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Learning to Learn - Metacognition

Lee Davis

Deputy Director, Education

PART OF THE CAMBRIDGE ASSESSMENT GROUP

Tuning in…

1. Read the following poem
2. Read for understanding
3. Explain the similes and metaphors contained in the poem to the person sitting next to you.

You're by Silvia Plath

Clownlike, happiest on your hands,
Feet to the stars, and moon-skulled,
Gilled like a fish. A common-sense
Thumbs-down on the dodo's mode.
Wrapped up in yourself like a spool,
Trawling your dark, as owls do.
Mute as a turnip from the Fourth
Of July to All Fools' Day,
O high-riser, my little loaf.

Vague as fog and looked for like mail.
Farther off than Australia.
Bent-backed Atlas, our traveled prawn.
Snug as a bud and at home
Like a sprat in a pickle jug.
A creel of eels, all ripples.
Jumpy as a Mexican bean.
Right, like a well-done sum.
A clean slate, with your own face on.

Metacognition

- Metacognition is a term used to describe the processes involved when learners plan, monitor, evaluate, and make changes to their own learning behaviours.
- It is often considered to have two dimensions: *metacognitive knowledge* and *metacognitive regulation*.

Metacognitive knowledge

The learner's knowledge of:

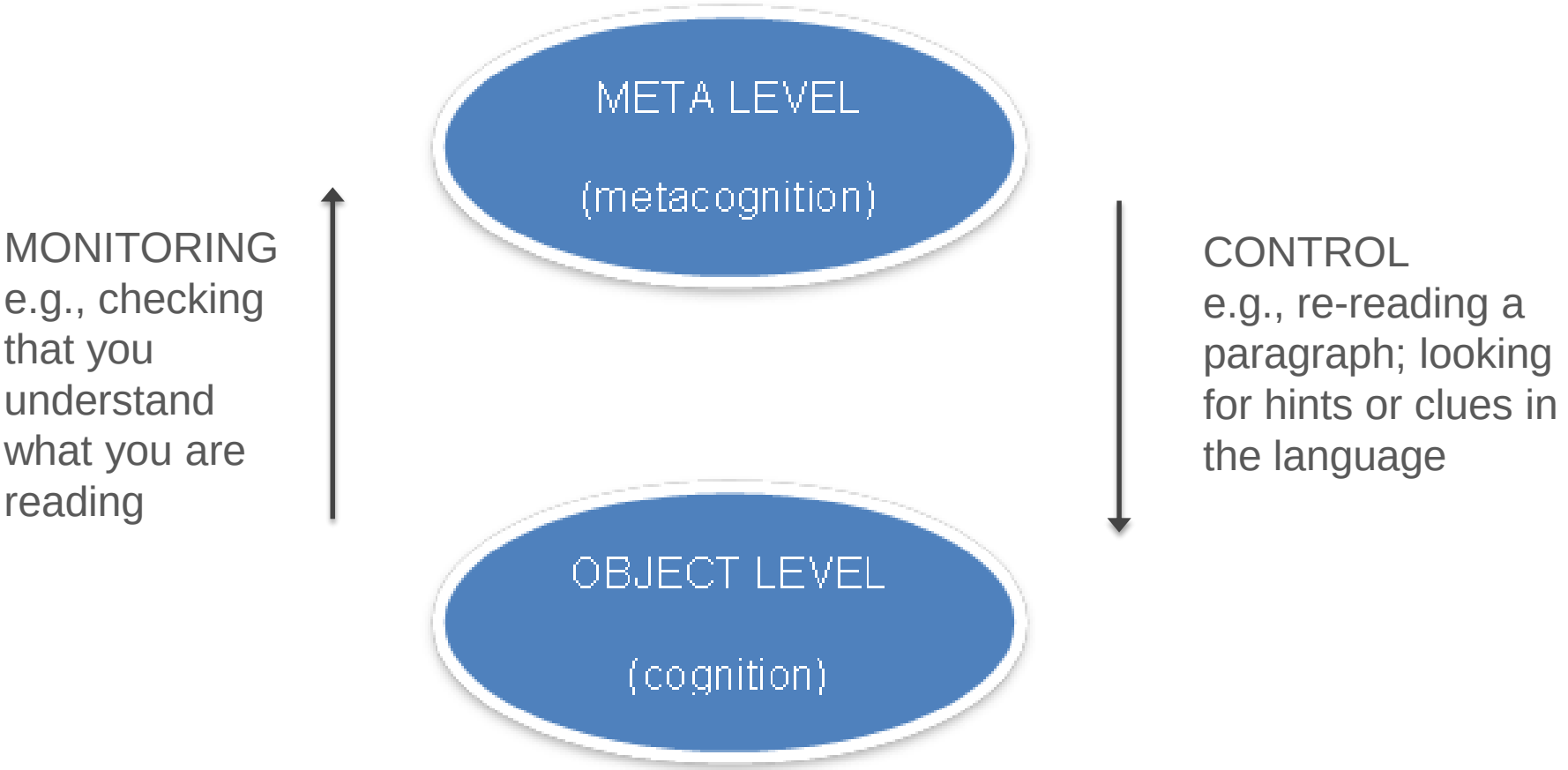
- their own cognitive abilities
  - eg, "I enjoy language and acquiring new vocabulary", "I'm good at English";
- particular tasks
  - eg, the language and metaphors in the poem we read were initially complex;
- different strategies (including when to use these strategies)
  - eg, read a poem slowly, several times, pausing over difficult words or sentences; read aloud; look up words I do not know in a dictionary; look for clues.

