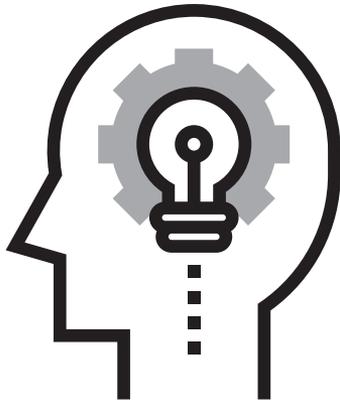


TABLE OF CONTENTS

Foreword	v
Introduction	vii
SECTION I: PLANNING STRATEGIES	1
1. <i>Stem Statements</i> [Thoughtful Lead-Ins]	3
2. <i>Inking Your Thinking</i> [Learning Logs]	10
3. <i>Film Footage</i> [Visualisation]	17
4. <i>Fat and Skinny Questions</i> [Higher-Order Questions]	24
5. <i>Roll the Dice</i> [Predicting]	31
6. <i>Pie in the Face</i> [Making Inferences]	38
7. <i>The Goal Post</i> [Goal-Setting]	47
8. <i>A Road Map</i> [Strategic Planning]	54
9. <i>Seesaw Thinking</i> [“What-If” Problem-Solving]	61
10. <i>Prime the Pump</i> [KWL]	68
SECTION II: MONITORING STRATEGIES	75
1. <i>Talk to Yourself</i> [Think Aloud]	77
2. <i>Soup Cans</i> [Labelling Behaviours]	85
3. <i>Alarm Clock</i> [Recovery Strategies]	92
4. <i>Instant Replay</i> [Tape Recordings]	99
5. <i>Sticky Note</i> [Memoing]	107
6. <i>Mental Menus</i> [Tracking]	114
7. <i>Cue Cards</i> [Prompting]	122
8. <i>Two-Way Talk</i> [Conferencing]	129
9. <i>Transfer Talk</i> [Bridging]	137
10. <i>The Microscope</i> [Recorded Observations]	145

SECTION III: EVALUATING STRATEGIES	155
1. <i>Thumbs Up/Thumbs Down</i> [PMI]	157
2. <i>Choose Your Spot</i> [The Human Graph]	165
3. <i>Mrs Potter's Questions</i> [Evaluating]	174
4. <i>A Revolving Door</i> [The Portfolio Registry]	183
5. <i>Connecting Elephants</i> [How Can I Use This?]	191
6. <i>The Big Idea</i> [Generalising]	199
7. <i>Checkmate!</i> [Self-Administered Checklists]	207
8. <i>What? So What? Now What?</i> [Student-Led Conferences]	216
9. <i>Story Time!</i> [Anecdotes]	225
10. <i>Double-Talk</i> [Double-Entry Journals]	233
In Closing	241
Bibliography	251
Index	255



INTRODUCTION

METACOGNITION

“What’s it all about, Alfie?”

An intellect is someone whose mind watches itself.

—Albert Camus

Metacognition – thinking about thinking; but exactly what does that mean? Metacognition is not even in the dictionary. It sounds pretty esoteric, doesn’t it? And if asked to define metacognition or describe it, you might feel somewhat inadequate. It’s like trying to explain atomic fusion to a five-year-old; you can conceptualise it in your mind, but you don’t know how to tell someone else – in simple language – what it is.

In the early 80s when the thinking skills movement was in its infancy, to use the word metacognition in a teacher workshop was risky; people actually became hostile. One time a veteran teacher stood up, red in the face and demanded, “Why do you have to use words like these? Can’t you speak English?”

To take some of the mystery (and hostility) out of the word, there are several examples of metacognition that may make it easier to grasp.

A WORKING DEFINITION

Think about a time when you were reading and suddenly you got to the bottom of a page of text and a little voice inside your head said, “I don’t know what I just read.” With this awareness of knowing what you don’t know, you employ a recovery strategy and read the last sentences again; you scan each paragraph looking for key words; you reread the entire page. Whatever you do, you capture the meaning and go on. This awareness – knowing what you know and what you don’t know – is called metacognition:

A reader who reads and reads and reads and doesn't know that he doesn't is not using metacognition. The key to metacognitive behavior is this self-awareness of one's own thinking and learning. "Once you know, you can't not know" and, in fact, you can then adjust accordingly. So metacognition is awareness and control over your own thinking behavior. (Fogarty, 1994)

To have awareness and control over your own thinking enables you to plan metacognitively, monitor progress metacognitively or evaluate metacognitively. Thus, the three areas – planning, monitoring and evaluating – provide the appropriate framework for self-reflection.

