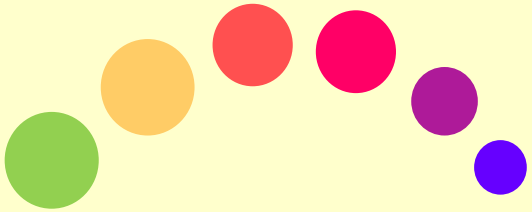


SPECIAL EDUCATION
SUPPORT SERVICE
building on ability

The Metacognitive Teacher and Learner: Teaching to Think, Learning to Learn

An Introduction to Metacognition and its role in teaching and learning with particular reference to students with individual learning needs

Intended Outcomes

Participants will:

- be familiar with the full meaning of the term *Metacognitio*n
- know how general metacognitive approaches may be used to support thinking and learning, in all subject areas and for different age and ability levels
- understand and appreciate the relevance of *Metacognition* to students with individual or additional educational needs (AEN) at individual and collective level
- understand and appreciate the importance of metacognitive thinking in their role as reflective teachers

Cognition

- Learning
- Understanding
- Questioning
- Remembering
- Concept forming
- Planning
- Imagining
- Problem solving
- Decision making
- Evaluating

'Thinking has to be learned in the way that dancing is learned'

(Nietzsche)

Learning to Think: Senior Cycle

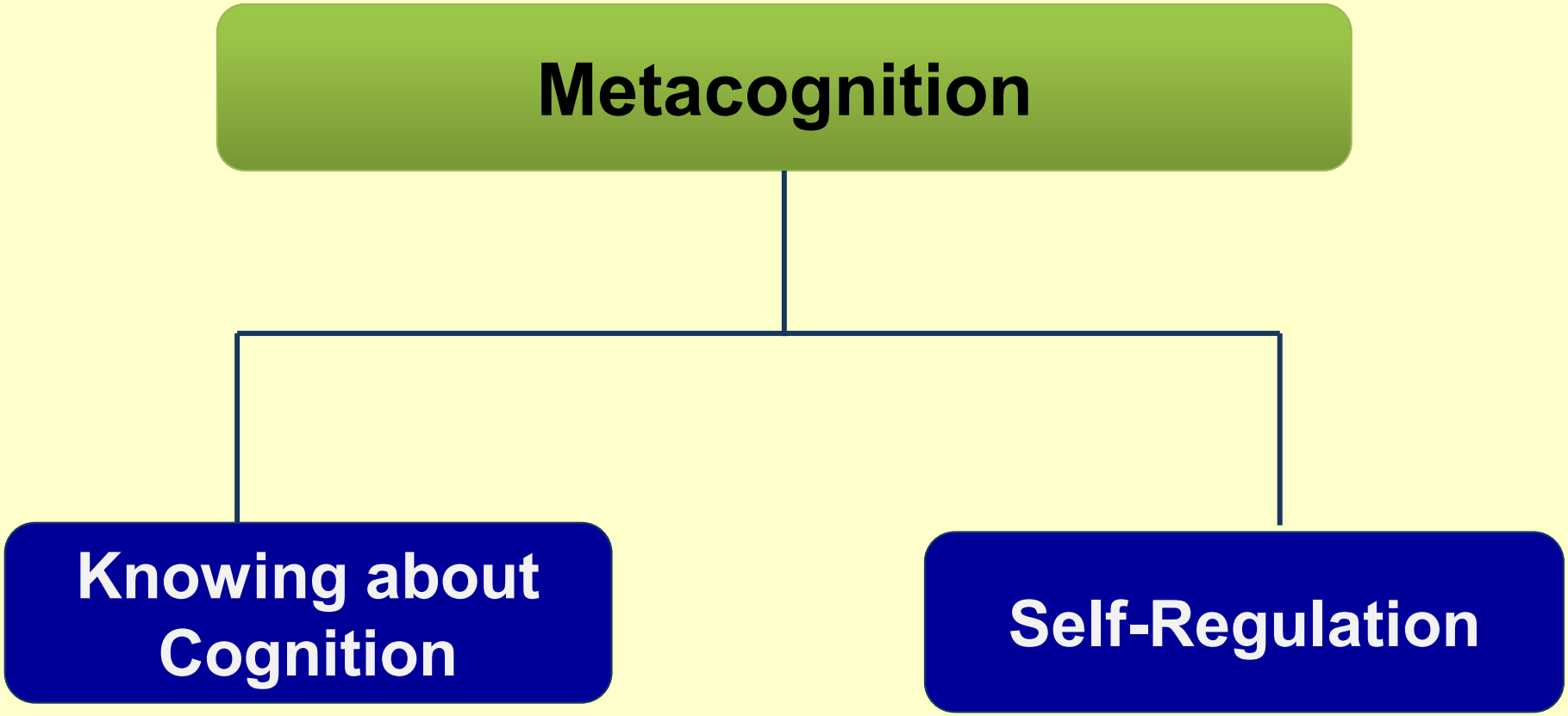
The ability to think critically and creatively, innovate and adapt to change, to work independently and in a team, and to be a reflective learner are prerequisites for life and for the workplace in the 21st century.

(Senior Cycle Key Skills Framework: p.2)

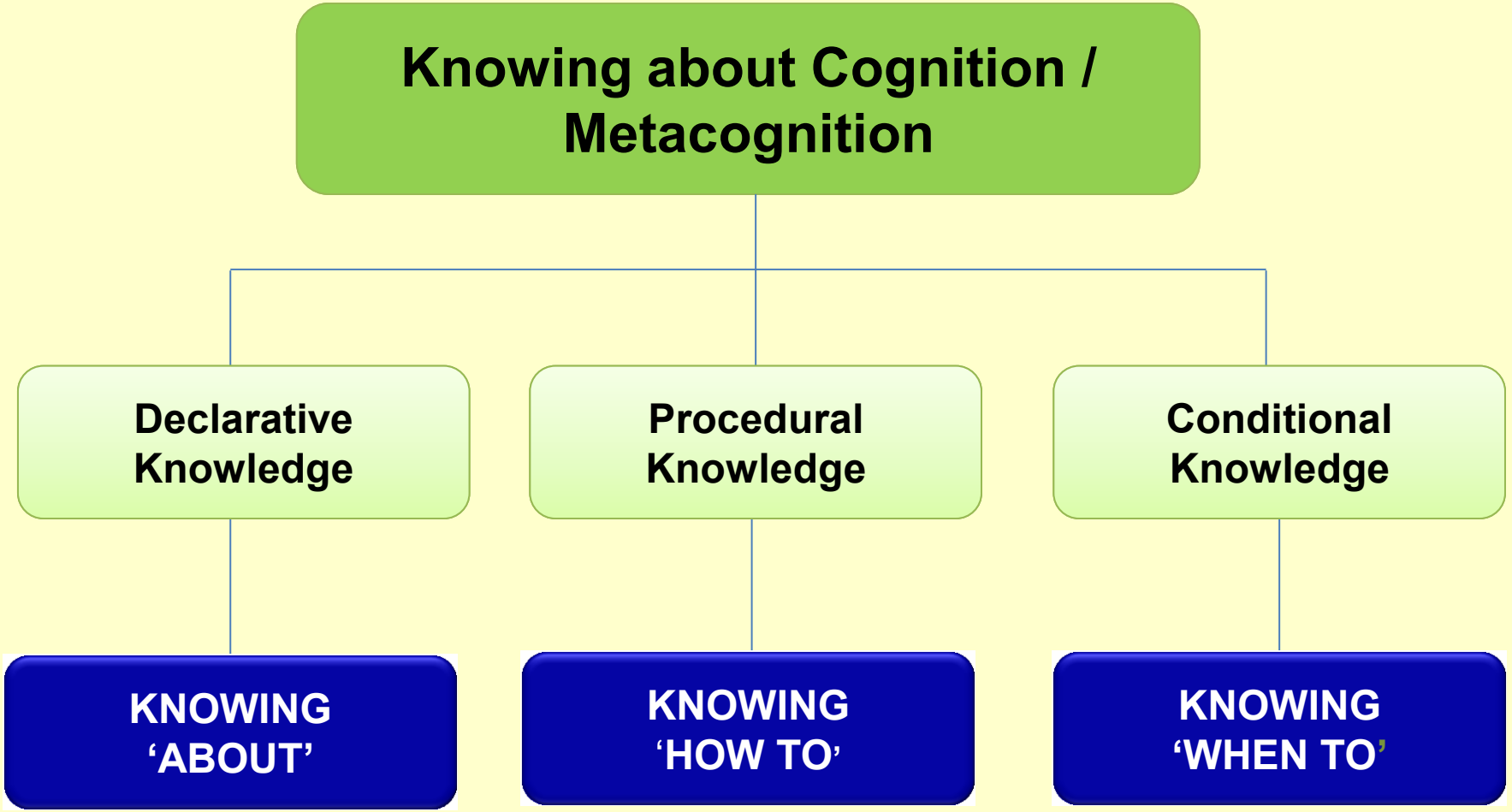
Cognition → Metacognition

- Metacognition refers to the active control of the thinking processes involved in learning
- It plays a critical role in successful learning
- Students with better metacognitive abilities tend to be more successful learners

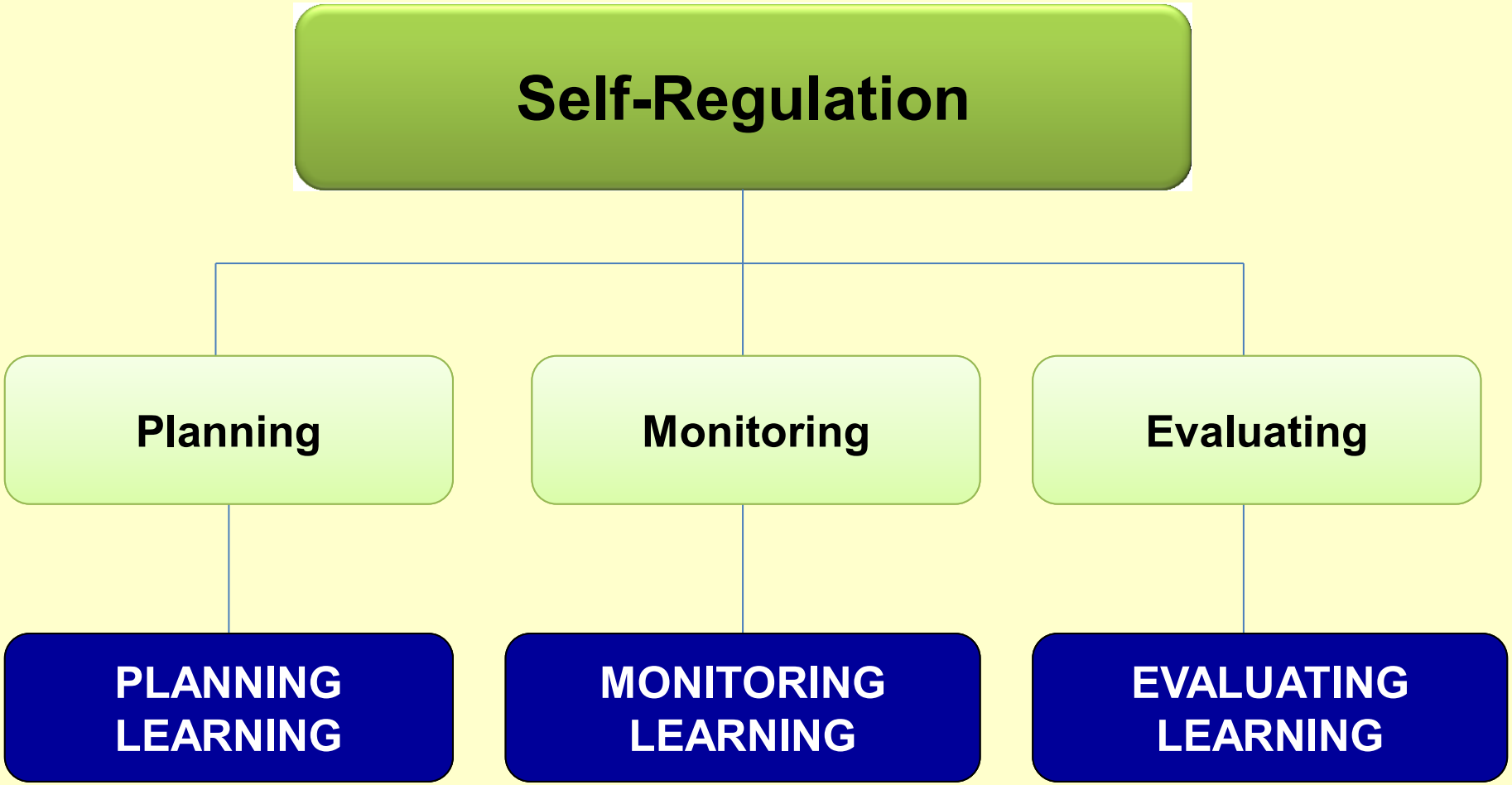
The Twin Aspects of Metacognition



Metacognitive Knowledge



Metacognitive Self- Regulation



EXAMPLE OF A REGULATORY CHECKLIST

PLANNING

What is our goal?
What information do we need?
What strategies can we use?
What resources do we need?
How much time will the task take?

