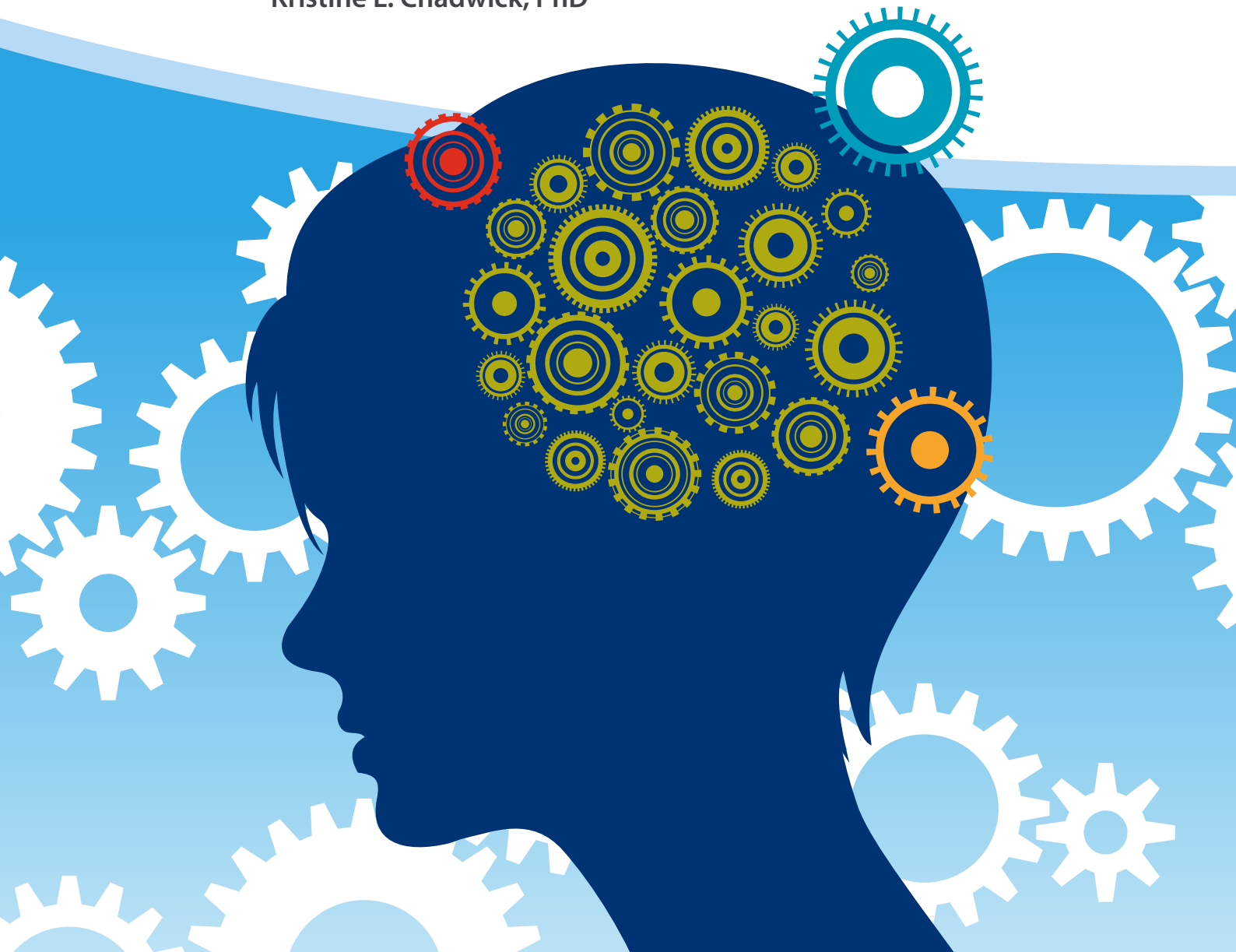# Making the abstract explicit: the role of metacognition in teaching and learning

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Introduction

This policy paper presents findings from a wide range of literature on metacognition in primary and secondary education. To help make the abstract explicit for school leaders and teachers, we focus on three aspects of metacognition commonly studied in the literature, metacognitive knowledge, metacognitive skills, and metacognitive experiences. Part 1 of the full paper describes key insights from research on metacognition. Part 2 presents promising practices for improving students' metacognitive abilities.

Finally, Part 3 provides recommendations for IB stakeholders meant to strengthen and reinforce the potential of IB programmes to develop students with metacognitive strengths for lifelong learning.

