CREATING RIGOROUS MATHEMATICAL THINKING: A DYNAMIC THAT DRIVES MATHEMATICS AND SCIENCE CONCEPTUAL DEVELOPMENT

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Introduction

Several longitudinal studies are being conducted to demonstrate the efficacy of a new paradigm for accelerating and deepening the creation of higher-order mathematical thinking and mathematics and science conceptual development. The paradigm operationalizes constructs of a theory of rigorous mathematical thinking (Kinard, 2000) through Feuerstein’s Instrumental Enrichment (FIE) program with Mediated Learning Experience (MLE, Feuerstein, 1980). This paper presents the paradigm and some initial results from one of the studies that targets inner-city youths who have experienced previous academic failure and possess the so-called traits that are presumed to place limits on individual difference (see, for example, Hernstein and Murray, The Bell Curve, 1994).

The Mathematical Thinking Dynamic

Kinard (2000) defines rigorous mathematical thinking as the synthesis and utilization of mental operations to:

- derive insights about patterns and relationships;
- apply culturally derived devices and schemes to further elaborate these insights for their organization, correlation, orchestration and abstract representation to form emerging conceptualizations and understandings;
- transform and generalize these emerging conceptualizations and understandings into coherent, logically-bound ideas and networks of ideas;
- engineer the use of these ideas to facilitate problem-solving and the derivations of other novel insights in various contexts and fields of human activity; and,

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