MONITORING

Do we understand what we're doing?
Is this strategy working?
Are we making progress towards our goal?
Are we answering the questions?
Do we need to make changes?

EVALUATING

Did we reach our goal successfully?
Did we need to change the approach that we began with?
What worked? What didn't work?
Would we do anything differently next time?

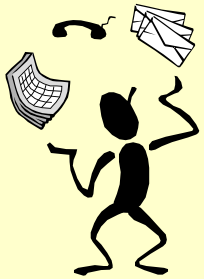
Based on Schraw 1998: 121.

Metacognition in Everyday Life!

- Consider for a moment how you use metacognition in your everyday life
- **Think about your knowledge and understanding of your own thinking**
- Think about 'thinking strategies' that you use in everyday life
- **Consider times when you use metacognitive self-regulation**
- Share your thoughts with your neighbour

The Importance of Metacognition (1)

- Content learnt in school may be quickly forgotten and may quickly become irrelevant
- The future is unpredictable



- We must equip students for this future by supporting them in becoming independent, critical, flexible and creative thinkers and learners

The Importance of Metacognition (2)

- Metacognition fosters development.
- Students who have been taught metacognitive skills learn better

- Students with good metacognitive skills are better critical thinkers, problem solvers and decision makers (Bransford et al.,1986; Ewell-Kumar, 1999; Heath, 1983)
- Metacognitive training can increase students' self confidence and sense of personal responsibility for their own development. (McCombs and Marzano,1990; Schunk,1990)

Vygotsky

‘If one changes the tools of thinking available to the child, his mind will have a radically different structure.’

(E. Berg, *Vygotsky’s Theory,* p. 46)

Metacognition

- **shapes active rather than passive learners**
- **gives students a sense of control over their learning**
- **enables learners to learn how to learn**
- **assists students in becoming self-directed learners**
- **promotes 'deep learning'**

'…involvement in shaping their own learning can heighten children's awareness of themselves as learners and encourage them to take more personal responsibility for, and pride in, their learning'.

(NCCA, 2007).

Assessment for Learning and Metacognition

Assessment for Learning emphasises the role that the child can play in her/his own learning by:

- **involving the child in deciding learning outcomes**
- **helping them to identify progress**
- **highlighting challenges**
- **reflecting on ways to improve in the future…**
- **metacognitive skills are key in supporting pupils' own monitoring and evaluation of their work**

Learning Goals

Share the learning aim of each lesson and the learning intention in each task

Give clear success criteria for each learning task

Enable students to check and comment on each others' work, using the success criteria

Encourage students, in pairs or small groups to engage in reflective evaluation of the work and learning they have done

Your mind *is* like a sponge that absorbs knowledge, but that's not *exactly* how it's done!

Teaching Metacognition

STRATEGIES TO SUPPORT THINKING IN THE CLASSROOM

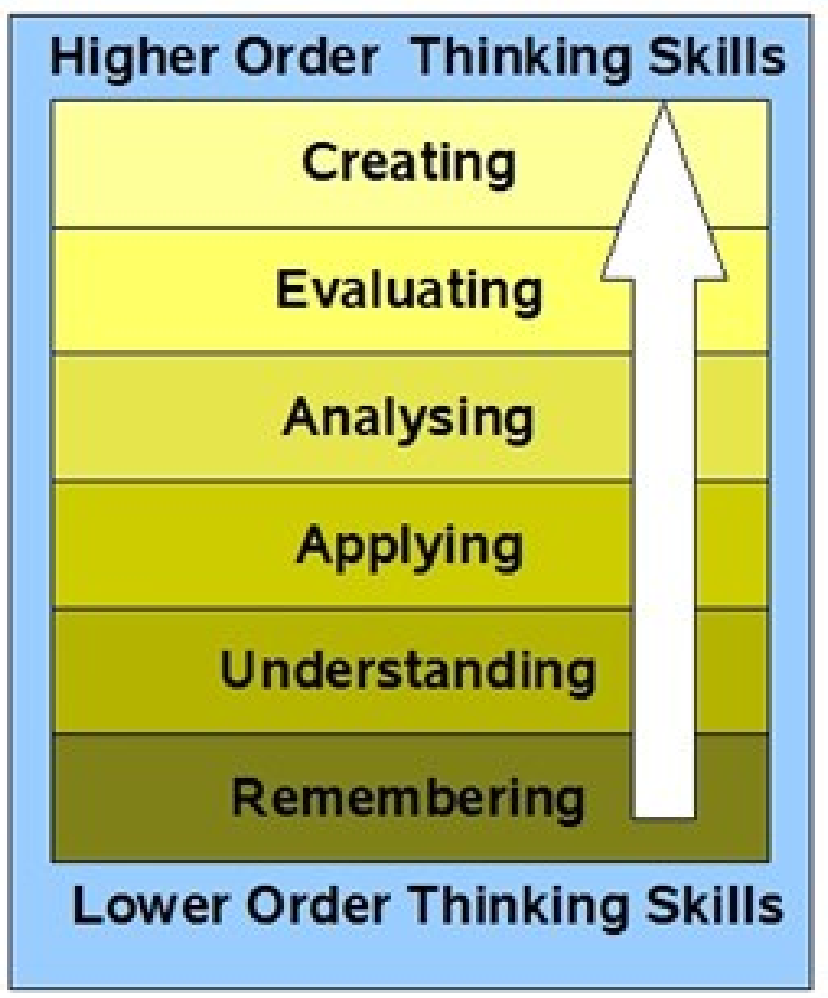
Some Dimensions of Thinking

- Cognitive
- Enquiry Methods
- Modalities of Learning
- Dispositions
- Creativity

Some Strategies to Promote and Support Thinking in the Classroom

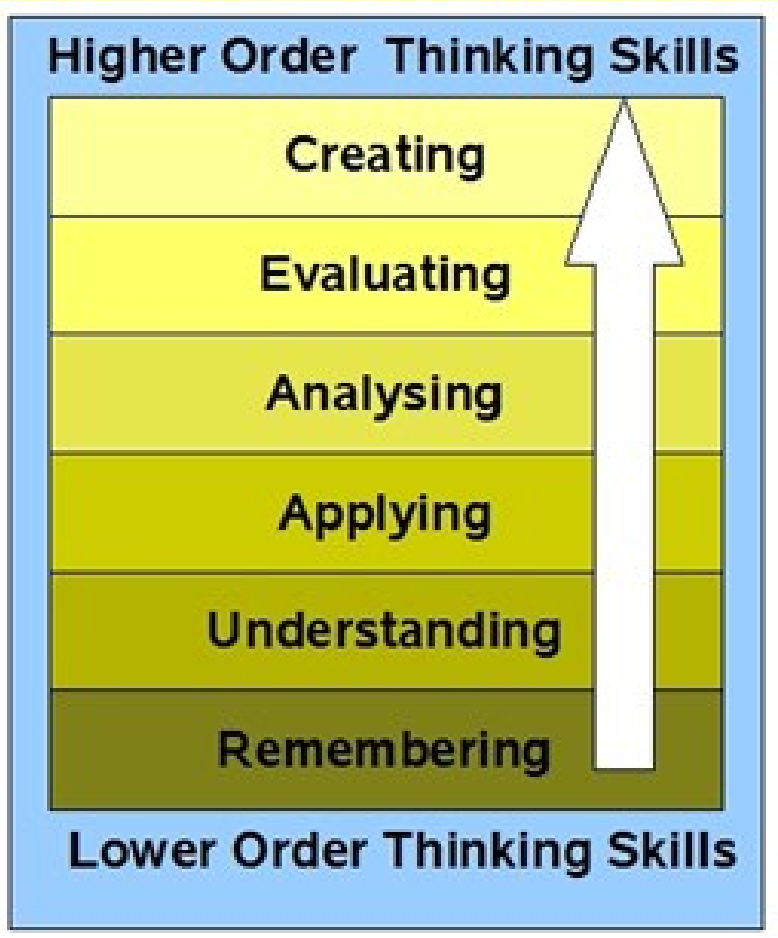
- Using Bloom's Taxonomy to promote Higher Order Thinking
- Developing a common language of thinking
- Metacognitive Questions
- Enabling Authentic Classroom Discourse
- Ryan's Thinkers Keys

Thinking in the Classroom: Using Bloom's Taxonomy

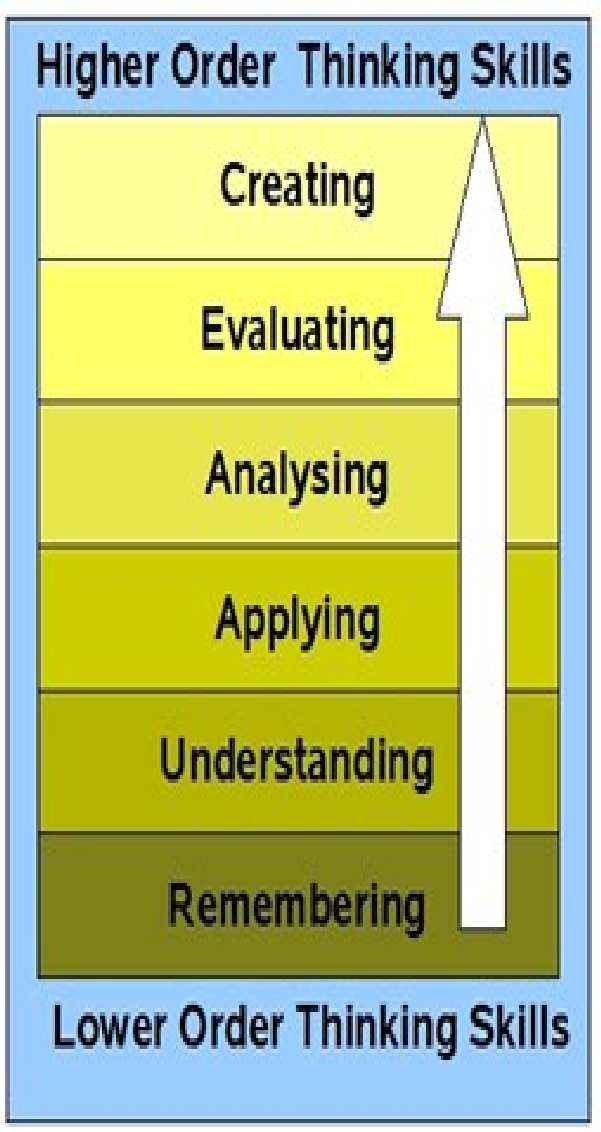


Thinking in the Classroom: Bloom's Taxonomy

- Model forming different levels of questions on different texts
- Ask students to make up their own questions, about texts or about the topics they are studying, at the different levels of thinking
- Ask students to identify the level of the question that they are going to answer before beginning work.
- Always model first



Thinking in the Classroom:



What would happen if…? Rewrite the story from another point of view

Pick two images that in your opinion effectively convey the mood of the poem. Explain your choice.