Metacognitive regulation

Metacognitive regulation describes how learners monitor and control their cognitive processes.

- Eg, a student realising that the *mean* was not the best way to understand an average for a discrete data set, but to use *mode* instead.
- Eg, re-reading a poem several times, concentrating on 'difficult' words where necessary, for understanding.

Model of Metacognition



Nelson and Narens (1990)

Four levels of metacognitive learners

(Perkins 1992)

“Happily, frogs were frolicking as I took a refreshing drink. Suddenly, I saw a splash of the pink piranhas. Elegantly, the River curved like a snake, the current as strong as an elephant. Violently, the river was crashing against the banks like a battering ram against an iron door. Peacefully, Trees were growing tall and healthy on the other side of the river. Smoothly, the water bounded on the smooth black rocks.”

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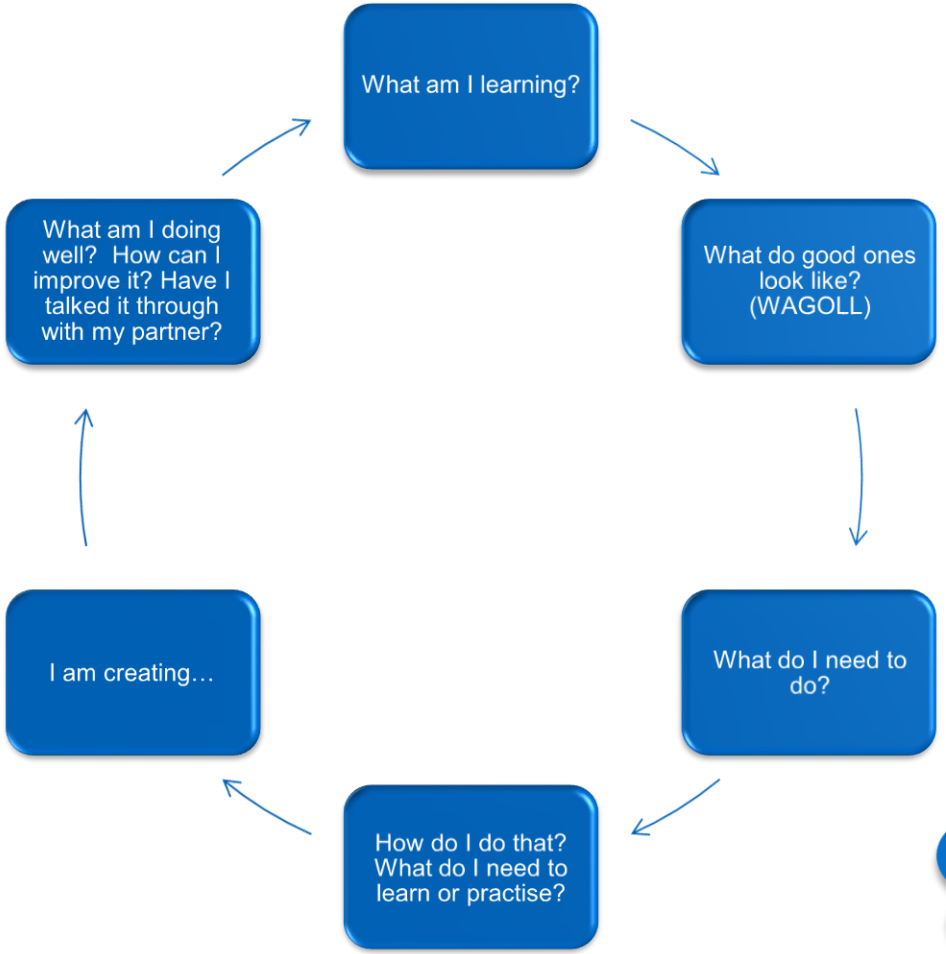
Metacognitive approaches typically involve:

