LOST Opportunities
In today’s dominant modes of pedagogy, questions about issues of race, class, gender, sexuality, colonialism, religion, and other social dynamics are rarely asked. Questions about the social spaces where pedagogy takes place – in schools, media, and corporate think tanks – are not raised. And they need to be.

The Explorations of Educational Purpose book series can help establish a renewed interest in such questions and their centrality in the larger study of education and the preparation of teachers and other educational professionals. The editors of this series feel that education matters and that the world is in need of a rethinking of education and educational purpose.

Coming from a critical pedagogical orientation, Explorations of Educational Purpose aims to have the study of education transcend the trivialization that often degrades it. Rather than be content with the frivolous, scholarly lax forms of teacher education and weak teaching prevailing in the world today, we should work towards education that truly takes the unattained potential of human beings as its starting point. The series will present studies of all dimensions of education and offer alternatives. The ultimate aim of the series is to create new possibilities for people around the world who suffer under the current design of socio-political and educational institutions.

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http://www.springer.com/series/7472
LOST Opportunities

Learning in Out-of-School Time
This volume focuses on learning outside of schools, a largely neglected topic at least in comparison to learning in schools. The chapters included here span studies of everyday and situated science and mathematical practices; the development of new theoretical and empirical frameworks for studying learning trajectories that span both in and out-of-school-time (OST) and settings; and the structured, organized OST programs where oftentimes everyday and situated knowledge and practices are leveraged to engage with more formalized practices and conceptions of science, technology, engineering, and mathematics.

While our title refers to OST learning opportunities as *lost*, in fact we know that in some ways they are just being *found*. Amid decades of educational research focusing almost entirely on learning in the classroom, quietly there has been developing a small but robust literature examining how scientific and mathematical practices occur across a wide array of everyday settings (Bransford et al., 2006; Gonzalez et al., 2005; Rogoff & Lave, 1984), in settings that may be less high-stakes than today’s classrooms (Cole, 2006; Gutiérrez, 2008), and in ways that children, youth, and adults take up science and mathematics in order to achieve local and meaningful purposes (Fusco, 2001; Nasir, 2002). Today, a growing number of scholars in the learning sciences are working to understand how everyday experiences and opportunities to engage in scientific or mathematically rich practices support the emergence of interest, fluency, and mastery in different disciplinary areas. New departments and faculty positions are being established at universities across the country, and consensus volumes and policy documents are being issued by governing bodies (National Research Council, 2009; President’s Council of Advisors on Science and Technology, 2010). Underpinning much of this work is a strong emphasis on educational equity and making available and accessible more socially supportive and intellectually engaging opportunities for children from nondominant communities to engage with and pursue learning experiences in science, technology, engineering, and mathematics (STEM).
A New Way of Looking

Conducting research on learning in OST settings requires broadening and deepening conceptions of learning, better specifying the nature of different learning settings, and more appropriately conceptualizing how learning in such contexts relates to school-based ways of knowing. Many scholars working in the domain of OST learning seek to develop knowledge that can be used not only to understand the science of learning but also to help to create, structure, and support new opportunities for learning both in and out of school.

Indeed, although the conventional discussion is frequently cast as “how can OST learning be structured to support school learning?” many scholars investigating the OST space and time are more interested in asking how learning across settings relate to one another, seeing the learning that happens outside of the school day as being oftentimes quite different in scope, meaning, and utility but also equally legitimate in terms of how it supports children’s emergent interests, identities, and disciplinary understanding and experience. Many of the chapters in this volume illuminate the powerful learning that can happen in OST settings, both in less structured home or community settings and in designed spaces such as in after-school programs, and what learning scientists themselves can learn by looking more closely at this space.

This in part is the opportunity of learning about OST learning.

This Volume

The chapters in this book address a diverse set of issues related to current research in the OST space. The scholars who have contributed to this book include leading thinkers in the field of education as well as many emerging scholars, some still in graduate school at the time of writing, who are pushing the boundaries on how to think about and research learning. The issues addressed in this book range from how mathematical practices are taken up in the home to how after-school programs can serve as sites for teacher development. Proposals for new research frameworks that can account for learning as it develops across settings and over time are included. Ways of conceptualizing different learning settings and indeed what counts as science or what counts as mathematics in different settings are also addressed.

The diversity of subjects in this volume reflects the burgeoning and diverse field of research on learning in informal environments and settings. This field spans studies that look closely at cultural and developmental issues related to learners and communities of learners, as well as studies that consider institutional and policy dimensions of supporting learning in OST.

This volume is the result of a series of meetings that was organized by the Exploratorium’s Center for Informal Learning and Schools to support collaboration and communication across four research centers funded by the National Science Foundation (NSF) under its Centers for Learning and Teaching (CLT) program and
its Science of Learning Centers (SLC) program. The four contributing centers were the following:

Center for the Mathematics Education of Latinos/as (CEMELA), which focuses on the research and practice of the teaching and learning of mathematics with Latino students in the USA and involves the University of Arizona Tucson, the University of Illinois at Chicago, and the University of California Santa Cruz.

