Thinking about metacognition and self-regulated learning?

https://www.youtube.com/watch?v=OOa46F_QDHQ

Using Zoom Webinar

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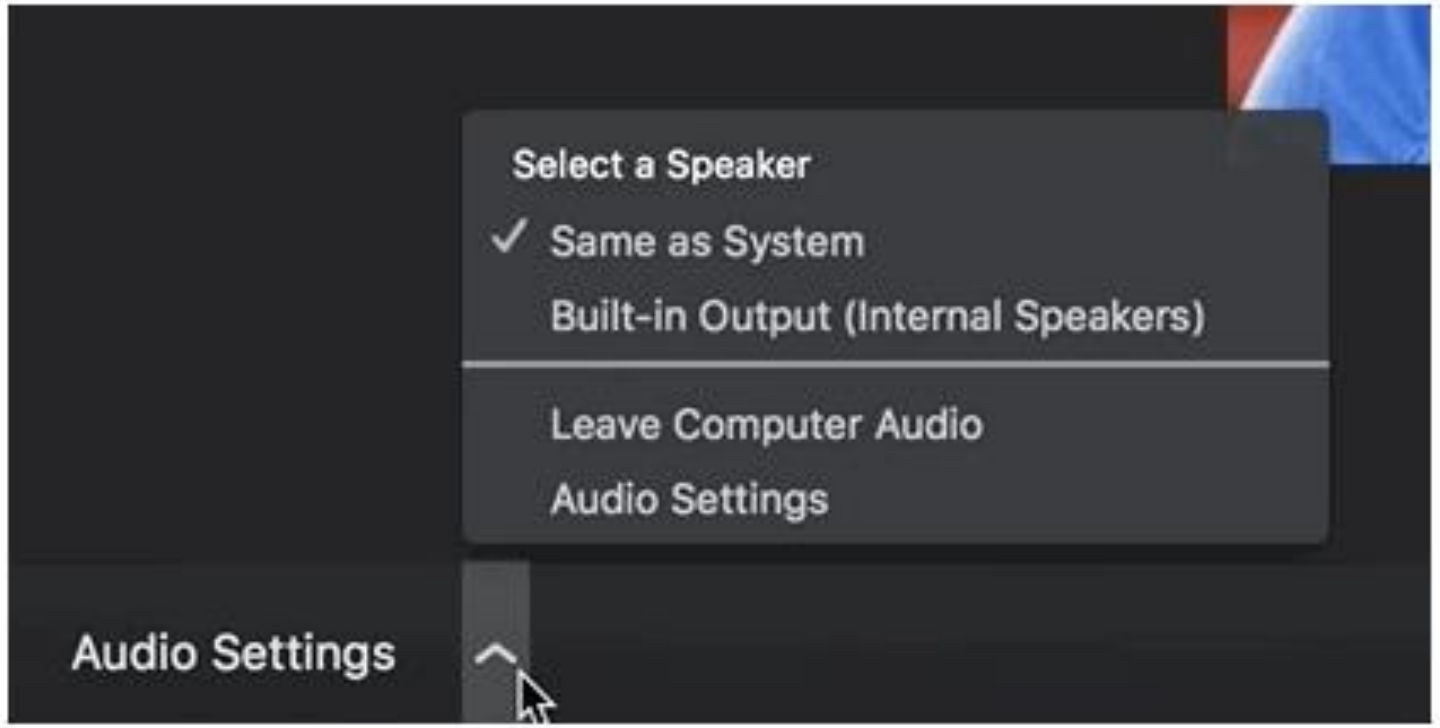

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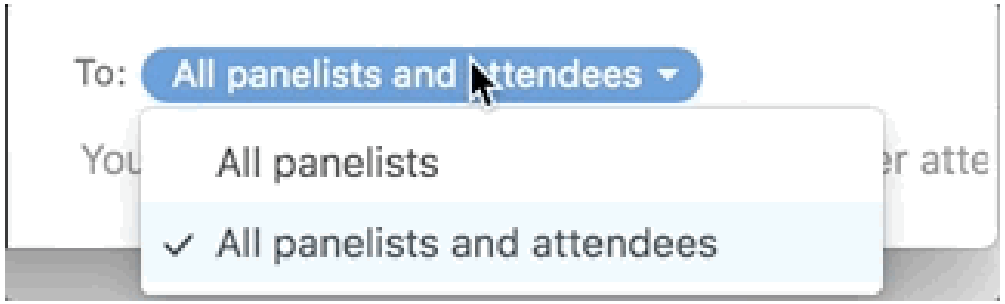
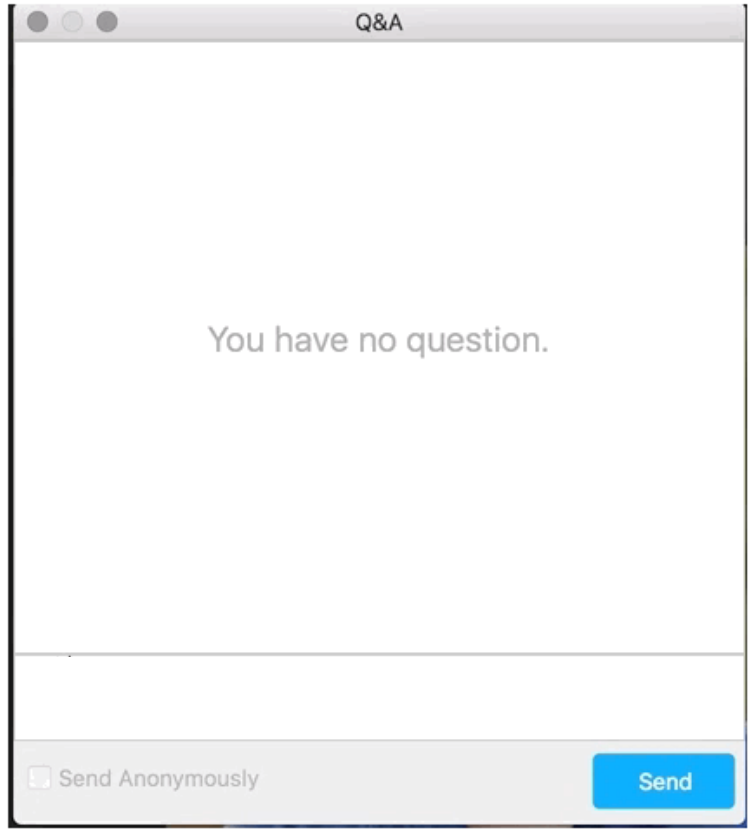
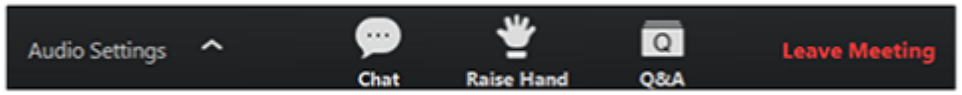


