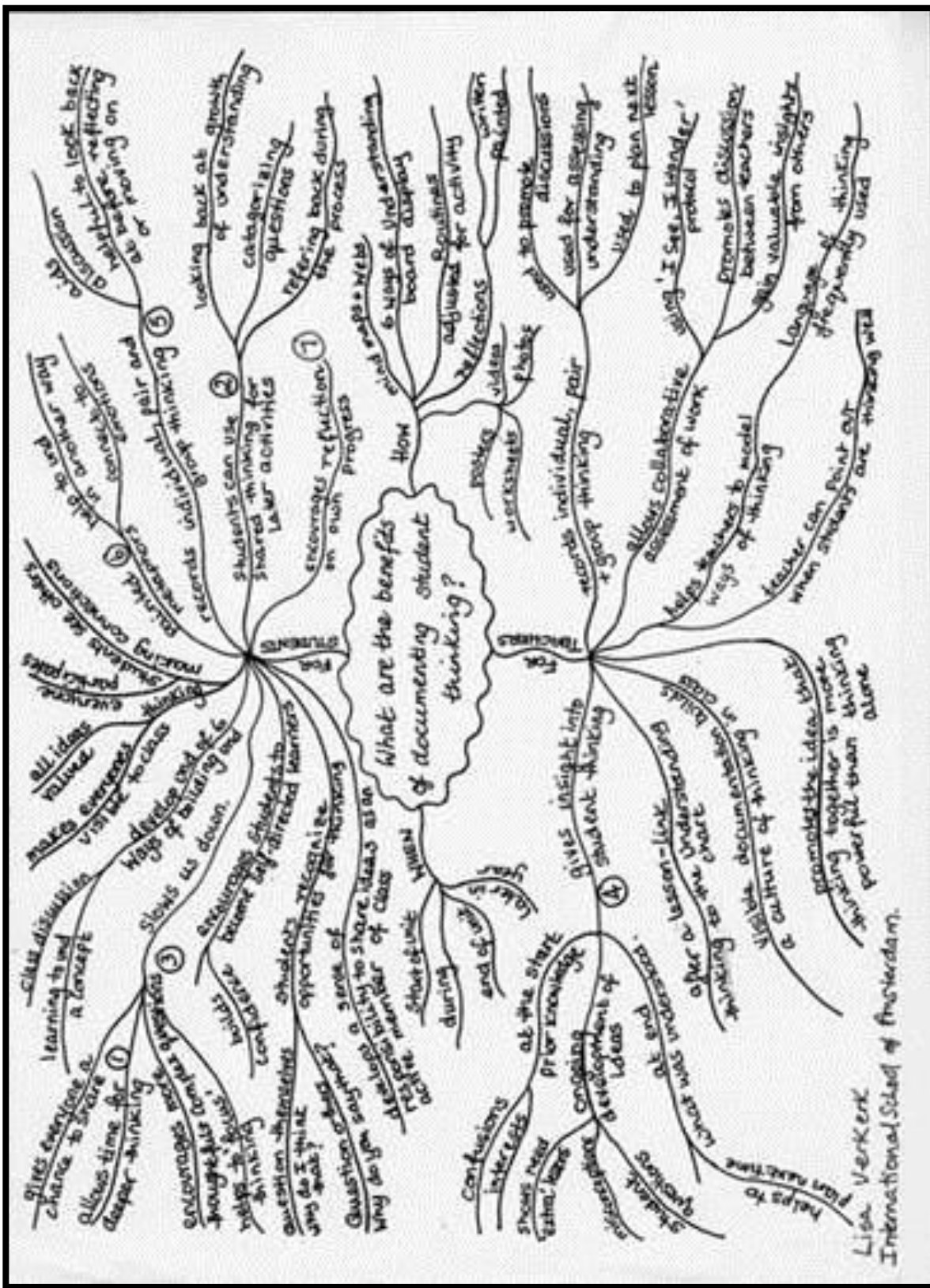


Making **VISIBLE** Thinking



Here are some thinking routines that are easy to implement and can easily become a regular feature in lessons across all learning areas.