PLANNING

Let me give a more specific example of metacognition in the planning stages that might clarify the concept. As a teacher, you plan your lessons prior to class, taking into consideration myriad variables including time, complexity, prior knowledge, student population, etc. This planning phase, the time when you predict, prepare and plan your day is a metacognitive time for you.

During this preparation time, it's almost as if you are standing *outside* the situation looking in. You are imagining the actual lesson and the reaction(s) of the class to your plans, but are in essence removed from the action. This is metacognitive planning.

MONITORING

Once you begin the actual teaching of the lesson, you move into the cognitive realm. You enter into the context of the subject matter content and execute your lesson plan, inputting information for student understanding. But often in the midst of the teaching act, teachers move out of that cognitive arena and into the metacognitive. Let me illustrate.

Halfway into your explanation of photosynthesis, you notice signs of confusion. One student is rifling through the pages of their science textbook looking for the part that explains photosynthesis. Another student is doodling a diagram of the process in their notebook, but you can see that it is incomplete. Several hands are raised and other students have a glazed look in their eyes.

Noticing all this, in an instantaneous glance up from the whiteboard, you immediately shift gears and ask students to turn to their partner and ask a question they have about the process of photosynthesis. After a few minutes – after the partners have tried to answer each other’s question – you ask for some sharing so you can clarify the concept for everyone.

This monitoring of the students’ reactions and the resulting adjustment to the instructional input is metacognitive in nature. Whenever we watch student behaviours, and log the information for “minor adjustments or repairs”, we act metacognitively – beyond the cognitive. It’s as if we do a “freeze frame” on the teaching in the classroom and take a second look at what’s going on. This is metacognition.

EVALUATING

If you’re still confused, or feeling vague about metacognition, let me give you a further example of metacognitive reflection as evaluation.

Think back to your childhood – about something you memorised years ago: a poem, a song, a theorem, maybe even the multiplication tables. It can be anything.

“ABCDEFGH . . .”, “’Twas the night before Christmas and all through the house...”, “Ours is not to reason why, just invert and multiply”. Next, recite that piece from memory, right now. Say it aloud to yourself.

Now, think about how you learned that piece so many years ago that to this very day you can recall it instantly and accurately. Think about the strategies used to learn this so that you can recite it by “rote memory”. This evaluative thinking – assessing what you know, and how and why you know it – is metacognitive thinking . Thinking about how you learn and being able to generalise those skills and strategies for transfer and use into diverse situations – that’s metacognitive reflection.

WHAT DO THE EXPERTS SAY?

In 1979, John Flavell used the term metacognition to describe “active monitoring and consequent regulation and orchestration of [cognitive] processes, usually in the service of some concrete goal or objective.” He went on to identify four elements in metacognitive ability: metacognitive knowledge, experiences, goals and strategies.

METACOGNITION: THE NEGLECTED SKILL SET FOR EMPOWERING STUDENTS

Early work done by Feuerstein (1978) in this area shed light on the emerging concept of metacognition. Through a series of tasks developed over a period of time, Feuerstein's work in cognitive mediation guides students through self-monitoring activities that lead to reflective behaviour and transfer. Feuerstein's ground-breaking work in this area and in-depth longitudinal studies in the field provide the substantive cognitive theory on which others have built. In fact, Feuerstein's landmark study demonstrates the modifiability of cognitive behaviour and changes the view of intelligence as an unchanging entity to a capacity that grows not only in developmentally appropriate ways with age, but also through deliberate interventions or "mediated learning experience".

According to Brown's research (1980) in reading, metacognition is what good readers do when they read – planning, monitoring and evaluating throughout the process. Brown and Palincsar (1982) believe that we can teach those metacognitive strategies to all children as a way to unlock the reading process for them.

On the other hand, Costa (1991) defines metacognition as our ability to know what we know and what we don't know. It is our ability to plan a strategy for producing what information is needed, to be conscious of our own steps and strategies during the art of problem solving, and to reflect on and evaluate the productivity of our own thinking.

Costa goes on to say, [when] you hear yourself talking to yourself . . . if you [are] having an inner dialogue inside your brain and if you evaluate your own decision-making/problem-solving processes – you [are] experiencing metacognition.

Costa summarises the research on metacognition as Planning, Monitoring and Evaluating:

Planning a strategy before embarking on a course of action helps us track the steps. It facilitates making judgments; assessing readiness for different activities; and monitoring our interpretations, perceptions, decisions, and behaviors. An example of this is what superior teachers do daily; develop a teaching strategy for a lesson, keep that strategy in mind throughout the instruction, then reflect upon the strategy to evaluate its effectiveness in producing the desired student outcomes. (Fogarty, 1994)

SELF-MONITORING

Rigney (1980) identified the following self-monitoring skills as necessary for successful performance on intellectual tasks: keeping one's place in a long sequence of operations, knowing that a sub-goal has been obtained, and detecting errors and recovering from those errors.