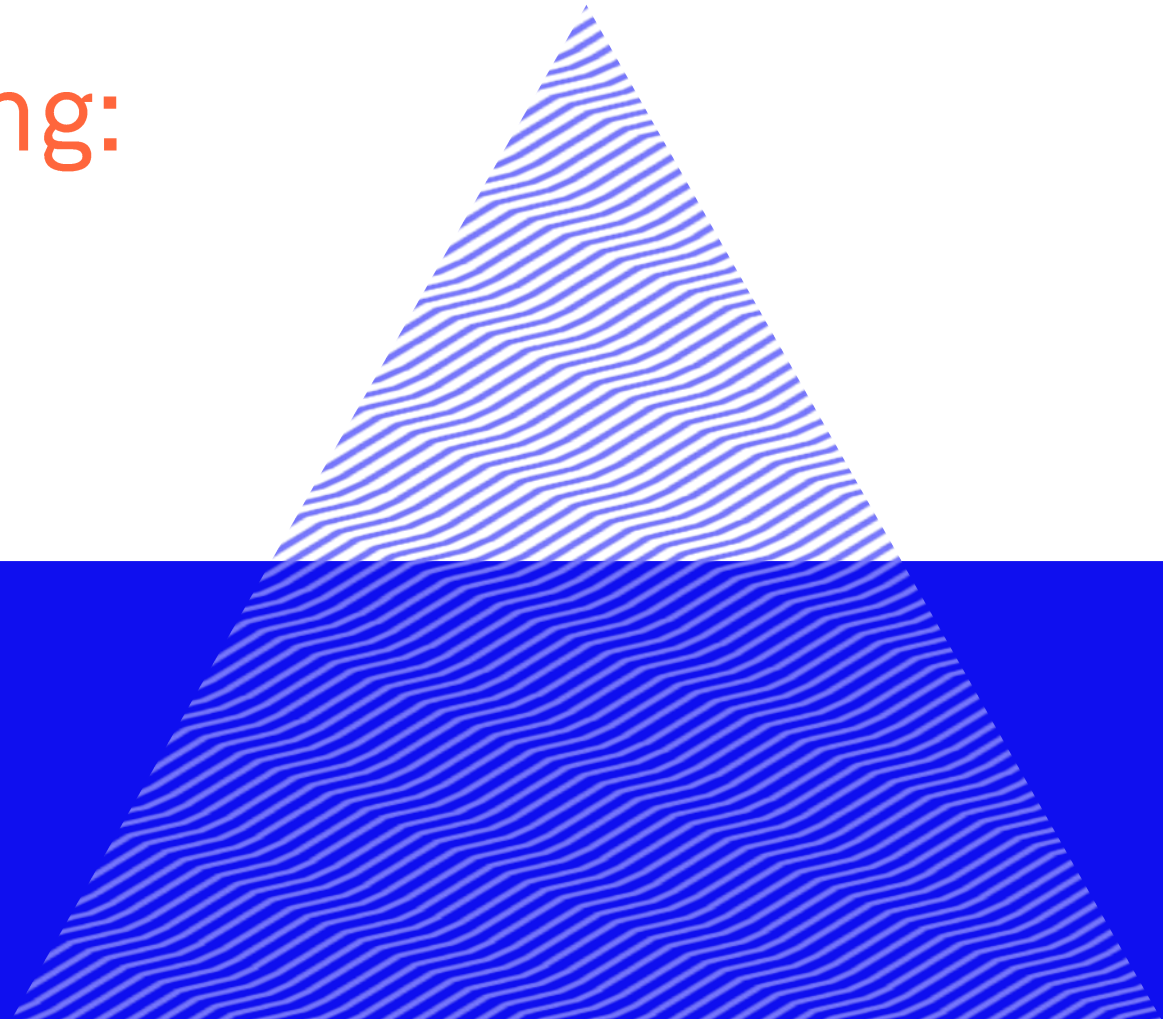




Effective metacognition and self-regulated learning: research to practice

Dr Tanya Vaughan & Susannah Schoeffel

18 February 2020, Webinar



EVIDENCE FOR LEARNING

Acknowledgement of Country

We would like to acknowledge the traditional custodians of the land on which we meet, and pay my respects to elders past, present and emerging.

What to expect

- Why we think it is important to look at metacognition and self-regulation
- A dive into the theory and research
- Classroom implications and examples at primary and secondary
- Q&A (get your questions ready)


QUIZ!

True or False

1. Metacognition is only developed in students in upper primary and secondary school.

2. Metacognition is a general skill that must be separated from subject knowledge.

3. Metacognition represents ‘higher order’ thinking and is therefore more important than mere cognition or subject knowledge.

4. Metacognitive knowledge and strategies can be taught in discrete ‘thinking skills’ lessons.

The Toolkits aim to:

- support evidence-informed decision making in Australian schools and early childhood education settings;
- provide guidance for school leaders and teachers, and early childhood education educators on how to use their resources to improve educational outcomes for their students, particularly those surrounded by disadvantage;
- act as an introduction to educational research.

The Toolkits

+5 Average months' worth of learning progress;

$ Cost to implement; and

The security of evidence.

Accessing the Toolkits

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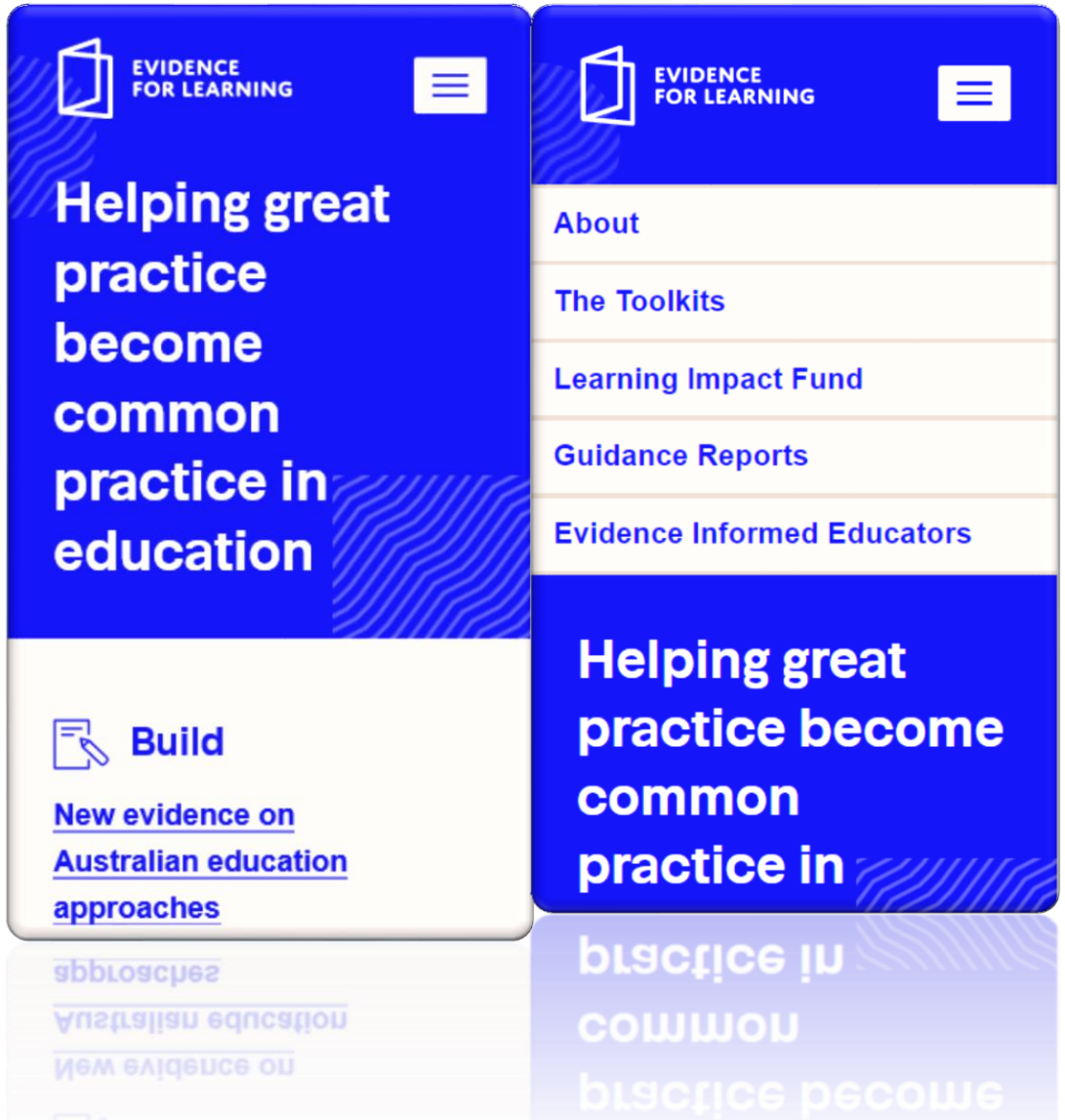
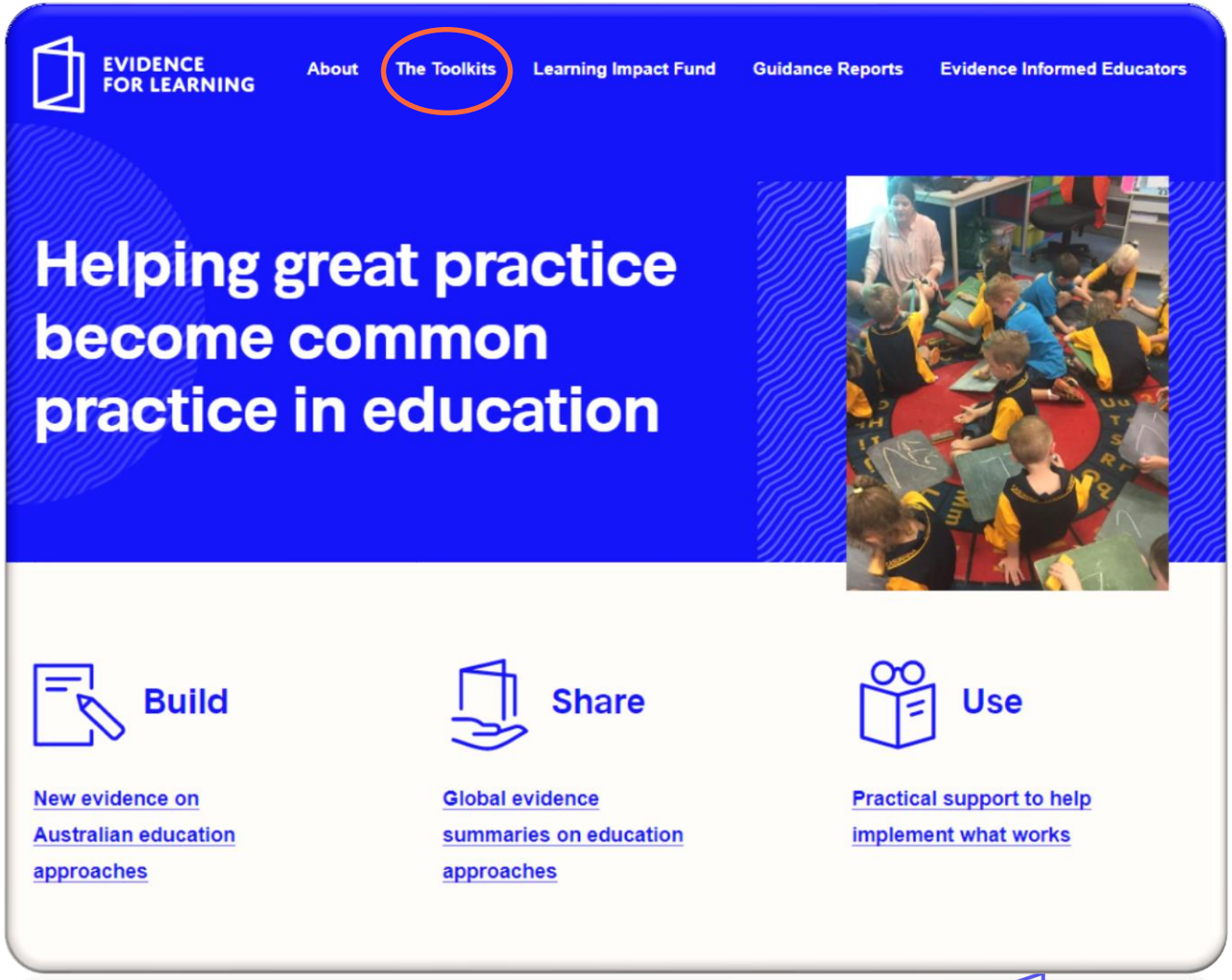
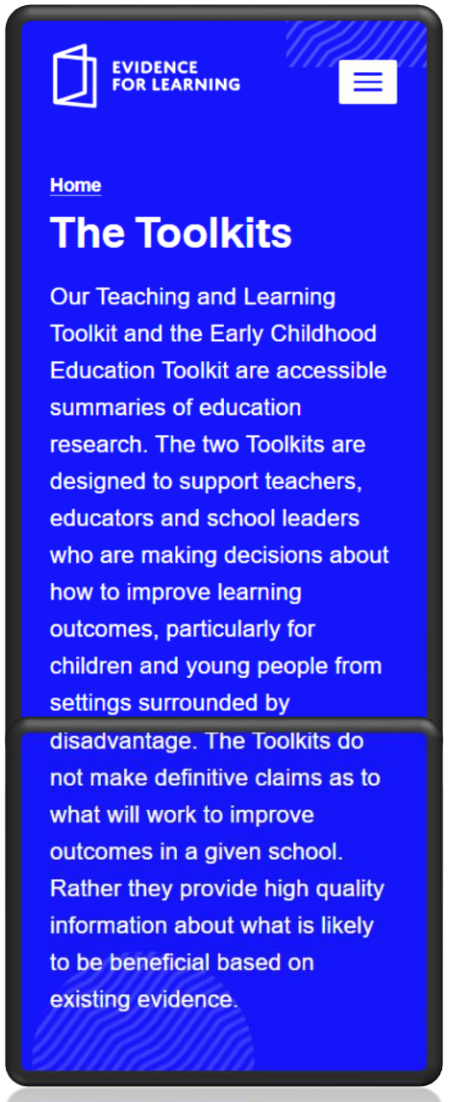