Center for Informal Learning and Schools (CILS), which supports research, scholarship, and professional development for informal educators to strengthen collaborations between, and learning across, formal and informal science education settings and involves the Exploratorium, King’s College London, and the University of California Santa Cruz.

The Learning in Informal and Formal Environments (LIFE) Center, which develops and tests principles about the social foundations of human learning in informal and formal environments, including how people learn to innovate in contemporary society, with the goal of enhancing human learning from infancy to adulthood, and involves the University of Washington, Stanford University, SRI International Northwestern University, and University of California, Berkeley.

MetroMath, the Center for Mathematics in America’s Cities, which focuses on improving mathematics teaching and learning in urban communities and schools and involves Rutgers University, the University of Pennsylvania, and City University of New York.

The CLT program was established by NSF to support the development of a new generation of scholars and leaders in key domains of science and mathematics education. CLTs primarily supported graduate studentships and postdoctoral research, as well as professional development and research activities supervised by center faculty. The SLCs supported research agendas that created the intellectual, organizational, and physical infrastructure needed for the long-term advancement of Science of Learning research.

Faculty and graduate students from CEMELA, CILS, LIFE, and MetroMath first met together in 2007 at the Exploratorium in San Francisco to share our work and discuss what we were learning about science; mathematics and learning in the OST space. The focus of CILS was explicitly on learning in OST settings. LIFE’s work partially focused on OST. CEMELA and MetroMath primarily focused on learning in schools, but both were beginning to examine the OST setting as a way of testing particular ideas or tools. When these disparate groups came together, we quickly discovered that we were all grappling with foundational issues of (1) what counts as science/mathematics in the OST setting and (2) what counts as learning in the OST setting. These two issues were at the core of our interests and challenges relating to research methods and methodologies, to program design, professional development, and even policy analysis.

We worked together to host two series of small video seminars—at the 2007 CILS Bay Area Institute and at the University of Pennsylvania Ethnography Conference in 2008—where we engaged small groups of scholars and informal
educators in viewing and considering the question of “What counts as math and science?” in relation to its appearance in everyday practices—from people fixing their cars, to walking their dogs, to visiting museums. We found that responses among participants varied tremendously, depending on their training and institutional perspectives. Out of these sessions, and after a poster session we collaboratively organized at the 2008 American Educational Research Association conference, we identified the need for a volume that specifically addressed research issues related to studying STEM in OST settings.

This volume is divided into three parts representing three of the different trends in the work of the contributing centers.

Part I raises the fundamental question of what counts as science and mathematics in everyday settings. The question seems easy to answer when we look inside the school at the subjects, textbooks, and teachers that go by the names “mathematics” and “science.” But once we step outside of schools, the question about what counts becomes complex and important. The chapters in this part take us inside some of this complexity, often relating what counts as and is experienced as STEM in OST settings to trends and representations of STEM in school settings. A commentary by Ray McDermott of Stanford University notes how narrow conceptions of what counts as math or science have operated to close doors for many children. In order to develop a theoretical understanding of the life-course outcomes of particular individuals, we need to better understand how people move and learn across a varied set of cultural niches with variable practices, materials, and evaluation systems that are used to gauge human behavior (Gutiérrez and Rogoff, 2003; Lee, 2008).

Part II contains four chapters describing emerging research frameworks for studying learning as it develops over time and across settings. These frameworks include the use of methods, such as technobiographies, discourse analysis, and ethnographic work including longitudinal ethnographic studies. A commentary by Kris D. Gutiérrez of the University of Colorado Boulder highlights how cross-setting accounts of learning could promote equity and transformative outcomes for youth from nondominant communities, including suggesting how educational systems might provide coordinated, redundant supports for learning across multiple settings over longitudinal time.

Part III contains five chapters that address teaching and learning in organized OST settings, primarily after-school programs. This section problematizes studies of the after-school setting, showing how the after-school space operates as a unique in-between space, adopting many of the norms of schooling as well as the norms of home or community time. A commentary by Mike Cole, from the University of California San Diego, closes this section with an appeal to policymakers to broaden conceptions of learning in order to understand and leverage the potential of the structured OST space. Without broadening conceptions of learning, without developing more appropriate ways to evaluate programs and assess learning in these settings, the opportunity of learning in OST settings is largely lost.
Thank Yous

Schools are essential institutions in our democratic society, and all of the authors in this book are products of and contributors to schooling. We have the utmost respect for the teachers and educators who spend their days and lives trying to make schools a powerful experience for the children who spend so much of their formative years in classrooms or preparing for time in classrooms. The work in this book is meant to broaden conceptions of learning and education to encompass but go beyond schools, and is in no way meant to devalue the contribution of schools. We believe that learning about learning in OST settings can strengthen teaching and learning across the educational landscape.

The editors of the volume wish to thank all of the chapter authors for their dedication, patience, and collaboration. We also want to thank our program officers at the National Science Foundation, particularly Janice Earle, who supported this effort through a supplemental grant to the Center for Informal Learning and Schools (ESI-0119787). Thanks also to Fan Kong, who helped to produce and complete the project. Finally, we would like to thank the teachers in our lives, both in and out of school.

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