How does the writer…? What is the theme of this novel?

What strategy could you use to…? Pick out three uses of figurative language…

Explain why…; Write a brief summary; What was the main idea?

Tell what happened; Can you name? How many…?

Bloom's Taxonomy

Thinking in the Classroom: Language

Thought is not merely expressed in words; it comes into existence through them

(Lev Vygotsky, *Thought and Language* : 218).

Thinking in the Classroom: Using the language

Examples of key words in teaching thinking and learning

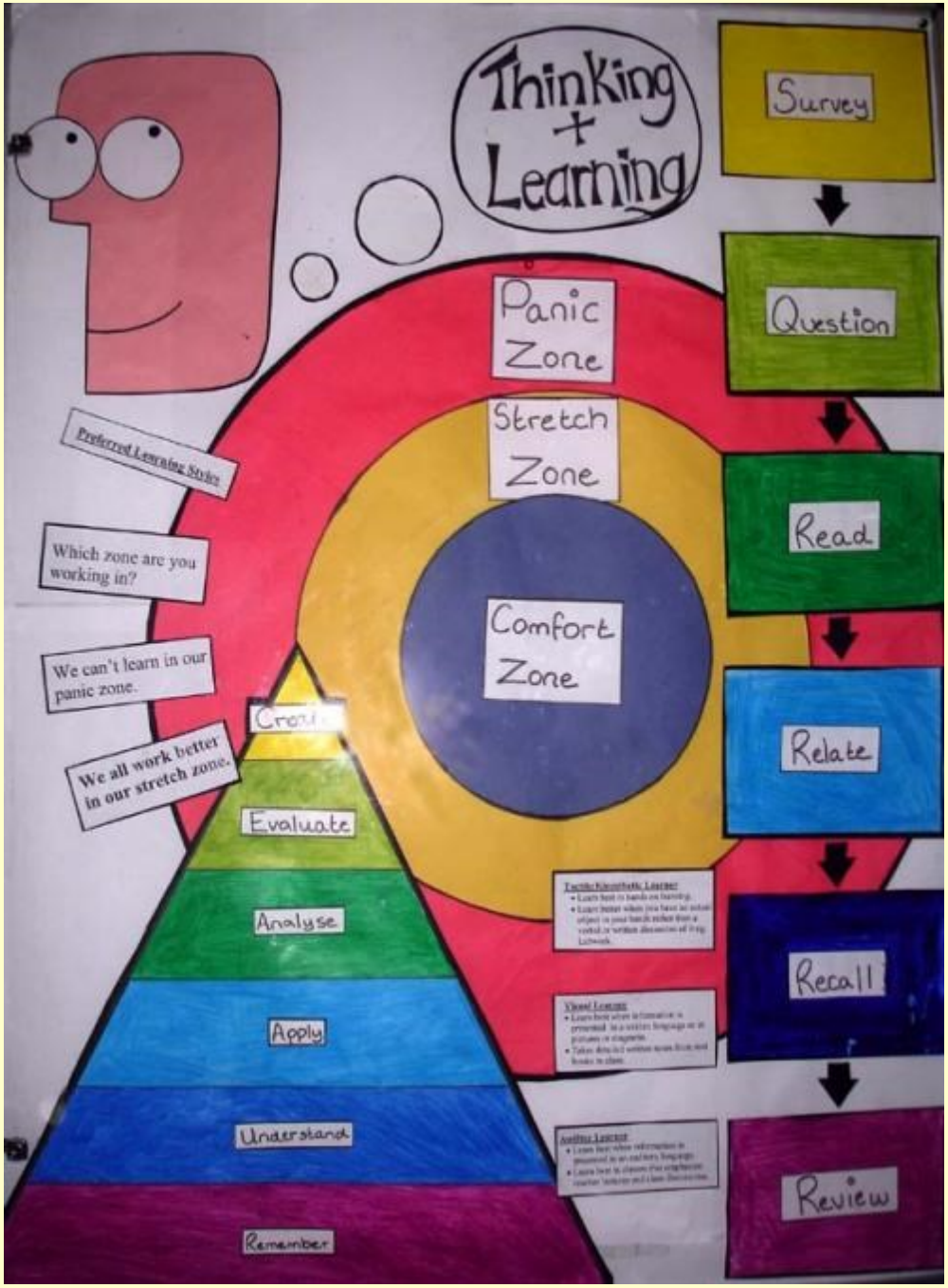
Thinking, learning, understanding, teaching, mastering, persevering, wondering, rehearsing, practising, modelling, describing, telling, asking, exploring, investigating, imagining, creating, listening, choosing, deciding, planning, assessing, evaluating, demonstrating, explaining, remembering, talking, analysing, discussing, guessing, synthesising, predicting, suggesting, testing, sketching, checking, considering, reconsidering, reviewing, recalling, noting, noticing, summarising, hypothesising…

(Based on list from: *Thinking about Thinking: Developing Metacognition in Children* by Robert Fisher)

Thinking in the Classroom

An example of the use of metacognitive language and strategies displayed in Mercy Mounthawk Secondary School, Tralee.

(From the SESS Equality of Challenge Initiative)



Thinking in the Classroom: Using Metacognitive Questions

- Working in cooperative groups, ask students to generate questions about material that is being studied

- Prompt students to create questions that correspond to the different levels of Bloom's Taxonomy

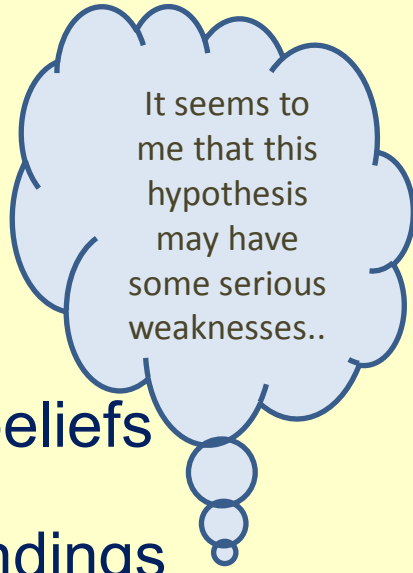
- Use fun questions as warm-ups to start thinking:
  - The answer's 'No there was a dog in it' – what's the question
  - Which is heavier, love or hate?

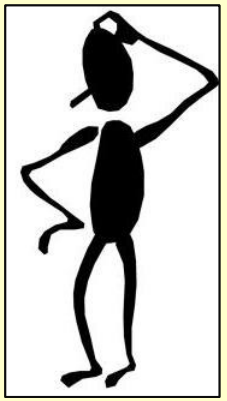
- Use open questions that allow for a range of possible answers and which draw on higher order thinking (HOT)

Thinking in the Classroom: Using Open Questions

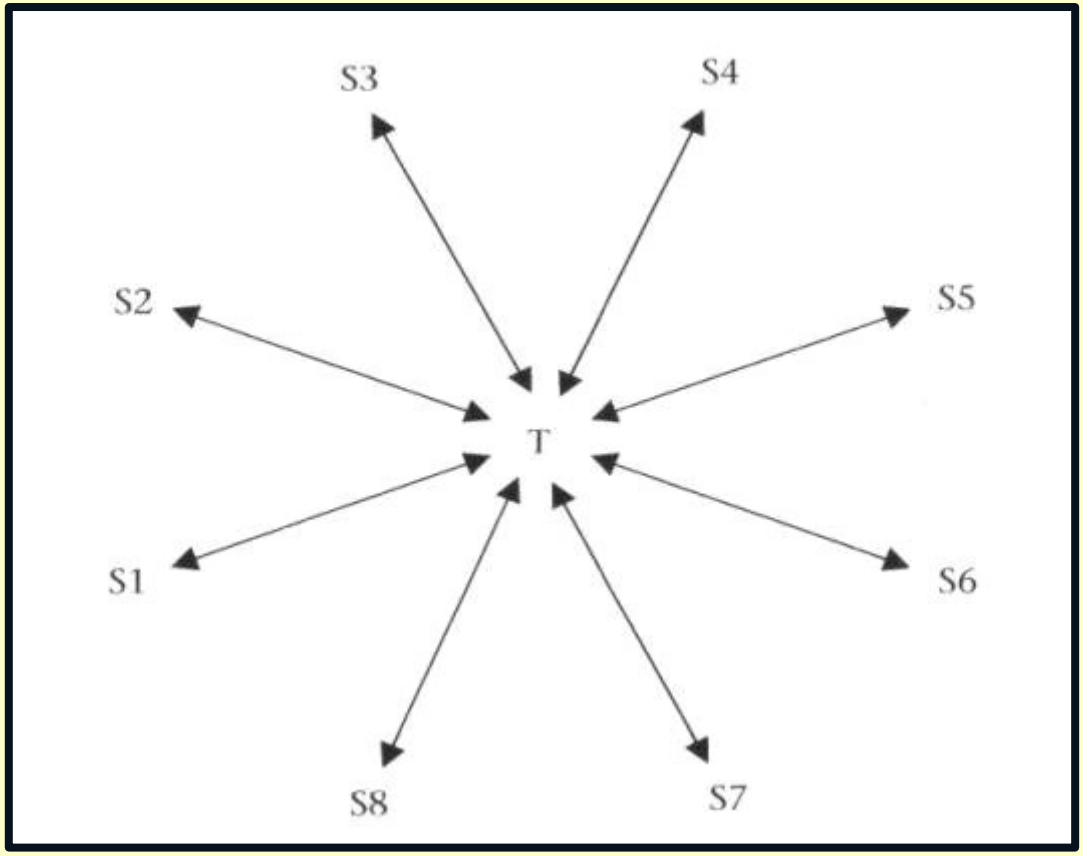
Open questions allow for a range of possible answers.
They offer cognitive challenge and they also:

- encourage more flexible thinking
- test the limits of knowledge rather than one item of knowledge
- encourage better assessment of students' beliefs
- offer the possibility to clear up misunderstandings
- result in unanticipated and unexpected answers
- encourage discussion and allow depth of discussion





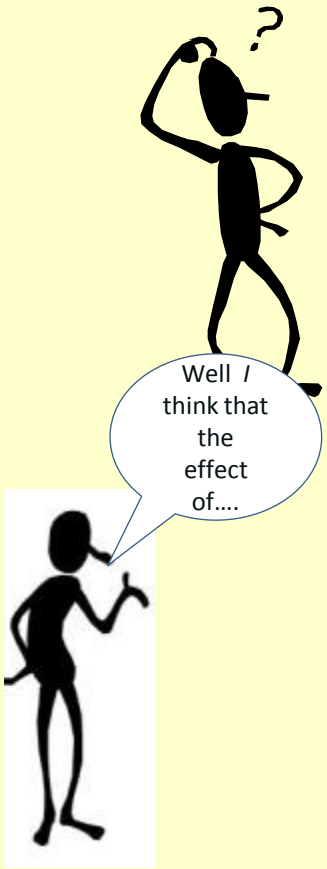
Thinking in the Classroom:
Patterns of Classroom Communication:
Teacher-controlled Mode