Laptop



The Teaching & Learning Toolkit

Tablet or phone



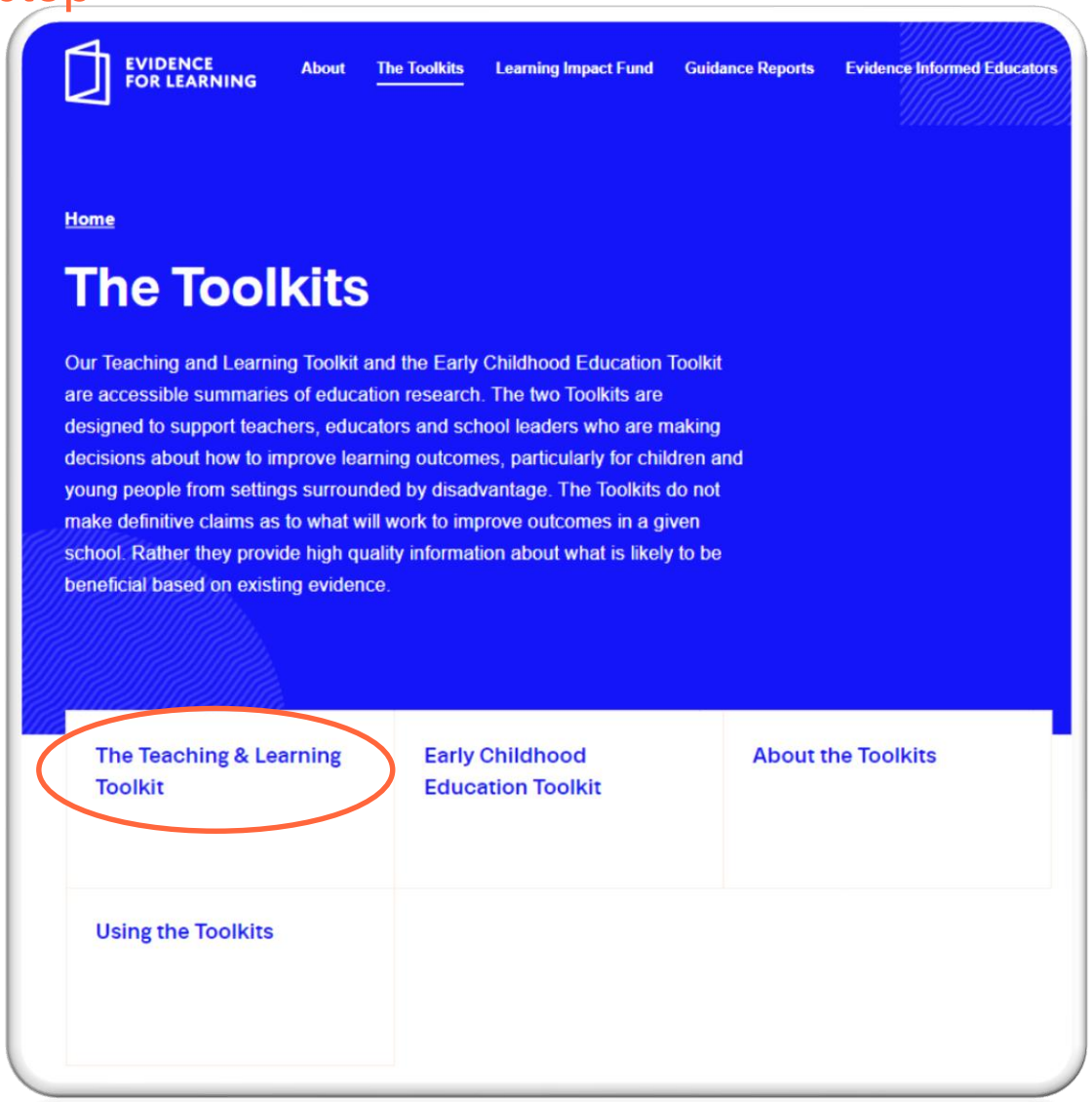
The Teaching & Learning Toolkit

Early Childhood Education Toolkit

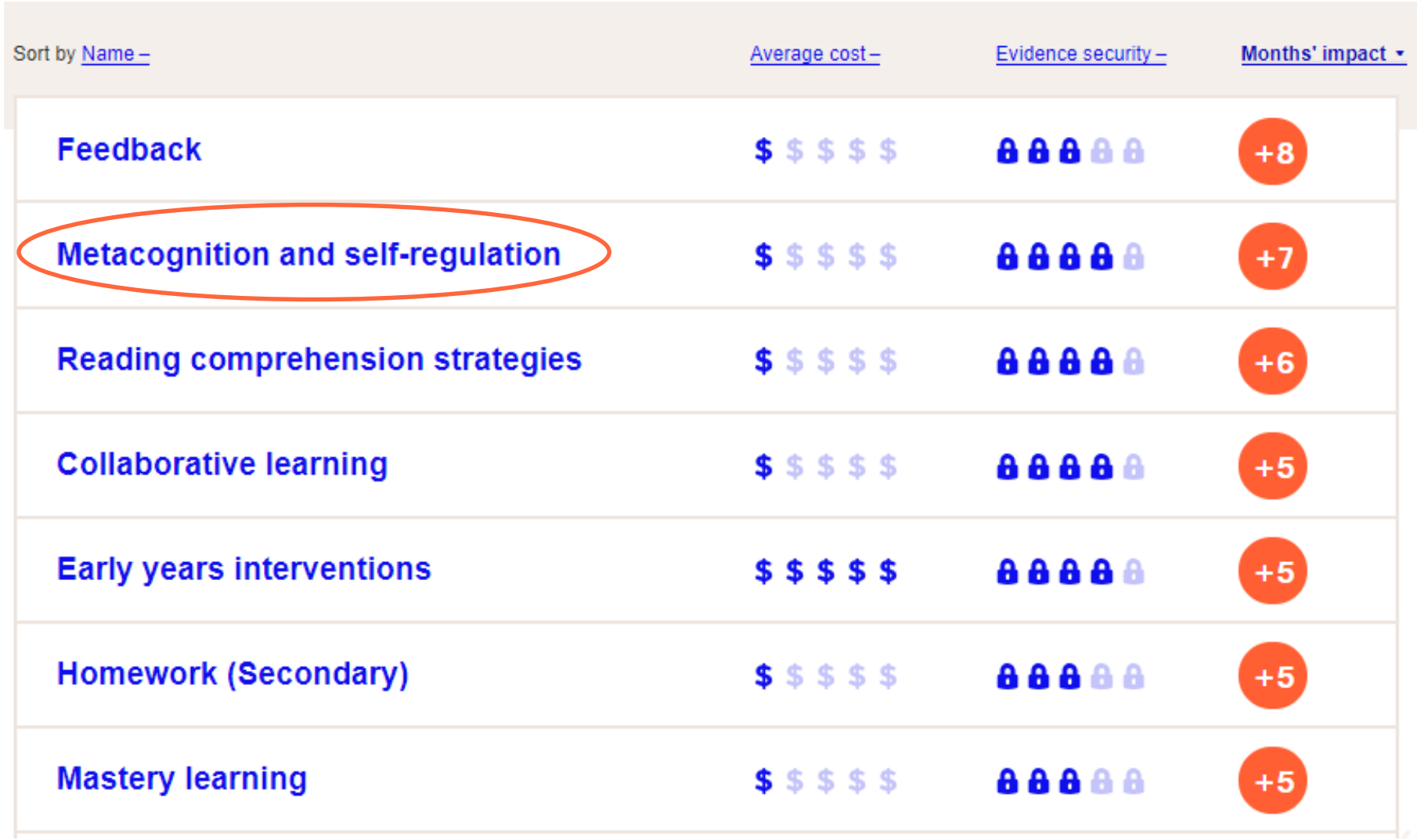
About the Toolkits

Using the Toolkits

Laptop



evidenceforlearning.org.au/the-toolkits/



Average cost
The approximate cost of implementing an approach.

Evidence security
Based on the quantity and the methodological quality of the available evidence, and the reliability or consistency of impact estimates.

Months' impact
The additional months' progress you can expect students to make as a result of an approach being used.

Metacognition and self-regulation

High impact, very low cost, based on extensive evidence

Metacognition and self-regulation approaches have consistently high levels of impact.

Average cost	Evidence security	Months' impact
$ $ $ $ $	🔒🔒🔒🔒🔒	+7

1.2
