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In an introductory linear algebra course, students are introduced to a large number of new concepts and definitions; further, they are expected to understand how these various concepts are all connected. In an attempt to improve the teaching of these various mathematical connections, this session will report on an action research study that focuses on the implementation of inquiry-oriented teaching in an introductory linear algebra class. The goals of this study were two-fold: to determine how inquiry-oriented teaching can be effectively implemented in an introductory linear algebra course and to determine the mathematical connections students appear to evoke in an inquiry-oriented linear algebra course. Data was collected over the course of two action research cycles, with each cycle taking place in an introductory linear algebra classes that I taught; the first class was taught in the summer of 2015, and the second in the fall of 2015. Data sources include video and audio recorded classroom observations, my own personal reflections on those observations, interviews with my students, and student work submitted through homework, exams, and in-class work. (Received September 22, 2015)