RLC Research Review:
Metacognition and Self-Regulation

Context – Looked After Children:

According to c. 41 of the Children Act 1989, Looked After Children (LAC) are children that have been in the care of a local authority and provided with accommodations for a continuous period of more than 24 hours. A child up is eligible for the LAC designation until they turn 18, return home, or are adopted (National Society for the Prevention of Cruelty to Children [NSPCC], 2021). The education of LAC in England is supported through key legislation and policy:

- The Children and Young Persons Act 2008, which amends aspects of the Children Act 1989 and reforms the care system of LAC,
- The Children and Families Act 2014, which specifies that local authorities must appoint at least one person to support the educational achievement of LAC, and
- Statutory guidance from the DfE (2021a), such as how to promote the emotional and behavioural development of LAC.

As of 31 March 2020, there were 80,080 LAC in England, representing nearly 1 in every 100 pupils attending school (DfE, 2021). While already a striking number, it has been growing year over year since 2008, increasing by over 15% since 2015. The majority of these children are placed in the care of their local authority due to abuse or neglect (63%), while the remaining are placed into care due to family dysfunction (14%), family in acute distress (8%), absent parenting (7%), child's disability (3%), parent's illness (3%), or other issues (2%) (DfE, 2021).

About 10% of LAC move between three or more placements each year, putting them at significant risk regarding their well-being and positive behavioural outcomes. Moreover, a large and growing body of evidence suggests that LAC may suffer from established behaviour patterns developed throughout early childhood that negatively impact their ability to thrive in typical educational settings without specific attention to their social-emotional and academic development. At the same time, LAC are far from a homogenous group of children. They vary by age (ranging from under 1 year up to 18 years), ethnicity, gender, reasons for being looked after, placements (e.g., foster placement, living independently), legal status (e.g., care order, voluntary agreement), locality of placement, and support needs.

The DfE's (2021) most recent data from 2019 on outcomes for LAC finds the following:

- four times more likely to have a special educational need;
- nine times more likely to have an education, health, and care plan;
- lower educational attainment non-looked after children at
    - key stage 1 in reading, writing, and mathematics, and science (26 percent fewer reached the expected standard);
    - key stage 2 in reading, writing, and mathematics (28 percent fewer reached the expected standard), though this outcome appears closely related to the prevalence of pupils with a special education need;
    - key stage 4 in the average Attainment 8 score (44.6 versus 19.1), percentage of pupils achieving grade 5 or above in English and mathematics (40.1 versus 7.2), and English baccalaureate average point score (3.87 versus 1.52).

In general, LAC are more likely than non-looked after children to have mental health issues, additional or special education needs, and lower educational attainment. Finally, after leaving care, they are also less likely to be in education, training, or employment (NSPCC, 2021). See the sources below for more in-depth examinations of the complex and multi-faceted circumstances and outcomes LAC face.

Department for Education. (2021). *Statistics: Looked-after children*. https://www.gov.uk/government/collections/statistics-looked-after-children
National Society for the Prevention of Cruelty to Children. (2021, August 6). *Statistics: Looked-after children*. https://www.gov.uk/government/collections/statistics-looked-after-children

Oakley, M., Miscampbell, G., & Gregorian, R. (2018). *Looked-after children: The silent crisis*. Social Market Foundation.
Sebba, J., Berridge, D., Luke, N., Fletcher, J., Bell, K., Strand, S., Thomas, S., Sinclair, I., & O'Higgins, A. (2015). *The educational progress of looked after children in England: Linking care and educational data*. Rees Centre, University of Bristol.