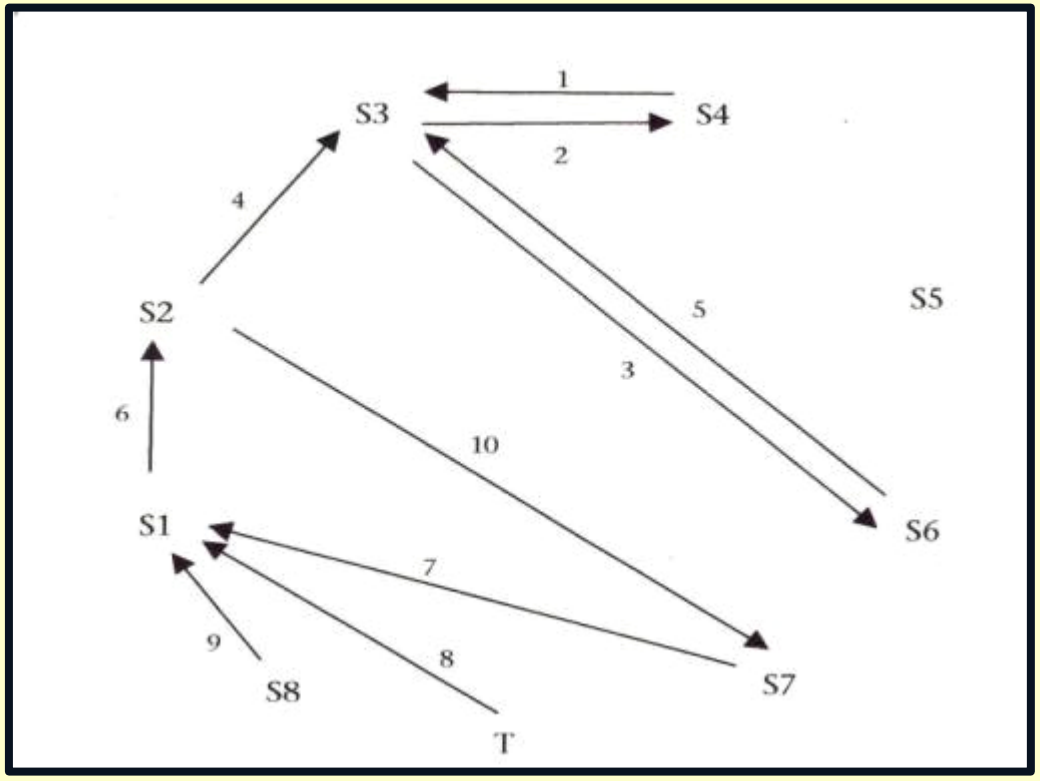


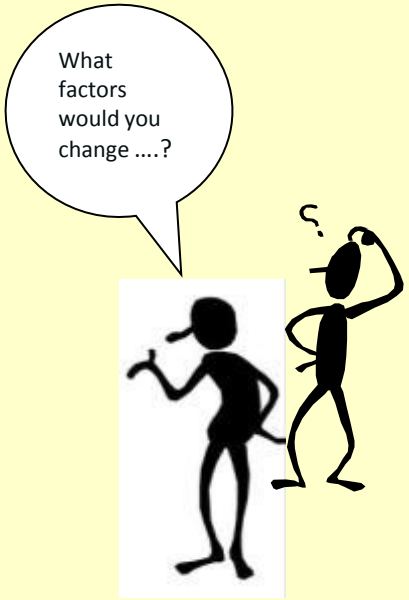
Kuhn ,*Education for Thinking p.123*

Thinking in the Classroom:
Patterns of Classroom Communication

Authentic Classroom Discourse







Kuhn *Education for Thinking p.124*

Thinking in the Classroom: Ryan's Thinkers Keys

The Decision	The Brainstorming	The Ridiculous
The Question	The Brick Wall	The Inventions
Information	Improvements	The Alternatives
The Action	The Combination	Forced Relationship
Perspectives	The 'What If'	Interpretation
Purpose	The Reverse	The Disadvantages
Rubrics	The Predictions	The Alphabet
The Consequences	(www.tonyryan.com.au)	

Thinking in the Classroom: Using 'Ryan's Thinkers Keys'

From: Still Learning to Think, Thinking to Learn Michael Pohl

Alphabet key	**Begin an A-Z list of 'Renaissance' words – keep adding to it as you research**
The Reverse Key	**List ten things that you would NOT have seen during the Renaissance**
The 'What if?' Key	**What if Leonardo da Vinci had been Irish?**
The Question Key	**Lorenzo de Medici is the answer. Write ten questions that will give this answer.**
The Disadvantages Key	**Identify and describe ten disadvantages of living in the Renaissance period compared to the 21st century.**
The Ridiculous Key	**You have travelled back in time to Florence in 1390. Describe how you spend your day there.**
The Variations Key	**How many ways could you travel from Marseille to the Middle East during the Renaissance. Describe the dangers/difficulties of each route.**

Thinking in the Classroom: Using 'Ryan's Thinkers Keys'

Based on an idea from : Still Learning to Think, Thinking to Learn by Michael Pohl

Alphabet key	**Begin an A –Z list of things that make you happy**
The Reverse Key	**Write down 10 things that you can't bring to school**
The 'What if?' Key	**What if you could bring your pets to school?**
The Question Key	**'Summertime'. Write 5 questions that will give this answer.**
The Disadvantages Key	**Tell about 5 things that you wouldn't like if there was no school.**
The Ridiculous Key	**You can fly. Write about your journey to school this morning.**
The Variations Key	**How many different ways could you come to school? Tell about the good things and the bad things about each way.**

Thinking in the Classroom:
Pohl's Use of Thinkers Keys with Bloom's Taxonomy

Bloom's Taxonomy Level	Thinker's Keys Activities	
	Choice 1	Choice 2
Remembering	Alphabet Key: Use an A-Z chart to list all the elements of the periodic table	Reverse Key: Make a list of ten things that are not elements or compounds
Understanding	Question Key: The answer is oxygen. What are five questions?	Commonality Key: What are common points between metals and non-metals?
Evaluating	Interpretation Key: A balloon inflated with helium fails to rise. Suggest a possible reason.	Prediction Key: Predict at least three different ways that rust may be combated in the year 2050.

Teaching Metacognition

STRATEGIES TO SUPPORT SELF-REGULATION

Metacognitive Self- Regulation: Strategies to Support Planning and Monitoring

Self-questioning as part of self-regulation

SQ4R Strategy

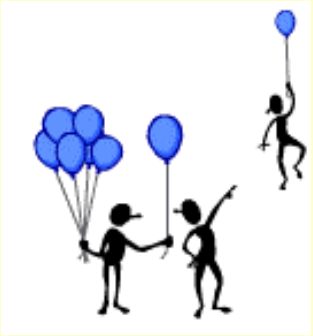
Self-Evaluation Matrices

Plus Minus Interesting (PMI)

Graphic Organisers

KWL Grids

Strategies to support critical use of the Internet



Metacognitive Self- Regulation: Planning and Monitoring

Self-Questioning

- Model self-questioning, using questions similar to the ones in the regulatory checklist when carrying out teaching/learning tasks

- Prompt students to self-question when they are carrying out tasks and encourage them in their effort to answer these questions

- Monitor students working in cooperative groups and prompt to self-question

Metacognitive Self- Regulation: Planning and Monitoring

Modelling and Supporting Self-Checking

- **Before an activity:**
  - **'What strategies will help us to learn in this lesson?'**
  - **'How should we plan this?'**
  - **'How long do we need?'**
  - **'What resources do we need?'**

- **During an activity:**
  - **'Is this going well?'**
  - **'Do we need to change how we're thinking about this?'**

Metacognitive Self- Regulation: Planning and Monitoring

SQ4R Strategy

'A metacognitive road map for reading and studying'

S: Survey
Q: Formulate Questions
R: Read and note answers to questions
R: Relate, make connections to what you know
R: Recall - summarise, pick out main points
R: Review

(SESS, 2009: page 42)

Metacognitive Self- Regulation: Planning and Monitoring

Self-Evaluation Matrices

- Support students in becoming familiar with using specific strategies effectively
- The teacher introduces one strategy at a time, modelling, teaching and then supporting students in using it.
- Students have a chance to practice each new strategy consistently
- Time is given regularly for students to reflect on when and how they have used the strategies

(SESS: Metacognition in the classroom, p.23 ff)

Metacognitive Self- Regulation: Planning and Monitoring

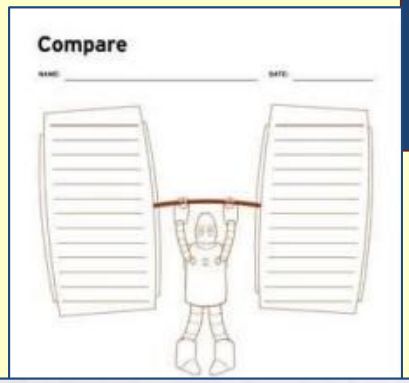
Part of a Strategy Evaluation Matrix (SEM)

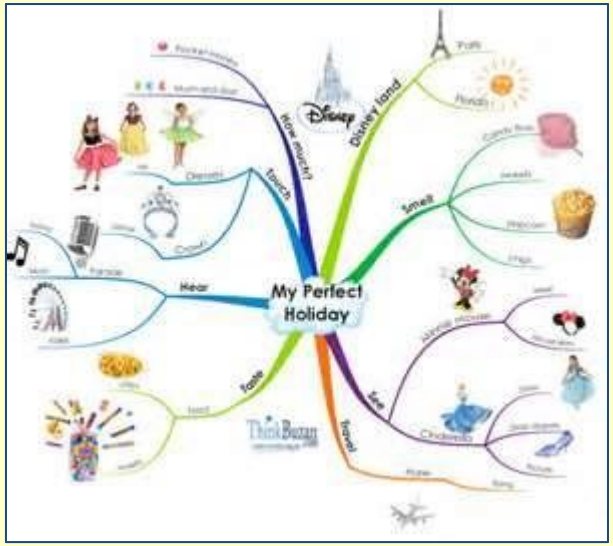
Strategy	How to Use	When to Use	What is it for?	How/When /Why Used
Skim/ Survey	Search for headings, high-lighted words, previews, summaries	Before reading a longer piece of text	Gives an overview of the key concepts, helps one to focus on the important points	
Activate prior knowledge	Stop and think what you already know about the topic	Before you read something new or begin an important task	Makes new information easier to remember	
Formulate questions	Write down questions that you think the text might answer	Before a first reading after surveying the text	Helps one to interact with the text to find information that one needs/wants to know.	

