teach? How can we teach thinking skills effectively?

Thinking skills are the discrete, precisely delineated operations used in varying combinations as we think. Many of such skills have been identified such as remembering, distinguishing the relevant from the irrelevant, classifying, predicting, judging, synthesizing, inferring relationships, and making conclusions. These skills are the tools of effective thinking. They are used over and over again to carry out many thinking tasks.

## Teaching thinking skills

There are four things we must be able to do before we are able to teach thinking skills effectively:

- 1 Identify and describe the attributes of thinking skills.
- 2 Design lessons for teaching thinking skills.

- 3 Develop assessments of student proficiency in thinking skills.
- 4 Integrate the teaching of thinking skills into the subject areas in the curriculum.

## Identify and describe the attributes of the thinking skill

The most important features of any thinking skill are often referred to by information processing specialists as *attributes*. A skill attribute is a component of a thinking skill that is engaged or utilized in the process of carrying out that skill. Experts have suggested that the most important attributes typical of most thinking skills are:

- A procedure which consists of a series of steps by which the skill is carried out. A procedure is what one does mentally in doing the skill.
- The rules one follows which inform and guide the execution and application of this procedure.

For example, thinking about as many alternatives as possible before deciding on one, is an important rule in decision making.

- The criteria which are applied in carrying out the procedure as the skill is executed. This is the knowledge required to carry out the skill well. For example, to make a decision on which university to choose to go for a higher degree, some criteria needed will be the cost, the courses available, the location of the university and the entry requirements.

Table 1 is an example showing the attributes of the thinking skill "PREDICTING". How can we identify the attributes of a skill as shown in the table?

Two ways of doing it are:

1. Use a process of reflective analysis, the 3-D procedure, that is, first, you define the skill you have selected. Second, you carry out the process of thinking about the skill yourself. Third, you define the skill in detail.
2. Refer to the specialists' description of the attributes of that skill.

Whether you are using 1 or 2, you would need to revise the description and rewrite it to make it appropriate to your students.

### Design lessons for teaching thinking skills

Once you have identified the major attributes of the thinking skill you wish to teach, you can develop lessons to teach this skill. There are many approaches you could take to help your students become proficient in particular thinking skill. You could, for example, stimulate and encourage students to think by

TABLE 1: ATTRIBUTES OF "PREDICTING"

<p>Definition: Stating in advance what will probably happen, forecasting, extrapolating, foretelling, prophesizing, projecting</p>
<p>Procedure:</p> <ol style="list-style-type: none"> <li>1. State clearly what the prediction is about.</li> <li>2. Collect data relevant to the prediction.</li> <li>3. Recall information that you already know about the topic.</li> <li>4. Identify a pattern in the recalled data.</li> <li>5. Map the perceived pattern on the given data to imagine the next possible instances of the perceived patterns.</li> <li>6. Determine the probability of each imagined outcome actually happening.</li> <li>7. Select the outcome most likely to occur.</li> </ol>
<p>Rules:</p> <ol style="list-style-type: none"> <li>1. When to use? In hypothesizing about any topic In forming new categories...</li> <li>2. How to start? Ask yourself what would happen next? Arrange the data ...</li> <li>3. What to do if ... Little relevant information exists? It is difficult to generate possible outcomes?</li> </ol>
<p>Criteria:</p> <ol style="list-style-type: none"> <li>1. Comparing, contrasting.</li> <li>2. Various types of patterns.</li> <li>3. Probabilities.</li> <li>4. Potential intervening conditions, variations, influences related to the subject.</li> <li>5. Historical, analogical situations.</li> </ol>

asking thought-provoking questions and by concentrating on subjects of interest to them. Or you could foster and facilitate thinking by asking carefully structured questions that move from data gathering to data processing or by providing inquiry-oriented classes. Or you could exercise student thinking by making students respond to questions, research tasks, or written assignments requiring different kinds of thinking. However, none of these approaches teach students directly how to carry out the thinking skills they are required to use when they respond to the questions you may ask them, the tasks you may assign them, or the opportunities and encouragement you may offer them. Students

benefit most from encouragement, teacher facilitation, and exercise when these are coupled with deliberate, systematic instruction in how to carry out the skill being learned. There are six kinds of lessons that can be useful in teaching a skill at different levels of proficiency.

#### 1. Introduction lesson

Instruction in any thinking operation may be initiated whenever a teacher senses a need for students to be able to execute it better than they seem able to do. The purpose of this lesson is to introduce students to the major attributes of a new skill at simplified level. Instruction here focuses directly on the thinking skill being introduced as students not

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only see the operation modeled but also have one or more opportunities to engage in it with appropriate teacher guidance. Introductory lessons like this do not, by themselves teach a skill. It only serves as a starter to launch the study of this skill.

