Understanding Meta-cognition

- **What is meta-cognition?**
- **Suggested strategies that teachers can use to build meta-cognitive capacities**
- **How might different orientations to teaching and learning help us to frame meta-cognitive questions for learners?**
- **What might we need to consider when using meta-cognitive tools?**

What is meta-cognition?

Meta-cognition is essentially "thinking about thinking".

Although it is treated as a "fuzzy" concept, with many different interpretations of its nuances by researchers across psychological and educational fields, meta-cognition is generally considered to have two key aspects. These are: *cognitive knowledge* and *cognitive regulation,* which are important in developing learning how to learn capacities. Lai (2011), in a literature review of the research, has compiled various dimensions of these two aspects, which we have added to (from Efklides, 2008; Darling-Hammond, et al (n.d.); Costa & Kallick, 2004):

Cognitive Knowledge

- **Reflection during a task** – what I know, don't know; what I am thinking (person and task knowledge, self-appraisal)

- **Knowledge about oneself as a learner** – how I think and learn; what factors might affect my performance (declarative cognitive knowledge)

- **Knowledge of how the mind works generally** – factors affecting cognition (theories of mind and memory), beliefs about ways of thinking and knowing (epistemological understanding)

- **Awareness of management of cognition** – including knowledge about particular strategies (procedural and strategy knowledge)

- **Knowledge of when to use particular strategies** – for a specific task (conditional knowledge)

Cognitive Regulation

- **Planning** – Identification and selection of appropriate strategies, activating background knowledge, goal setting, budgeting time and allocation of resources, predicting outcomes

- **Monitoring/regulating** – Attending to and being aware of comprehension and task performance, forming internal questions, making connections between new and previously learnt material, awareness of dissonance, self-testing, using compensatory strategies, becoming aware of actions on others and the environment, aware of mental models (meta-cognitive experiences)

- **Evaluating** – Assessing the processes and products of one's learning, and revisiting and revising learning goals, evaluating against specific criteria of efficiency and effectiveness

There is a reciprocal relationship between cognitive regulation and cognitive knowledge. Cognitive regulation helps to build a learner's cognitive knowledge, which in turn facilitates cognitive regulation. Studies have shown that meta-cognition follows a developmental trajectory, and also plays a role in the development of cognition in line with theories of Piaget and Vygotsky.

Meta-cognition is closely related to three other learning domains:

- **Critical thinking** – monitoring the quality of thought (its origins, biases and positioning) assists one to engage in high-quality critical thinking

- **Self-regulated or self-directed learning** – monitoring and regulating one's performance is essential for self-empowered and enabled learning

- **Motivational/affective domain** – monitoring and regulating one's feelings enables one to build dispositions and strategies to meet challenges.

The figure below shows the relationships between the different elements of meta-cognition and how they support each other.

