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Supporting Mathematical Thinking and Processes in the Mathematics Curriculum

Mathematical thinking and mathematical processes are central to mathematics education as ways of doing and learning mathematics with meaning and for the development of contextual understanding. The National Council of Teachers of Mathematics [NCTM] strongly promotes five mathematical processes in learning mathematics. More recently NCTM has emphasized the importance of sense making and reasoning in high school mathematics noting that these are the foundations of the five processes. These processes often take a back seat in traditional mathematics classrooms where the focus tends to be on procedural approaches to do and learn mathematics. So, what is mathematical thinking? What are these mathematical processes? Why are they important? What are ways of supporting students' development of mathematical thinking and engagement in mathematical processes in doing and learning mathematics? I focus on these questions in this presentation. I discuss a cognitive view of mathematical thinking, the mathematical processes advocated by NCTM, the relationship between mathematical thinking and the mathematical processes, and how these processes are considered in the school mathematics curriculum (using Alberta and Ontario Programs of Studies as examples). Based on the research literature in mathematics education, I also highlight examples of categories of mathematical tasks that support mathematical thinking and processes. Based on my teaching of mathematics education courses for prospective secondary mathematics teachers and my research on exemplary practicing secondary mathematics teachers' thinking and teaching of algebra and problem solving, I provide examples of inquiry-based pedagogical approaches to support the development of mathematical thinking and learning of the processes.