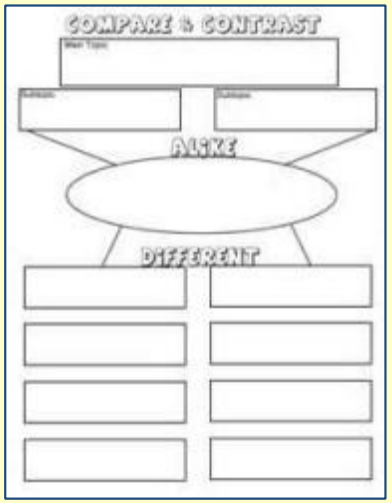
From Schraw: 1998

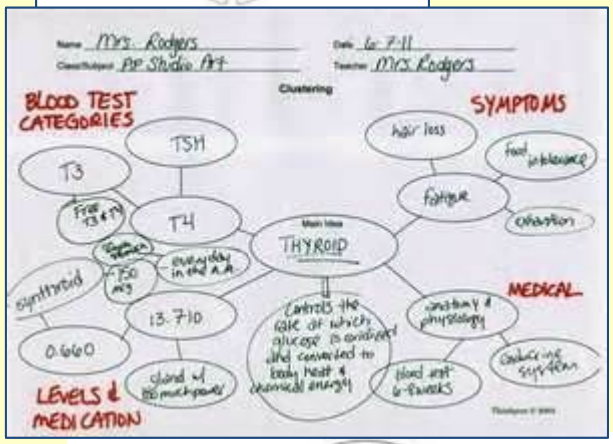
Metacognitive Self-Regulation: Planning and Monitoring

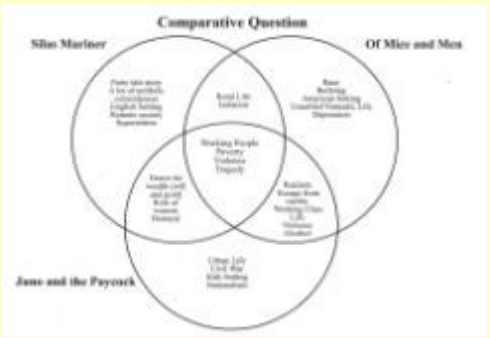
Graphic Organisers

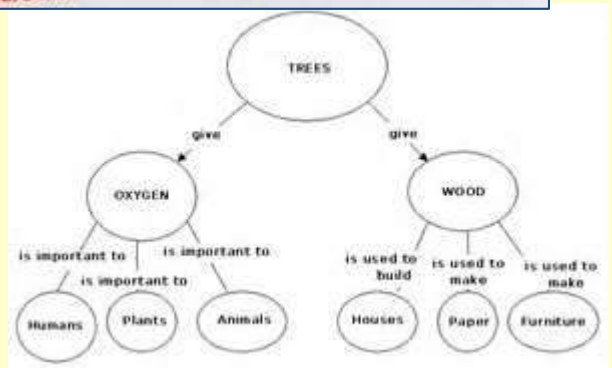


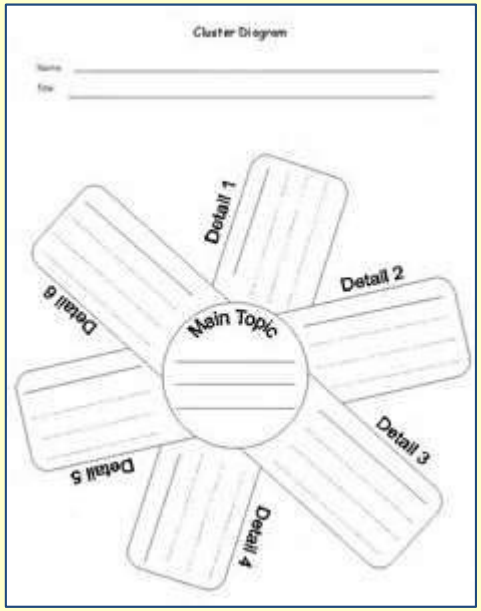






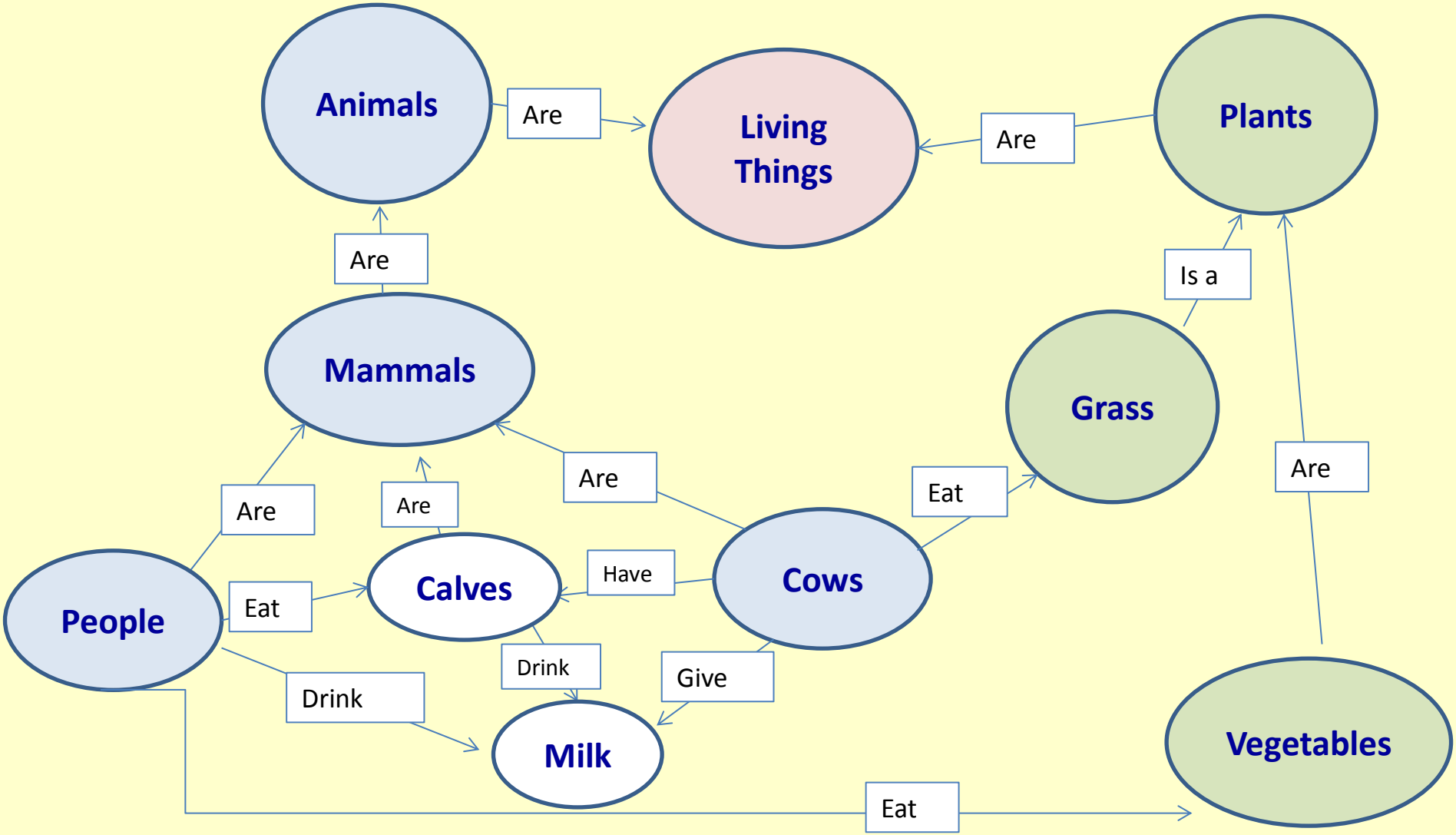






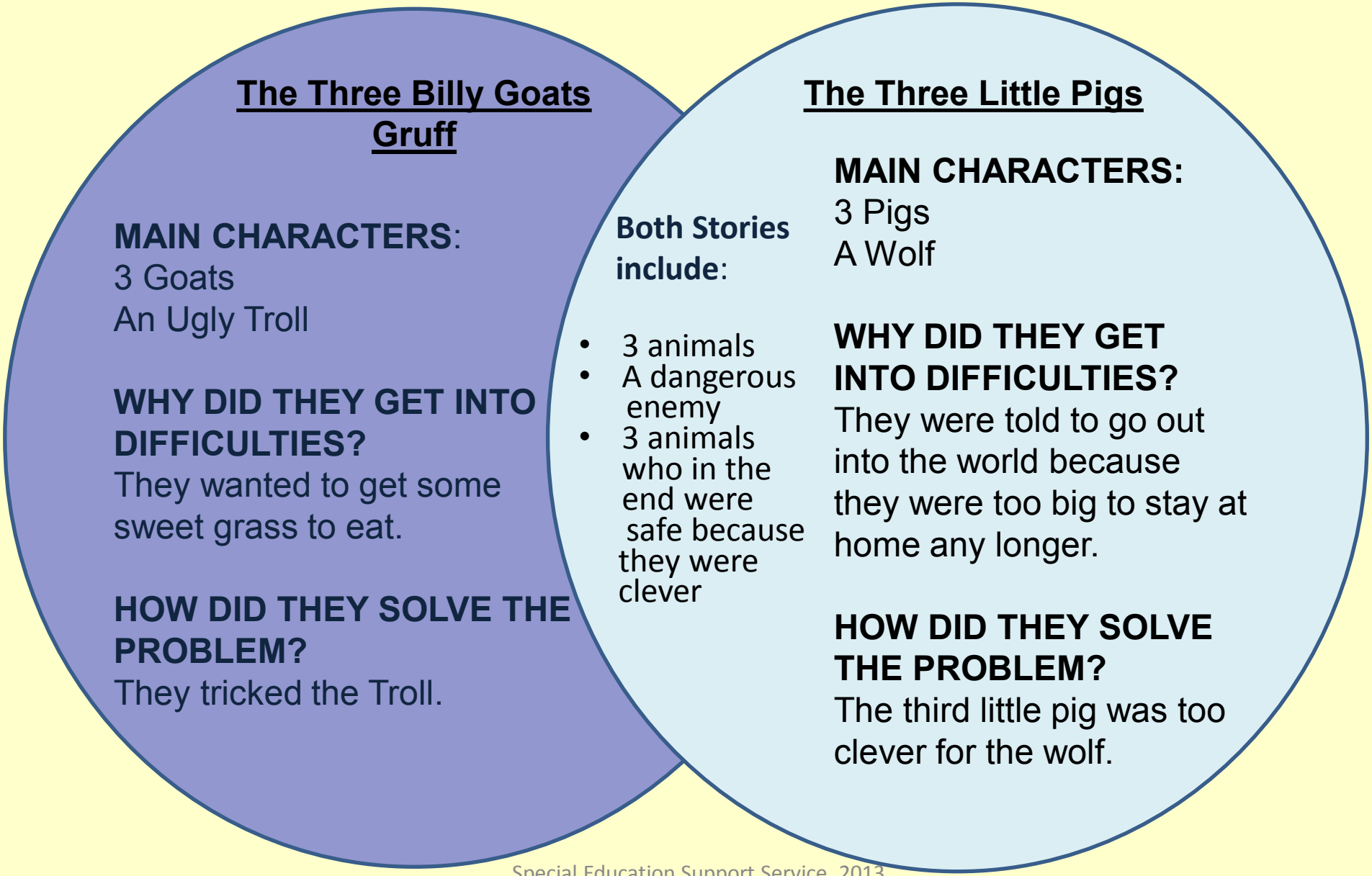
Metacognitive Self-Regulation: Planning and Monitoring

Using Graphic Organisers



Metacognitive Self-Regulation: Planning and Monitoring

Using Graphic Organisers



Metacognitive Self-Regulation: Planning and Monitoring

PMI – Plus Minus Interesting

(Edward de Bono, *De Bono's Thinking Course*, 1982)

- Three column grid labelled 'Plus, Minus, Interesting'
- Draws attention to the positive, negative and interesting aspects of any question or problem
- Helps the student to make decisions quickly
- Encourages the widening of perspectives

Metacognitive Self-Regulation: Planning and Monitoring

Consider a Proposal to have One Hour of P.E. Daily

PLUS	MINUS	INTERESTING
Students would be a lot fitter. It might help to prevent health problems such as back and neck problems and obesity. Physical exercise releases endorphins and serotonins in the brain, so students would be more relaxed, so they'd learn better.	PE facilities would have to be extended so that several classes could be engaged in PE at the same time Some subject/s would almost certainly have to be dropped as there would be less time. PE gear would wear out faster – more expense for parents.	What subject/s should be dropped? Would it result in a happier school? Should teachers have to do the one hour of PE daily too?

