

## **Enhancing the Pedagogy of Mathematics Teachers to Facilitate the Development of 21st Century Competencies in their Classrooms**

EPMT — 21st CC

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### **KEY IMPLICATIONS**

- In-service mathematics teachers have limited knowledge of metacognition and how to teach for metacognition and therefore need appropriate professional development.
- Student learning can be enhanced through the use of knowledge building tasks and facilitation of appropriate classroom discourse.
- Students are active learners in classrooms that teach for metacognition.

### **BACKGROUND**

The results of international benchmark studies, for example the Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS), show that majority of our students are very good in applying their knowledge in routine situations and this is definitely a consequence of what teachers do and use during their mathematics lessons. For our students to scale greater heights, we need our teachers to nurture metacognitive learners who are active and confident in constructing mathematical knowledge.

### **FOCUS OF STUDY**

The problem the project addressed is related to an aspect of classroom pedagogy of mathematics teachers. This aspect concerns the construction and articulation of mathematical knowledge by students. As we were desirous of improving student learning in our mathematics classrooms, it was critical to engage our teachers in specific and targeted professional development. Therefore, this project engaged teachers in professional development that facilitated development of a teaching strategy, which used knowledge-building tasks and metacognitive activities to nurture metacognitive learners who were active and confident in constructing and articulating mathematical knowledge in their classrooms.

### **KEY FINDINGS**

The key findings show that after participation in the project, teachers were using more knowledge building tasks in their lessons and their knowledge of metacognition deepened. The knowledge the teachers gained from the project impacted their students' learning of mathematics. This enabled them to plan more effectively for lessons that teach for

metacognition. They selected appropriate learning tasks for their lessons and also structured the classroom discourse appropriately so that students were engaged in constructing and articulating mathematical knowledge.

## SIGNIFICANCE OF FINDINGS

The project has implications for practice. Firstly, it shows that teachers have a narrow conception of what metacognition is and how it may be developed in the mathematics classroom. Therefore, teachers need to develop themselves in this important area as developing 21st century competencies are not possible when learners are not metacognitive individuals. Secondly, the project shows that student learning is greatly influenced by teacher actions which can be influenced through meaningful professional development (PD), in this case teaching for metacognition in mathematics classrooms.

## PARTICIPANTS

The project worked with 40 secondary school mathematics teachers from 7 schools.

## RESEARCH DESIGN

Adopting a hybrid model of PD (Kaur, 2011) which was developed in an earlier CRPP project (CRP 06/06 BK), the in-service teachers developed a teaching strategy to facilitate the development of 21st century competencies in their mathematics classrooms. The project comprised three phases. During the first phase teachers were introduced to new knowledge, such as knowledge building tasks and also strategies for developing metacognition.

In the second phase, teachers were guided and supported in integrating their new knowledge into their classroom practices. In the third and last phase teachers were empowered to develop fellow colleagues in their respective schools, cluster and elsewhere. Data was collected using pre and post intervention teacher surveys related to teacher actions and their perceptions of themselves and their students.

## REFERENCE

Kaur, B. (2011). Enhancing the pedagogy of mathematics teachers (EPMT) project: a hybrid model of professional development. *ZDM – The International Journal of Mathematics Education*, 43, 791–803.

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This brief was based on the project AFD 02/14 BK: Enhancing the Pedagogy of Mathematics Teachers to Facilitate the Development of 21st Century Competencies in their Classrooms (EPMT — 21st CC).

## How to cite this publication

Kaur, B., & Toh, T.L. (2017). *Enhancing the Pedagogy of Mathematics Teachers to Facilitate the Development of 21st Century Competencies in their Classrooms: EPMT — 21st CC*. (NIE Research Brief Series No. 17-009). Singapore: National Institute of Education.

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