**We have divided these into subject specific areas, but they can be easily applied in all areas of the curriculum.



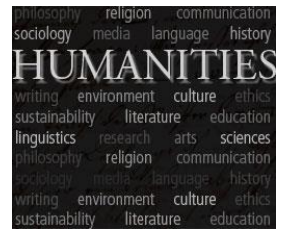
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Thinking routines which support the Critical Numeracy Model

Thinking routines are regular thinking strategies you might use over time with which students become familiar. Students can use them in cross curriculum contexts. They are designed to be simple, memorable and to extend thinking beyond habitual limited patterns. Below we suggest thinking routines from the **Harvard Project Zero Visible Thinking** website, as well as some others which can support development of critical numeracy:

	<p>I see, I think, I wonder</p> <p>Think, pair, share</p> <p>3 Things I know, 2 questions, 1 analogy</p> <p>Connect, extend, challenge</p> <p>What makes you say that?</p> <p>Generate, sort, connect, elaborate</p>
<p>De-coding</p> <ul style="list-style-type: none"> • Terminology • Maths ideas 	<p>Meaning-making</p> <ul style="list-style-type: none"> • What do I know? • What does it mean?
<p>Using</p> <ul style="list-style-type: none"> • Is it significant? • What are the implications? 	<p>Analysing</p> <ul style="list-style-type: none"> • Is it true? • Is it fair? • How does it position me?
<p>Futures Wheel</p> <p>Headlines</p> <p>Does it fit?</p> <p>Creative Hunt</p> <p>Options Explosions</p>	<p>Question starts Claim, support, question</p> <p>Stop, Look, Listen True for who?</p> <p>Step Inside: what does the person perceive, know, care about?</p> <p>Tug for truth Circle of viewpoint</p> <p>de Bono's 6 hats</p>

Thinking Routines which can support the development of Critical Numeracy



3-2-1 Bridge

A routine for activating prior knowledge and making connections

Your initial responses to the topic	Your new responses to the topics
3 Thoughts/Ideas	3 Thoughts/Ideas
2 Questions	2 Questions
1 Analogy	1 Analogy



Bridge:

Explain how your new responses connect to your initial responses?

http://www.simerr.educ.utas.edu.au/numeracy/thinking_strategies/thinking_strategies.htm

Purpose: What kind of thinking does this routine encourage?

This routine asks students to uncover their initial thoughts, ideas, questions and understandings about a topic and then to connect these to new thinking about the topic after they have received some instruction.

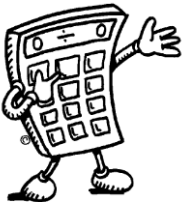
Application: When and Where can it be used?

This routine can be used when students are developing understanding of a concept over time. It may be a concept that they know a lot about in one context but instruction will focus their learning in a new direction, or it may be a concept about which students have only informal knowledge. Whenever new information is gained, bridges can be built between new ideas and prior understanding. The focus is on understanding and connecting one's thinking, rather than pushing it toward a specific outcome.

Launch: What are some tips for starting and using this routine?

This routine can be introduced by having students do an initial 3, 2, 1 individually on paper.

For instance, if the topic is "democracy," then students would write down 3 thoughts, 2 questions, and 1 analogy. Students might then read an article, watch a video, or engage in an activity having to do with democracy. Provocative experiences that push students thinking in new directions are best. After the experience, students complete another 3,2,1. Students then share their initial and new thinking, explaining to their partners how and why their thinking shifted. Make it clear to students that their initial thinking is not right or wrong, it is just a starting point. New experiences take our thinking in new directions.



Question Starts

A routine for creating thought-provoking questions

English

1. Brainstorm a list of at least 12 questions about the topic, concept or object. Use these question-starts to help you think of interesting questions:

Why...?

How would it be different if...?

What are the reasons...?

Suppose that...?