- teaching students specific strategies to set goals, monitor, and evaluate their own learning progress.
- it involves **making learning goals explicit,** helping students to **plan strategies** and then ways of **monitoring their progress** towards achieving these goals.
- creating a learning environment that supports the development of metacognitive skills.
- encouraging discussion of strategies in class helps students understand when to use certain strategies, how they impact on their learning, and why the strategies work.

What does success look like?



Is the learning objective separate from the context?

Impact - research

- Helps students to become independent learners
- Effective for disadvantaged students
- High impact across a broad range of abilities and learning domains
- Strong evidence base
- Low cost

Hattie (2009) – **effect size of 0.69** for metacognitive strategies

Calculating Effect Sizes

Definition

"The standardised mean difference between two groups."

$$\text{Effect Size} = \frac{[\text{Mean of Experimental Group}] - [\text{Mean of Control Group}]}{\text{Standard Deviation}}$$

An effect size of 1 equates to **12 months** of development for the learner.

"A change in practice whose effect size was known to be 0.6 would result in an improvement of about **one GCSE grade** for each pupil in each subject."

Why does it matter? Because it is powerful

Effect Sizes for teacher as activator and teacher as facilitator

Source: Hattie, J. [2009] Visible learning

Teacher as Activator	Effect Size (d)	Teacher as Facilitator	Effect Size (d)
Reciprocal teaching	.74	Simulations and gaming	.32
Feedback	.72	Inquiry based teaching	.31
Teaching students self-verbalization	.67	Smaller class sizes	.21
Metacognition strategies	.67	Individualised instruction	.20
Direct instruction	.59	Problem-based learning	.15
Mastery learning	.57	Different teaching for boys and girls	.12
Challenging goals	.56	Web-based learning	.09
Frequent/effects of testing	.46	Whole language – reading	.06
Behavioural organizers	.41	Inductive teaching	.06
Average activator	**.60**	**Average facilitator**	**0.17**

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Impact

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Keywords

Average Impact

Cost

£ £ £ £ £

Meta-cognition and self-regulation

High impact for very low cost, based on extensive evidence.

£ £ £ £ £ | 🔒 🔒 🔒 🔒 🔒

+8 months

Download Approach

What is it?

Meta-cognition 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 pupils specific strategies to set goals, and monitor and evaluate their own academic development. Self-regulation means managing one's own motivation towards learning. The intention is often to give pupils a repertoire of strategies to choose from during learning activities.

How effective is it?

Meta-cognition and self-regulation approaches have consistently high levels of impact, with pupils making an average of eight months' additional progress. The evidence indicates that teaching these strategies can be particularly effective for low achieving and older pupils.

These strategies are usually more effective when taught in collaborative groups so learners can support each other and make their thinking explicit through discussion.

The potential impact of these approaches is very high, but can be difficult to achieve as they require pupils to take greater responsibility for their learning and develop their understanding of what is required to succeed. There is no simple method or trick for this. It is possible to support pupils' work too much, so that they do not learn to monitor and manage their own learning but come to rely on the prompts and support from the teacher. "Scaffolding" provides a useful metaphor: a teacher would provide support when first introducing a pupil to a concept, then reduce the support to ensure that the pupil continues to manage their learning autonomously.

How secure is the evidence?

Videos and Case Studies

Toolkit Talks: Meta-cognition and self-regulation

Toolkit Case Study: The Skills Programme at EGA, London

Strategies

Metacognitive approaches typically involve:

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Strategies

- It involves **making learning goals explicit,** helping students to **plan strategies** and then ways of **monitoring their progress** towards achieving these goals.

