

On facilitating different types of problem-solving discourse: Focus on heuristics, connectivity and aesthetics

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Abstract: The talk aims at addressing the following question: How can mathematical problem solving be facilitated by means of systematic effort to incorporate heuristic, connective and aesthetic discourses in classroom discussions? The talk is based on results of three intervention studies with middle and high school students. In the first study, a practice of developing and using heuristic vocabulary in collaborative problem solving was facilitated in two 8th grade classes during a five-month period. This practice affected problem-solving competencies of those students who were identified as “weak” at the beginning of the intervention. In the second study, a practice of systematic verbalizing connections between solved and to-be-solved problems was facilitated in 10th and 11th grade classes, for eight months. The students began using this practice voluntarily towards the end of the intervention and progressed as problem solvers. In the third study, considerable effort was made to incorporate aesthetic discourse in problem-solving discussions in three middle-school classes, during eight-month period. Different patterns of gradual change in social and sociomathematical norms related to mathematical problem solving were observed in the participating classes. The talk is concluded by consideration of the lessons learned from the above studies, in terms of an emerging model of learning through mathematical problem solving. Directions for future research are drawn.