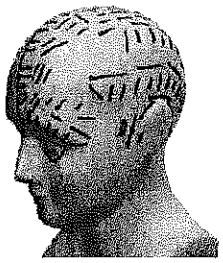
Getting the HOTS for Inquiry



Jan-Marie Kellow

Good Thinking Definition:

Thinking Skills +

Thinking Dispositions +

Understanding of Knowledge

Source: Yoram Harpaz (2003) Approaches to teaching thinking: Towards a conceptual mapping of the field
www.learningtolearn.sa.edu.au/Colleagues/pages/default/harpaz/

Thinking Dispositions

Attitudes and inclinations that link skills and action.

Cultivated by
- personal example (modelling),
- cultivating activities (e.g. inquiry research)

Example: Costa's habits of mind (www.habits-of-mind.net/)

Thinking skills

Techniques and strategies used to develop processes and efficiency of thinking (quick & precise).

Cultivated by explicit teaching, preferably in context.

Examples: Perkins & Swartz' graphic organisers
De Bono's CoRT.

Explicit teaching in Context

"An essential element in developing a thinking culture will be the explicit teaching of thinking skills to all students"

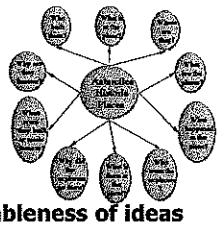
Michael Pohl 1997

"Skills must be imparted in an authentic context in which learners-researchers experience them as essential for developing their understanding"

Yoram Harpaz

Types of Thinking

- **Generating ideas**
  - Generating possibilities
  - Creating metaphors
- **Clarifying ideas**
  - Analysing ideas
  - Analysing arguments
- **Assessing the reasonableness of ideas**
  - Assessing basic information
  - Inference

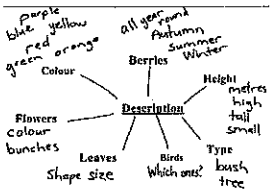


Source: Dr Robert Swartz www.nctt.net

Generating ideas

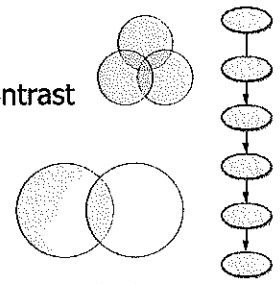
Generating Possibilities

- **Brainstorming**
- **SCAMPER**
  Substitute,
  Combine,
  Adapt,
  Modify/Distort,
  Put to Other Purposes,
  Eliminate,
  Rearrange/**R**everse
- **Thinker's Keys** e.g. What if..? (Tony Ryan)



Clarifying Ideas
- Analysing Ideas

- Definitions
- Classification
- Compare & Contrast
- Sequencing
- Parts/Whole



Source: Dr Robert Swartz www.nctt.net

Parts-Whole Relationships

- What smaller things make up the whole?
- For each part, what would happen if that part was missing?
- What is the function of each part?
- How do the parts work together as a whole?

Adapted from strategies by Robert Swartz & Sandra Parks

FISH

- What are the smaller parts that make up the whole fish?
- What would happen to the fish if one part was missing?
- What is the function of each part?
- How do the parts work together as a whole?

Further Examples

- Parts of a habitat e.g. rocky shore
- Societies/Communities e.g. function of various people within a community and their contribution to the whole
- Any living thing
- Solar system
- Historical events
- Design elements
- Music

Clarifying Ideas
- Analysing arguments

- Finding Reasons/Conclusions

-What reasons does an author give for their conclusions?

-Are those reasons valid?

- Uncovering assumptions

- what assumptions have been made?
- what are those assumptions based on?

Source: Dr Robert Swartz www.nctt.net

Assessing the Reasonableness of Ideas

Assessing Basic Information

- Accuracy of Observation
- Reliability of Sources

Source: Dr Robert Swartz www.nctt.net

Reliability of Sources

- When and where is the information from?
- Where/how did the source get their information?
- What expertise and biases does the author have?
- Can you confirm this information from other sources?

Use 'Henny Penny' with younger students

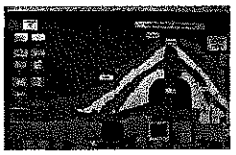
Inference

- **Use of Evidence**
  - Causal explanation
  - Generalisation
  - Prediction

Source: Dr Robert Swartz www.nctt.net

Prediction

- What might happen?
- What evidence is there that this might happen?
- How likely is the prediction?



Thinking Processes

- Decision making
- Problem solving

"Too often we... enjoy the comfort of opinion without the discomfort of thought."
John F. Kennedy

Decision-making

- Why do I need to make this decision?
- What are my options? (Generate Possibilities)
- What are the likely consequences of each option? (Prediction) (PMI)
- How important are the consequences?
- Considering the consequences which option is best?