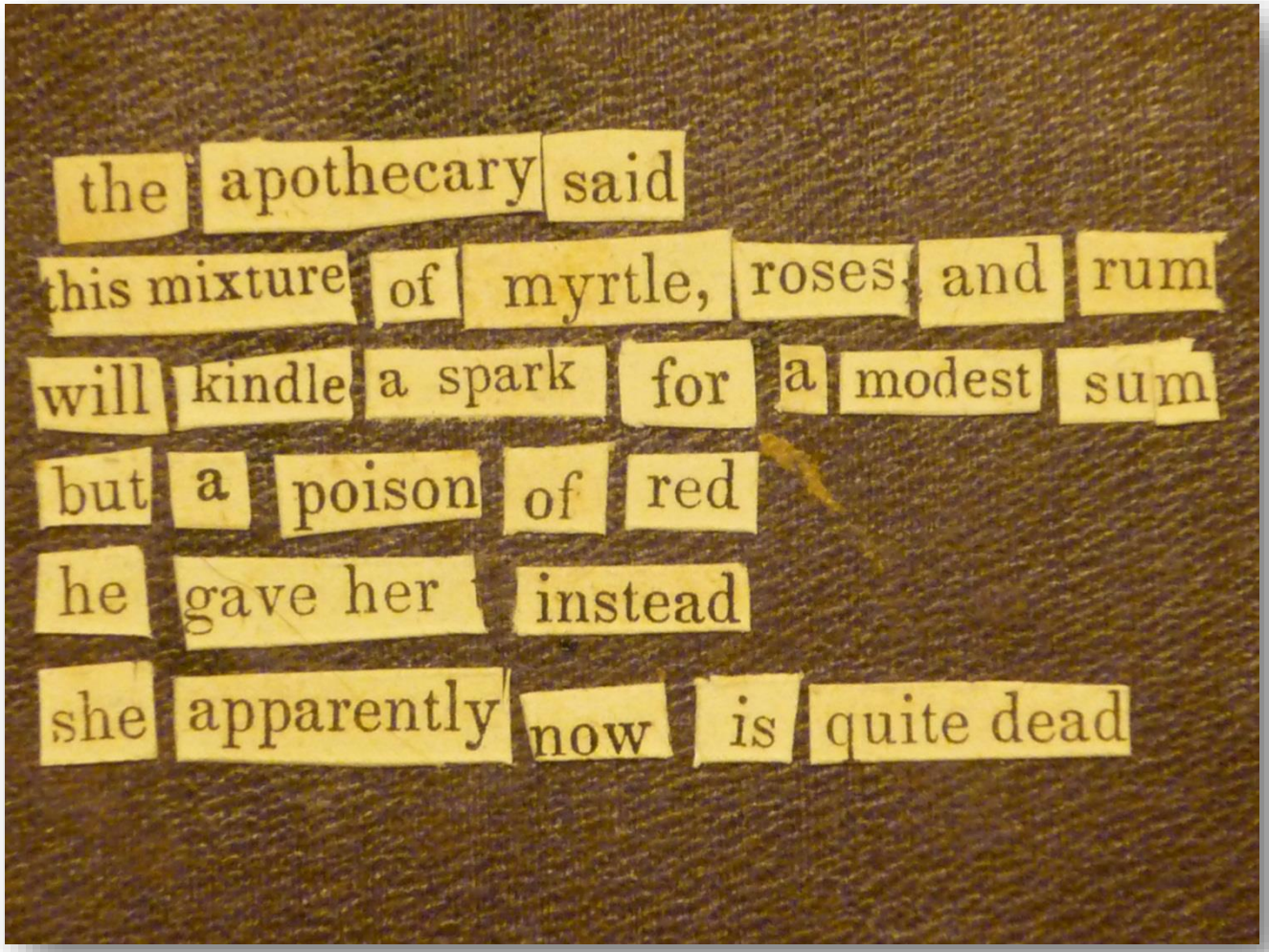
- Encouraging discussion of strategies in class helps students understand when to use certain strategies, how they impact on their learning, and why the strategies work.