What if...?

What if we knew...?

What is the purpose of...?

What would change if...?

2. Review the brainstormed list and star the questions that seem most interesting. Then, select one or more of the starred questions to discuss for a few moments.
3. Reflect: What new ideas do you have about the topic, concept or object that you didn't have before?



Purpose: What kind of thinking does this routine encourage?

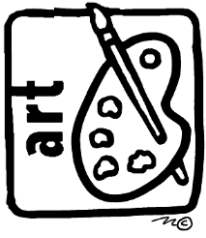
This routine provides students with the opportunity to practice developing good questions that provoke thinking and inquiry into a topic. It also helps students brainstorm lots of different kinds of questions about a topic. The purpose of asking deep and interesting questions is to get at the complexity and depth of a topic. The purpose of brainstorming varied questions about a topic is to get at the breadth, and multi-dimensionality of a topic.

Application: When and Where can it be used?

Use Question Starts to expand and deepen students' thinking, to encourage students' curiosity and increase their motivation to inquire. This routine can be used when you are introducing a new topic to help students get a sense of the breadth of a topic. It can be used when you're in the middle of studying a topic as a way of enlivening students' curiosity. And it can be used when you are near the end of studying a topic, as a way of showing students how the knowledge they have gained about the topic helps them to ask ever more interesting questions. This routine can also be used continuously throughout a topic, to help the class keep a visible, evolving list of questions about the topic that can be added to at anytime.

Launch: What are some tips for starting and using this routine?

Before using Question Starts, you might want to ask students what they think makes a good question. Then, when you show the Question Starts, explain that this routine is a tool for asking good questions. Start the routine by providing a topic- Stockholm, a compass, the Equator, good sportsmanship. Ask them to use the Question Starts to generate a list of questions about the topic. Initially, it's best to work together as an entire group. Once students get the hang of the routine, you can have them work in small groups, or even solo. Or mix it up. For example, do step 1 as a whole class, do step 2 in pairs, and step 3 as a whole class again.



LOOKING: TEN TIMES TWO

A routine for observing and describing



1. Look at the image quietly for at least 30 seconds. Let your eyes wander.
2. List 10 words or phrases about any aspect of the picture.
3. Repeat Steps 1 & 2: Look at the image again and try to list 10 more words or phrases to your list.

I think this routine could also work well when listening to music for the first time.



What kind of thinking does this routine encourage?

The routine helps students slow down and make careful observations about an object, image or work of art. It asks students to think about words or phrases to describe the work and encourages students to push beyond first glance, or obvious description.

When and where can I use it?

The routine can be used with any kind of art-work, especially visual art. You can also use non-art images or objects.

Use Ten times Two when you introduce a new artwork to engage students in careful looking before having a discussion about it or before using another routine. You can also use the Ten times Two routine after an in depth discussion about an artwork to both push forward and summarize some of the ideas and observations that were made during the conversation.

The routine is useful before a writing activity. It gets students thinking about descriptive language and helps students make observations about the work of art.

What are some tips for starting and using this routine?

Give your students time to look and tell students know that you will be the time-keeper. Quiet, uninterrupted thinking and looking time is essential to this routine.

Students can work as a class, in small groups or individually. You can also vary the way students work, for example, students might generate the first list of words solo, writing their ideas down on post-it notes so that they can be posted to a class list of observations. The second list in a group situation. Students should try to write their ideas down, or in a whole class discussion the teacher might write students' comments on the board. Make sure that the descriptive words and phrases generated are made visible for the whole group at some point in the discussion. Add to the list as necessary during any follow up conversations.

A natural follow up to the Ten times two would be another routine that encourages students to talk about their observations and interpretations, for example the **What makes you say that? Routine or Claim Support Question.**



Colors, Shapes, Lines

What are they like? What do they do?

A Routine for Exploring the Formal Qualities of Art

1. Take a minute to look at the artwork. Let your eyes wander over it freely. What do you see? Take a few observations from students and then move on to the next step.
2. Observe and describe the colors, shapes, and lines in detail. Make 3 columns.

