

# *I*nnovations in *L*earning

New Environments  
for Education

Edited by  
Leona Schauble  
Robert Glaser

Innovations in Learning  
New Environments for Education



# Innovations in Learning New Environments for Education

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# CONTENTS

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|   |                                                                                                                                                                                    |            |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
|   | <b>Foreword</b>                                                                                                                                                                    | <b>vii</b> |
|   | <b>Preface</b>                                                                                                                                                                     | <b>xi</b>  |
|   | <b>PART I: EDUCATION OUTSIDE THE CLASSROOM</b>                                                                                                                                     | <b>1</b>   |
| 1 | <b>Outside the Classroom Walls: Learning in Informal Environments</b><br><i>Leona Schauble, DeAnna Banks Beane, Grace Davila Coates, Laura M. W. Martin, and Peter V. Sterling</i> | 5          |
| 2 | <b>Collaborative Planning and Community Literacy: A Window on the Logic of Learners</b><br><i>Linda Flower</i>                                                                     | 25         |
| 3 | <b>Learning to Learn From Effective Tutors</b><br><i>Connie Juel</i>                                                                                                               | 49         |
| 4 | <b>Motivation as an Emergent Issue in an After-School Program in El Barrio</b><br><i>Pedro Pedraza and Jorge Ayala</i>                                                             | 75         |
|   | <b>PART II: LEARNING INSIDE THE CLASSROOM</b>                                                                                                                                      | <b>93</b>  |
| 5 | <b>"This Question Is Just Too, Too Easy!" Students' Perspectives on Accountability in Science</b><br><i>Beth Warren and Ann S. Rosebery</i>                                        | 97         |

|    |                                                                                                                                                                                                                     |     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 6  | <b>Moving Beyond Learning Alone and in Silence: Observations From the QUASAR Project Concerning Communication in Mathematics Classrooms</b><br><i>Edward A. Silver</i>                                              | 127 |
| 7  | <b>Toward a Practice of “Constructional Design”</b><br><i>Mitchel Resnick</i>                                                                                                                                       | 161 |
| 8  | <b>A Classroom Environment for Learning: Guiding Students’ Reconstruction of Understanding and Reasoning</b><br><i>Jim Minstrell and Virginia Stimpson</i>                                                          | 175 |
| 9  | <b>Challenging Prospective Teachers’ Understandings of History: An Examination of a Historiography Seminar</b><br><i>G. Williamson McDiarmid</i>                                                                    | 203 |
| 10 | <b>Schools for Thought: Overview of the Project and Lessons Learned From One of the Sites</b><br><i>Mary Lamon, Teresa Secules, Anthony J. Petrosino, Rachelle Hackett, John D. Bransford, and Susan R. Goldman</i> | 243 |
| 11 | <b>Psychological Theory and the Design of Innovative Learning Environments: On Procedures, Principles, and Systems</b><br><i>Ann L. Brown and Joseph C. Campione</i>                                                | 289 |
|    | <b>PART III: CHANGING ENVIRONMENTS FOR EDUCATION</b>                                                                                                                                                                | 327 |
| 12 | <b>Accelerated Schools After Eight Years</b><br><i>Henry M. Levin</i>                                                                                                                                               | 329 |
| 13 | <b>Below the Surface of School Reform: Vision and Its Foes</b><br><i>Joseph P. McDonald</i>                                                                                                                         | 353 |
|    | <b>Author Index</b>                                                                                                                                                                                                 | 369 |
|    | <b>Subject Index</b>                                                                                                                                                                                                | 375 |

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## FOREWORD

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The present generation of students in the United States can expect to live their adult lives in a very different world from that of previous generations—a rapidly changing and increasingly technology-based world. As citizens and parents, they will be asked to make decisions about complex social and political issues. As workers, they will participate in a global economy in which high-wage jobs will be high-skill jobs that demand complex thinking and reasoning. As a nation, our country's place in the global economy will depend on its citizens' abilities to meet such challenges.

These changes in society and technology, in turn, pose unprecedented challenges for our schools. Although American schools have always offered students a broad choice of courses, including some that make extensive thinking and reasoning demands and others that are less demanding, today it has become critically important that all students learn academically demanding content and skills. This is the challenge at the heart of an education reform movement that has been gaining momentum in this country for the past 20 years.