Elements of meta-cognition and relationships between elements
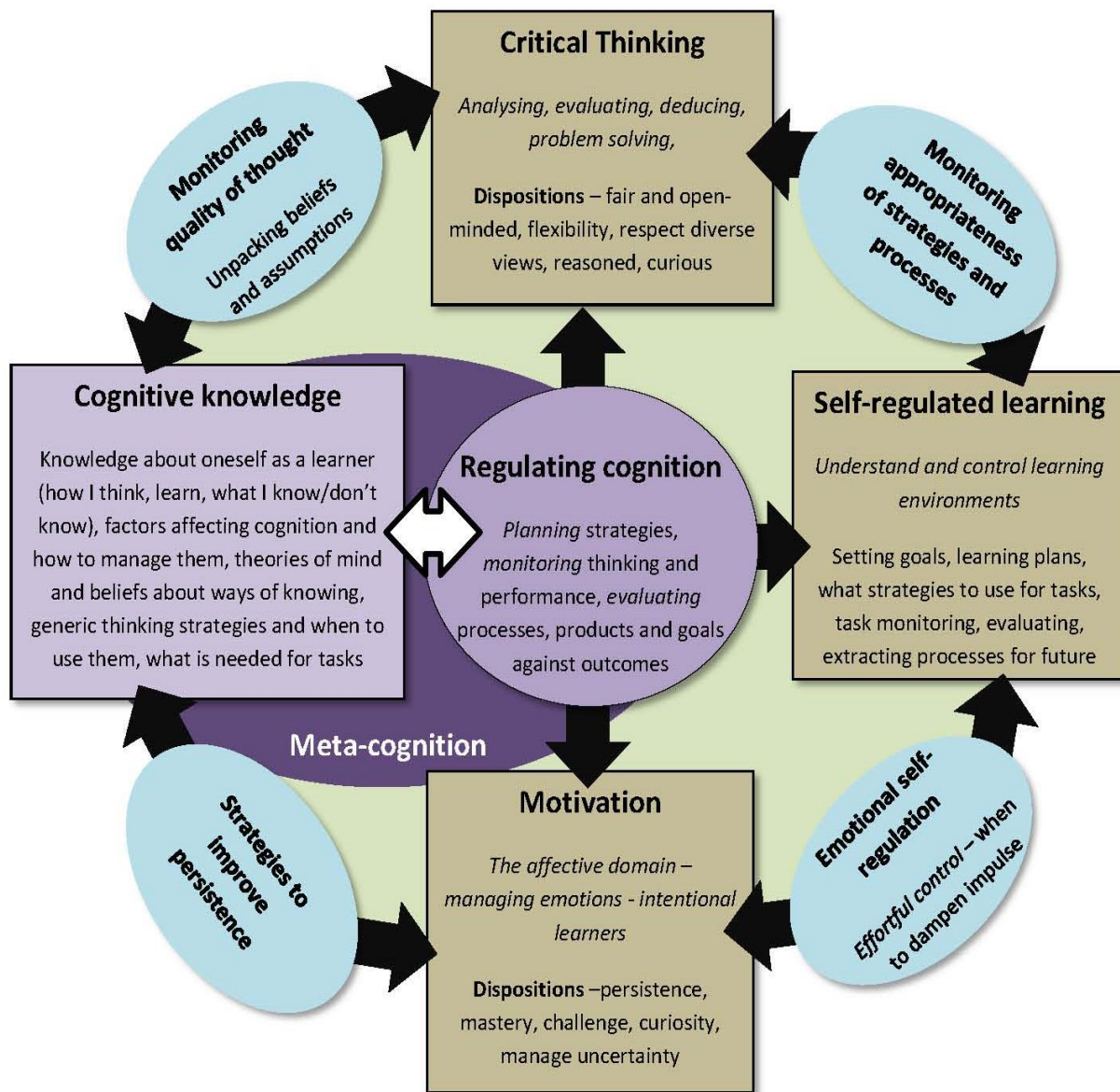
Suggested strategies that teachers can use to build meta-cognitive capacities include:

- *Reflective practice* – encouraging students to engage in and value reflective processes about their learning and thinking *in* action or *on* action.

- *Building knowledge about meta-cognition* –

  o Providing direct instruction about meta-cognition, theories of the mind, factors affecting cognition, learning styles, emotional awareness.

  o Developing a meta-cognitive vocabulary to give learners a language to talk about their learning, thinking and emotions.

  o Encouraging students to build theory about their own learning and cognitive processes that be can used deliberately in future tasks. This can be assisted by learning journals, de-briefing, cognitive coaching or mentoring.

- *Visible thinking/learning strategies* –

  o Deliberate teaching or visible employment of learning strategies, thinking routines, thinking ideals, question sets, or specific tools/heuristics to help develop thinking and student management of tasks, emotions and learning.

  o Providing opportunity for students to select, practise and evaluate different strategies.

- *Fostering dispositions* – valuing, making visible and encouraging the dispositions that support motivation, self-regulation, and critical thinking.

Suggested strategies that teachers can use to build meta-cognitive capacities include:

- *Self-regulation* –

  o Encouraging students to engage in self-regulating processes during tasks.

  o The teacher can scaffold self-regulation through modelling of the processes, thinking out loud for the students, using prompts.

  o Students can engage in group discourse to test out ideas and strategies, think aloud, give and get feedback, and provide constructive critique.

  o It is important to build community of practice environments to support such discourse.

- *Self-assessment* – providing opportunities for students to be involved in their assessment. This means involving students in an understanding or development of the intentions, outcomes, or criteria of the learning.

How might different orientations to teaching and learning help us to frame meta-cognitive questions for learners?

Depending on our orientations to teaching and learning we may develop different types of questions to help learners and ourselves reflect on our thinking and learning. The following table gives some examples of how different orientations to teaching and learning might result in different perceptions of meta-cognition.