COLORS <i>What colors do you see? Describe them.</i>	SHAPES <i>What kinds of shapes do you see? Describe them.</i>	LINES <i>What kinds of lines do you see? Describe them.</i>

3. Choose a kind of color, shape, or line that you listed.
* How does it contribute to the artwork overall? (How does it help the artwork "work?") Consider:
 - How does it contribute to how the artwork feels?
 - How does it contribute to the mood of the artwork?
 - How does it contribute to how the artwork looks?
 - How does it contribute to the story the artwork tells?
 - How does it contribute to the ideas in the artwork?
* Do this with at least two elements. They can be chosen from any column.
 4. What new ideas do you have about the artwork? What do you see now that you didn't see before?
-



What Makes You Say That Interpretation with Justification Routine



1. What's going on?
2. What do you see that makes you say that?

Purpose: What kind of thinking does this routine encourage?

This routine helps students describe what they see or know and asks them to build explanations. It promotes evidential reasoning (evidence-based reasoning) and because it invites students to share their interpretations, it encourages students to understand alternatives and multiple perspectives.

Application: When and where can I use it?

This is a thinking routine that asks students to describe something, such as an object or concept, and then support their interpretation with evidence. Because the basic questions in this routine are flexible, it is useful when looking at objects such as works of art or historical artefacts, but it can also be used to explore a poem, make scientific observations and hypothesis, or investigate more conceptual ideas (i.e., democracy). The routine can be adapted for use with almost any subject and may also be useful for gathering information on students' general concepts when introducing a new topic.

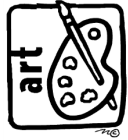
Launch: What are some tips for starting and using this routine?

In most cases, the routine takes the shape of a whole class or group conversation around an object or topic, but can also be used in small groups or by individuals. When first introducing the routine, the teacher may scaffold students by continually asking the follow-up questions after a student gives an interpretation. Over time students may begin to automatically support their interpretations with evidence with out even being asked, and eventually students will begin to internalize the routine.

The two core questions for this routine can be varied in a number of ways depending on the context: What do you know? What do you see or know that makes you say that? Sometimes you may want to precede students' interpretation by using a question of description: What do you see? or What do you know?

When using this routine in a group conversation it may be necessary to think of alternative forms of documentation that do not interfere with the flow of the discussion. One option is to record class discussions using video or audio. Listening and noting students' use of language of thinking can help you see their development. Students' words and language can serve as a form of documentation that helps create a rubric for what makes a good interpretation or for what constitutes good reasoning.

Another option is to make a chart or keep an ongoing list of explanations posted in the classroom. As interpretations develop, note changes and have further discussion about these new explanations. These lists can also invite further inquiry and searches for evidence. Other options for both group and individual work include students documenting their own interpretations through sketches, drawings, models and writing, all of which can be displayed and revisited in the classroom.





I Used to Think..., But Now I think...

A routine for reflecting on how and why our thinking has changed



Remind students of the topic you want them to consider. It could be the ideal itself--fairness, truth, understanding, or creativity--or it could be the unit you are studying. Have students write a response using each of the sentence stems:

- I used to think...
- But now, I think...



Purpose: What kind of thinking does this routine encourage?

This routine helps students to reflect on their thinking about a topic or issue and explore how and why that thinking has changed. It can be useful in consolidating new learning as students identify their new understandings, opinions, and beliefs. By examining and explaining how and why their thinking has changed, students are developing their reasoning abilities and recognizing cause and effect relationships.

Application: When and Where can it be used?

This routine can be used whenever students' initial thoughts, opinions, or beliefs are likely to have changed as a result of instruction or experience. For instance, after reading new information, watching a film, listening to a speaker, experiencing something new, having a class discussion, at the end of a unit of study, and so on.

Launch: What are some tips for starting and using this routine?