Adapted from strategies by Robert Swartz & Sandra Parks

Decision-making Matrix

Example: Choosing the best way of generating electricity

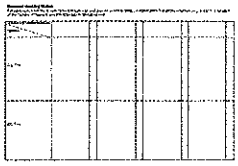
Consequences / Options	Costs	Environmental Effects	Other factors
Hydro-electricity			
Nuclear Power			
Wind Power			

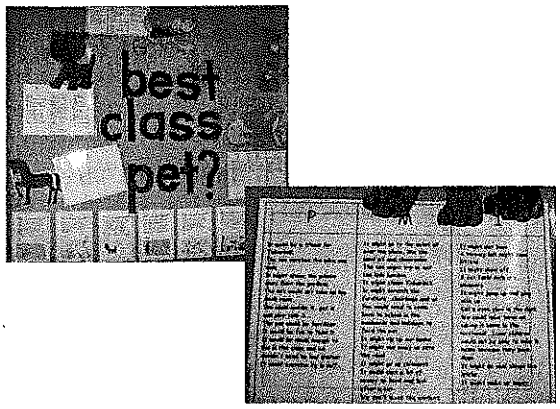
Put + or - beside each consequence to indicate whether a positive or negative consequence. Consequences can also be weighted according to importance.

Which City

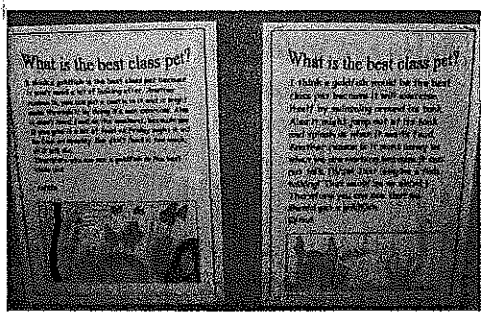
Scenario:

You have been offered a job in another city that pays more money than your current job. You need to decide whether to take the job or not.





Reasons/Conclusions



Problem-solving

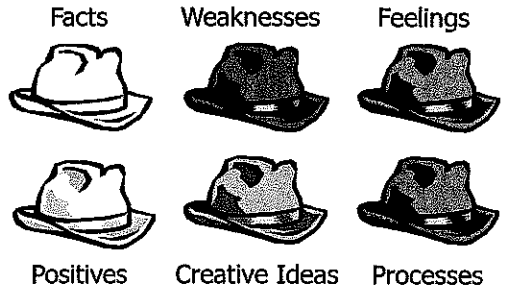
"No problem can withstand the assault of sustained thinking"

Voltaire

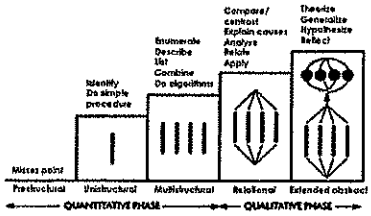
Problem-solving

- Define the problem
- Generate possible solutions (Brainstorm)
- Investigate possible consequences of each solution (PMI) (Values)
- Select best solution

Thinking Hats



SOLO Indicative Verbs



www.tlc.murdoch.edu.au/gradatt/objectivesBefore.html#figure3_2

Example: Fairytale Animals

- **Uni-structural:** Which animals in the story were talking?
- **Multi-structural:** What things in the story tell you that the animals aren't real animals?
- **Relational:** What do the animals' actions tell us about the author's beliefs?
- **Extended Abstract:** Why do many fairytales have animals acting in a human fashion?

Tony Ryan's Tips

- Role **model** your own thinking
- Encourage awareness of **self-talk**
- Show your class **how their brain works**
- Create a **positive thinking disposition**
- Encourage questions
- Authentic rich experiences

Source:
www.thinkerskeys.com/cms/pages/BM_Menu/Free+Material/Classroom+Support/!/display.html

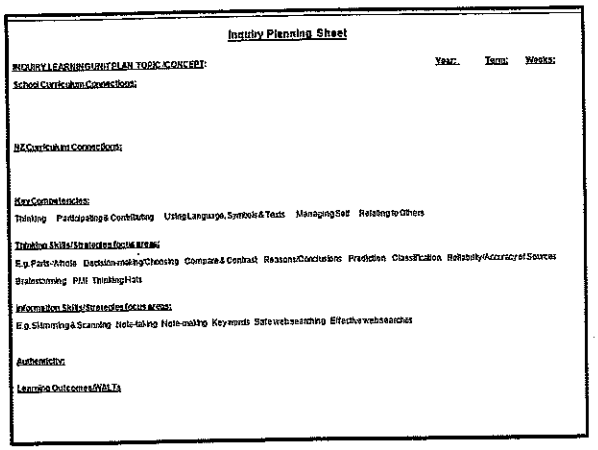
Reflective Journal

Parts-Whole Relationships

1. What smaller things make up the whole?
2. For each part, what would happen if that part was missing?
3. What is the function of each part?
4. How do the parts work together as a whole?