Understand how students learn

Demonstrate knowledge and understanding of research into how students learn and the implications for teaching.

1.5
Differentiate teaching to meet the specific learning needs of students across the full range of abilities

Demonstrate knowledge and understanding of strategies for differentiating teaching to meet the specific learning needs of students across the full range of abilities.

Approach summary

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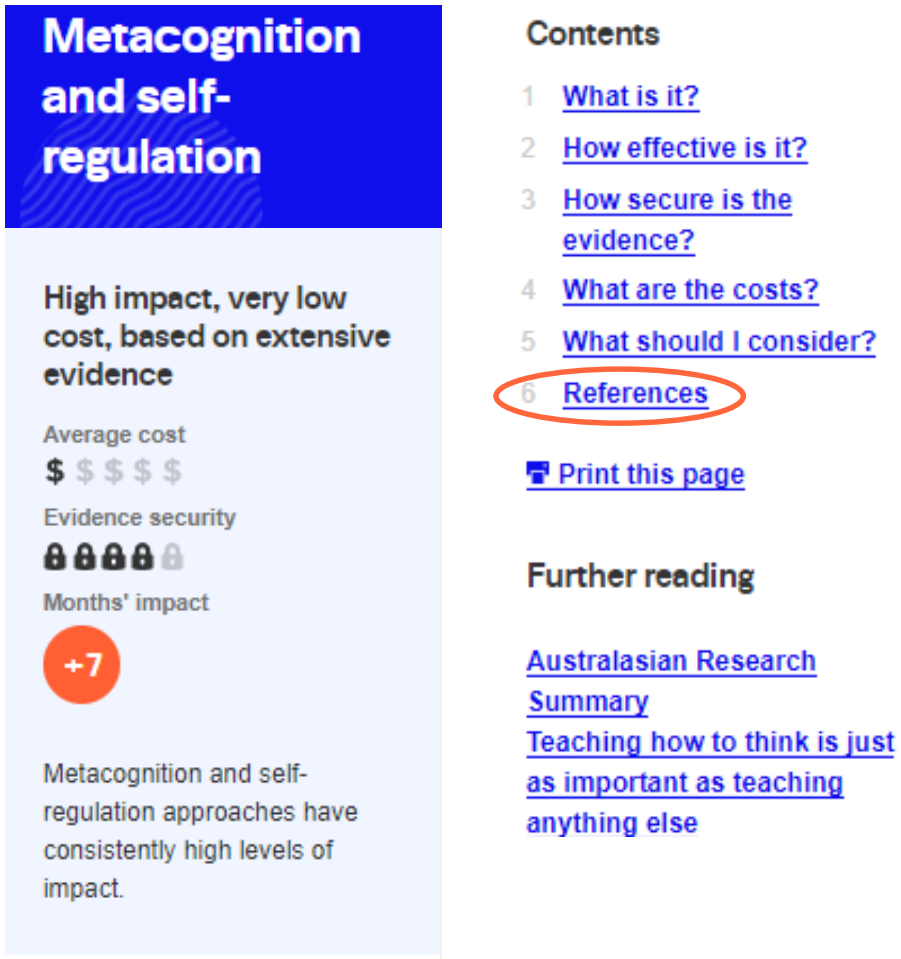

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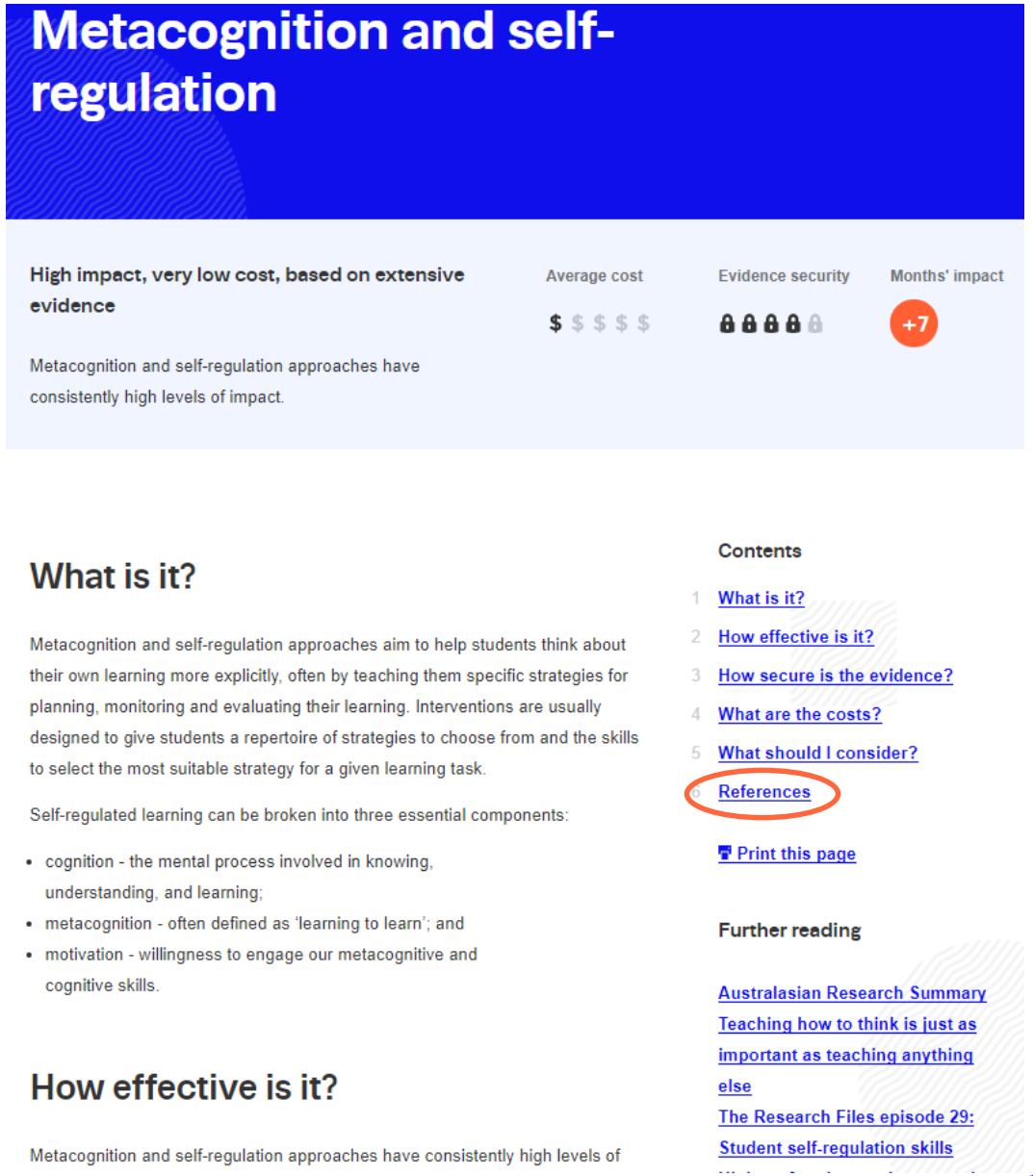

Approach references

Definition

Metacognition and self-regulation approaches (sometimes known as 'learning to learn') aim to improve learning by getting learners to think about their own learning more explicitly so as to take increased responsibility for their own achievement.

