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Inside the Mathematics Class. Sociological Perspectives on Participation, Inclusion, and Enhancement.

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Review

Siemon, D., Barkatsas, T., & Seah, R. (2019). *Researching and Using Progressions (Trajectories) in Mathematics Education. Boston: Brill Sense.*

This book brings to the fore the results of work done by scholars in Australia and the United States for the last 10-15 years, in the area of design and implementation of schools mathematics curricula. The contributors to this book have worked using the perspective of the introduction of learning progressions or learning trajectories in the research and practice of mathematics education, attending to different aspects, such as theory, focus and scale, and methods to identify and validate the progressions. The objective of this book is either to act upon both upon the competencies and to provide resources for teaching and learning mathematics. With this purpose in mind, the authors have chosen this specific methodological design of the progressions in mathematics education, by either looking at individual student learning trajectories and determined pedagogical practices or at the macro analysis of the engagement of the student populations with mathematics over time.

Notwithstanding the benefits of this approach to the research and practice of mathematics education, the editors acknowledge the shortcomings. For example, when looking at the trajectories at the individual level by the means of teaching experiments, these experiments will have a very limited impact on the curriculum design and implementation because of its narrow focus and scale. In the case of the macro level, the analysis is done at the end or after finishing the progression in mathematics education, thus it does not capture the impact of mathematics education in learning progressions if students had been taught different curriculums or if they had been "taught well". In line with this argument, the book also considers the general implications and further research areas in the curriculum design and implementation of the mathematics education. The common ground on which the arguments and work of the present book are built is that learning is a process that needs time and that teaching has the important task of identifying the position of

the learners in their respective learning progression/trajectory and offer them the necessary support to move forward in this singular journey.

The book is structured in ten chapters plus the introduction and epilogue, all of which have gone through a peer review process before publication. Chapter 1 is titled "Knowing and Building on What Students Know: The Case of Multiplicative Thinking", and it describes the use of rich assessment tasks and Rasch modelling to identify and explore multiplicative thinking in grades 4 through 9, in Australia. Chapter 2, "Learning trajectories in early mathematics education" discusses in detail the use of the concept of learning trajectory in the United States, for early childhood mathematics education. Chapter 3, 'Hypothetical Learning Trajectory (HLT): A Lens on Conceptual Transition between Mathematical "Markers"' introduces the notions of marker studies and transition studies to support teachers in establishing hypothetical learning trajectories and also to guide educational research. In chapter 4, "Using Digital Diagnostic Classroom Assessments Based on Learning Trajectories to Drive Instruction", the authors bring forward a digital learning system based on multiple learning trajectories to inform teaching and progress student learning in the underlying cognitive framework.

Starting with chapter 5 and for the rest of the book (excluding epilogue), the authors report results from the Reframing Mathematical Futures II (RMFII) project conducted in Australia. To begin with, Chapter 5 "Researching Mathematical Reasoning: Building Evidence-Based Resources to Support Targeted Teaching in the Middle Years" 'describes the rationale for and methodology used to develop the evidence-based learning progressions and teaching advice for algebraic, geometrical and statistical reasoning' (p. 3). In chapter 6, "Reframing Mathematical Futures II: Developing Students' Algebraic Reasoning in the Middle Years", the authors detail the algebraic reasoning dimension of the RMFII project, while chapter 7 "A Learning Progression for Geometric Reasoning" deals with the geometrical reasoning in relation to measurement and spatial reasoning. Finally, the last dimension from mathematics education considered in the RMFII project is statistical reasoning, studied in chapter 8 "Statistics and Probability: From Research to the Classroom". On an integrative note, chapters 9 "Investigating Mathematics Students' Motivations and Perceptions" and 10 "Secondary Students' Mathematics Education Goal Orientations" give account of the students' voice, through

the surveys carried out in the RMFII project. The book ends with an overview and final comments on the importance of progressions/trajectories in mathematics education practice and research. All in all, this book offers some fresh insights in the mathematics education research that are interesting to continue and overcome its difficulties in order to transfer the benefits of the research to more student populations that need it throughout the world.

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