Graphic Organisers

- www.sdcoe.k12.ca.us/score/actbank/torganiz.htm
- www.graphic.org/goindex.html
- www.greece.k12.ny.us/instruction/ela/6-12/Tools/Index.htm
- www.eduplace.com/graphicorganizer/
- www.educationworld.com/tools_templates/index.shtml#graphicOrganizers
- www.enchantedlearning.com/graphicorganizers/star/



Inquiry Planning Sheet

INQUIRY LEARNING/UNIT PLAN TOPIC/CONCEPT: Year: Term: Weeks:

School Curriculum Connections:

NZ Curriculum Connections:

Key Competencies:

Thinking Participating & Contributing Using Language, Symbols & Texts Managing Self Relating to Others

Thinking Skills/Strategies focus areas:

E.g. Parts-Whole Decision-making/Choosing Compare & Contrast Reasons/Conclusions Prediction Classification Reliability/Accuracy of Sources Brainstorming PMI Thinking Hats

Information Skills/Strategies focus areas:

E.g. Skimming & Scanning Note-taking Note-making Keywords Safe web searching Effective web searches

Authenticity:

Learning Outcomes/WALTs

Resources

- **www.inquiringmind.co.nz/Thinking.htm**
- Birkdale Intermediate www.bis.school.nz/index.php?option=com_content&task=view&id=54
- "Infusing the teaching of Critical and Creative Thinking into Content Instruction" by Robert Swartz & Sandra Parks (The Critical Thinking Co.)
- Solo Taxonomy www.tki.org.nz/r/assessment/atol_online/ppt/**solo-taxonomy**.ppt
- Thinker's Keys www.thinkerskeys.com/cms/pages/BM_Menu/Thinkers+Keys/Free+Thinkers+Keys+for+Kids/1/display.html

DETERMINING PARTS-WHOLE RELATIONSHIPS

THE WHOLE OBJECT

PARTS OF THE OBJECT

PART CONSIDERED

WHAT WOULD HAPPEN TO THE OBJECT IF THE PART WERE MISSING?

WHAT IS THE FUNCTION OF THE PART?

Decision Making

Notes from 'Infusing the teaching of Critical and Creative Thinking into Content Instruction" by Robert Swartz & Sandra Parks (The Critical Thinking Co.)

Introducing the thinking strategy: Decision Making

1. Ask the class to think about a time they had to make a decision. Discuss with partner. Share examples.
2. Introduce the strategy: "When you think about what to do, your thinking is called '**decision-making**'. The different choices you have are called **options**.'
3. Share with your partner what you decided to do and how you figured out the best thing to do.
4. "When deciding what to do the things that might happen are called **consequences**."
5. Discuss with your partner some of the consequences you thought about.
6. "When making decisions we have **reasons** for expecting certain consequences"
7. Discuss your reasons for thinking your decisions might have the consequences you discussed.
8. "When making a decision some consequences are more important than others. You can give consequences a rating from 1-5 depending on how important they are. When you have thought about the **important consequences** you are ready to make a choice."

Lots of inquiries lend themselves to this thinking skill. Additionally it can be great for critical thinking in your reading programme.

Read a passage from a suitable book eg. Charlottes' Web by E.B. White and Horton Hatches the Egg by Dr. Seuss, numerous fairy tales. Get students to list decisions made by the characters.

Certain books lend themselves exploration of the choices made by the characters. Students can look at a decision a character made and the choices they had, the consequences of those choices and reasons (from the book) that lead them to think that is a possible consequence. They can then decide what decision they might have made.

Alternatively you can read the book (or give them a section to read) and stop before the character makes the choice and get students to decide.

Some questions for students to answer (ref: p.39-40):

- Why is a decision needed?
- What are the options (What are the choices)
- What are the likely consequences of each option (What might happen if I do these things?)
- How important are the consequences?
- Considering the consequences, which option is best? (What is the best thing to do?)

Decision-making Matrix

For each option list the 4 main factors to consider and give each one a rating on importance. List all the information you can find for each of the factors. If relevant give the information ratings as well.

Factors & Consequences / Options								