Strategies

Strategy	Explanation	Example	Effect size
Organising and transforming	Overt or covert rearrangement of instructional materials	Making an outline before writing an essay; summarising and restating for others	0.85

Taken from Hattie (2009) Visible Learning

Found poem


the apothecary said
this mixture of myrtle, roses and rum
will kindle a spark for a modest sum
but a poison of red
he gave her instead
she apparently now is quite dead

Strategies

Strategy	Explanation	Example	Effect size
Self-consequences	Student arrangement or imagination of reward for success	Deferred gratification, self-regulation	0.70

Taken from Hattie (2009) Visible Learning

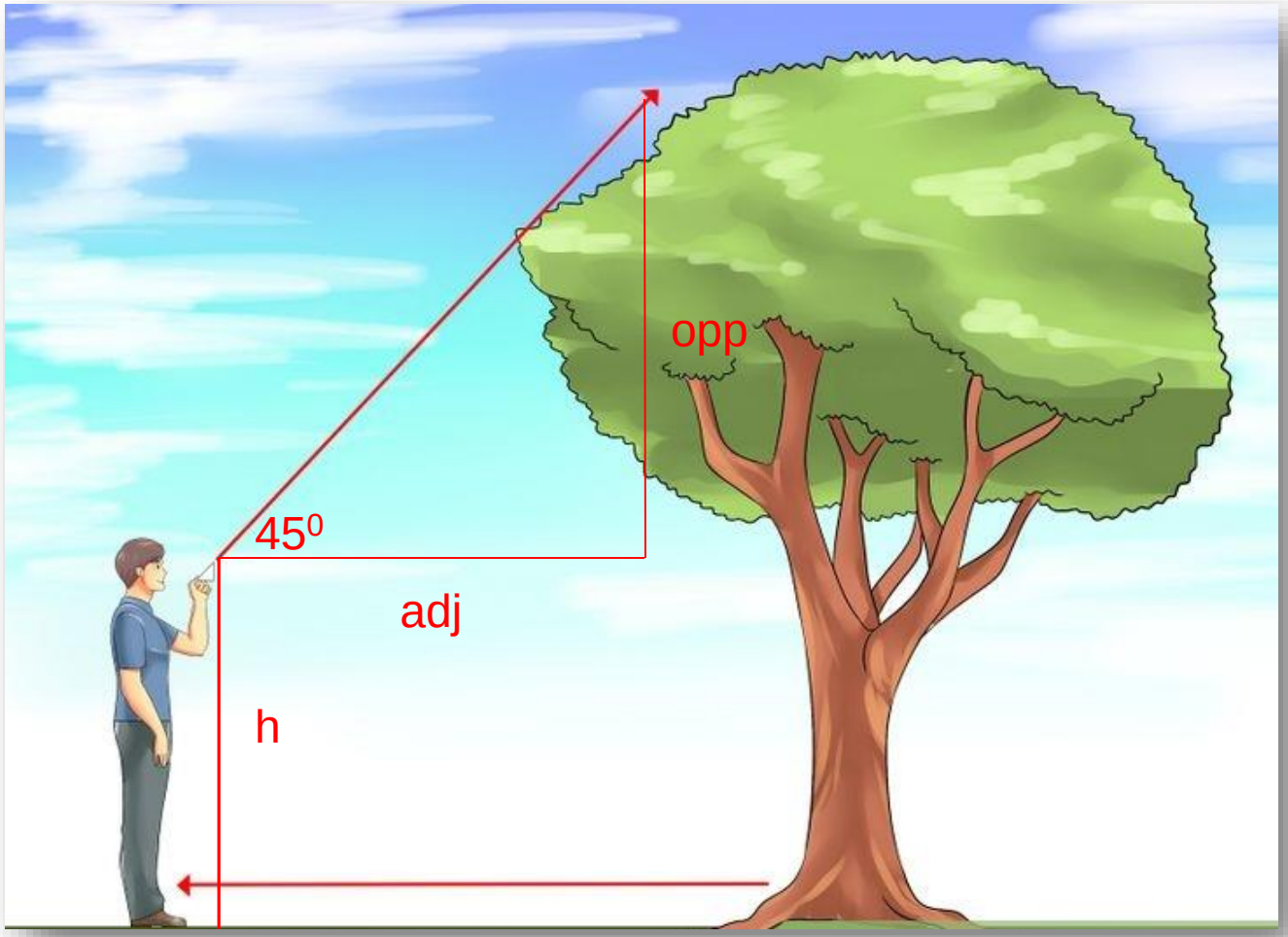
Strategies

Strategy	Explanation	Example	Effect size
Self-instruction	Self-verbalising the steps to complete a given task	Verbalising steps in solving a maths problem	0.62

Taken from Hattie (2009) Visible Learning

How can you calculate the height of this tree?

