

Individual and Collective Analysis of the Genesis of Student Reasoning Regarding the Invertible Matrix Theorem in Linear Algebra

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Abstract: I present research regarding the development of mathematical meaning in an introductory linear algebra class. In particular, I present analysis regarding how students—both individually and collectively—reasoned about the Invertible Matrix Theorem over the course of a semester. To do so, I coordinate the analytical tools of adjacency matrices and Toulmin’s (1969) model of argumentation at given instances as well as over time. Synthesis and elaboration of these analyses was facilitated by microgenetic and ontogenetic analyses (Saxe, 2002). The cross-comparison of results from the two analytical tools, adjacency matrices and Toulmin’s model, reveals rich descriptions of the content and structure of arguments offered by both individuals and the collective. Finally, a coordination of both the microgenetic and ontogenetic progressions illuminates the strengths and limitations of utilizing both analytical tools in parallel on the given data set. These and other results, as well as the methodological approach, will be discussed in the presentation.

Key words: linear algebra, individual and collective, genetic analysis, Toulmin scheme, adjacency matrices.