Title:

Key texts:

Muijs, D., & Bokhove, C. (2020). Metacognition and self-regulation: Evidence review. *Education Endowment Foundation.* https://educationendowmentfoundation.org.uk/education-evidence/evidence-reviews/metacognition-and-self-regulation

See also the Education Endowment Foundation's two guidance reports on improving mathematics: https://educationendowmentfoundation.org.uk/education-evidence/guidance-reports

Other reading:

Dinsmore, D. L., Alexander, P. A., & Loughlin, S. M. (2008). Focusing the conceptual lens on metacognition, self-regulation, and self-regulated learning. *Educational Psychology Review, 20*(4), 391–409. https://doi.org/10.1007/s10648-008-9083-6

Mannion, J. (2020, October 20). How the EEF gets metacognition and self-regulation wrong – and why it matters. *Rethinking Education*. https://rethinking-ed.org/eef-metacognition-wrong/#_ftn12

Quigley, A., Muijs, D., & Stringer, E. (2018). *Metacognition and self-regulated learning: Guidance report*. https://educationendowmentfoundation.org.uk/education-evidence/guidance-reports/metacognition

Method:

The evidence review by Muijs and Bokhave (2020) provides the basis for the Education Endowment Foundation's (EEF) guidance report on metacognition and self-regulated learning. In the review, Muijs and Bokhave synthesize insights from the current evidence base, integrating primary studies, systematic reviews, and meta-analyses. From a total of over 180 sources, the shed light on the theory and practice for metacognition and self-regulation in relation to two main areas: conceptual clarity (e.g., definitions and models, historical developments with these concepts, related evidence about disadvantaged groups) and how pupils' associated skills can be improved and the impact on attainment (e.g., teaching metacognition and self-regulation, differential effectiveness by population subgroup, considerations for interventions).

Two additional key texts are the EEF's guidance report for improving mathematics: in the early years and Key Stage 1, and in Key Stages 2 and 3. Both reports provide research-informed overviews on the teaching of mathematics and have a number of connections with the review by Muijs and Bokhave.

The literature review below is further informed by (a) individual journals (all peer reviewed) primarily in the area of education, (b) relevant evaluation reports commissioned by the EEF, and (c) grey literature sources that evidenced a clear connection with the research literature and which contributed to current debates and understandings. Sources were selected to illustrate a range of aspects of the theory and a range of research methodologies from international contexts. All incorporated sources were published within the last ten years, except the systematic review by Dinsmore et al. (2008), which despite being somewhat dated remains a key text.

Overview of the Issue or Subject:

Metacognition and self-regulation are often-conflated concepts. Not only does much of the available literature fail to explicitly define these concepts, but there are many instances where, for instance, self-regulation and self-regulated learning are treated as interchangeable. For instance, Dinsmore et al.'s (2008) systematic review found that only 49% of 255 studies provided explicit definitions for metacognition, self-regulation, and self-regulated learning. And where definitions were provided, there was considerable overlap between the three constructs. It is therefore critical for any teacher or school looking to implement new strategies in these areas to have a clear understanding of their definitions and interrelationship.

Metacognition is a concept introduced by Flavell in the 1970s, and in the years since it has become a key predictor of educational attainment and surpasses intelligence in terms of accounting for observed variance in pupils' learning. As Mannion (2020) explains, referring to Flavell's work, "we learn to control our thinking by monitoring what we know about people (self and others), tasks and strategies. He proposed that this ***metacognitive knowledge*** grows through ***experience***, by setting ***goals***, and by choosing and using ***strategies*** to achieve those goals. All of these components interact with one another, and through such interactions we develop metacognitive skills and further our knowledge" (para. 11). Mannion (2020) goes on to mention that while this conception may appear complex, metacognition can be simply understood as "monitoring and controlling your thought processes" (para. 19). As the EEF guidance report for the early years outlines, examples of pupils demonstrating this ability might include:

- examining existing knowledge to inform the selection of a particular approach to solving a mathematical task;
- monitoring whether the chosen approach has been successful; and then
- deliberately changing or continuing the approach based on that evidence.

Self-regulation, on the other hand, emerged out of Bandura's research into how one's behaviours and emotions manifest through interactions with the external environment. According to Dinsmore et al. (2008), there is "a clear cognitive orientation for metacognition, while self-regulation is as much concerned with human action as the thinking that engendered it" (p. 405). This different character of self-regulation is represented in the figure below, and it gives rise to Mannion's (2020) definition that "self-regulation is monitoring and controlling your emotions and behaviours" (para. 19).

Clearly, metacognition and self-regulation are closely related concepts; they both have to do with self-monitoring and self-control. However, appreciating their differences is central to selecting and implementing appropriate strategies that promote pupil learning and well-being.

