Developing metacognition in students

Cambridge Schools Conference
Kuala Lumpur
December 2016
What is metacognition?

**metacognition**

/ˌmɛtəˈkɒɡənɪʃən/  

*noun*  
PSYCHOLOGY  

awareness and understanding of one's own thought processes.

Thinking about thinking

Knowing about knowing

Cognition about cognition
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
  - Metacognitive regulation.
Metacognitive knowledge

The learner’s knowledge of:

- their own **cognitive abilities**
  - e.g. “I enjoy language and acquiring new vocabulary”, “I’m good at English”;

- particular tasks
  - e.g. the language and metaphors in the poem we read were initially complex;

- different strategies (including when to use these strategies)
  - e.g. 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.

- e.g. 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.

- e.g. Re-reading a poem several times, concentrating on ‘difficult’ words where necessary, for understanding.
Over to you

What strategies do you currently use to help students:

- **Know** what success looks like (intended learning outcomes)?
- **Plan** how to get there?
- **Monitor** how well they’re doing in their pathway to the intended learning outcomes?

Share with the person sitting next to you.
Why does it matter? Because it is powerful

Effect Sizes for teacher as activator and teacher as facilitator

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

## Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Explanation</th>
<th>Example</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organising and transforming</td>
<td>Overt or covert rearrangement of instructional materials</td>
<td>Making an outline before writing an essay; summarising and restating for others</td>
<td>0.85</td>
</tr>
<tr>
<td>Self-instruction</td>
<td>Self-verbalising the steps to complete a given task</td>
<td>Verbalising steps in solving a maths problem</td>
<td>0.62</td>
</tr>
<tr>
<td>Self-evaluation</td>
<td>Setting standards and then using them for self-judgement</td>
<td>Checking work against rubric before handing in</td>
<td>0.62</td>
</tr>
</tbody>
</table>

Impact

Meta-cognition and self-regulation
High impact for very low cost, based on extensive evidence.

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?
Four levels of metacognitive learners

- Tacit
- Aware
- Strategic
- Reflective

(Perkins 1992)
Metacognitive approaches typically involve:

- 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.

- Creating a **learning environment** that supports the development of metacognitive skills.
Metacognitive Talk
9 Metacognitive Questions

- What 3 questions could students ask themselves…
  - …before the task?
  - …during the task?
  - …after the task?
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?  

(Source: innerdrive.co.uk)
Metacognitive talk - teachers

- What could you do if you have problems?
- How do you know that?
- Will this way make it easier?
- Was it difficult to do or was it easy?
- We are learning to analyse a poem.
- I don’t understand it either, so let’s have a look together.
- Check what you are counting in or the unit of measure.
- Is there a better way?
Metacognitive talk - students

I know what to do. Oh, I love hard work.

We should talk about it together.

We’ve got to solve a problem.

Hmm, I’m not sure that’s right.

Did you mean…?

Something is missing.

I think we’re nearly there.

I think this one is correct, but I’m not sure about this one.
Answering exam questions

Asking students to reflect, **before** and **after** an exam or test, on study habits, time spent on topics, deliberate practice, etc.
Music Technology
Advanced Subsidiary
Unit 2: Listening and Analysing

Monday 16 May 2011 – Morning
Time: 1 hour 45 minutes

You must have:
Individual CD players, headphones and audio CD of recorded extracts.

Instructions
- Use black ink or ball-point pen.
- Fill in the boxes at the top of this page with your name, centre number and candidate number.
- Answer all questions.
- Answer the questions in the spaces provided.
- There may be more space than you need.
- If you are using a computer to play the CD, access to sequencing software is NOT permitted.
- You must ensure that the left and right earpieces of your headphones are worn correctly.
- You must write in continuous prose in Questions 5(f) and 6(g).

Information
- The total mark for this paper is 80.
- The marks for each question are shown in brackets.
- Use this as a guide as to how much time to spend on each question.
- Questions labelled with an asterisk (*) are ones where the quality of your written communication will be assessed.
- You should take particular care with your spelling, punctuation, grammar and clarity of expression on these questions.

Advice
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Headphones must be on the right way round?

Do I need to listen to the whole track?

READ THE QUESTION

Turnover ➤

(RTFQ)
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?

Choice of mic.
Distance

<table>
<thead>
<tr>
<th>Description</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choice of mic.</td>
<td>(1)</td>
</tr>
<tr>
<td>Distance</td>
<td>(1)</td>
</tr>
</tbody>
</table>

(Total for Question 2 = 10 marks)

Easy:
4 marks
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?
Reflection

- What have you found particularly useful from the workshop?

- What would you like to try in your classroom?

- What would you like to find out more about?

- How will you cascade to other teachers in your school what you have learnt today?
“Too often, we teach students what to think but not how to think.” - OECD Insights (2014)
Next steps – Cambridge Resources

Education Brief on Metacognition:

Getting Started with Metacognition:
http://cambridge-community.org.uk/professional-development/gswmeta/index.html

(including a printable list of relevant books, websites and articles) http://cambridge-community.org.uk/professional-development/gswmeta/MC_M1_doc_007.pdf
Thank you