Metacognition involves consciously planning, monitoring and evaluating your own learning. It is often considered to have two dimensions: knowledge (or the extent to which a learner is aware of and can articulate metacognitive strategies) and skillfulness (actual capacity in managing learning or capability at putting these strategies into practice). Approaches usually focus on teaching students specific strategies to set goals, and monitor and evaluate their own academic development in relation to particular learning tasks and activities, covering all aspects of thinking from basic skills such as recall, to more complex thinking such as evaluation and synthesis. Self-regulation relates to metacognitive skillfulness but also involves managing one's own motivation towards learning and the development of dispositions such as resilience and perseverance.

In practical terms, the intention is often to provide students with a repertoire of strategies to choose from during learning activities, this often involves Feedback on use of different strategies. Approaches also frequently involve Collaborative learning activities and techniques.

Search terms: Metacognition; executive function; self-regulation, learning strategies

Evidence Rating

Overall, the evidence is rated as extensive. There are eleven meta-analyses with seven undertaken in the last 10 years. These are mainly from experimental studies which were often undertaken in schools and which evaluated impact on student achievement as well as more general cognitive outcomes, with some exploration of the causes of any identified heterogeneity. The underlying studies, however, vary in quality. Most of the estimates of impact are high. The majority of the pooled effects from the meta-analyses fall in the range 0.44 to 0.71 (a range of less than a third of a standard deviation). However the range of effects from newer meta-analyses is more varied (0.30 to 0.90), and recent single studies have not consistently achieved the gains presented in the meta-analyses.

evidenceforlearning.org.au/teaching-and-learning-toolkit/feedback/technical-appendix

Approach references

References

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Effectiveness of learning strategy instruction on academic performance: A meta-analysis.
Educational Research Review, 11, 1-26.
(2014)

7. Fauzan, N.
The effects of metacognitive strategies on reading comprehension: a quantitative synthesis and the empirical investigation
Doctoral dissertation, University of Durham
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9. Haller, E.P., Child, D.A. & Walberg, H.J.
Can Comprehension be taught? A Quantitative Synthesis of "Metacognitive Studies."
Educational Researcher, 17.9 pp 5-8.
(1988)

Summary of effects

Meta-analyses	Effect size	FSM effect size	Measure*
Abrami, P.C., Bernard, R.M., Borokhovski, E., Wade, A., Surkes, M.A., Tamim, R., & Zhang, D. (2008)	0.34	-	
Chiu, C.W.T. (1998)	0.67	-	
de Boer, H., Donker, A. S., & van der Werf, M. P. (2014)	0.57	-	
Dignath, C., Buettner, G. & Langfeldt, H. (2008)	0.62	-	
Donker, A. S., De Boer, H., Kostons, D., Dignath van Ewijk, C. C., & Van der Werf, M. P. C. (2014)	0.66	0.72	
Fauzan, N. (2003)	0.50	-	
Haller, E.P., Child, D.A. & Walberg, H.J. (1988)	0.71	-	
Higgins, S., Hall, E., Baumfield, V., & Moseley, D. (2005)	0.62	-	
Klauer, K.J. & Phye, G.D. (2008)	0.69	-	
Losinski, M., Cuenca-Carlino, Y., Zablocki, M., & Teagarden, J. (2014)	0.90	-	(students with emotional and behavioural needs)
Zheng, L. (2016)	0.44	-	
Single studies			
Crawford, C. & Skipp, A (2014)	0.09	-	
Dorsett, R., Rienzo, C., Rolfe, H.,Burns, H., Robertson, B., Thorpe, B. & and Wall, K. (2014)	-0.14	-	
Gorard et al. (2015)	0.14	-	Reading
	0.13	-	Maths
Hanley, P., Bohnke, J.R., Slavin, B., Elliott, L., & Croudace, T. (2016)	-0.02	-	
Hanley, Slavin & Elliott (2015)	0.22	0.38	
Moteram, G., Choudry, S., Kalambouka, A., Hutcheson, G., & Barton, A. (2016)	0.30	-	
NIESR (2015)	0.18	0.17	English
	0.10	0.11	Maths
Torgerson, D., Torgerson, C. Ainsworth, H. Buckley, H. M Heaps, C. Hewitt, C. & Mitchell, N. (2014)	0.74	1.60	
Tracy, B., Reid, R., & Graham, S (2009)	0.47	-	Writing
Effect size (weighted mean)	**0.54**		

Meta-analyses abstracts

1. Abrami, P.C., Bernard, R.M., Borokhovski, E., Wade, A., Surkes, M.A., Tamim, R., & Zhang, D. (2008)

Critical thinking (CT), or the ability to engage in purposeful, self-regulatory judgment, is widely recognized as an important, even essential, skill. This article describes an on-going meta-analysis that summarizes the available empirical evidence on the impact of instruction on the development and enhancement of critical thinking skills and dispositions. We found 117 studies based on 20,698 participants, which yielded 161 effects with an average effect size (g+) of 0.341 and a standard deviation of 0.610. The distribution was highly heterogeneous (QT = 1,767.86, $p < .001$). There was, however, little variation due to research design, so we neither separated studies according to their methodological quality nor used any statistical adjustment for the corresponding effect sizes. Type of CT intervention and pedagogical grounding were substantially related to fluctuations in CT effects sizes, together accounting for 32% of the variance. These findings make it clear that improvement in students' CT skills and dispositions cannot be a matter of implicit expectation. As important as the development of CT skills is considered to be, educators must take steps to make CT objectives explicit in courses and also to include them in both pre-service and in-service training and faculty development.

Approach summary

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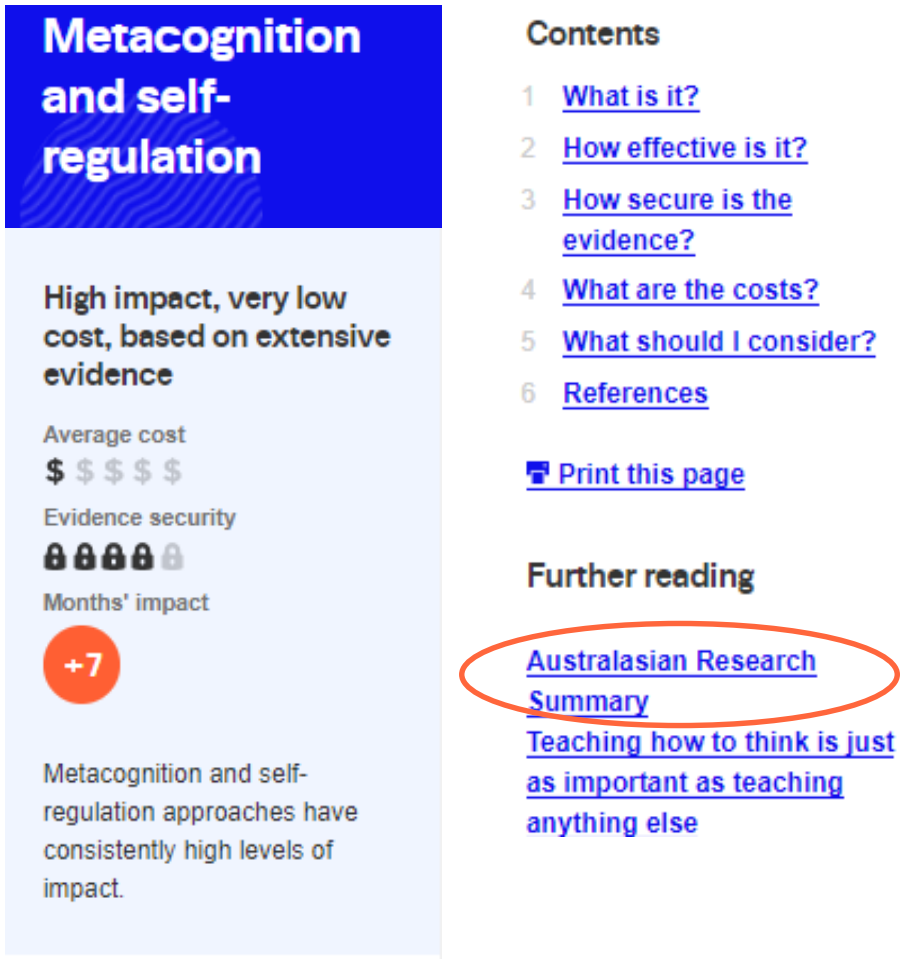

