Author: Leon, Huai Luu
Title: Knowing the Math is not enough: mathematical problem-solving processes of high-achieving female students
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Supervisor: Yeap, Ban Har
Abstract

The purpose of the study was to explore the reasons why female upper secondary students in an Integrated Programme who apparently knew their mathematics were unable to solve problems by investigating the types of metacognitive and affective behaviours they displayed when solving problems and how their affective and metacognitive behaviours influenced their problem-solving processes. Four such students were identified through a two part paper and pencil test consisting of familiar and novel questions on the same mathematics topics. These four students were then given three problems to solve while thinking aloud. Data was collected through the video recordings of the problem-solving sessions and the written and interview responses of the students. The transcripts of the students’ think-aloud were analysed using a modified Foong’s (1993) taxonomy of problem solving behaviours to identify the types of metacognitive and affective behaviours shown by the students when solving mathematical problems. The findings showed that these students were capable of six types of metacognitive behaviours: (a) suggest a plan, (b) assess task facility, (c) review progress, (d) recognize error, (e) recognize new development, and (f) self-questioning. The types of metacognitive behaviours demonstrated by the student varied with the problem presented to them. The findings also showed that these students expressed more negative feelings than positive ones. In particular positive self-evaluation was rare. There were instances when the students’ actions and decisions were influenced by their feelings and anticipation where particular method was avoided or error was ignored. These students persevered at problem solving as long as there was something they thought they could try. Three out of four of these students experienced “mind went blank” once either during analysis or review. Some other reasons that could have contributed to the students’ failure in obtaining correct answers included not able to recognize the knowledge required, difficulty in coordinating and using more than one type of mathematical knowledge at the same time and handling multiple information.