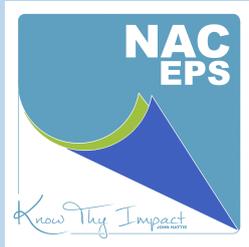# Metacognitive Approaches in Learning & Teaching

North Ayrshire Council Educational Psychology Service

and

Professional Learning Academy

Introduction

There are many definitions of metacognition. Flavell (1971; 1979) was the first to conceptualise metacognition which refers to our knowledge about our own cognitive processes. Metacognition can be subdivided into **metacognitive knowledge** and **metacognitive experiences** (Cross & Paris, 1988; Paris, Cross & Lipson, 1984). The knowledge aspect of metacognition can be further differentiated into: knowledge of self, knowledge of tasks and knowledge of strategies. Neuroscience research offers evidence that suggests that developmental changes in metacognition is linked to the maturation of the prefrontal cortex, the area of the brain which is involved in executive functioning (Baker et al, 2014).

> **Metacognition can be defined as the awareness and control of one's own cognitive processes (Paris et al., 1984)**

Metacognition Explained…

Metacognitive Experiences

Metacognitive experiences focuses on the self-regulatory aspect of metacognition closely linked to critical thinking (Miller, 1985; Paris et al, 1984), for example, when a numeracy strategy fails and a repair strategy is required to solve the problem – it is important to be aware that this skill can be taught (Bensley & Spero, 2014).

Metacognitive Knowledge

Knowledge of Self – relatively stable declarative knowledge of ourselves as learners, including information on preferences for formats or ability for thinking e.g. a preference for multiple choice questions or a self-perception regarding problem-solving skills (Garner, 1987; Paris & Oka, 1986; Paris et al, 1984)

Knowledge of Tasks – another type of declarative knowledge regarding knowledge of the ability of a wider population for example, it is easier to read information about a familiar topic than a new topic (Garner, 1987; Paris et al, 1984)

Knowledge of Strategies – procedural knowledge on commonly accessible strategies such as chunking and repetition to aid memory (Garner, 1987; Paris et al, 1984)

Effectiveness of Metacognitive Approaches in Learning & Teaching…

Effective metacognitive strategies are well-structured, supported and focus on explicitly teaching students how to plan, monitor and evaluate their own learning, and provide opportunities for them to try these strategies out. Evidence suggests that metacognitive training can improve the attainment of pupils and importantly it has a positive impact on reducing the attainment gap (Sosu & Ellis, 2014).

Metacognitive approaches have high impact on pupil progress (around 8 months progress). It is suggested that these metacognitive strategies are more effective when taught in groups so as learners can work collaboratively to support each other through explicit thinking and learning however metacognitive approaches can be hard to implement within the classroom as pupils have to be willing to take responsibility for their learning thus a careful balance of support and challenge should be provided by scaffolding learning. A number of meta-analyses of research have consistently found high levels of impact of metacognitive strategies (Sutton Trust).

A recent meta-analysis of research found that metacognitive knowledge instruction as an intervention within Primary and Secondary schools found a significant positive impact of metacognitive approaches on learning in several domains including writing, reading comprehension, science and maths across all pupil ability levels (Donker et al, 2014).

Numeracy & Metacognition…

Schneider & Artelt (2010) concluded that collective evidence from the last four decades supports the importance of the use of metacognitive approaches within the teaching of mathematics. Numerous studies reported a significant positive impact of metacognitive approaches on pupil mathematics performance with equal benefit to pupils of a range of ability levels.

Educators, Jo Boaler & Sherry Parrish, have suggested the use of the following evidence based metacognitive approaches within numeracy lessons:

- Teaching a range of strategies that pupils can apply to future numeracy tasks to equip pupils with an effective bank of strategies
- Encouragement of pupils to be aware of the strategies they are using to solve a given numeracy problem and for pupils to try out more than one strategy if possible
- Class group discussions around the strategies that pupils have used to solve a given numeracy problem including compare and contrast of strategies and open discussions around the accuracy and efficiency of different strategies used by the pupils
- Welcoming creativity of novel strategies from pupils with promotion of a Growth Mindset classroom ethos that mistakes are a learning tool

Literacy & Metacognition…

Reading Comprehension focus

A key metacognitive skill that pupils require for reading is **Comprehension Monitoring –** the evaluation and regulation of comprehension (Garner, 1987; Wagoner, 1983)

A local research project (the SHORS project) led by Taryn Moir, Educational Psychologist, recently reported the significant positive impact of metacognitive approaches to teaching and learning reading comprehension for North Ayrshire primary school pupils with equal benefit to pupils of a range of ability levels.

The core elements of the metacognitive approach to learning and teacher reading comprehension were:

- Teach children some/all of the 12 reading comprehension strategies using: direct teaching- provide a range of examples during initial teaching and practice through modelling, thinking aloud, application and guided practice **and** keeping it visual (posters anchor charts)
- Use kinaesthetic hand gestures indicating the use of a strategy
- Refer to strategies
- Encouragement of active involvement and conscious use of strategies
- Use visual organisation aids
- Guide students through high focused, high quality discussion about the text
- Provide interesting, appropriate and varied reading material
- Establish an engaging motivational context and reading opportunities
- Support vocabulary

Metacognitive strategies for pupils included: summarise as you go, hold your thoughts as you read, visualise, hear a voice reading aloud as you read and think about crunch points of text. For more detail of this project, please see the NACEPS Research Snapshot with a spotlight on the SHORS project.

Sources and Recommended Reading

https://educationendowmentfoundation.org.uk/resources/teaching-learning-toolkit/meta-cognition-and-self-regulation/

http://www.mathsolutions.com/documents/chapter_1_ccss_edition.pdf

Moir, T., Boyle, J., Woolfson, L. M. (2016) Developing higher-order reading skills in mainstream primary schools: a metacognitive approach – a study protocol Educational Psychology in Scotland. Vol 17 No. 2

NACEPS SHORS Project Research Snapshot

Schneider & Artelt (2010) "Metacognition and mathematics education"

Donker et al (2014) "Effectiveness of learning strategy instruction on academic performance: a meta-analysis"