Guershon Harel:Thinking in Terms of Ways of Thinking

Instructional objectives formulated in terms of ways of thinking are essential in *DNR* based instruction in mathematics (a theoretical framework developed in a long series of teaching experiments in elementary, secondary, and university mathematics courses, as well as teaching experiments in professional development courses for teachers at each of these levels). Without targeting ways of thinking, students are unlikely to become independent thinkers when doing mathematics. This brings up important curricular and instructional questions, such as: What does it mean to think of mathematics teaching and learning in terms of ways of thinking? When should we start targeting ways of thinking with students? How do we advance desirable ways of thinking with students? The talk will address these questions, and further argues that the formation of ways of thinking is extremely difficult and those that have been established are hard to alter. Hence, the development of desirable ways of thinking should not wait until students take advanced mathematics courses; rather, students must begin to construct them in elementary mathematics, which is rich in opportunities to help students begin acquiring crucial ways of thinking.