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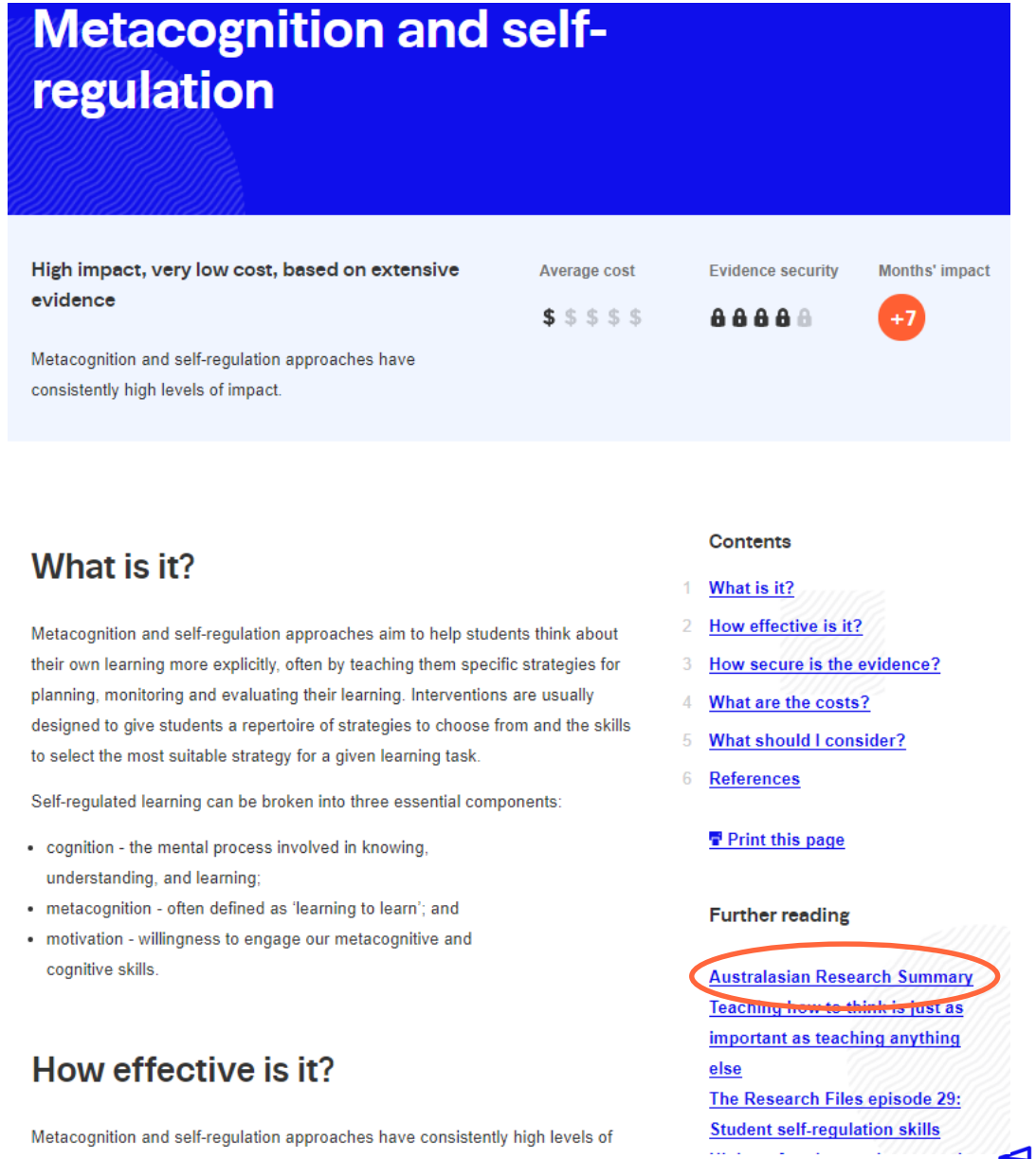

Australasian Research Summary

Summary of Australian and New Zealand Research

References

Databases searched

Search terms

Metacognition and self-regulation

Australasian Research Summary

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Shaping minds, shaping the world

The summary below presents the research evidence on metacognition and self-regulation in the Australasian context.

The Teaching & Learning Toolkit focuses on impact; it presents an estimate of the average impact of metacognition and self-regulation on learning progress, based on the synthesis of a large number of quantitative studies from around the world.

This page offers a summary and analysis of individual Australasian studies on metacognition and self-regulation. In contrast to the Toolkit it includes studies which do not estimate impact, but instead investigate the implementation of interventions and how they are perceived by school leaders, teachers and students. This information is valuable for school leaders and teachers interested in finding out more about particular examples of metacognition and self-regulation interventions that have been delivered in Australia and New Zealand.

Melbourne Graduate School of Education generated this summary and it is current for June 2016.

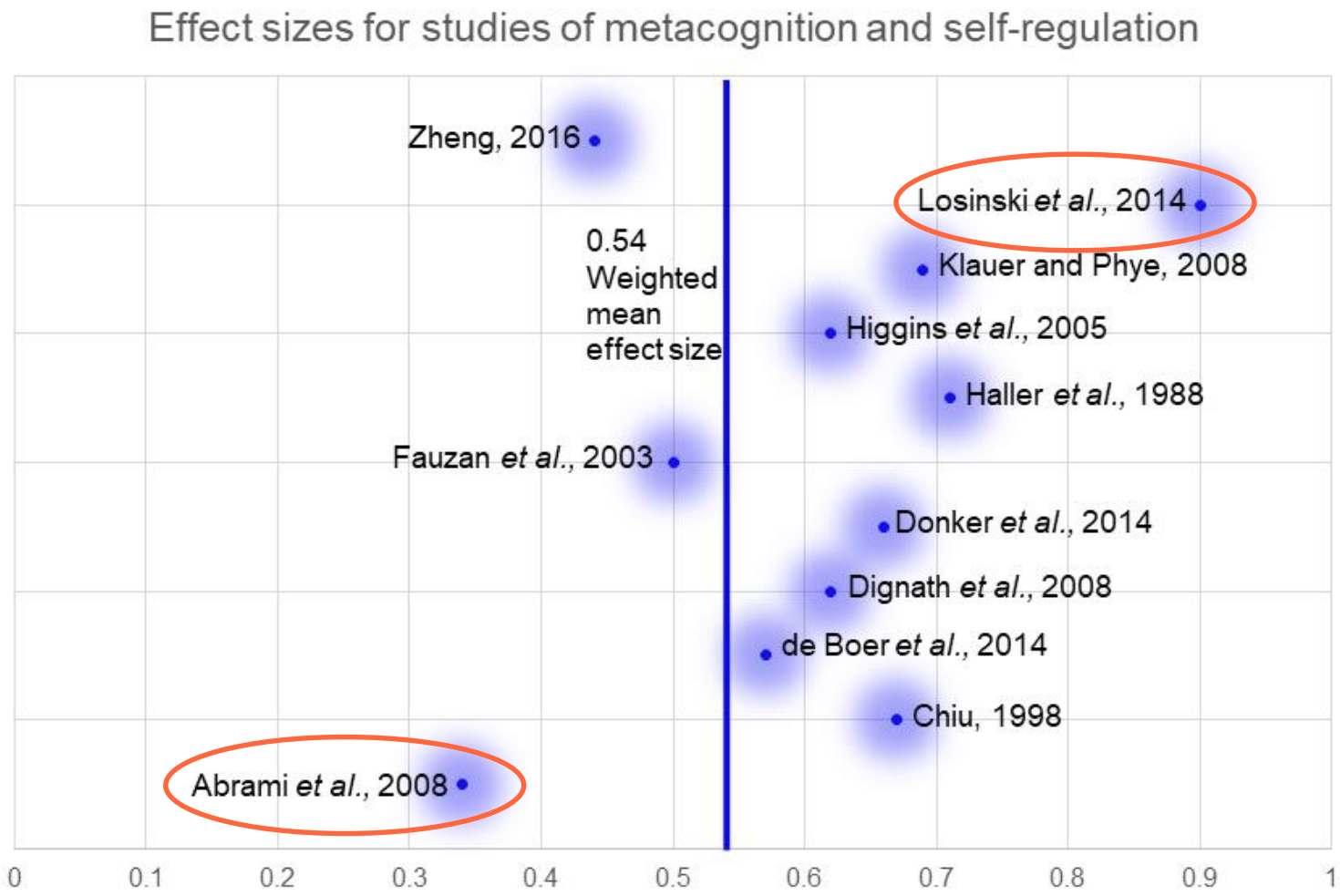
Contents

1 Summary of Australasian Research
2 References
3 Databases searched
4 Search Terms

Summary of Australasian Research

Metacognition and self-regulation approaches (sometimes known as 'learning to learn' approaches) aim to help learners think about their own learning more explicitly. This is usually by teaching students specific strategies to set goals, and

