

# Paving the Way Towards Lifewide and Lifelong Learning: Exploring and Fostering Metacognition for Learning and Transfer

(OER 02/21 LNH)

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## Programmatic Research’s Objectives

**Strong metacognitive ability** has been linked to the acquisition of new skills and competencies, and therefore is crucial for lifewide and lifelong learning necessary for the 21<sup>st</sup> century learner. The need to understand Singapore students’ metacognition as they play out in the local school context, and to foster students’ and teachers’ metacognitive competencies and practices, culminated in a 4-year research programme, funded by the Singapore Ministry of Education under the Education Research Funding Programme for \$1.99 million SGD. Three lines of inquiry were pursued:

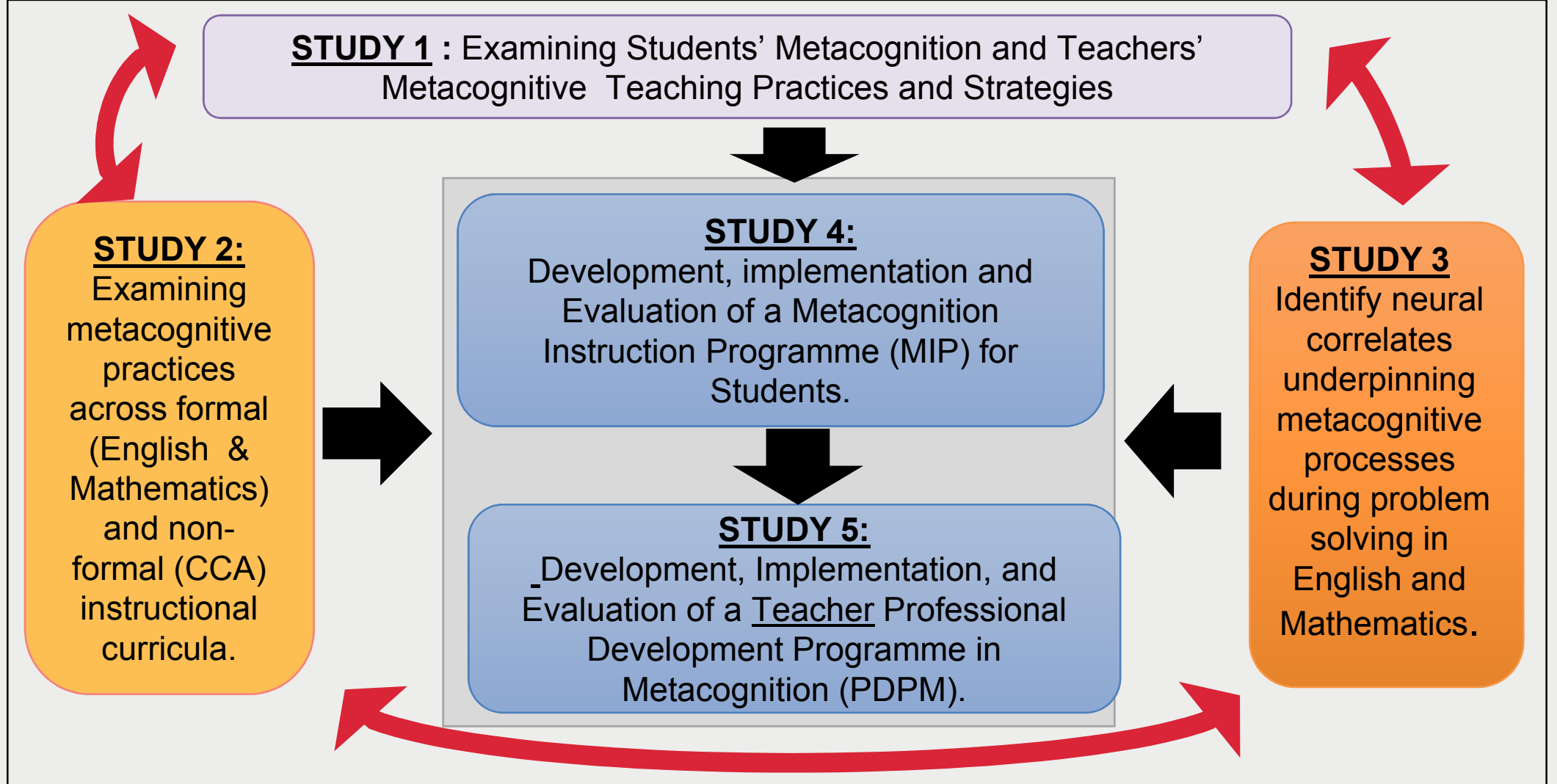
- to develop **a comprehensive knowledge base** on the nature of students’ metacognition, in Mathematics and English and non-formal curricula.
- to examine the **various contextual factors** that **influence** students’ metacognition, e.g., personal attributes, their teachers, and their peers
- to enhance students’ and teachers’ metacognition via (i) an **intervention programme** that teaches students to develop metacognitive awareness and ability to apply various metacognitive strategies; and (ii) a **professional development programme** that supports teachers to develop better and holistic understanding of metacognitive processes and strategies and guides them to apply such enhanced understanding in teaching.