Using trigonometry



Strategies

Strategy	Explanation	Example	Effect size
Self-evaluation	Setting standards and then using them for self-judgement	Checking work against rubric before handing in	0.62

Taken from Hattie (2009) Visible Learning

Success Criteria for writing a **play script**

- Character's name written in the margin to show who is speaking
- Stage directions written inside brackets
- Each speech written on a new line
- No speech marks
- No use of the word 'said'
- Stage directions describe the setting
- Stage directions tell the actors how to say their speech and what to do
- Use adverbs and adjectives in the stage directions


Metacognitive
Talk

9 Metacognitive Questions

- What questions could students ask themselves…
  - …before the task?
  - …during the task?
  - …after the task? (3 questions for each)

9 Metacognitive Questions

Before the Task

- Is this similar to a previous task?
- What do I want to achieve? Success looks like this…
- What should I do first?

During the Task

- Am I on the right track?
- What can I do differently if I'm not?
- Who can I ask for help? C3B4Me?

After the Task

- What worked well?
- What could I have done better?
- Can I apply this to other situations?

(Taken from: innerdrive.co.uk)

Metacognitive Talk - teachers

What could you do if you have problems?

How do you know that?

We are learning to analyse a poem.

Will this way make it easier?

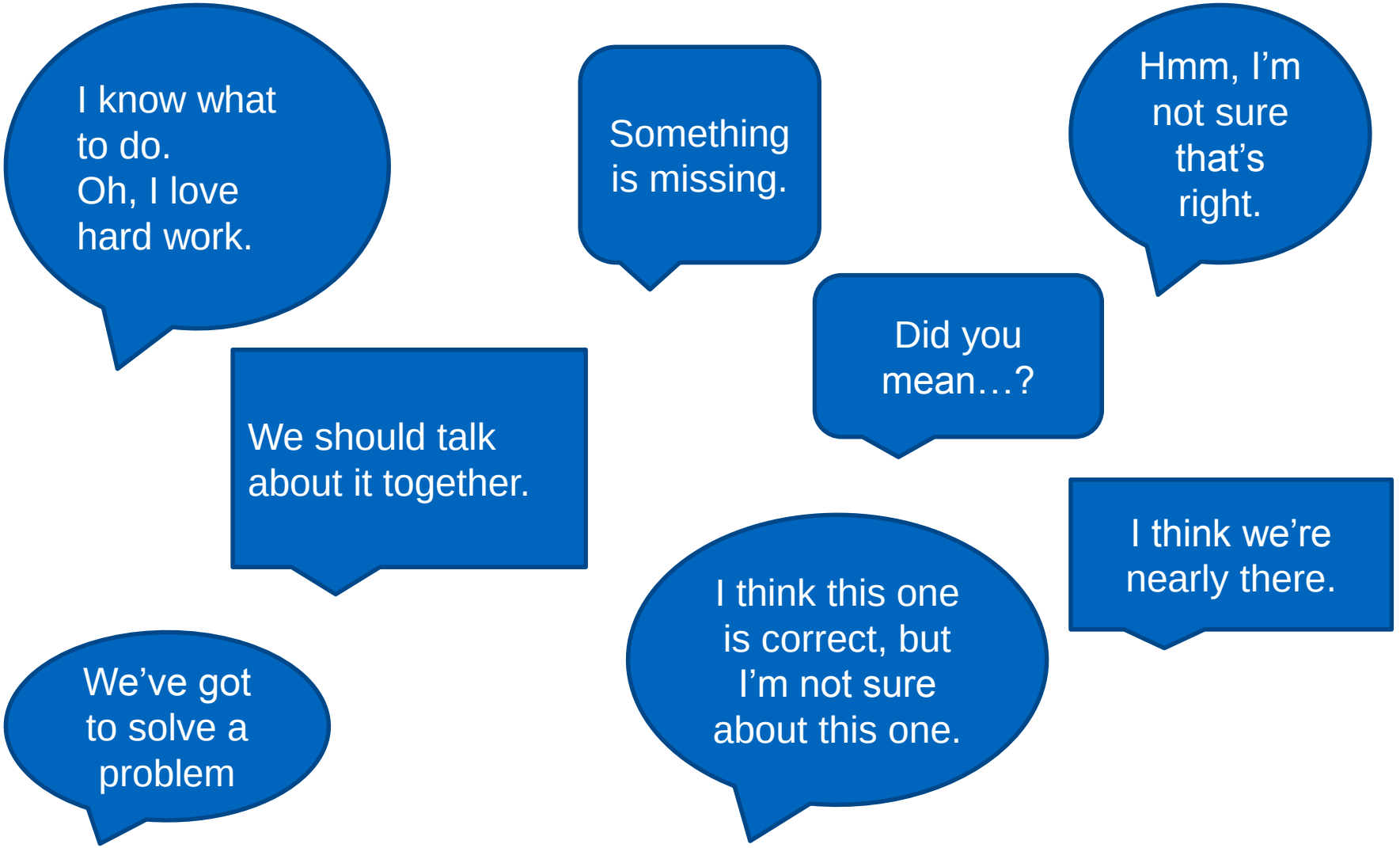
Was it difficult to do or was it easy?