Effect sizes for metacognition and self-regulation



Metacognition and self regulation

Effectiveness of 10 learning techniques			Example
High utility	**Practice testing**	Self-testing or taking practice tests on material to be learned.	Retrieval practice, with or without hints, produced similar results. However, there was some evidence that hints can improve retention if they increase the rate of retrieval success during practice. Without hint: In Africa, what kind of geographical feature is spreading into farmland? With hint: In Africa, what kind of geographical feature is spreading into farmland? This kind of geographical feature is characterised by extreme dryness.
	Distributed ('spaced') practice	Implementing a schedule of practice that spreads out activities over time.	Spaced practice, with a gap of one to thirty days between practice.
	Elaborative interrogation	Generating an explanation for why an explicitly stated fact or concept is true.	Why would this fact be true of this (x) and not some other (y)?
Moderate utility	**Self-explanation**	Explaining how new information is related to known information, or explaining steps taken during problem solving.	Explain what the sentence means to you. That is, what new information does the sentence provide for you? And how does it relate to what you already know?
	Interleaved practice	Implementing a schedule of practice that mixes different kinds of problems, or a schedule of study that mixes different kinds of material, within a single study session.	Teaching students how to compute the volumes of different geometric solids. Practice sessions separated by a week, and students practiced how to calculate each of the four types of geometric solid in each practice session.
	Summarisation	Writing summaries (of various lengths) of to-be-learned texts.	Students writing three lines that summarise the main points from the page after having 30 minutes to read the text. Distinct from note taking, where a student will write out three lines of notes on each page that they read.
	Highlighting	Marking potentially important portions of to-be-learned materials while reading.	Students highlighting materials themselves or reading texts that have been highlighted by others – there is no difference of impact between the two.

teachermagazine.com.au/articles/building-students-metacognition-and-self-regulation

E4L

Metacognition and self regulation

Low utility	**Highlighting**	Marking potentially important portions of to-be-learned materials while reading.	Students highlighting materials themselves or reading texts that have been highlighted by others – there is no difference of impact between the two.
	Keyword mnemonic	Using keywords and mental imagery to associate verbal materials.	Learning French vocabulary, the student would first find an English word that sounds similar to the foreign cue word, such as dentist for 'la dent'. The student would then develop a mental image of the English keyword interacting with the English translation. So, for la dent–tooth, the student might imagine a dentist holding a large molar with a pair of pliers.
	Imagery use for text learning	Attempting to form mental images of text materials while reading or listening.	Tenth grade students given 35 minutes to read text about the dipole nature of water molecules. Students were asked to mentally imagine the content of each paragraph.
	Rereading	Restudying text material again after an initial reading.	Spaced rereading with a gap of four days outperforms massed rereading.

teachermagazine.com.au/articles/building-students-metacognition-and-self-regulation

E4L

Recommendations

1

Teachers should acquire the professional understanding and skills to develop their students' metacognitive knowledge

2

Explicitly teach students metacognitive strategies, including how to plan, monitor, and evaluate their learning

3

Model your own thinking to help students develop their metacognitive and cognitive skills

4

Set an appropriate level of challenge to develop students' self-regulation and metacognition

5

Promote and develop metacognitive talk in the classroom

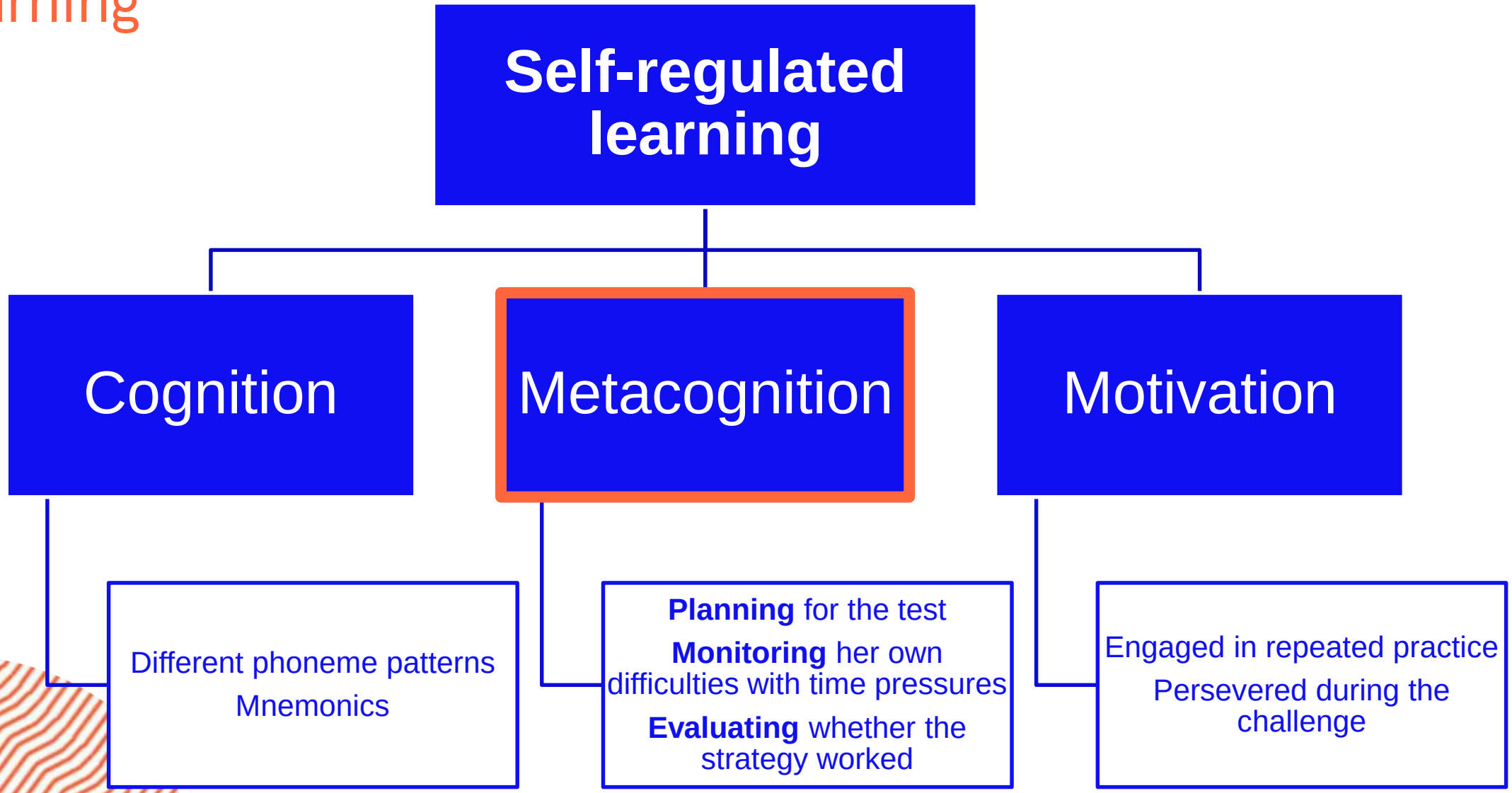
6

Explicitly teach students how to organise and effectively manage their learning independently

7

Schools should support teachers to develop knowledge of these approaches and expect them to be applied appropriately

The relationship between metacognition and self-regulated learning



Metacognition

My knowledge of myself (my approach to maths problems); the task (what to do I know about this type of problem); and strategies (different ways to solve them)

1. Planning

- What is the goal of my task?
- What kind of information do I need?
- How much time will I need?

"I need to think about how we have done these problems before and choose the best strategy… I know, I'll start by writing out the problem as an algebraic equation."

Task

Mason and Jasmine have $5 between them. Mason has 90c more than Jasmine. How much money dies Jasmine have?

3. Evaluating

- Have I reached the learning goal?
- What worked? What didn't?
- What would I change for next time?

"Writing out the equations has successfully moved me on to the next step with this task"

2. Monitoring

- Do I have a clear understanding of what I am doing?
- Am I moving towards the learning goals?
- Do I need to change strategies?

"Has this improved my understanding of the task? Yes, it now looks like a type of problem I'm familiar with: a simultaneous equation."

