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Introduction

A glance at the cover of this book will show that complex thinking can take many qualitatively different forms. While the elements of critical and creative thinking have traditionally been recognised as forms of high order thinking, I believe it is equally important that one also includes the third component – that of caring thinking.

While the three identified forms of complex thinking may be considered independently, they do not, by definition, need to be seen as mutually exclusive. As Figure 1 suggests, the merging of the three concepts may best be depicted on a Venn Diagram. Here it can be seen that there is an intersection between all three elements of complex thinking. One can think creatively about caring issues and hence an overlap of these circles. One could think critically about caring issues and hence an overlap of these circles. Accepting and rejecting ideas and deciding between alternatives (i.e. critical thinking) is a necessary step towards creative production and hence an overlap of these circles.

The cover also depicts a question mark in the centre of the circles. Figure 1 reveals what I believe is at the heart of all forms of complex thinking. The ability to deconstruct an idea, a concept or an object according to its attributes, elements or constituent parts can be seen as an essential component inherent within all three forms of complex thinking. This process of looking at discrete pieces in greater detail in order to achieve a better understanding of the whole is most often referred to as analytical thinking.

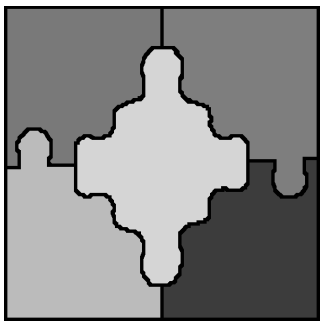
To my mind, this form of thinking is a crucial, integral part of all other forms of complex thinking – whether we are considering thinking of a critical, creative or caring nature. It is at the very heart of all good thinking.

The sections that follow provide examples of approaches to the teaching of the four components of complex thinking.

When infused with the teaching of relevant and appropriate content, the application of these strategies can be seen as an empowering process. They equip students with a range of tools that can be readily transferred to other learning situations with the potential to become tools for lifelong learning.

The emphasis within each section is the description of simple techniques that can easily be applied by students. Some strategies involve the use of acronyms that will assist with easy recall and long-term retention.

What is Analytical Thinking?

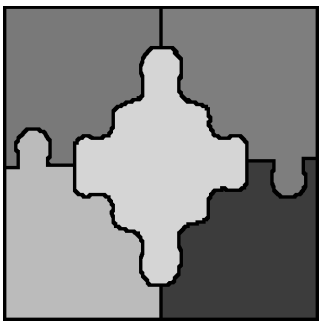


Analytical thinking is the process used in order to gain a better understanding of something by paying close attention to the parts that go to make up the whole.

Analytical thinking is particularly useful when considering:

- intricate systems
- causes and effects
- complicated concepts
- similarities and differences
- the interrelationship of
  - events
  - ideas
  - people
  - concepts
- sequences of events
- steps within a process.

What is Involved in Analytical Thinking?



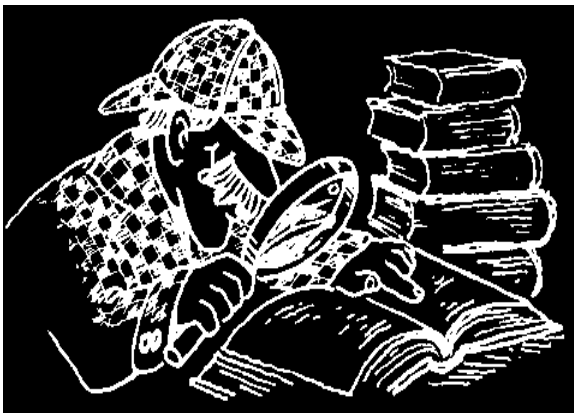
Analytical thinking may involve students in tasks such as:

1. Describing attributes
   e.g. SCUMPS (size, colour, use, materials, parts, shape)

2. Comparing/contrasting and classifying/categorising
   e.g. using Venn diagrams

3. Using graphic organisers such as:
   a. Concept maps
   b. Mind maps
   c. Fishbone diagrams
   d. Flow charts
   e. Lotus Blossom Diagrams

4. Working at the Analysis level of Bloom's Taxonomy.



There are many resources commercially available that cover the vast range of graphic organisers frequently used by teachers and students. Examples of readily available texts of this genre have been listed in the reference section of this publication.

1. Describing Attributes

Attribute listing is a highly analytical task. It involves students in describing inherent qualities or features of objects. A useful tool that we can share with students that will add structure to an attribute listing activity is the acronym - SCUMPS. When SCUMPS is applied, students are asked to consider the object under analysis in terms of its:

SIZE - relatively (bigger than a… / smaller than a…)
- comparatively (about the size of…)

COLOUR - or colours commonly associated with the object

USE - or uses most often associated with the object

MATERIAL - or materials commonly used in the construction

PARTS - the individual elements that make up the whole

SHAPE - or shapes within.

Clearly, simply describing an object in terms of its SIZE, COLOUR, USES, MATERIALS, PARTS and/or SHAPE could not be considered a very productive form of thinking – nothing particularly useful will occur if listing the attributes of an object is all that we do. Certainly, what we will gain is a better insight and understanding of the object.

However, having identified the attributes of an object, we can turn this activity into one with a creative (and productive) focus by asking 'What if…' questions. For example, imagine students were asked to list the attributes of a pencil, the chair they were sitting on or a telephone.

The teacher may then ask, 'How might we improve the design of this object by changing some of its attributes? What if…'

'What if...' this object was a **different** size?
Would this improve the design of the object?

'What if...' we changed the size so that the object was...
- twice as big, twice as small
- ten times bigger, ten times smaller
- a hundred times bigger, a hundred times smaller?

*Might this change **the way we use** the object?*
*Can we think of a **new use** for the changed object?*

'What if...' this object was a **different** colour or different colours?
Would this improve the design of the object?
*Might this change **the way we use** the object?*
*Can we think of a **new use** for the changed object?*

'What if...' this object was a different size?
Would this improve the design of the object?

'What if...' we didn't use the object in the way it was intended?
*Can we brainstorm some **new uses** for the object?*

'What if...' this object was made from **different materials?**
Would this improve the design of the object?
Can we make it cheaper?
Can we make it more durable?
Can we make it more long lasting?
Can we make it more versatile?

'What if...' we **increased or reduced** the number of parts within?
Would this improve the design of the object?