Approaches to Supporting Pupils' Metacognitive Development

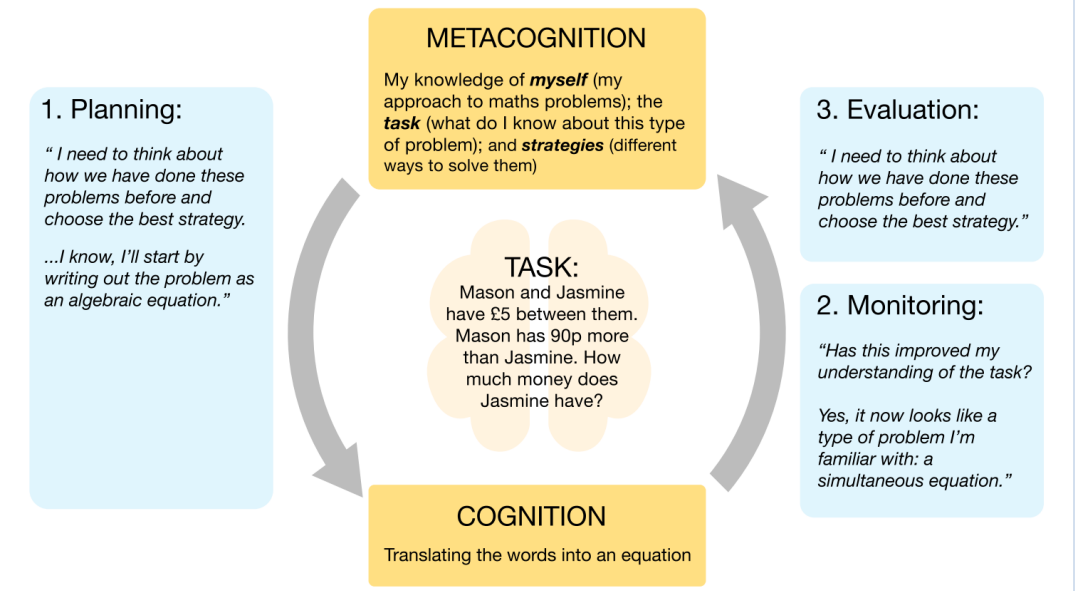
The EEF notes that until recently, metacognition was thought to be a late-developing aspect of pupils' learning ability (ages 8-10), which then advanced rapidly until about age 15. However, an emerging perspective suggests that metacognitive development begins early on, and teachers thus need to give it attention in all developmental stages. Muijs and Bokhove (2020) observe that research generally points to two main types of interventions for developing pupils' metacognitive and self-regulation abilities: the direct approach (i.e., explicit instruction and implicit modelling by the teacher) and the indirect approach (i.e., creating a conducive learning environment that includes guided practice through dialogue and inquiry).

Direct Approaches

As they sound, direct approaches involve deliberate actions to teach pupils metacognitive and self-regulation skills. Within this category of interventions, such actions can include either explicit techniques (e.g., modelling a learning strategy and its purpose) or implicit techniques (e.g., modelling a learning strategy without detailing its purpose). Muijs and Bokhove (2020) offer the research summaries integrated below, focusing on the key practices and questions that teacher and school leaders should give attention. Within these, findings from the EEF's guidance on improving mathematics in the early years and Key Stage 1 (2021a) along with Key Stages 2 and 3 (2017) provide further guidance.

Explicit techniques combine interactive questioning with a mastery approach to learning, both facilitated by teacher input. One such approach that regularly shows significant effect sizes is *strategy instruction*, which consists of "awareness raising (why do these strategies matter), modelling of the appropriate

strategy, practise of the strategy and evaluation and goal setting" (Muijs & Bokhove, 2020, p. 28). Findings from recent studies underscore that such instruction should target metacognitive strategies in tandem with cognitive strategies (i.e., how pupils approach knowledge acquisition and task completion). To this end, the EEF's guidance report suggests teachers should explicitly teach pupils the metacognitive regulation cycle, encompassing how to plan, monitor, and evaluate learning. Quigley et al. (2018) provide the example below:



Source: Quigley et al. (2018, p. 11)

Regarding the metacognitive regulation cycle, the authors go on to state how "Most learners will go through many of these thinking processes to some extent when trying to solve a problem or tackle a task in the classroom. The most effective learners will have developed a repertoire of different cognitive and metacognitive strategies and be able to effectively use and apply these in a timely fashion. They will self-regulate and find ways to motivate themselves when they get stuck. Over time, this can further increase their motivation as they" (p. 11).