This research brief provides a short overview of metacognition in education and summarizes the main findings and recommendations from the full policy paper.
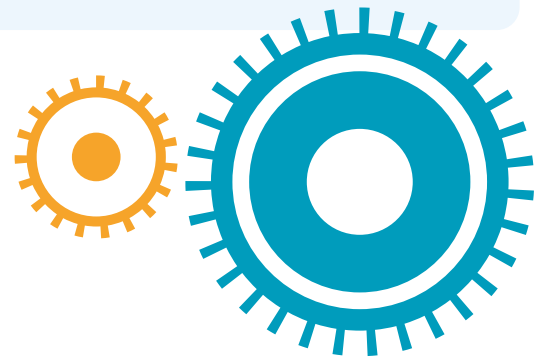
What is so important about reflecting on our thinking?

When we do purposeful thinking about our thinking we engage in *metacognition*. Metacognition is an essential part of teaching and learning and the main driver for self-regulation. In the metacognitive process, learners tap into their prior experiences to develop a plan, achieve a goal, select strategies, monitor progress, and reflect on what and how they learned. Imagine yourself as a student. You just received a challenging social studies assignment to present on the history of global pandemics. The task will require research, note-taking, presentation skills, critical and creative thinking, organizational skills, self-monitoring to gauge your progress, and motivation. At every stage from start to finish, your metacognition is at work helping you grow through the learning experience.

What role do teachers play?

Teachers are important models and facilitators of the metacognitive process. Teachers make their own thinking and the thinking of students explicit using techniques, such as questioning, reflecting, think-alouds, and feedback. Not surprisingly, research has established a positive link between metacognition and academic performance. Despite its critical importance, students rarely receive explicit instruction on metacognition across all levels of education. Making thinking visible and reflecting on the learning process can be difficult and abstract for students. Thankfully, research and innovations in education from around the world can provide schools, educators, and parents with tools to support students.

What does the research tell us?

We systematically collected research published between 2000 and 2020 as a starting place for generating the main research insights presented in Part 1 and to identify the promising approaches presented in Part 2. Here are some of the key findings from Part 1:

- Metacognitive strategies are among the most influential factors in student learning.
- Interventions that improve metacognitive knowledge and skills can be effective.
- Metacognitive knowledge increases with age, but all learners, especially primary-aged students, need explicit instruction to build metacognitive knowledge and skills.
- Parents and families play an integral role in providing metacognitive experiences and developing students' metacognitive knowledge and skills.
- Students' motivation, growth mindset, self-efficacy, and emotions all influence their use of metacognitive learning strategies, which supports students' academic resilience.
- Beliefs about knowledge and learning influence how teachers and students use metacognition and approach self-regulated learning.

In summary, research shows that metacognition is essential for students to effectively self-regulate their learning. Interventions that aim to enhance students' metacognitive abilities are associated with improved academic performance, especially if they combine instruction in metacognitive knowledge and skills and address motivation, growth mindset, self-efficacy, and emotion. Teachers should use explicit metacognitive language and instruction, ask questions rather than give answers, provide illustrative examples of metacognitive thinking, model for students, and prompt students to connect their learning within and across subjects.

What does metacognitive development look like in practice?

Approaches to fostering metacognitive knowledge and skills vary widely from large-scale government policies and international education programs to discrete classroom practices. This policy paper presents illustrative examples and unpacks specific classroom practices for metacognition within each phase of the *self-regulated learning process*: goal-setting and planning, monitoring and control, and self-evaluation and reflection. Highlighted classroom practices include: (a) using mnemonic devices to build students' metacognitive knowledge, (b) metacognitive questioning to help students develop plans and achieve goals, (c) Reciprocal teaching to encourage students to develop their monitoring skills, and (d) reflective journaling for tying the self-regulated learning process together and for self-evaluating. We dissect one widely adopted and successful program to improve metacognition and other skills, called *Cognitive Acceleration*, to demonstrate the level of commitment needed to create learning environments that support students' metacognition growth.

How do growth mindset, metacognition, and academic resilience work together?

Given the recent increase in attention around social and emotional learning in education, the IB commissioned three policy papers focused on key interrelated social and emotional learning topics that are most closely aligned to the work of IB: metacognition, growth mindset, and academic resilience. Research illustrates how these three factors work together in teaching and learning. Failure, setbacks, and mistakes are a natural and inevitable aspect of school and academic learning. Adaptive responses to the stress of setbacks draw on growth mindset thinking about ability, the metacognitive knowledge and skills to make adjustments and be strategic, and the academic resilience to persevere with confidence, composure, and control. Metacognition skills may be critical for learners to implement a growth mindset when stressed and to manage emotions when failure makes them want to quit.

When teachers message and model a growth mindset in the face of setbacks in their own learning, they illustrate a self-regulatory process that underpins the academic resilience students need in their own lives. Recognizing one's fixed mindset dialogue and adjusting to make room for growth mindset thinking is a metacognitive process that sets the stage for academic resilience. Goal-setting and consistent reflection on progress toward those goals are also important metacognitive processes that influence growth mindset and, in turn, academic resilience. Goals emphasize the link between effort, strategy, and progress in learning. Reciprocally, mindset beliefs and thinking will influence

how teachers and students use metacognitive knowledge and skills. It is important to understand how these three factors of growth mindset, metacognition, and academic resilience interact in typical academic experiences across grade levels and content areas. They do not function in isolation.