Is there a better way?

Check what you are counting in or the unit of measure.

I don't understand it either, so let's have a look together.

Metacognitive Talk - students



Strategies

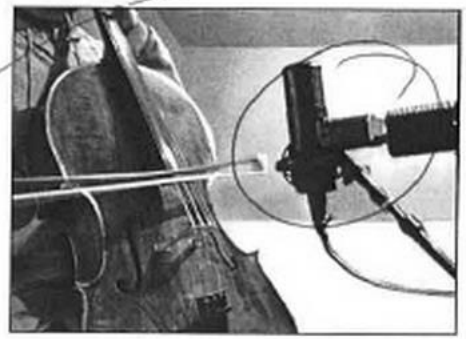
"Exam wrappers"

Asking students to reflect, before and after an exam or test, on study habits, time spent on topics, deliberate practice, etc.

(see examples from Carnegie Mellon on desks)

Don't give them a past paper to do. Just ask them to annotate it!

(e) The Cello features heavily in the texture of this recording. Look at the picture below and describe the **choice** of mic, the **distance** and the intended **result** of this setup.



Mic has to be condenser? / why?

close mic.

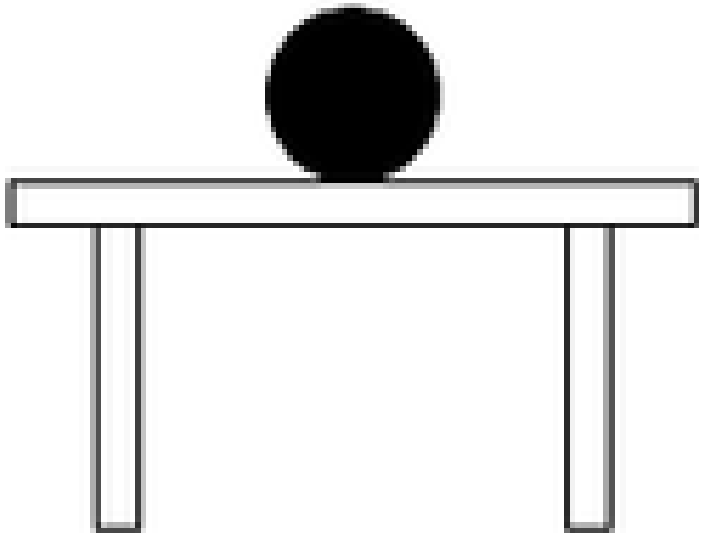
What's the point of close micing something?

	Description	Result
Choice of mic.	(1)	(1)
Distance	(1)	(1)

(Total for Question 2 = 10 marks)

Easy: 4 marks

Metacognitive talk and formative assessment



The ball sitting on the table is not moving. It is not moving because:

A. No forces are pushing or pulling the ball.

B. Gravity pulls the ball down but the table is in the way.

C. The table pushes up with the same force that gravity pulls down.

D. Gravity is holding it on the table.

E. There is a force inside the ball holding it on the table.

Wilson and Draney, University of California, 2004

A metacognition checklist

- Planning - ask your students to identify their learning goals and to think about how they can meet their goals.
- Monitoring - ask your students to identify where the task could go wrong. How could they prevent this from happening? What can they do if they notice they have already gone off track?
- Evaluating – ask your students to consider their performance on the task. How could they improve their performance in future tasks?
- Practice and feedback - give your students the opportunity to use the new strategies both with support and independently. Have you given them feedback on their strategy use?
- Supportive classroom environment - think about how you can make the classroom environment more supportive of metacognitive practices. Are you modelling metacognitive practices through thinking aloud? Are you giving the learners plenty of opportunity to work collaboratively with their peers, reflect on their learning, and evaluate their progress?