Implicit techniques, on the other hand, rely on having pupils reflect individually about their learning and in some cases record and examine those reflections. Mujis and Bokhove (2020) describe the example of the ReflectED project, where "pupils receive a weekly ReflectED lesson from their teacher who follows a series of lesson plans. Pupils are expected to reflect individually on their learning in other lessons and record these reflections electronically once a week. The lesson plans include tasks for the week, to support pupils to practice their metacognitive skills throughout their normal lessons. Children code their reflections to record their thoughts on a lesson and their performance. This enables them, and the teacher, to read previous reflections to inform future teaching and learning" (p. 29). Although the project has yet to produce reliable findings about the impact on pupil development, early evidence is promising.

There is also some evidence about strategies that seek to bridge explicit and implicit techniques, yet comparatively limited to the individual areas of study. In general, the following strategy has shown effectiveness in reading instruction and may have applicability in other curriculum areas:

- *Develop preskills:* Students' prior knowledge about the task and strategy is assessed and remediation is provided when needed.
- *Discuss the strategy:* The strategy to be learned is described, a purpose for using the strategy is established, and the benefits of using the strategy are presented.
- *Model the strategy:* The teacher cognitively models (models while thinking out loud) how to use and apply the strategy for the task.
- *Memorize the strategy:* Students memorize the strategy steps until they are fluent in understanding any mnemonic and meanings.

- *Guided practice:* Instruction is scaffolded from student–teacher collaborative practice to independence.
- *Independent practice:* The teacher provides independent practice across task and settings to foster generalization and maintenance. (see Muijs & Bokhove, 20c20, p. 29)

Indirect Approaches

Indirect approaches emphasise that metacognitive strategies need to be practised, particularly through the use of dialogue and inquiry. In particular, there is a need for teachers to provide regular guidance as pupils learn to engage in metacognitive reflection. Several factors appear to be vital in this regard (see Muijs & Bokhove, 2020, pp. 30-32):

- *Timing:* "metacognitive reflection needs to follow the task, and not occur concurrently, as task completion needs to fully engage cognition."
- *Social Connections:* "As an important element of metacognition is to develop more conscious awareness of thinking around learning, dialogue and discussion can have an important role to play. This view is also based on the importance of the social element of metacognition and interaction to the development of learning"
- *Cognitive Conflict:* "One aspect of dialogue that is highlighted in some successful programmes, such as Cognitive Acceleration in Science Education (CASE) is cognitive conflict, which happens when a pupil comes across a problem that cannot be solved with existing cognitive structures or processes (Adey et al, 2002). This can be developed through the use of novel and difficult problems and questions, but does require significant scaffolding from teachers. This is related to the idea of working in a pupil's 'Zone of Proximal Development', defined as the difference between what a child can do unaided and what s/he can do with the help of an adult or more informed peer."
- *Inquiry-Based Learning:* "Inquiry can also play an important role in developing self-regulation and metacognition, provided tasks are sufficiently challenging, build on firm pupil subject knowledge, are realistic, and are suitably guided and supported by the teacher. . . . Scaffolding, through teacher prompting and visuals for example, are important in the individual and group practice and inquiry phases"
- *High Expectations:* Developing Teachers should carefully increase their expectations regarding pupils' independence as the pupils gain competence and fluency. Teachers can provide regular opportunities for pupils to develop independent metacognition through
    - encouraging self-explanation—pupils explaining to themselves how they planned, monitored, and evaluated their completion of a task; and
    - encouraging pupils to explain their metacognitive thinking to the teacher and other pupils

