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Kimberly Santucci Sofronas* (sofronki@emmanuel.edu), Emmanuel College, 400 The Fenway, Boston, MA 02115, **Thomas C DeFranco** (tom.defranco@uconn.edu), Storrs, CT, **Charles Vinsonhaler** (charles.vinsonhaler@uconn.edu), Storrs, CT, **Nick Gorgievski** (nick.gorgievski@nichols.edu), Dudley, MA, **Larissa Schroeder** (schroeder@hartford.edu), West Hartford, CT, and **Chris Hamelin** (chris.hamelin@huskymail.uconn.edu), Storrs, CT.
What Does it Mean for a Student to Understand the First-Year Calculus?: Perspectives of 24 Experts.

This paper presents the views of 24 nationally recognized authorities in the field of mathematics, and in particular the calculus, on student understanding of the first-year calculus. A framework emerged from this study that includes four overarching end goals for understanding of the first-year calculus: (a) mastery of the fundamental concepts and skills, (b) construction of connections and relationships between and among concepts and skills, (c) ability to use the ideas of the first-year calculus to solve problems, and (d) understanding of the context and purpose of the calculus. The framework may serve as an organizational tool that links together a number of disparate studies from the research literature. Organizing the body of prior research around a framework of core goals that define student understanding of the first-year calculus may have a number of practicable outcomes that have potential to further promote student understanding. These include identification of end goals and related sub-goals in need of further study or yet to be researched; synthesis of what is known about students' areas of misconception and cognitive difficulty as they relate to end goals and sub-goals outlined in the framework; shaping of instruction in ways that consider those problem points. (Received August 02, 2010)