Paradigm	Meta-cognitive questions	Purpose
Teaching as training, behaviourism, empiricism	• What did you do and experience? • What have you learnt? • How can you apply this in practice?	To embed learning

Teaching as instructing, cognitivism, rationalism	• What are you thinking? • What do you know, not know, need to know? • How are you thinking about this? • What questions are you asking and why are they valuable?	• To build understanding • To make thinking visible • To improve thinking
Teaching as facilitating, social constructivism, structuralism	• How are you thinking/learning/feeling about this? What thinking/learning/ dialogue/feedback strategies do you find useful? • What are your and others' preferred ways of learning? • How does this help build better inquiry, dialogue and teams? • What models/tools can you use to broaden your range of thinking?	• To understand own self as a learner • To make learning strategies transparent • To build capacities for self-directed learning and effective team work
Teaching as liberating, curriculum as social reform, post-structuralism, critical theory	• How are you thinking about this? What are the underlying patterns of thinking, belief systems, assumptions, power relations, paradigms, metaphors, consciousness that are shaping how you are thinking? • How can you think about this in different ways? (Disruptive wonder)	• To make transparent enculturated belief systems • To liberate into new possibilities
Teaching as transformation, humanism, curriculum as currere, developmental theories	• How has your thinking/understanding/ being/feeling/sensing/relating/valuing changed over time? • How is the past affecting your present and future? • How do you understand yourself, the ways you think, learn, relate, and grow? • What are your dissonances, learning edges and aspirations and where are you on your journey? What patterns are you noticing about your development and how does this relate to the	To build self-transforming capacities

	development of others?	
Teaching as drawing out, spiritual traditions, holistic education, presencing	• Be fully present in the moment, while also being a witness to yourself – noticing your bodily felt sense, intuition, conscious mind, ego, states, view – and how they flow and interact with the world. • What surprises, intrigues, inspires? • What are your snags, paradoxes? • Tune in to the deeper source of yourself to reveal generative insights and actions.	• To build clarity, awareness, integrity and alignment of self • To build mindfulness – reflexivity of inquiry in action • To assist in self-awakening
Teaching as occasioning and conversing, complexity science/ ecology, process theories	• What are we noticing that is going on in this space together? • What do we value in this? • What signals are we picking up? • What are we listening in to, tuning into and why? What do we each see that is emerging in ourselves and collectively? • How are our liberating constraints here creating certain emergent patterns? • How can we improve our ethical attention to this process and each other? • How can we build on these?	• To build quality of relationships • To assist in building co-creative, emergent insights, practice and processes

## What might we need to consider when using meta-cognitive tools?

Dr Sue Stack explores some of the affordances and the issues of fostering cultures of meta-cognition.

What do we mean by meta-cognition?

At the simplest level, meta-cognition is thinking about thinking. It is the "pause, stand back, and witnessing" of your thinking, sensing, feeling, or learning processes, making them visible and enabling you to modify your behaviour. As you are reading this you might become aware of your thinking, how you might be

flowing with the text, opening to what comes, or resisting it, saying "hurry up, get to the point, give me the take-away message or tool that I can use in my own practice". You might be thinking critically, wondering who the author is, and her stance. You might have memories evoked, imagination fired up, new ideas emerging in the space between you and the text.

You could become aware that your thinking is following well-trodden pathways, despite your mood and situation that might reflect your learning styles. This idea might intrigue you, and you might wonder what thinking and inquiring might be like from other learning styles. You could find out, explore, map the dimensions, and create a framework that articulates these learning styles simply. You might then have a meta-cognitive tool similar to the *dialogical inquiry model*, as shown to the right.
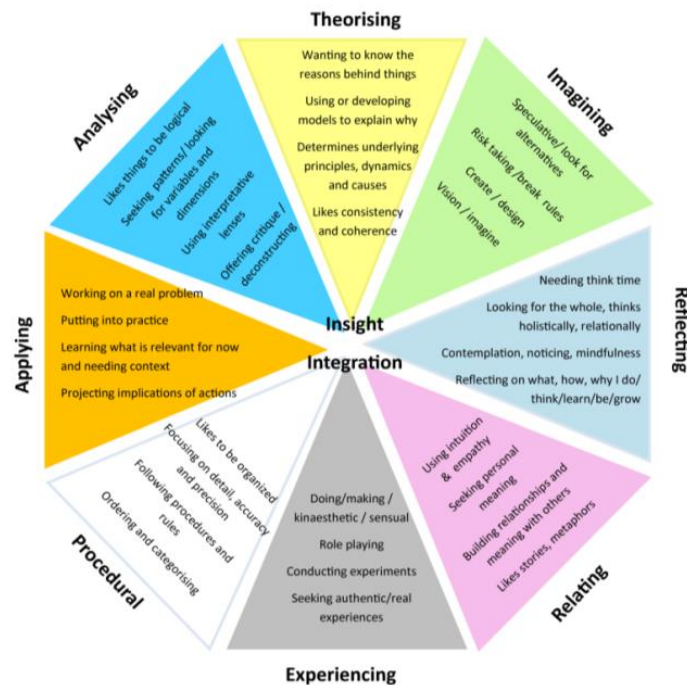
The value of such a tool is that it might help you and others name better your habitual thinking patterns, to recognise that you can move beyond these and to navigate less well-travelled thinking zones. It might encourage greater tolerance of difference, spark new ideas about teaching and learning, and development of new tools and explicit processes for your students. It may help you be a better monitor and regulator of your own processes in action, giving you goalposts to check yourself against.

