

Preface

Learning and Teaching Real world Problem Solving in School Mathematics: A Multiple-Perspective Framework for Crossing the Boundary is, to a considerable extent, a response to the widening divide between mathematics as practiced in schools and mathematics as enacted in social and workplace practices. School mathematics is generally viewed as a series of academic hurdles that students need to overcome in order to move up to the next level, whereas in the real world outside the school, whether in the course of daily life or in the workplace, individuals encounter situations in which they are called upon to deal with mathematical processes that are “black-boxed,” i.e., hidden in automated machines or other symbolic systems. However, decoding, interpreting, and using the black-boxed mathematics in social and workplace contexts are complex processes that involve problem solving. In this context, school mathematics and real world problem solving seem to be becoming increasingly two disconnected social worlds separated by a growing thick, nonporous boundary. The thesis of this book is that the crossing of the boundary between the two disconnected social worlds of school mathematics and real world problem solving is essential to reclaim school mathematics as a tool to practice real world problem solving.

The ultimate aim of this book is to identify the conceptual tools and the instructional modalities which enable students and teachers to cross the boundary between school mathematics and real world problem solving. The book identifies, examines, and integrates seven conceptual tools, of which five are constructs (activity theory, narrative, modeling, critical mathematics education, ethnomathematics) and two are contexts (STEM and the workplace) in order to develop two closely linked multiple-perspective frameworks: one for learning real world problem solving in school mathematics, which sets the foundations of learning real world problem solving in school mathematics; and one for teaching real world problem solving in school mathematics, which explores the modalities of teaching real world problem solving in school mathematics.

An assumption that underlies this book is the centrality of human agency of teachers and students in the learning/teaching process. The multiple-perspective learning and teaching frameworks are more of an invitation than a prescription.

They are an invitation to a menu of instructional strategies from which students, teachers, and schools can choose. The choices can vary from simple strategies that can be embedded in regular classroom problem solving activities to more involved capstone projects that require favorable policies, adequate resources, and committed and motivated teachers. In summary, teacher agency in choosing, implementing, and appropriating the level of adoption of the multiple-perspective framework for teaching real world problem solving in school mathematics is central within the available resources and constraints of the learning/teaching context.

One distinct feature of this book is the telling of the story in each chapter in two types of discourse: the public and the personal. The public discourse tells the shared and public story of known ideas related to real world problem solving in school mathematics, while the personal discourse recounts the author's personal story of events, people, and experiences that pertain to real world problem solving in school mathematics. The narrative that I included in every chapter on my personal and professional experiences as a student, teacher, or researcher has made explicit the links between my public scholarly space represented by my publications and teaching, and my private space represented by events, people, and experiences that helped shape my public scholarly life.

The book consists of four parts. *Part 1*, entitled "The Landscape," scans the theoretical landscape in which the issue of real world problem solving in school mathematics is situated and explores the relationships among the triad (real world, school, and mathematics). *Part 2*, entitled "The Perspectives," surveys and reviews critically the literature on five selected relevant theoretical constructs (activity theory, narrative, modeling, critical mathematics education, and ethnomathematics) and draws implications to learning and teaching real world problem solving in school mathematics. Building on the identified implications, specific instructional designs are suggested for interfacing school mathematics and real world problem solving. *Part 3*, entitled "The Contexts," explores the potential of the workplace and STEM contexts for promoting learning and teaching real world problem solving in school mathematics. *Part 4*, entitled "The Framework," integrates the five perspectives and the two contexts into two multiple-perspective frameworks; one which sets the foundations and principles of learning real world problem solving in school mathematics, and another which explores the modalities of teaching real world problem solving in school mathematics.

This book is primarily intended as a reference for scholars and graduate students of mathematics education. It may also be used as a textbook for a graduate course for a comprehensive overview of mathematics education. It also may inform practicing mathematics educators. It may, moreover, serve as general reading for individuals passionate about intellectual journeys.

This book draws on a rich repertoire of lifelong professional and personal experiences which involved my students, colleagues, scholar friends, and family members. To all of them I owe debt and deep gratitude. I specially want to acknowledge the caring support of my wife, Muna, who generously provided the protected time for me to pursue the demanding task of writing this book.

I would like to acknowledge those whose contribution was essential to the completion of this book. I would like specially to acknowledge my university, the American University of Beirut, for granting me a 1-year sabbatical leave to complete this book. I also would like to acknowledge the generosity and superb scholarship of my friend Mogens Niss, who enthusiastically read the manuscript and wrote a beautiful and insightful introduction. Last but not least, I would like to acknowledge with great appreciation the contribution of Ms. Samira Shami, who capably and painstakingly provided a very careful copyediting of the manuscript.

This book is a narrative about a journey during which I experienced multiple identity making/remaking, both as a person and a scholar. I sincerely hope that this book faithfully tells the story of that journey.

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