Next steps

- Begin with one domain area, such as reading, and think about what metacognitive strategies will be helpful to your students (e.g., predicting, questioning). Ask them some of the problems they face when reading. How can you help them to think about their own reading more explicitly?
- Model the strategies through thinking aloud (metacognitive talk). Encourage your students to think aloud with their peers.
- Choose the next area of focus (e.g. maths problem solving). Are there any strategies from the previous domain of learning that can be transferred to this area? What new strategies can be used?
- Be sure to give feedback on the different strategies students are using, encourage reflection on what does and does not work in particular situations.
- **Work together with other teachers in your school/department and share practice that promotes the development of metacognitive abilities in the classroom.**

"Too often, we teach students *what* to think but not *how* to think." - OECD Insights (2014)

Next steps – Cambridge Resources

Getting Started With Metacognition

http://cambridge-community.org.uk/professional-development/gswmeta/index.html

Education Brief – Metacognition

http://www.cie.org.uk/images/272307-metacognition.pdf

Want to know more?

Professor Steve Higgins from Durham University talking about what metacognition is and how it can be used in the classroom.

https://educationendowmentfoundation.org.uk/modals/video/132/

For a more in-depth look at metacognition, this podcast discusses the neural basis of metacognition, and how we measure and quantify it.

https://www.youtube.com/watch?v=PzdopL2mGqo

Want to know more?

Listen to Dylan Wiliam talk about the importance of young people being able to reflect on their learning and how teachers can utilise these insights

http://www.journeytoexcellence.org.uk/videos/expertspeakers/metacognitiondylanwiliam.asp

For more on the benefits of metacognition, visit the Education Endowment Foundation's Teaching and Learning Toolkit website which describes metacognition as having "high impact for very low cost, based on extensive evidence."

Explanation of effect sizes: https://educationendowmentfoundation.org.uk/uploads/pdf/Technical_Appendices_(July_2012).pdf

Want to know more?

Think Aloud:

https://www.teachervision.com/skill-builder/problem-solving/48546.html

SOLO and self-evaluation:

http://pamhook.com/mediawiki/images/d/dc/SOLO_Taxonomy,_Metacognition_and_HOT_Maps.pdf

Want to know more?

Websites

OECD Insights: Debate the issues. Focus on metacognition http://oecdinsights.org/2014/10/28/want-to-improve-your-problem-solving-skills-try-metacognition/

Examples of both cognitive and metacognitive questions that can be used in the classroom http://journal.media-culture.org.au/0605/11-leslie.php

Education Endowment Foundation: Teaching and Learning Toolkit on metacognition https://educationendowmentfoundation.org.uk/toolkit/toolkit-a-z/meta-cognitive-and-self-regulation-strategies/

Thinking Together Project. A dialogue-based approach to the development of children's thinking and learning. http://thinkingtogether.educ.cam.ac.uk

Chris Watkins, UCL Institute of Education. Numerous papers on learning to learn: http://chriswatkins.net/publications/

Want to know more?

Books

Hattie, J. (2009) Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement. Abingdon, UK: Routledge

Larkin, S. (2009). Metacognition in young children. London, UK: Routledge.

Whitebread, D. & Pino Pasternak, D. (2010) Metacognition, self-regulation & meta-knowing. In Littleton, K., Wood, C. & Kleine Staarman, J. (eds) International Handbook of Psychology in Education. Bingley, UK: Emerald.

Brown, A. L. (1987). Metacognition, executive control, self-regulation and other more mysterious mechanisms. In F. E. Weinert, & R. H. Kluwe (Eds.), Metacognition, motivation and understanding (pp. 65–116). Hillsdale, NJ: Erlbaum.

Kolencik P L and Hillwig S A (2011) Encouraging Metacognition – Supporting Learners Through Metacognitive Teaching Strategies. Peter Lang, New York.

Reflection

- Connect?
- Extend?
- Challenge?