### *2. Guided Practice lesson 1*

Once a thinking skill has been explicitly introduced, students require many more lessons of guided practice to learn it. Unlike introductory lessons in which students must focus exclusively on the operation, guided practice lessons allow time and opportunity to deal with the subject matter used in the lesson and the substantive products of skill use. After discussing and analysing how the thinking operation being practiced was employed, students can then use the insights generated by their application of it to carry forward the subject matter learning in which they are engaged. Gradually, as students become more proficient with the new thinking skill, you can reduce the amount of explicit guidance to eventually little, if any, skill instruction.

### *3. Independent application lesson*

As students demonstrate an ability to execute the thinking operation being practiced without assistance, you can then provide them repeated opportunities to use it on their own. These applications should continue to be in the same kind of data or subject matter in which the operation was originally introduced or practiced. When students independently apply the skill as specifically required by you, they integrate the various steps in the procedure by which it is made operational, and they begin to internalize the rules, principles and other knowledge that inform it. Such

application is an important step en route to automatizing a thinking operation and to taking ownership of it. Once the students have demonstrated that they can do it on their own, you can then offer additional instruction designed to help them apply the operation in a variety of settings to transfer it beyond the introductory setting.

### *4. Transfer and elaboration lesson*

Transferring a thinking operation consists of helping students learn how to execute a previously learned skill in new settings. This means helping them identify the cues in these settings that signal the appropriateness of using the operation. Lessons that launch such transfers are reintroductions of the thinking operation but in new situations. In these reintroductions, students review what they have already known about the operation being learned and then receive instruction in how to execute it in the new setting.

### *5. Guided Practice lesson 2*

Once a thinking skill has been initially transferred to a new context, it must be practiced again until students demonstrate proficiency in using it in the new context. This is a repetition of guided lesson 1 but in a new setting.

### *6. Autonomous Use lesson*

Being able to use a thinking skill to generate knowledge on one's own, is the major goal of the teaching of skill. Students at this point need guidance and practice in selecting which operations to use as well as in applying them accurately, efficiently and effectively. This kind of lesson should provide them opportunities to do so.

**Develop assessments of student proficiency in thinking skills**

Anything worth teaching in depth is worth assessing. This is especially true of thinking skills. Such assessment should be frequent and continue throughout your course. Currently there are few instruments to assess thinking skills. These include process portfolios, performance assessments, group and individual assessments, and paper-and-pencil assessments. These instruments should vary in structure and content according to which level the students are at in learning the skill to be assessed. A test on a newly introduced thinking skill should focus exclusively on the skill and use data from that portion of the course just completed by the students. This test, consisting of five or six items, may be attached to the regular unit test usually used to assess student learning of that content. This might include two items about the skill, one calling for a definition of it and the other calling for recognition that it is being used; three items that require students to apply the skill to data they know something about and to show how they do it; and finally an item asking them to explain to a novice how to do the skill. Observational instruments may also be used to assess student proficiency in thinking skills. Table 2 shows an example of a test for the skill of "classifying".

You can learn how to write any instrument to assess student proficiency in thinking skills by doing the following:

- 1 Select the instrument you wish to use
- 2 Analyse examples of the kind of instrument you want to prepare
- 3 Draft the instrument yourself
- 4 Check and revise your draft
- 5 Administer the test at an appropriate time, analyse the results and revise it for later use.

**Table 2: A test for the skill of "classifying"**

1. Which of the following best defines the skill of "classifying"? (a) to arrange things in the order in which they occur (b) to put together things having a common characteristic (c) to put together names alphabetically
2. Which of the following shows information that has been classified? (a) People - Indian, Malay, Chinese Animal - monkey, elephant, lion, cat, deer Plant - ixora, oil palm (b) When Tom woke up this morning, he brushed his teeth and ate his breakfast. He went to school with his friend. But he did not feel well. He returned home almost immediately.
3. The following are words associated with food: tasty, too salty, bacon, orange juice, rice, soft, fish, peanut butter, bread, soup, jam, strawberry jam Classify them into 3 different groups.
4. Tell the class the steps you have followed to classify the items in question 3.
5. Give a list of other items not related to question 3. Try to classify them into groups. Explain how you can do it. Explain why you did it the way you did.

### **Integrate the teaching of thinking skills with subject matter**

Once you have learned how to teach the various kinds of lessons for teaching thinking skills and use the strategies appropriately, and feel comfortable in doing so, you will want to integrate instruction in thinking skills into your regular teaching. This means mixing the two to the point where they complement and support each other. By infusing instruction in thinking skills with the teaching of academic subjects, you can provide instruction in important thinking operations at a time when they are needed to accomplish subject-matter learning objectives.

Integrating the teaching of thinking skills in subject matter is not without difficulty, however. All too often attention to subject matter overwhelms skill teaching. In integrating instruction in thinking skills with instruction in subject matter, you should, in your first few lessons on any new thinking skill,

concentrate on the skill rather than on any subject matter. In the subsequent lessons, when the students are able to use the lessons well enough, attention can be given equally, first to how they carry out the skill and then to what they learn by so doing. Eventually, focus is given almost exclusively to subject matter objectives while students apply this skill because they can do it well. In this way, your students learn both the subject matter and the skills. In fact, with the skills mastered, they learn the subject matter more effectively.

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