However, before long, this tool or framework might become a prison for your thinking. Every way of thinking or feeling might be too easily mapped into these categories and explained by this model. Those that do not fit into the categories, or cross boundaries – the deeper nuanced intricate experiences – might fall

down the cracks, ignored. So this living tool, this scaffolding for you to make something more visible and expansive, becomes a means for making opaque a world bubbling to be seen in new ways. We become trapped in our own theories of the world that shape how we sense it, think about it and navigate it.

"But…", you argue, "I am reluctant to throw this tool away; it has been invaluable in helping so many people be more effective and efficient in their thinking, their inquiry, their dialogue and feedback with others. They have been able to understand deeper, develop strategies, achieve better scores, meet higher standards, show competence and create better products for our current world. These tools help to make the thinking we value visible so people are able to judge themselves against standards and be self-directed, self-regulating, self-assessing learners".

You also remind me that there are many such tools like these used to great effect that reveal processes that have been implicit, providing processes for thinking, inquiring and learning. Yes, I agree. For example, the "Harvard Visible Thinking Project" and "Habits of Mind" are highly successful tools for schoolchildren. Meta-cognition is one of the great tools of the mind that can help us deal with complex situations, check our thinking and biases to avoid typical error traps in decision-making under complex and difficult situations, saving lives. This is now being built into courses for bushfire managers, corporate leaders, air traffic controllers, and others. It is foundational to courses at university that encourage students to think outside the box, to develop their thinking capacities and to move from formal logical operations into dialogical thinking.

But, I warn in response, these very processes to unpack our thinking are actually shaped by all that makes up our thinking – the evolutionary hard-wiring of our brains, our symbolic language, the metaphors that we use, our bodies, our environment, our cultures, our systems, our perspectives, our beliefs, our paradigms, our ways of knowing, being and valuing, our consciousness, our relationships between us and the world and others. We are so deeply embedded in these we are often unaware of how significantly they influence our feeling/thinking/knowing and selection around teaching and learning. Meta-cognitive tools of different shapes would also help us to make these layers visible, though we need to realise that meta-cognition itself is an assumption-laden concept.

"But…", you say, "We have to live pragmatic lives in the world. We are trainers after all, not philosophers. When we start becoming aware of our thinking and the origins of our thinking, where will it stop? Are we left falling down a bottomless pit, each floor beneath us giving away? An onion peeled until there is nothing left? A room full of mirrors, reflecting smaller and smaller reproductions of ourselves till infinity? Who are we then?"

Yes, I reply, I can see your concern here for your learners. Do we want to set such a deep meta-inquiry into motion? It is a lot simpler to introduce a tool or process, have people stick to the guidelines, hold tightly to the guide ropes. Too much questioning, too much peeling of the meta-onion-layers can disorient and destabilise the self, creating cognitive conflict, leading to significant transformation.

"Well…", you say, "Transformation is what we want. What do you mean, here, by transformation?"

Transformation, I reply, is named by so many different people through so many different meanings, yet it seems like the golden currency of the moment. Is it about a change in *what* people think about something, or a change in *how* they are thinking, or a change in the cognitive structures that hold that thinking? Is it a change in practice or behaviours or values? Is it a development of self, perhaps a movement to a higher stage on one of the 100 or so mapped development lines by psychologists, educators, sociologists, anthropologists, neurologists, spiritualists, and others? Is it about a deep existential change that doesn't seem to fit into any of the models of development? Is it a deconstruction, a disintegration, a releasing of aspects of self? Is it generative and integrating, enabling more imaginative wholes, coming from a centre providing integrity and alignment with deep values and sense of purpose? Is it a greater awareness of who we are as we act and think?

"Yes, Sue", you say, "this is all very problematic but ultimately training is aiming for a change in a person, whether a particular pragmatic skill, attitude, behaviour, or understanding. We don't need meta-cognitive tools to unpeel the onion completely, just to provide pragmatic changes in the direction we want. If people are transformed too much developmentally they might not fit the system that we are training them for".

