

# GAMES FOR ENHANCING SUSTAINABILITY OF YEAR 7 MATHS CLASSES IN INDONESIA

## Theory-Driven Development, Testing and Analyses of Lessons, and of Students' Outcomes

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### *Abstract*

The results of international comparative studies have shown that relationships exist between metacognition and cognitive activation and learning success. Since 2007 we have been carrying out projects in Indonesia to improve cognitive and metacognitive activities of pupils of year 7 and their teachers. These activities are to contribute to the construction and sensible use of sustainable mental models for mathematical concepts and methods by learners. This paper shows how games are used for the enhancement of metacognitive and discursive activities in class. Their effectiveness is documented exemplarily by means of students' outcomes and transcripts of lessons from project classes.

**Keywords:** Cognitive activation, Metacognition, Games, Integers

### *Abstrak*

Hasil dari studi banding internasional telah menunjukkan bahwa di satu sisi terdapat hubungan antara metakognisi dan kegiatan kognisi dan pada sisi lain terdapat keberhasilan belajar. Sejak tahun 2007 telah dilakukan proyek di Indonesia untuk meningkatkan kognisi dan kegiatan kognisi dari siswa kelas 7 beserta para pengajarnya. Kegiatan ini harus memberikan kontribusi untuk pembangunan dan penggunaan yang dapat dimengerti dari sebagian besar bentuk ide tentang pengertian secara matematik dan metode-metode melalui siswa. Pada artikel ini digambarkan bagaimana permainan diterapkan sebagai pendukung metakognitif dan kegiatan diskursif dalam pengajaran. Pengaruhnya didokumentasikan berdasarkan contoh dari hasil kerja siswa dan catatan pengajaran dari kelas proyek.

**Kata kunci:** Pengaktifan kognitif, Metakognisi, Permainan, Bilangan bulat

For more than a decade, Indonesian mathematics educationalists endeavour with a variety of different methods to improve mathematical abilities of Indonesian students. The most important project, which is broadly conceived in primary schools (Year 1 to 6) in this reform process, is called PMRI (Sembiring et al., 2010). In 2009, the Institute of Cognitive Mathematics (Osnabrück University, Germany) assumed responsibility for the German-Indonesian feasibility study "Development of Metacognitive and Discursive Activities in Indonesian Maths Teaching" (MeDIM) in Year 7 in cooperation with the Institut Mathesis (Pyzdry, Poland) and the Institute for Didactics in Mathematics (Sanata Dharma University, Yogyakarta). With the introduction of cognitive, metacognitive and discursive activities in this study, some methodological approaches approved from PMRI were further continued. The documentation of the theoretical foundations of the project MeDIM, the concept of