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Much of the emphasis in recommendations for mathematics education instruction has been on the teaching and learning of concepts. In practice, however, instructors at all levels of education do expect students to develop technical, procedural proficiency. This is especially true in tertiary education in which the clear majority of students enrolled in mathematics courses are studying towards a non-mathematics degree, taking mathematics primarily for technical skills required in their discipline-specific courses. The question then arises, how can procedures be taught in a non-rote, transferable, deep way? This presentation will focus on one aspect of a larger research program geared toward addressing the above question. A categorization of students' reasons for choosing one procedure over another in the face of choice will be presented. This will be tied to the literature on flexible procedural knowledge and expand on the emerging understanding of teaching for depth of procedural knowledge. (Received September 20, 2016)