Explain to students that the purpose of this activity is to help them reflect on their thinking about the topic and to identify how their ideas have changed over time. For instance:

When we began this study of _____, you all had some initial ideas about it and what it was all about. In just a few sentences, I want to write what it is that you used to think about _____. Take a minute to think back and then write down your response to "I used to think..."

Now, I want you to think about how your ideas about _____ have changed as a result of what we've been studying/doing/discussing. Again in just a few sentences write down what you now think about _____. Start your sentences with, "But now, I think..."

Have students share and explain their shifts in thinking. Initially it is good to do this as a whole group so that you can probe students' thinking and push them to explain. Once students become accustomed to explaining their thinking, students can share with one another in small groups or pairs.

Thinking Routines Matrix

from the upcoming book *Making Thinking Visible* by Ritchhart, Morrison & Church (Spring 2011)

Routine	Key Thinking Moves	Notes
<i>Routines for INTRODUCING & EXPLORING IDEAS</i>		
See-Think-Wonder	Description, Interpretation & Wondering	Good with ambiguous or complex visual stimuli
Zoom In	Description, Inference, & Interpretation	Variation of STW involving using only portions of an image
Think-Puzzle-Explore	Activating prior knowledge, wondering, planning	Good at the beginning of a unit to direct personal or group inquiry and uncover current understandings as well as misconceptions
Chalk Talk	Uncovers prior knowledge and ideas, questioning	Open-ended discussion on paper. Ensures all voices are heard, gives thinking time.
321 Bridge	Activates prior knowledge, questioning, distilling, & connection making through metaphors	Works well when students have prior knowledge but instruction will move it in a new direction. Can be done over extended time like the course of a unit.
Compass Points	Decision making and planning, uncovers personal reactions	Solicits the group's ideas and reactions to a proposal, plan or possible decision.
Explanation Game	Observing details and building explanations	Variations of STW that focuses on identifying parts and explaining them in order to build up an understanding of the whole from its parts and their purposes
<i>Routines for SYNTHESIZING & ORGANIZING IDEAS</i>		
Headlines	Summarizing, Capturing the heart	Quick summaries of the big ideas or what stands out
CSI: Colour, Symbol, Image	Capturing the heart through metaphors	Non-verbal routine that forces visual connections
Generate-Sort-Connect-Elaborate: Concept Maps	Uncovering and organizing prior knowledge to identify connections	Highlights the thinking steps of making an effective concept map that both organizes and reveals one's thinking
Connect-Extend-Challenge	Connection making, identify new ideas, raising questions	Key synthesis moves for dealing with new information in whatever form it might be presented: books, lecture, movie, etc.
The 4 C's	Connection making, identifying key concept, raising questions, and considering implications	A text-based routine that helps identifies key points of complex text for discussion. Demands a rich text or book.
Micro Lab	A protocol for focused discussion	Can be combined with other routines and used to prompt reflection and discussion
I used to think	Reflection and metacognition	Used to help learners reflect on how their thinking has shifted and changed over time.
<i>Routines for DIGGING DEEPER INTO IDEAS</i>		
What makes you say that?	Reasoning with evidence	A question that teachers can weave into discussion to push students to give evidence for their assertions.
Circle Viewpoints	Perspective taking	Identification of perspectives around an issue or problem.
Step Inside	Perspective taking	Stepping into a position and talking or writing from that perspective to gain a deeper understanding of it.
Red Light, Yellow Light	Monitoring, identification of bias, raising questions	Used to identify possible errors in reasoning, over reaching by authors, or areas that need to be questioned.
Claim Support Question	Identifying generalizations and theories, reasoning with evidence, counter arguments	Can be used with text or as a basic structure for mathematical and scientific thinking.
Tug of War	Perspective taking, reasoning, identifying complexities	Identifying and building both sides of an argument or tension/dilemma
Word-Phrase-Sentence	Summarizing and distilling	Text-based protocol aimed at eliciting what a reader found important or worthwhile. Used with discussion to look at themes and implications.