What do we recommend for International Baccalaureate (IB) stakeholders?

Our recommendations build from research and promising practices to strengthen and reinforce IB's existing supports for metacognitive development in students.

Make metacognition valued and explicit

IB already provides students with explicit metacognitive experiences, such as the Theory of Knowledge course in the Diploma Programme. IB can further demonstrate the value of metacognition by defining the concept clearly in curriculum standards, assessments, and each aspect of IB's system of professional learning. School leaders, teachers, students, and parents should recognize the role of metacognition in developing internationally-minded students, have resources and training on how to use metacognition, and understand how metacognition can be assessed and evaluated in different ways.

Ensure students use their reflections

Reflection within IB programmes should be explicitly connected to the other phases of the self-regulated learning process (i.e., goal-setting, planning, monitoring) in IB's approaches to teaching and learning. Self-evaluations and reflections are most useful when the formative information generated is used to make self-regulated learning strategies more effective.

Create learning environments that foster metacognition

IB's programme standards and practices specific to teaching and learning strongly align with self-regulated learning and metacognition. Schools and teachers should consider two additional principles that will further enable self-regulated learning and enhance students' motivation. First, teachers should present students with consistent opportunities to set and plan long-term, proximal, and personally meaningful goals. Second, teachers should emphasize student choice and personal relevance to improve motivation and engagement.

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decisions that drive student readiness

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Assess metacognitive knowledge and strategy use regularly

We recommend schools take a holistic approach that includes occasional schoolwide use of self-report measures, ongoing classroom-based formative assessments, and informal teacher observations. This type of approach can lead to the development of a well-rounded, nuanced evaluation of students' metacognitive abilities and lead to more effective planning for teachers and school leaders.

Evaluate teachers' beliefs and provide needed support

School leaders should use prior knowledge, teacher interviews, and classroom assessments to evaluate whether teachers' beliefs and actions lead to student-centered learning environments where students are given the support, guidance, and autonomy to own their learning process. Teachers can use developmental frameworks, approaches for cultural expression, and research-based examples as models to follow.

Align curriculum, assessment and professional learning

Curriculum, assessment, and professional learning must all be coherent and aligned. School leaders are well-positioned to ensure these core components of teaching and learning are aligned to IB's principles and practices while also balancing the external demands from national and regional governments, local education agencies, parents, and the general public.

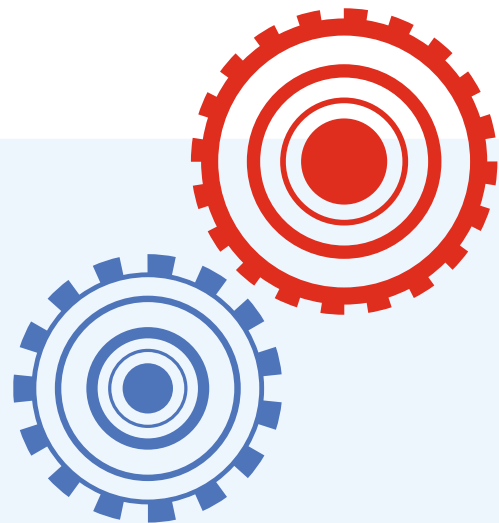## Parents can model metacognitive thinking and behavior

Most promising teaching practices presented in this policy paper have one thing in common—teachers modeled metacognitive thinking and behavior, especially for younger children, to provide explicit examples that could be adapted to individual strengths. Metacognitive behaviors taught in school can be reinforced at home to enhance student ownership of learning across environments. Parents are important models in student learning.

All students can own their learning

A deep base of metacognitive knowledge and strong metacognitive skills provide students with the necessary tools for effectively regulating and owning their learning. The promising practices presented in this policy paper, although directed at teachers, can be adapted and used by students to improve their metacognitive skills for goal-setting, planning, monitoring, and reflection. Students who exhibit strong ownership over their learning also know to seek help when they are struggling with a task. Seeking help can introduce students to new learning strategies and avoid unnecessary frustration and stress. Finally, all students, regardless of how well they currently use metacognition, should have the confidence to know that with continued practice and support from teachers, peers, and parents they will develop the skills that allow them to become lifelong learners.

Conclusion

Promoting metacognition is less about finding the perfect policy, practice, or program and more about creating a culture of teaching and learning that produces thoughtful and reflective students who are prepared and motivated to engage in independent, lifelong learning. The insights and lessons learned from the research provided in this policy paper can help teachers and school leaders take small steps toward creating a school culture and learning environments that cultivate metacognition for all learners.