## Milestones and preliminary insights

- Since the inception of the research in April 2021, the project is still **in progress**, with the first 3 studies undergoing analyses and the 4<sup>th</sup> and 5<sup>th</sup> studies in its data collection phases.
- Preliminary findings from Study 1 ( from valid survey responses from more than 3100 Sec 1 students and 260 teachers):
  - Students and teachers could be meaningfully profiled statistically according to **metacognitive knowledge** (declarative, procedural, and conditional), **metacognitive regulation** (planning, monitoring and evaluating), and **metacognitive experiences** (estimates and feelings).
  - Positive association between students’ self-reported metacognitive competence and **academic performance** in both English and Mathematics, which is in line with extant research on students of the same age group.
  - In predicting students’ **ability to transfer**, current findings show that metacognitive competence is the most influential, compared to strategic mindset and behavior, academic ability, and motivation. Teachers’ metacognition also has some influence on students’ metacognition, particularly for the teaching and learning of English.

## Features of Programmatic Research

- Five interlinked sub-studies** proposed that are **multi-disciplinary**; employ **varied approaches and tools**, adopt **multiple levels of analysis**, and use **multiple foci** (see Figure 1).



**STUDY 1 :** Examining Students’ Metacognition and Teachers’ Metacognitive Teaching Practices and Strategies

**STUDY 2:** Examining metacognitive practices across formal (English & Mathematics) and non-formal (CCA) instructional curricula.

**STUDY 3** Identify neural correlates underpinning metacognitive processes during problem solving in English and Mathematics.

**STUDY 4:** Development, implementation and Evaluation of a Metacognition Instruction Programme (MIP) for Students.

**STUDY 5:** Development, Implementation, and Evaluation of a Teacher Professional Development Programme in Metacognition (PDPM).

*Figure 1. Overview of the 5 studies in the research programme. Studies 1 to 3 pertain to understanding metacognition from quantitative, qualitative, and neuro-imaging perspectives respectively, while Studies 4 and 5 are the intervention and the professional development programmes respectively.*

- Main **research questions** addressed
  - How do students engage in metacognition as applied across formal and non-formal curricula
  - What factors influence student metacognition in relation to formal and non-formal curricula?
  - How and to what extent is student metacognition related to student academic and non-academic outcomes? In particular, how and when does student metacognition lead to learning transfer?
  - How are the results from different approaches in measuring student metacognition related?
  - How can student metacognitive competence be fostered?
  - How can teacher metacognitive instructional strategies and practices be improved?

## Conclusion and Implications for Educators

With the adoption of a comprehensive approach, this programmatic research will have important implications for our educators as it

- generates **contextualized resources** that can be utilized in crafting an “organic” intervention programme for fostering metacognition,
- identifies **relevant practices** of highly metacognitive students and teachers who are active practitioners of metacognitive teaching strategies, and
- Identified elements that promote or impede students’ utilization of metacognitive strategies would be useful to schools and policymakers in making critical decisions regarding what needs to be improved, maintained, or toned down for a more **metacognition-nurturing school milieu**.