Cognition

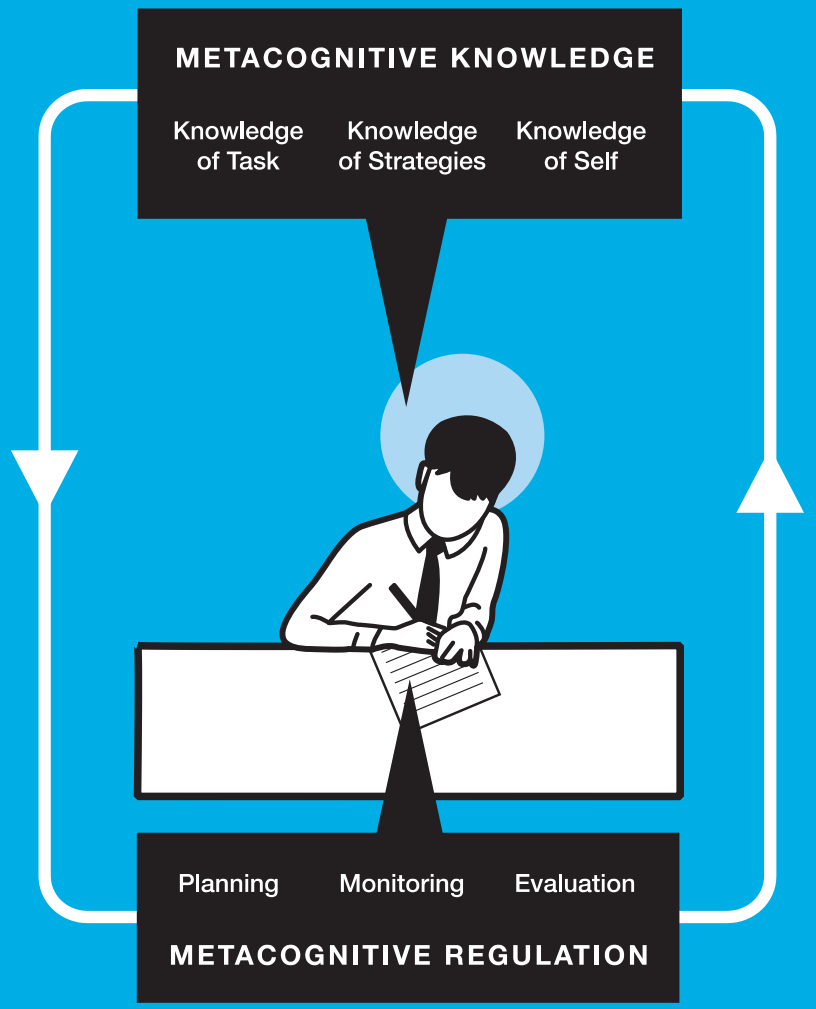
Translating the words into an equation

Metacognitive knowledge and metacognitive regulation

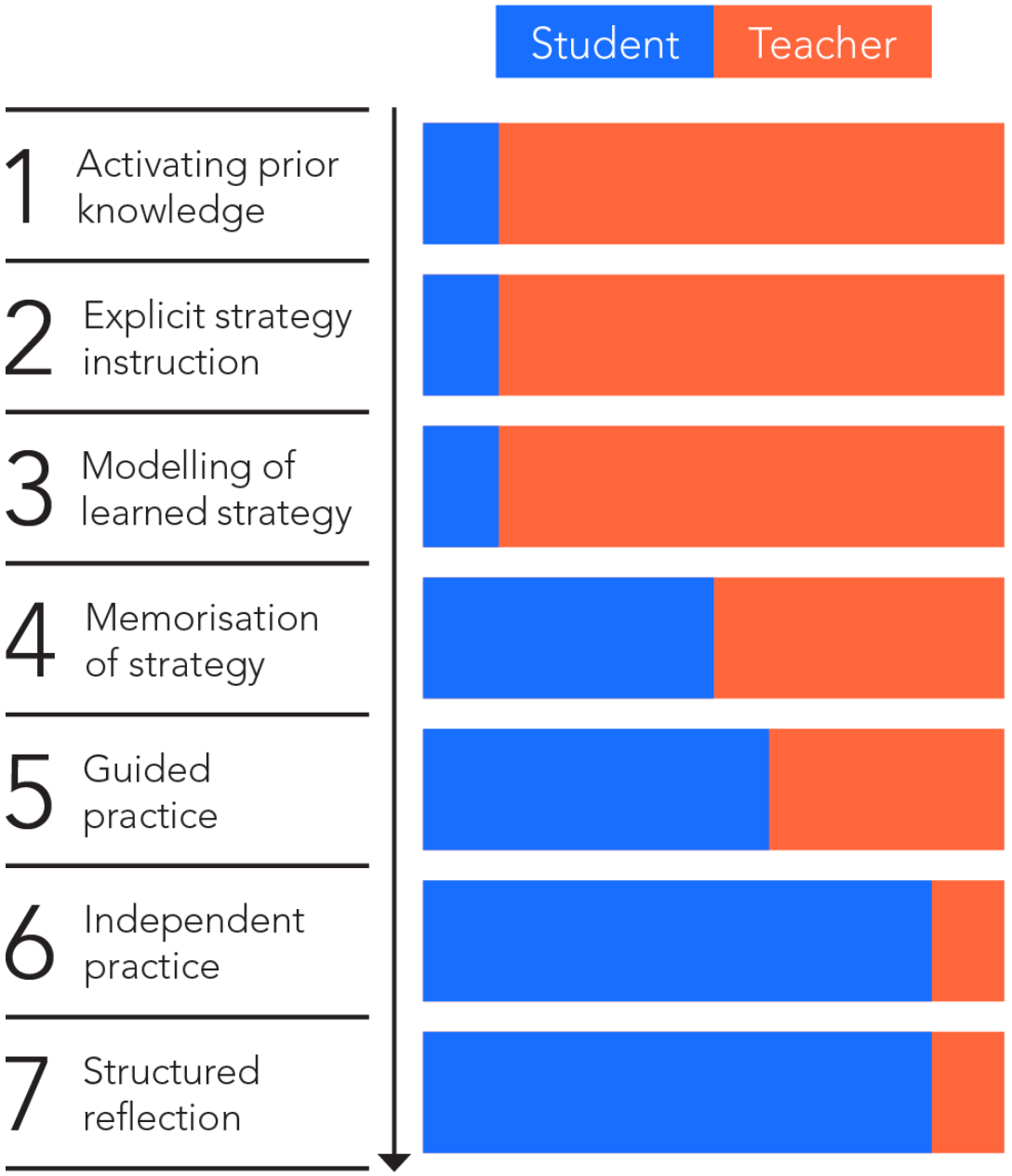
Metacognition considered to have two dimensions:

- Metacognitive **knowledge** refers to what learners know about learning (**knowledge of task, knowledge of strategies and knowledge of self**), e.g. the learner's knowledge of different strategies to accomplish a task *"If I scan the text first, it will help me to understand the overall meaning"*
- Metacognitive **regulation** refers to what learners do about learning. It describes learners' awareness and control their cognitive processes and includes **planning, monitoring and evaluating** their performance. e.g. if a particular strategy is not achieving the results they want, they may decide to try a different strategy *"Is the strategy that I am using working? Do I need to try something different?"*

Metacognition



Embedding metacognition in classrooms



Building a whole-school strategy for metacognition

School

- Whole school culture and commitment
- Teachers' professional learning
- Build metacognition within a high-quality program or intervention
- Integrate high impact strategies e.g. feedback, peer tutoring
- Deliver both domain and subject-specific metacognitive strategies
- Monitor and track delivery and implementation

Unlocking the potential of metacognition in your classrooms

Classroom

- Build a supportive culture in the classroom to allow for metacognitive talk.
- Help students set clear learning goals and how they can plan to achieve them.
- Explicitly teach students how to plan, monitor and evaluate their learning as supported by learning tools.
- Model your own thinking to help students develop their metacognitive and cognitive skills.
- Set an appropriate level of challenge to develop students' self-regulation and metacognition.
- Carefully design guided practice, with support gradually withdrawn as the student becomes proficient, before applying them in independent practice
- Implement consistently and across different classrooms and curriculum

Questions?

Submitted question

How does this [metacognition] fit within the concept of self-directed learning?

Ambrose, Bridges, DiPietro, Lovett, and Norman (2010) suggest that “to become self-directed learners, students must learn to assess the demands of the task, evaluate their own knowledge and skills, plan their approach, monitor their progress, and adjust their strategies as needed” (p. 191) – thus metacognitive skills are critical to being an effective self-directed (self-regulated or lifelong) learner.

Ambrose, S. A., Bridges, M. W., DiPietro, M., Lovett, M. C., & Norman, M. K. (2010). *How learning works: Seven research-based principles for smart teaching*. John Wiley & Sons.

Up next: Oral language development in the early years

17 March | 5:00-6:00pm

Danielle Toon
Evidence for Learning

Dr Sally Stanton
Institute of Social Science Research, University of Queensland

Dr Sandy Houen
Institute of Social Science Research, University of Queensland

Please share with your early years and primary colleagues.

Where to now?

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Helping great practice become common practice in education

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