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Clarifying the Stages of Mathematical Defining: Gestation and Presentation.

Research shows that students generally do not understand definitions the way that mathematicians do, namely that mathematics definitions are stipulated rather than extracted and thus have no truth value (Edwards & Ward, 2008; Selden & Selden, 2008). However, others suggest that even mathematicians have a more complex relationship with definitions and the classroom should reflect this (De Villiers, 1998); Klein for instance advocated classrooms which do not present mathematics as "finished" but rather as in formation using what he called the "bio-genetic principle." Taking a cue from Polya's words, "Mathematics presented with rigor is a systematic and deductive science, but mathematics in gestation is an empirical and inductive science" (Polya, 1944), I suggest an alternate model for thinking of mathematical definitions with two stages: gestation and presentation. Definitions in gestation often have an extracted nature while presented definitions are fully stipulated. I present evidence from instruction that fits this model which was used by a research mathematician in an undergraduate real analysis class as well as the corresponding student thinking about mathematical definitions which arose in this environment. (This work was partially supported by NSF DUE #0837810.) (Received September 22, 2009)