In addition, (1) *looking ahead* includes: learning the structure of a sequence of operations, identifying areas where errors are likely, choosing a strategy that will reduce the possibility of error and provide easy recovery, and identifying the kinds of feedback that will be available and evaluating the usefulness of this feedback, while (2) *looking back* includes: detecting errors previously made, keeping a history of what has been done and what should come next, and assessing the reasonableness of the immediate outcome.

Yet, some believe that not everyone is metacognitive. Whimbey and Whimbey (1976) state that all adults metacognate, while Sternberg and Wagner (1982) say some children have virtually no idea what they are doing when they perform a task and are often unable to explain their strategies for solving problems.

HOW TO TEACH – NOT DIRECT, BUT INFUSE

Others focus their writing on how to teach for metacognition. If we wish to develop intelligent behaviour as a significant outcome of education, instructional strategies purposefully intended to develop children's metacognitive abilities must be infused into our teaching methods, staff development and supervisory processes (Costa, 1981). Interestingly, *direct* instruction in metacognition may *not* be beneficial. When strategies of problem solving are imposed rather than generated by the students themselves, their performance may be impaired. Conversely, when students experience the need for problem-solving strategies, induce their own, discuss them and practise them to the degree that they become spontaneous and unconscious, their metacognition seems to improve (Sternberg and Wagner, 1982). The trick, therefore, is to teach metacognitive skills without creating an even greater burden on students' ability to attend.

STRATEGIES FOR ENHANCING METACOGNITION

Costa (1991) suggests specific strategies:

Planning Strategy. Prior to any learning activity, teachers should point out strategies and steps for attacking problems, rules to remember and directions to follow. During the activity, teachers can invite students to share their progress, thought process and perceptions of their own behaviour. After the learning activity, teachers can invite students to evaluate how well the rules were obeyed.

Generating Questions. Regardless of the subject area, it is useful for students to pose study questions for themselves prior to and during their reading of textual material.

Choosing Consciously. Teachers can promote metacognition by helping students explore the consequences of their choices and decisions prior to and during the act of deciding.

Evaluating with Multiple Criteria. Teachers can enhance metacognition by causing students to reflect upon and categorise their actions according to two or more sets of evaluative criteria. An example would be to invite students to distinguish what was done that was helpful or hindering, what they liked or didn't like, and what were pluses and minuses of the activity.

Taking Credit. Teachers may cause students to identify what they have done well and invite them to seek feedback from their peers. The teacher might ask, "What have you done that you're proud of?" and "How would you like to be recognised for doing that?" (Name on the board, pat on the back, handshake, applause from the group and so on.) Students will become more conscious of their own behaviour and apply a set of internal criteria for those behaviours that they consider good.

Outlawing "I Can't." Students should be asked to identify what information is required, what materials are needed or what skills are lacking in their ability to perform the desired behaviour. This helps students identify the boundaries between what they know and what they need to know.

Paraphrasing or Reflecting Back Students' Ideas. Some examples of paraphrasing, building upon, extending and using students' ideas might be to say: "What you're telling me is . . .", "It seems you're saying . . .", "I think I hear . . .".

Labelling Students' Behaviours. When teachers place labels on students' cognitive processes, students become conscious of their own actions: "What I see you doing is making out a plan of action for . . .", "What you are doing is called an experiment", "You're being very helpful to Mark by sharing your paints. That's an example of cooperation."

Clarifying Students' Terminology. Students often use hollow, vague and non-specific terminology. For example, in making value judgements, students might say, "It's not fair", "He's too strict", "It's no good". Teachers need to clarify these values: What's too strict? What would be more fair?

Role Playing and Simulations. Role playing can promote metacognition because when students assume the roles of other persons, they consciously maintain the attributes and characteristics of that person. Dramatisation serves as a hypothesis or prediction of how that person would react in a certain situation. Taking on another role contributes to the reduction of ego-centred perceptions.

Journal Keeping. Writing and illustrating a personal log or a diary throughout an experience causes students to synthesise thoughts and actions, and to translate them to symbolic form. The record also provides an opportunity to revisit initial perceptions, to compare changes in those perceptions with the addition of more data, to chart the processes of strategic thinking and decision making, to identify the blind alleys and pathways taken, and to recall the successes and the tragedies of experimentation. (A variation on writing journals is making video and/or audio tape recordings of actions and performances.)

Modelling. Of all the instructional strategies, modelling the model is by far the most effective. The adage, actions speak louder than words proves to be true. If students see teachers model behaviours such as delineating a plan and justifying a choice, students are more likely to exhibit those same behaviours.