Hmmm, I say. The designers of meta-cognition tools are people with orientations to teaching and learning, ways of knowing, and understandings about the nature of human being. They intentionally or unconsciously draw from paradigms such as cognitivism, behaviourism, humanism, constructivism, connectivism, and holism. Meta-cognitive tools designed from different orientations are likely to perturb different layers of being. The problem is that often quite simple meta-thinking tools, a seemingly simple question, can start a process which we do not necessarily intend; for example challenging someone's role as a teacher and their deeper sense of identity can create an earthquake shudder in the self. It is important, therefore, that we understand the likely effects.

Meta-thinking tools or processes are not *timeless*, rather, they are *timely* for a certain point of someone's journey, providing a pragmatic solution for some, or a tipping point for another. Different people will take from tools different things according to what they need, probably not realising that they are using them differently compared to others. Others will deliberately re-purpose them. Some teachers will not apply the tool to themselves, instead, being a dissociated observer and using the tool with their students only. For others, such tools may not be relevant for their contexts and stage of thinking and in some cases, counter-productive.

Some people might appropriate them within their existing cognitive frames, seeing them as neat explanations for their experiences, perhaps providing a satisfying "AHA!" For some, it might be a brief illumination and then forgotten and unembodied. Others might use them to propel them to their learning edge with excitement, embracing new understandings, ways of thinking and growth of self, and thus expanding their cognitive frames or ego-development. Others might experience guilt, discomfort, fear, or a feeling of inadequacy by what has been named, or terrified of stepping into what has been opened up. Others might be in shock, open, but in a big pause to see what happens next, and transformation may not happen for some time. For others, the hard thinking and creation of such tools facilitate self-transformation as they are called to deeply reflect on how they think, learn and who they are. Continuing meta-cognition can be very wearying.

So when we encourage meta-thinking we are opening Pandora's Box, and need to do so with an understanding of what might eventuate. Many teachers are often oblivious to the deeper life going on in a student's "unpeeling".

It is a peek inside my students' heads. I can see their thinking…

It is a waiting, a naming, inquiring, playing, tasting, noticing, testing, embedding, forgetting, living, embodying… Then liberation from it… new cycles

A deeper relation to my human beingness…

It is a clarity from noticing, authenticity and awareness, a witness to myself

It is a new way of seeing, thinking and sensing... peeling the onion layers to get to the point of origin

Discovering a new self, wanting to be all I can be, being able to articulate my values, living authentically, hoping to find a place in the system which values who I am…

We can also expand the notion of meta-cognition beyond the individual into group-thinking and consciousness. We can expand our meta-tools beyond "thinking", through processes like "presencing", which tunes in through sensing and meditation to understand and connect with larger wholes.

So in designing a course utilising meta-cognitive tools and processes what do I need to have in mind?

- How do I provide ethical care for participants on their journeys?

- What is timely and useful for people and how do I know?

- Quantity of different tools to choose from, suitable for different development stages, orientations, interests, which also illuminate the different onion layers?

- What is my stance, and what unknown minefields am I planting in my tools and my approaches to using them because of my own orientations?

- How do the tools I use invite the participation of the self, rather than making the self seem small, less than others, or guilty or wrong?

- How do I give time for people to get to know the tool, explore it, re-purpose it, use it, and get feedback from it?

- How do I ensure people have the capacity to liberate themselves from such tools they buy in to? Understanding limitations and orientations?

References

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Acknowledgements & Background

This resource has been prepared by Dr Sue Stack (pictured, top) based on workshops she co-facilitated with Dr Helen Bound (bottom) in the Tools for Learning Design project.

This and other content related to the Tools for Learning Design project can be found on the Tools for Re-imagining Learning website, a resource for trainers, curriculum and learning designers, and training leaders in the Singapore Continuing Education and Training sector interested in deepening understanding of their practice to create innovative and enlivening possibilities for their adult learners.

The Tools for Re-imagining Learning website and the Tools for Learning Design project overview can be found at www.ial.edu.sg.

For more information on the Tools for Learning Design project or the Tools for Re-imagining Learning website (content), please email Dr Stack at susan.stack@utas.edu.au or Dr Bound at helen_bound@ial.edu.sg.

We welcome questions or feedback on this publication, the Tools for Learning Design research report or the Tools for Re-imagining Learning website (layout or technical issues). Please email research@ial.edu.sg.

Tools for Re-imagining Learning

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