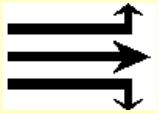
Metacognitive Self-Regulation: Planning and Monitoring

Plus-Minus-Interesting
'What if Humans Could Fly?'

PLUS	MINUS	INTERESTING
• No fuel costs • No air pollution • No noise pollution • Free travel anywhere in the world •We wouldn't have to travel Ryan Air • No check –in required • No lost luggage • No airport duty • No long-term car parks	•It might be very cold without feathers •Thunderstorms, wind, rain, fog, snow, hail… • Accidents in the air • No 'Magnificent Men in their Flying Machines'! • No duty free shops • There would be less privacy	• Our bodies may have evolved very differently – would we have to have feathers? • Our perspective on everything would be very different • Would we have lived in nests? • How would aerial battles have been fought? • Would we have had bird brains?

Metacognitive Self-Regulation: Planning and Monitoring

Edward de Bono: CoRT



- PMI (Plus, Minus, Interesting)

- CAF (Consider all Factors)

- FIP (First Important Priority)

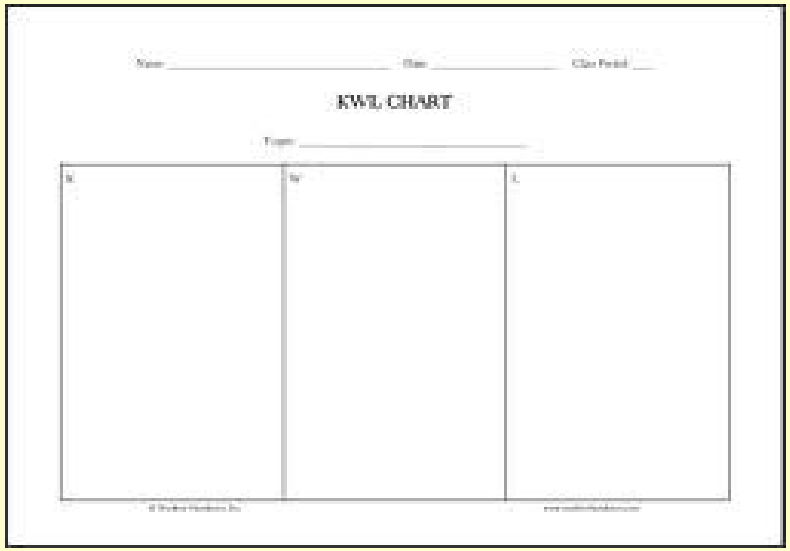
- OPV (Other People's Views)
- De Bono's Thinking Hats

De Bono's Thinking Hats

- **BLACK -** Caution, judgement, assessment. Is this true? Will it work? What are the weaknesses? What is wrong with it?
- **WHITE -** What information do we have? What questions do we need to ask?
- **YELLOW -** Why is this worth doing? What are the benefits?
- **GREEN -** Creativity, new ideas.
- **BLUE -** Organisation of thinking. Metacognition
- **RED -** Emotions, intuition. Emotions. Intuition, feelings, and hunches. No need to justify the feelings. How do I feel about this right now?

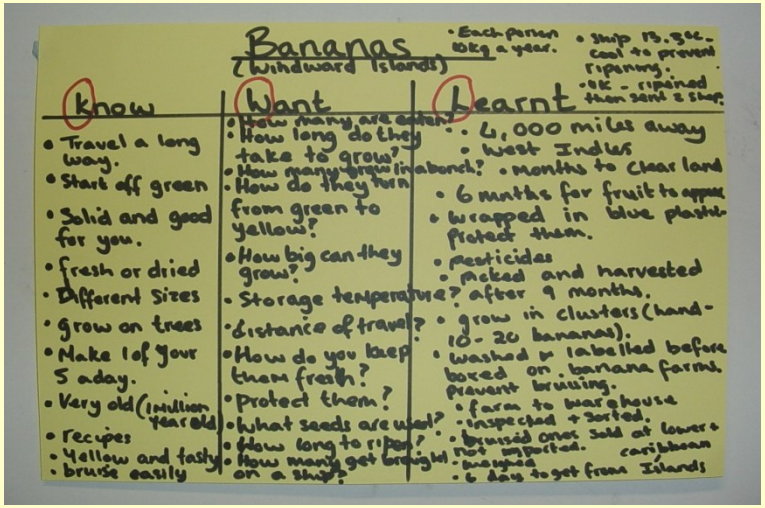
Metacognitive Self-Regulation: Planning and Monitoring

K-W-L Grids



Useful in:

- Planning and taking study notes
- Project organisation
- Essay writing



Help to:

- Activate prior knowledge
- Think and plan
- Record
- Review
- Reflect on learning

Metacognitive Self-Regulation: Planning and Monitoring

KWL Grids – Researching Number

K	W	L
NATURAL NUMBERS We use these all the time. For example: 1, 4, 6, 7, 59… **WHOLE NUMBERS** These are the same as Natural Numbers but they include Zero as well. For example: 0,1,5,65,99…	How many kinds of numbers are there? Is there a special group for minus numbers? Is there a group for fractions?	Numbers are listed in SETS. There are 5 different SETS: 1. Number Sets 2. Intervals 3. Density Properties 4. Representation Properties 5. Transcendental Numbers **Number Sets (1)** include **Natural Numbers** and **Whole Numbers** as well as: **Integers** include ZERO as well as negative ('minus') numbers. **Rational Numbers** are fractions (ratios) of Integers. Zero can not be the bottom number. **Real Numbers** Nearly every number is a real number, including Integers, Natural Numbers, Whole Numbers and Rational Numbers.
Still Want to Know		
What numbers are not Real Numbers? What are Intervals, Density Properties, Representation Properties and Transcendental Numbers? Why are there so many sets – why not just give one name to all numbers that are not Real Numbers?		

Metacognitive Self-Regulation: Planning and Monitoring

Critical Use of Internet Technology

- Analysing, evaluating and synthesising information from the web
- Developing the ability to understand, appraise and integrate information from many different sources
- Initially they need assistance to sort out the 'information glut'
- Print and Internet record sheets can help

(*Working with Differentiating the Curriculum* by Caroline Coil : p.17-18)

Metacognitive Self-Regulation: Planning and Monitoring

Sample Internet Record Sheet

Website Address/es	Author of Site, or the Organisation who are responsible for it	What do I know about the Author/ Organisation	Date last updated	Date accessed

WHAT I FOUND OUT

_____

_____

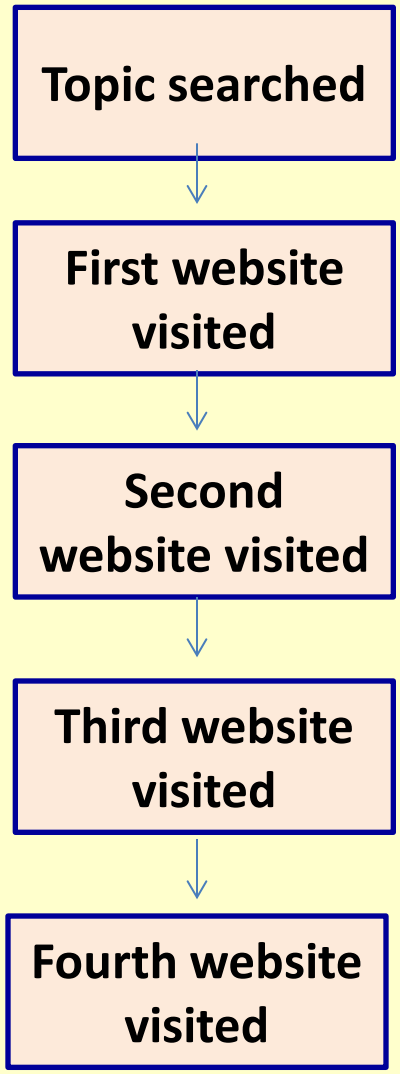
_____

_____

_____

Metacognitive Self-Regulation: Planning and Monitoring

Website Search Flowchart



Based on Caroline Coil: p.24

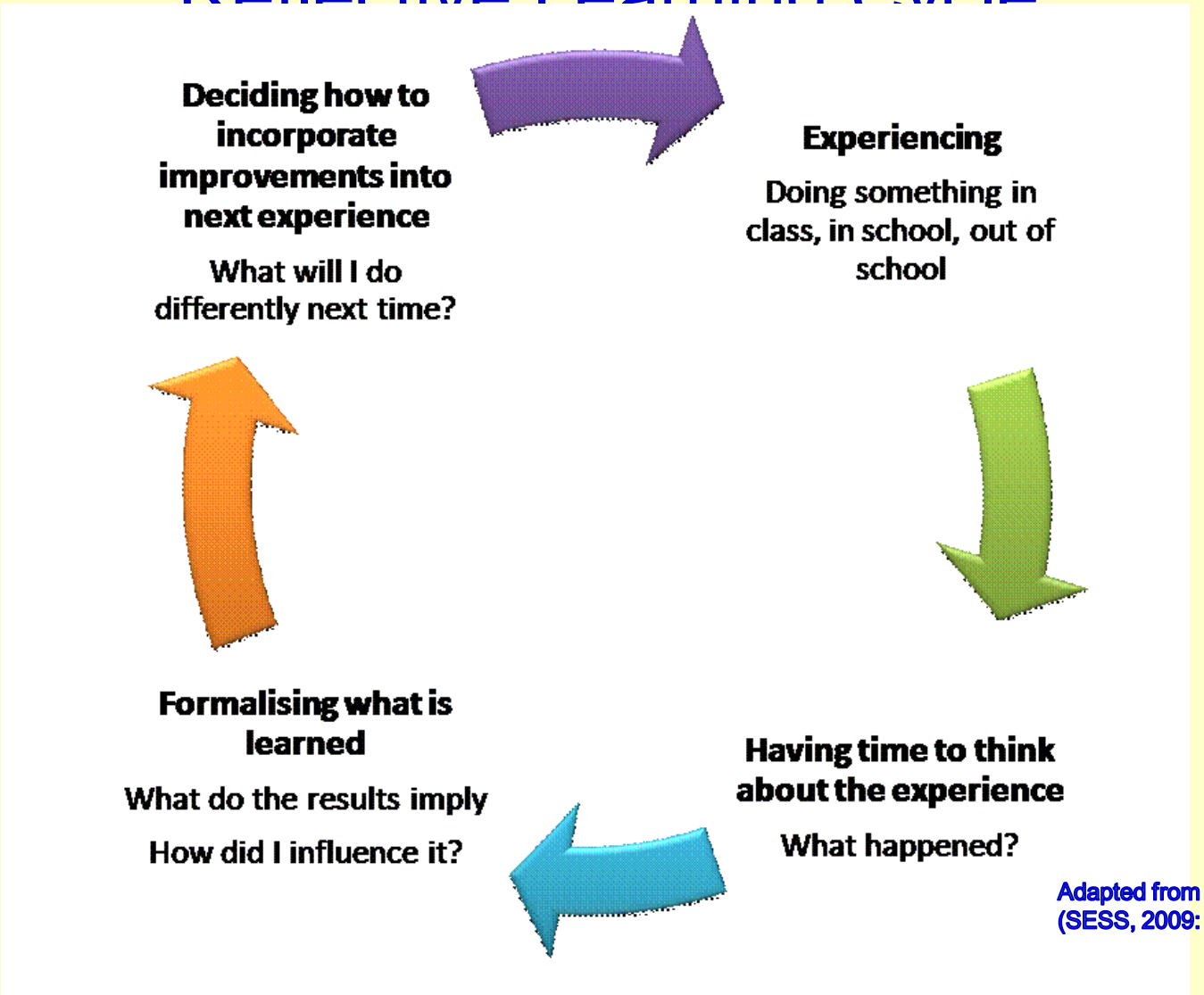
SPECIAL EDUCATION SUPPORT SERVICE
building on ability

Teaching Metacognition

STRATEGIES TO SUPPORT REFLECTION AND EVALUATION

Metacognitive Self-Regulation: Reflection and Evaluation

Reflective Learning Cycle



Adapted from Kolb, 1984 (SESS, 2009: p.11)

Metacognitive Self-Regulation: Reflection and Evaluation

Modelling and Supporting Self-Checking

After an activity:

- **'What kind of thinking did we do?'**
- **'How did we do our thinking?**
- **'Did we have a plan? A strategy?'**
- **'Was our thinking good/effective?'**
- **'How could we improve our thinking next time'**
- **'Can we use this approach in another area?'**

Metacognitive Self-Regulation: Reflection and Evaluation

Using Rubrics

- May be drawn up and used by either teacher or student
- May be used for a very wide range of purposes
- Assist objective evaluation and self-regulation

Metacognitive Self-Regulation: Reflection and Evaluation

Rubric for Poetry essay

Criteria	Weight	Level 1	Level 2	Level 3
Organisation of material	X 1	Badly structured: no apparent plan.	Plan apparent but organisation somewhat confused.	Excellently structured and coherent essay.
Relevance and number of main points made	X 3	Only one or two relevant points made.	Two or three relevant points made. Not well-supported.	Four or more very relevant, well-supported points made.
Language	X 1	Expression unclear. Many errors in grammar and spelling	Fairly fluent writing but some grammar and spelling errors.	Well-written, fluent essay. No spelling or grammar errors.
Quotations/ references	X 1	1 to 2 poems from the course referenced. Few or no quotations.	3 to 4 poems referenced. At least two supporting references or quotations for each point made.	4 or more poems referenced. Liberal references and quotations made an effective argument.

