Preliminary Research Report

Exploring student's spontaneous and scientific concepts in understanding solution to linear single differential equations

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In this study, we use the zone of proximal development to characterize students' spontaneous and scientific concepts of rate of change, rate proportional to amount, exponential function and long-term behavior of solutions for a system of one and two linear autonomous differential equations. Our focus on the dynamics of the differential equation systems is to investigate how these spontaneous and scientific concepts are incorporated from a system one linear differential equation into a larger system of two linear differential equations. We use and adapt previously used instructional activities from an inquiry-oriented differential equation course to help us gather our data by doing semi-structured interviews with five students. We present only preliminary findings on student's thinking of solutions mainly for single differential equations, with some insights of student thinking of solutions on a system of two differential equations.

KEYWORDS: Differential equations, solutions, rate of change, zone of proximal development