Using The Emergent Model Heuristic to Describe the Evolution of Student Reasoning regarding Span and Linear Independence

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Abstract: A prominent problem in the teaching and learning of undergraduate mathematics is how to build on students' current ways of reasoning to develop more generalizable and abstract ways of reasoning. A promising aspect of linear algebra is that it presents instructional designers with an array of applications from which to motivate the development of mathematical ideas. The purpose of this talk is to report on student reasoning as they reinvented the concepts of span and linear independence. The reinvention of these concepts was guided by an innovative instructional sequence known as the Magic Carpet Ride problem, whose creation was framed by the emergent models heuristic (Gravemeijer, 1999). During our talk we will: explain how this instructional sequence differs from a popular "systems of equations first" approach, present the instructional sequence via the framing of the emergent models heuristic; and provide samples of students' sophisticated thinking and reasoning.