Metacognitive Self Regulation: Reflection and Evaluation

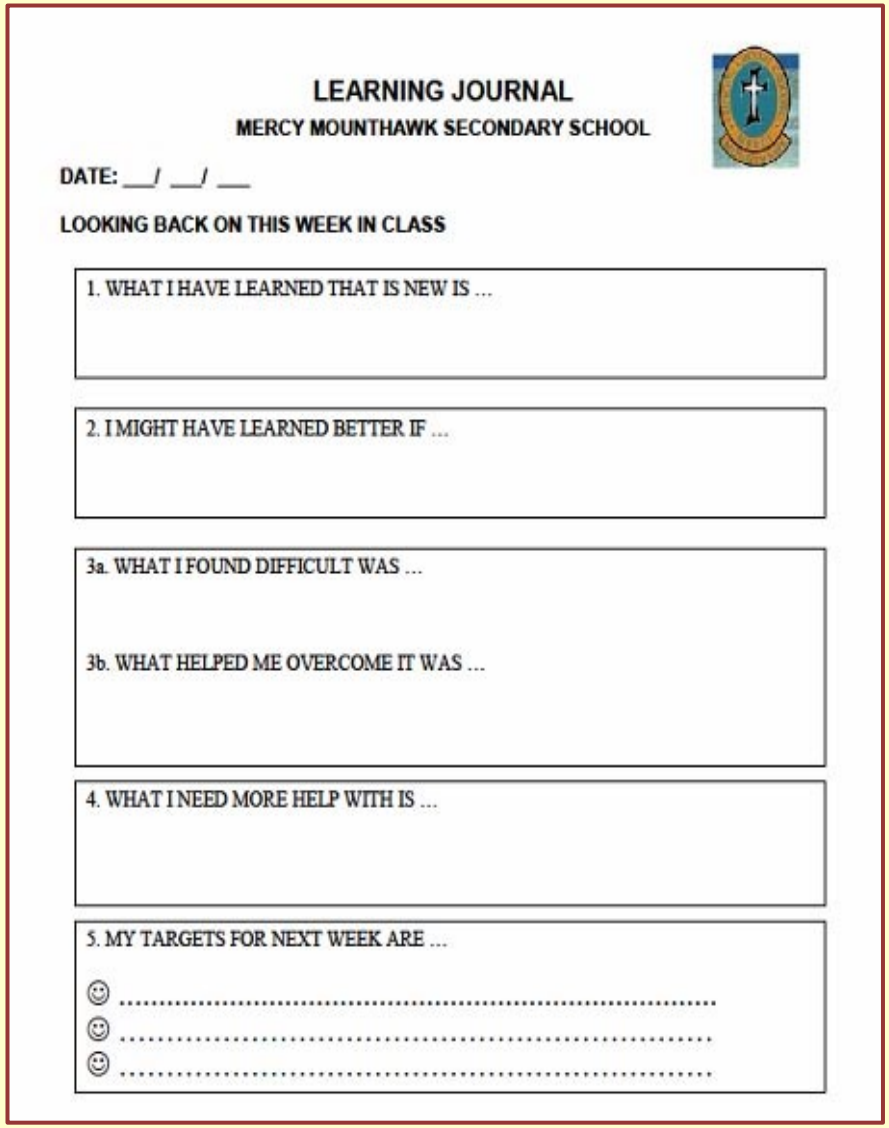
Sample Rubric for Written Work

CRITERIA			
Handwriting	Untidy	Could be neater	Very neat
Capital Letters	None	Some	All
Punctuation	Lots missing	Some missing	All there

Metacognitive Self-Regulation: Reflection and Evaluation

Learning Journals

- A page from a reflective journal used in Mercy Mounthawk Secondary School Tralee.
- Alternate written reflection with reflective discussion led by open questions from the teacher.



LEARNING JOURNAL

MERCY MOUNTHAWK SECONDARY SCHOOL

DATE: __/ __/ __

LOOKING BACK ON THIS WEEK IN CLASS

1. WHAT I HAVE LEARNED THAT IS NEW IS ...

2. I MIGHT HAVE LEARNED BETTER IF ...

3a. WHAT I FOUND DIFFICULT WAS ...

3b. WHAT HELPED ME OVERCOME IT WAS ...

4. WHAT I NEED MORE HELP WITH IS ...

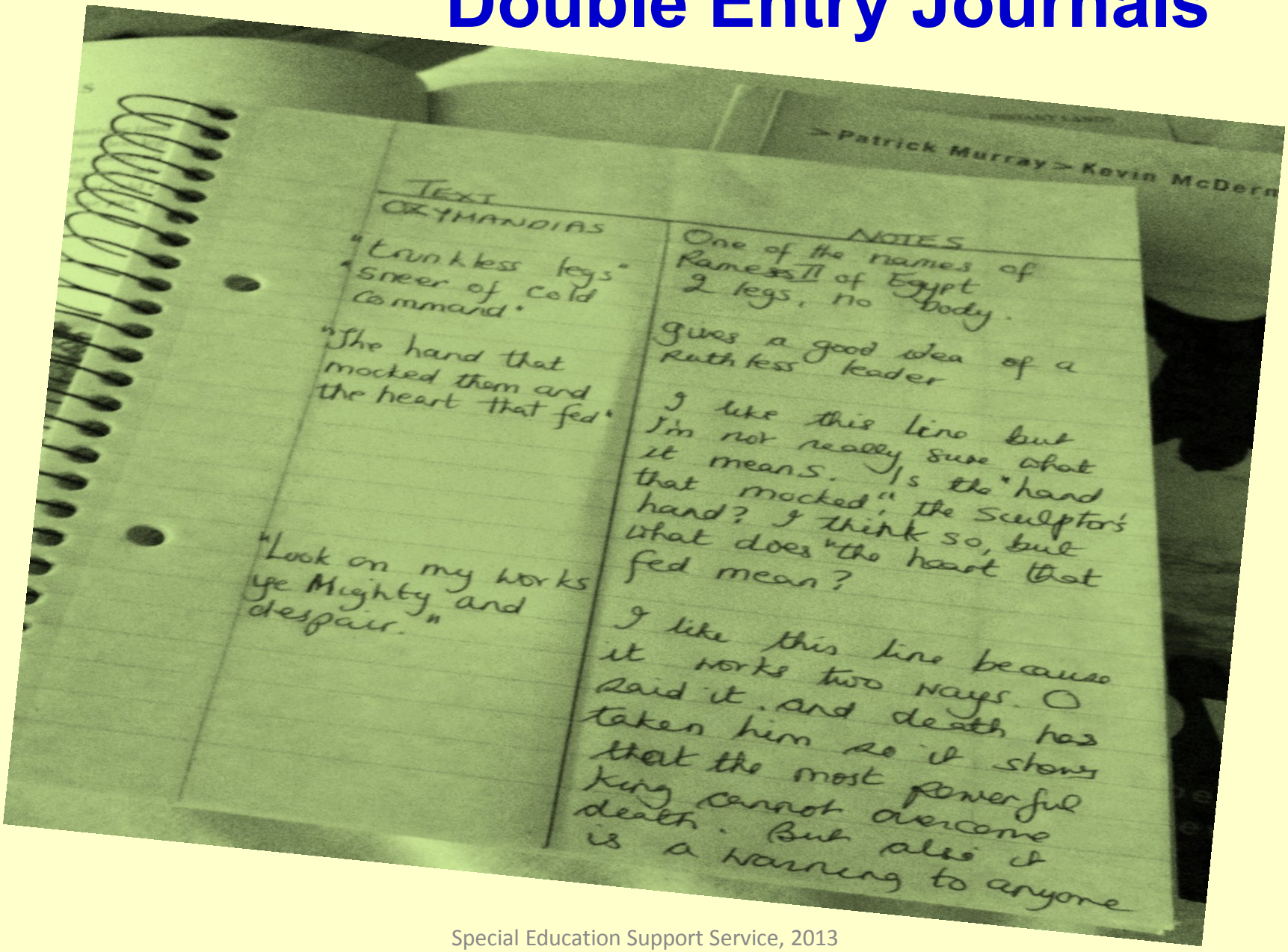
5. MY TARGETS FOR NEXT WEEK ARE ...

☺ .....

☺ .....

☺ .....