Challenges

Despite the promising research findings about metacognition and self-regulation noted above, developing pupils' skills in these areas present several significant challenges. The EEF guidance report for improving mathematics in Key Stages 2 and 3 (see p. 21) summarizes these as follows. First, teachers need to ensure that pupils' metacognitive development does not detract from concentration on the mathematical task itself. This might happen if pupils are expected to do too much, too early, without effective scaffolding from their teacher. Regardless of the strategy being taught, pupils need significant time to imitate, internalise, and independently apply strategies, with strategies used repeatedly across many maths lessons. It is likely that the time required to develop metacognition is much greater than for other skills and knowledge. Finally, discussion and dialogue can be useful tools for developing metacognition, but pupils may need to be taught how to engage in discussion. Teachers should model effective discussion and 'what to do as a listener'. Orchestrating productive discussions requires considerable skill and so may require targeted professional development.

Overall Strength of Evidence

The EEF's Teaching and Learning Toolkit notes that there exists a great depth of research in the areas of metacognition and self-regulation. On average, studies suggest that interventions can have an impact of up to seven months' additional progress regarding pupils' attainment, and such impacts may be

particularly likely when metacognition and self-regulation strategies are combined. At the same time, positive outcomes appears related to several factors:

- Primary age pupils may realize greater benefits than secondary age pupils,
- Maths and science outcomes may be greater than in other curriculum areas, and
- Digital technology that complements approaches to scaffold pupils' development may be particularly influential.

Options or Questions Regarding Key Issues and Debates:

The EEF's school audit tool that accompanies the most recent guidance on metacognition and self-regulation outlines the following three areas for consideration regarding interventions to promote pupils' metacognition and self-regulation.

Whole School Approach to Curriculum and Teaching

- What professional development time is allotted to ensuring school staff understand the importance of metacognition and self-regulation to pupils' learning?
- How are metacognition and self-regulation represented in school policies as well as teachers' planning and practice?'
- What professional development is needed to develop your knowledge and understanding of these approaches? Have you considered professional development interventions which have been shown to have an impact in other schools?

Teacher Knowledge

- In the classroom, how can you promote and develop metacognitive talk related to your lesson objectives?
- How are challenges for pupils designed to take advantage of the zone of proximal development?

Pupil Knowledge and Behaviours

- Which explicit strategies can you teach your pupils to help them plan, monitor, and evaluate specific aspects of their learning?
- How can you give them opportunities to use these strategies with support, and then independently?
- How can you ensure you set an appropriate level of challenge to develop pupils' self-regulation and metacognition in relation to specific learning tasks?

Potential Implementation Issues to Consider:

There have been several recent critiques about the EEF's guidance report on SEL. While the authors of these critiques tend to praise the EEF's clear distinction between metacognition and self-regulated learning, its emphasis on the importance of cognition, and the incorporation of motivation and how it impacts pupil learning and well-being, they also highlight several critical issues. Mannion (2020) summarizes these as follows:

First . . . this is not how metacognition and self-regulation are usually defined in the research literature. This definition therefore introduces confusion into an already complex arena.

Second, the EEF model is primarily concerned with cognition, and overlooks the self-regulation of emotions and behaviours. [However], developing the ability to monitor and control our feelings (physical and emotional) – and therefore our behaviours – is really the bedrock of self-regulated learning. This goes way beyond motivation, important though motivation undoubtedly is.

And third, the EEF uses the terms self-regulation and self-regulated learning interchangeably. In the guidance document, there are 42 references to self-regulated learning and 19 references to self-regulation, and no attempt is made to differentiate between the two. This is a problem because to understand how these concepts help define one another is actually quite illuminating.

Appreciating and understanding these critiques is essential to achieving successful outcomes with school- and classroom-level interventions.

It is also important to appreciate the costs of interventions that target metacognition and self-regulation. As the EEF Teaching and Learning Toolkit finds, the main costs arise from ensuring school staff receive the professional development training needed to embed the focus approaches into the school's ethos, curriculum, and activities. For example, school leadership will need to examine the extent to which a shared language exists among school staff for these concepts as well as connections to existing school policies. Professional development opportunities and resources in this area tend to be inexpensive, but the cost will of course depend on the extent of use of existing resources and supports. An additional cost that bears consideration is how school leaders will support teachers in implementing evidence-based practices for metacognition and self-regulation, particularly the explicit teaching of these concepts.