Beyer (1987) elaborates on a cueing technique to prompt metacognition. Questions Beyer suggests to foster metacognitive behaviour are: What am I doing? Why am I doing it? What other way can I do it? How does it work? Can I do it again or another way? How could I help someone else do it?

Current research by Swartz and Perkins (1989) refines the concept of metacognition beyond the accepted, generalised definition of awareness of and control over one's own mind and thinking. They distinguish four levels of metacognitive thought: tacit use, aware use, strategic use and reflective use.

Tacit Use	without thinking about it
Aware Use	aware that and when
Strategic Use	conscious strategies
Reflective Use	reflects before, during and after

METACOGNITION: THE NEGLECTED SKILL SET FOR EMPOWERING STUDENTS

A QUICK GUIDE: HOW THE METACOGNITIVE STRATEGIES REFLECT RESEARCH AND FINDINGS ON BEST PRACTICES

Framework: Best Practice	Rationale NOW Learning	Coaching Feedback (Hattie)	P21: Four Cs of 21st Century Learning	Attitudes/ Dispositions
The Economist Chart: <ul style="list-style-type: none"> • What Works, at What Cost? • Feedback to Students • Metacognition 	4 Forces for Learning <ul style="list-style-type: none"> • CCSS • HOT • Any Time Learning • DIY (Do it Yourself) 	Task <ul style="list-style-type: none"> • Person • Self-Regulation • Process 	Process vs Content <ul style="list-style-type: none"> • The Four Cs • Critical Thinking • Creativity • Communication • Collaboration 	Google Hires: <ul style="list-style-type: none"> • Cognitive Ability • Emergent Leaders • Student Ownership • Intellectual Humility • Innate Curiosity

PLANNING	Description	Feedback	Four Cs of 21st Century Learning	Dispositions
Stem Statements	Thoughtful Lead-Ins	Person	Creativity	Innate Curiosity
Inking Your Thinking	Learning Logs	Process	Communication	Student Ownership
Film Footage	Visualisation	Process	Creativity	Cognitive Ability
Fat and Skinny Questions	Higher-Order Questions	Task	Critical Thinking	Innate Curiosity
Roll the Dice	Predicting	Process	Creativity	Cognitive Ability
Pie in the Face	Making Inferences	Task	Creativity	Innate Curiosity
The Goal Post	Goal-Setting	Process	Collaboration	Emergent Leaders
A Road Map	Strategic Planning	Self-Regulation	Collaboration	Emergent Leaders
Seesaw Thinking	"What-If" Problem-Solving	Process	Critical/Creative Thinking	Intellectual Humility
Prime the Pump	KWL	Process	Critical Thinking	Emergent Leaders

MONITORING				
Talk to Yourself	Think Aloud	Self-Regulation	Critical Thinking	Student Ownership
Soup Cans	Labelling Behaviours	Process	Creativity	Cognitive Ability
Alarm Clock	Recovery Strategies	Process	Critical Thinking	Intellectual Humility
Instant Reply	Tape Recordings	Task	Critical Thinking	Student Ownership
Sticky Note	Memoing	Process	Communication	Student Ownership
Mental Menus	Tracking	Self-Regulation	Collaboration	Intellectual Humility
Cue Cards	Prompting	Self-Regulation	Collaboration	Intellectual Humility
Two-Way Talk	Conferencing	Self-Regulation	Collaboration	Intellectual Humility
Transfer Talk	Bridging	Process	Collaboration	Emergent Leaders
The Microscope	Recorded Observations	Process	Critical Thinking	Cognitive Ability

EVALUATING	HOT	Coaching Feedback (Hattie)	Four Cs of 21st Century Learning	Attitudes/ Dispositions
Thumbs Up/ Thumbs Down	PMI	Self-Regulation	Critical Thinking	Precision
Choose Your Spot	The Human Graph	Self-Regulation	Communication	Empathy
Mrs Potter's Questions	Evaluating	Process	Critical Thinking	Impulsivity
A Revolving Door	The Portfolio Registry	Process	Critical Thinking	Cognitive Ability
Connecting Elephants	How Can I Use This?	Task	Collaboration	Wonderment
The Big Idea	Generalising	Task	Communication	Clarity
Checkmate!	Self-Administered Checklists	Self-Regulation	Critical Thinking	Student Ownership
What? So What? Now What?	Student-Led Conferences	Self-Regulation	Critical Thinking	Student Ownership
Story Time!	Anecdotes	Communication	Communication	Student Ownership
Double-Talk	Double-Entry Journals	Process	Critical Thinking	Attitudes/Dispositions