Double Entry Journals



Metacognitive Self-Regulation: Reflection and Evaluation

Double-Entry Journals

Quotes

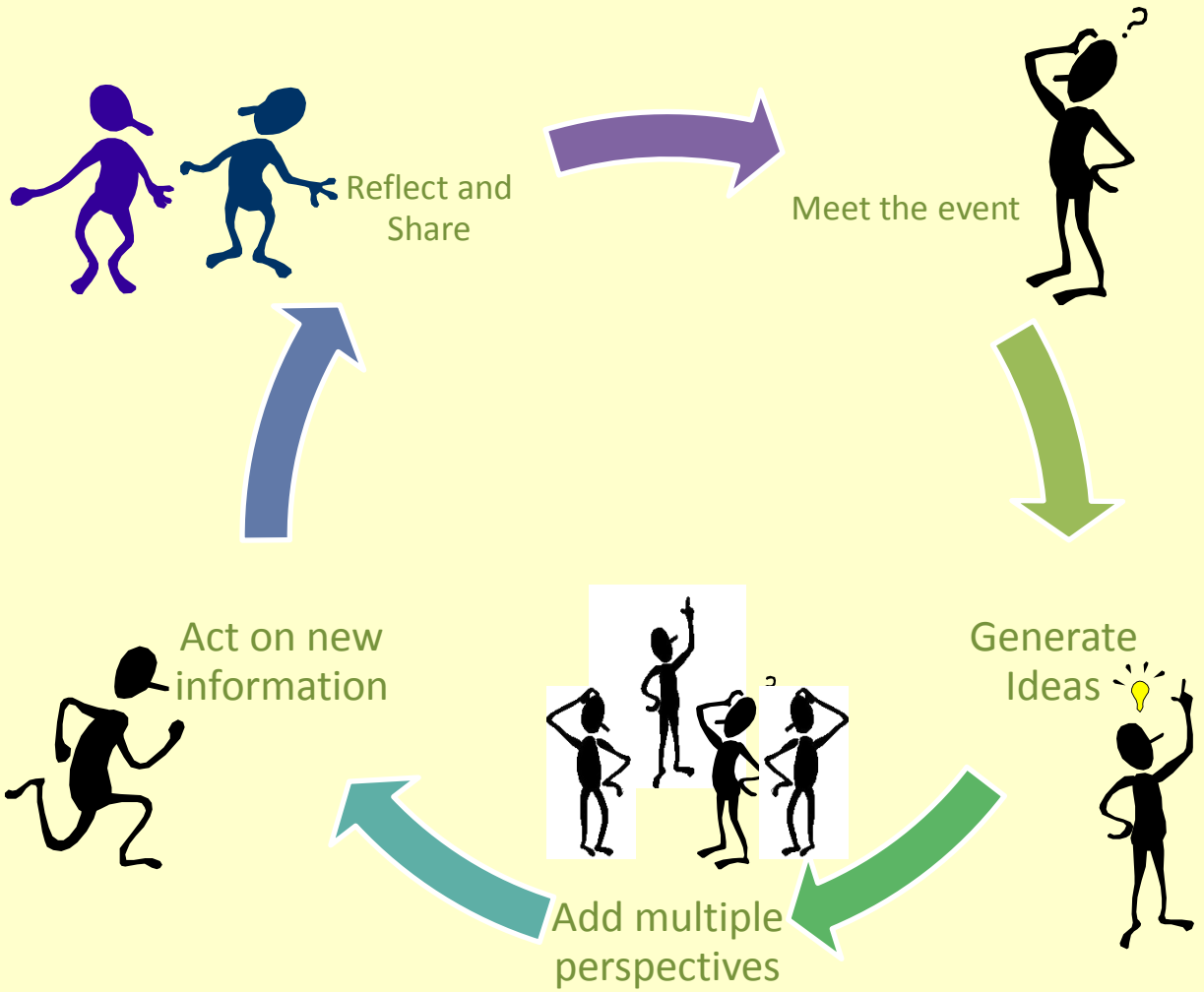
Children who have limited experience with books and other literary related materials, need an especially rich literary environment in school. The classroom needs to be a safe place where students feel comfortable and encouraged as they experiment with varying uses of their developing literacies.

Notes

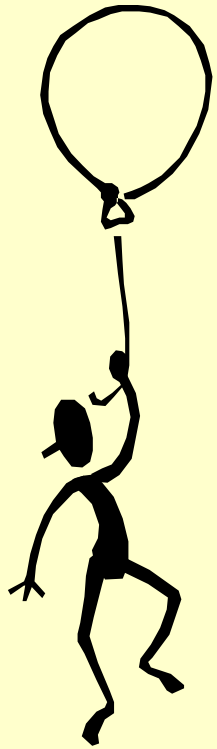
This made me think of the children, particularly those who don't speak English, who do not get the opportunity to have their parents read to them on a regular basis. It made me think about ways I could set up my classroom to promote literacy for all my students. Some things I want to do are to have a good classroom library, to provide sustained silent reading each day, to have a cross-age reading programme where the students will be reading buddies, and to have guest readers from the community and the students' families come into the classroom and share their favourite books.

Metacognitive Self-Regulation: Reflection and Evaluation

Adaptive Metacognition (CEBLE)



(Lin, Schwartz and Hatano, *Towards Teachers' Adaptive Metacognition* [2005])



Teaching Metacognitively

METACOGNITION AND STUDENTS WITH ADDITIONAL LEARNING NEEDS

Metacognition and Individual Learning Needs:
Mild General Learning Difficulties

- Many students with mild cognitive difficulties have poor short-term memory.
- This can cause difficulties in:
  - self-organisation
  - thinking
  - understanding and planning tasks
  - remembering strategies
  - monitoring and evaluation performance

- Modelling, teaching and supporting the development of metacognitive skills helps these students to overcome difficulties caused by poor short-term memory.

Metacognition and Individual Learning Needs:

Feuerstein's Instrumental Enrichment

(Metacognition and Pupils with MGLD)

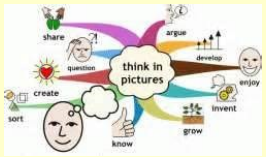
- Real tasks were given
- The students had to explain how they did it
- They were asked to give advice on how to succeed with such tasks
- They had to name the strategies
- The teacher used the students' names for these strategies

- Students were asked to 'bridge' from this learning to other applications: 'Where else might you be able to apply this?'

Metacognition and Individual Learning Needs:
Dyslexia

The development of explicit awareness and knowledge is important at all stages

Learners with dyslexia should, from the outset, be encouraged to be reflective, observant and exploratory in their learning



A metacognitive approach encourages the development of problem-solving strategies

Many students who are Dual Exceptional have dyslexia

(Based on Snowling and Stackhouse, 2006: pages 208-9)

Metacognition and Individual Learning Needs: Exceptional Ability

- **Exceptionally able students are not always, or even often, effective learners**:
  - They may have good metacognitive knowledge but may not able to self-regulate
  - Having a good working memory may mean that they bypass the planning of tasks
  - Planning and monitoring performance may increase the ability to choose and apply skills and strategies more consistently and effectively
  - Learning to reflectively evaluate task performance is an essential part of learning to value failure

Metacognition and Individual Learning Needs:
Exceptionally Able Students:
Self-Directed Learning

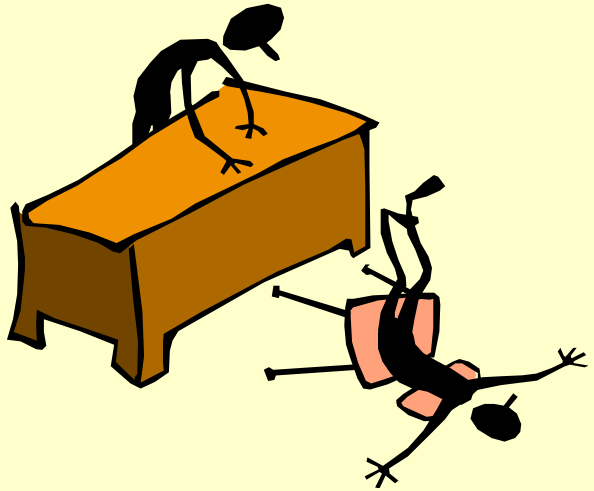
- Exceptionally able students may work at a faster pace than their classmates
- These students may require individualised programmes
- Independent study must have clear goals and targets
- The metacognitive and study/ thinking skills necessary for this independent study must be modelled, taught and supported

Metacognition Benefits all Students

- Researchers like Reuven Feuerstein(1980) believe that children fail because they do not have the appropriate tools for learning

- They can be taught such skills in order to facilitate success therefore

- Metacognitive work may well be a case of extension for all… since all pupils can benefit from it (Deborah Eyre, 1997: p. 66)



Teaching Metacognitively

THINKING ABOUT THINKING - ABOUT OUR THINKING AND TEACHING

Teaching Of, For and About Thinking

TEACHING ABOUT THINKING
(Use a variety of narratives to provoke, develop and reflect on the nature of thinking – for example, Philosophy 4 Children)

Teaching of Thinking

Teach the vocabulary of thinking. Directly demonstrate, model and explain thinking

INFUSION OF THINKING

Restructure or redefine lesson content to develop and focus on thinking skills

Use pedagogical strategies and materials to emphasise thinking during learning

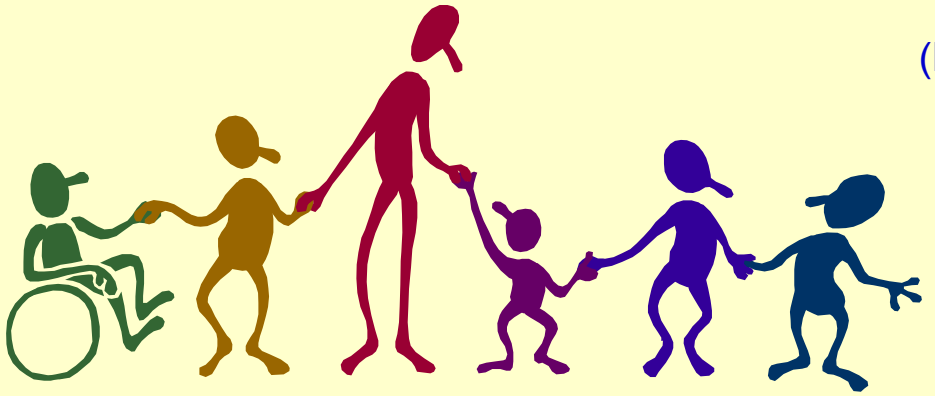
Teaching for Thinking

Use methods which promote thinking in the context of the curriculum (e.g. CA Programmes)

Strategic thinking and learning
Remodel pedagogic tactics and approaches to explicate content, the nature of thinking and associated cognitive processes and thinking processes

"Schools should be communities where students learn to learn"

(Brown et al, 1993)



Resources

Metacognition for the classroom and Beyond: Differentiation and support for learners, Special Education Support Service (2009). http://www.sess.ie/search/node/Equality%20of%20Challenge

(Many other useful resources here also)

Anderson, L, Krathwohl, D. *et al.* *A Taxonomy for Learning, Teaching and Assessing: A revision of Bloom's Taxonomy of Educational Objectives* (Longman 2001)

Pohl, Michael. *Learning to Think, Thinking to Learn* ;*Still Learning to Think, Thinking to Learn* (Hawker Brownlow, 2006).

Infusing Thinking into the Middle Years (2002)

Gifford, Michael. *Setting your Sights: techniques for learning to learn* (User Friendly Resource Enterprises Ltd., 1999)

Resources

Coil, Carolyn, *Working with Differentiating Curriculum and Instruction: Occasional Paper 2 (Hawker Brownlow Education, 2004).*

Bennett and Rolheiser. *Beyond Monet* (2008)

Cleghorn, P. *Thinking Through Philosophy 3* (ePrint Publishing, 2003).

Fisher, Robert. *Poems for Thinking* (Nash Pollock, Oxford:1997).

Games for Thinking (Nash Pollack, Oxford:1997).

Stories for Thinking (Nash Pollack, Oxford:1996).

Teaching Thinking: Philosophical Enquiry in the Classroom (London, 2008)

Kuhn, Deanna. *Education for Thinking* (Harvard University Press,2005)

Gadsby, Claire. Perfect Assessment for Learning (ITP Camarthen,2012).

Web Sites

http://www.sess.ie

http://www.ncca.ie

www.teachingthinking.net/thinking/pages/robert_fisher_news.htm

http://www.tonyryan.com.au

http://jfmueller.faculty.noctrl.edu/toolbox/rubrics.htm

http://www.teachingthinking.net

http://www.eduplace.com/graphicorganizer

www.instructionalleadership.ie

www.thinkingschoolsinternational.com

Further Reading

Kolb, D.A *Experiential learning: Experience as the source of learning and development* (Englewood Cliffs NJ: Prentice-Hall, 1984).

Hacker, Dunlosky and Graesser. *Handbook of Metacognition in Education* (Routledge, 2009)

Reece, R. and Walker, S. *Teaching, Training and Learning* (Business Education Publishers Ltd., 2003).

Kahneman, Daniel. *Thinking Fast and Slow* (Penguin: 2011).

Renzulli, S. and Reis, S. *Enriching Curriculum for All Students* (Corwin Press, 2008).

Eyre, **D.** Able Children in Ordinary Schools (Oxford: David Fulton, 1997)

McGregor, Debra. *Developing Thinking, Developing Learning* (OUP, 1981).