Recent studies have assessed students' understanding of various topics addressed in the school curriculum with the goal of exploring the impact of instruction on understanding. The findings indicate that most American students emerge from instruction possessing only a fragile understanding of the material. In science, for example, although students can repeat various scientific principles they have been taught, they have difficulty using them outside the classroom to explain everyday scientific phenomena. Similarly, in mathematics, students learn to solve problems by plugging numbers into formulas. When confronted with slightly more difficult versions of these same problems, they often perform poorly. In short, even though our students do acquire sufficient information from classroom instruction to

pass school tests, most of them fail to achieve a deep enough level of understanding of the topics studied to result in useable knowledge.

This volume represents one response to the continuing national search for ways of enhancing student learning within both the classroom and society. The chapters in this book were first presented at a conference convened by the U.S. Department of Education's National Research Center on Student Learning at the Learning Research and Development Center, University of Pittsburgh. The conference was organized with advice, encouragement, and support from the Department of Education under grant R117G10003. Planning for the conference involved a wide search for examples of instructional programs that aim to enhance student proficiency in understanding, reasoning, and problem solving.

The chapters that follow introduce the reader to a variety of such programs. They were selected for inclusion in this volume because they represent promising approaches that offer evidence of success. Such programs are presently being used in both school and nonschool settings at various locations throughout the country. Many of them are still in a formative stage, with their developers continuing to work both on further improvements to the underlying approach and on efforts to extend their usage to additional sites.

The volume presents such programs, identifies their key features, explores the mechanisms underlying their operation, and delineates barriers and facilitators to their adoption by others. In the process, it provides many thoughtful perspectives on the nature and design of effective learning environments for elementary and secondary students. In addition to curricular innovations, this volume covers issues such as informal learning environments that occur outside traditional school settings, how teachers adapt to instructional innovations in the classroom and in their philosophies of teaching, and which aspects of school systems must change for lasting improvements to take hold.

As the editors of this volume note, such work reflects a promising new trend in the design of instruction—efforts by diverse interdisciplinary teams of practitioners, researchers, teacher educators, and community members to create fully developed examples of improved learning environments for students. Such complex design tasks pose an interrelated set of challenges that are both practical and theoretical in nature. These include the practical challenge of developing a full-scale model and the theoretical challenge of understanding how it achieves its outcomes.

Team members bring to this enterprise their own unique perspectives, knowledge, and expertise. As these diverse partners work together over time, they have begun to create a shared knowledge base that is vastly richer

than the sum of the knowledge each one initially possessed. Collectively, the chapters in this volume document the development of this shared knowledge base. They help us grasp the nature of the advances in scientific understanding of learning, teaching, and the design of learning environments that have emerged to date; they also identify directions for future research arising from such work.

I look forward with great anticipation to the advances in practice and research that this volume promises.

—*Judith W. Segal*<sup>1</sup>

Office of Educational Research and Improvement  
United States Department of Education

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<sup>1</sup>The views expressed in this article are part of ongoing research and analysis at the Office of Educational Research and Improvement and do not necessarily reflect the position of the United States Department of Education.



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## PREFACE

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*Innovations in Learning: New Environments for Education* documents the growth of a new kind of interdisciplinary teamwork that is evolving among practitioners, researchers, teacher educators, and community partners. The premise of this work is that the design of learning environments and the development of theory must proceed in a mutually supportive fashion. For their part, scientific researchers have learned that a prerequisite to studying the kinds of learning that matter is helping to shoulder the responsibility for ensuring that these forms of learning occur. In many instances, fruitful forms of learning evolve gradually over a long time, and only with sustained practice, teaching, and assistance. Therefore, to support and study learning, researchers are increasingly making major and long-term investment in the design and maintenance of contexts for learning. Practitioners are assuming new roles, as well, reflecting an increasing awareness of the need to move beyond skillful doing. If developing learning contexts are to be protected within and expanded beyond the systems that surround them, it is necessary to foster professional communities that will support reflection about practice, including the generation and evaluation of rich and flexible environments for student thinking. One consequence of recent reforms is that teachers are increasingly regarding such tasks as central to their professional development.

This volume describes coordinated interaction between educational design, on the one hand, and the development of learning theory, on the other, through a series of examples. These examples have been chosen because they are continuing, proven programs with evidence of success. Contributors to the volume are researchers and practitioners who have played a role in inventing these programs and have guided their development over a period of years. The chapter authors were participants in a conference to explore “The Contributions of Instructional Innovation to Understanding Learning,” convened by the National Research Center on

Student Learning, at the Learning Research and Development Center, University of Pittsburgh, and sponsored by the Office of Educational Research and Improvement, U.S. Department of Education. Consistent with the theme of the conference, rather than choosing illustrations of a pipeline or “application model of research” from research and then to practice, we have selected interventions in which researchers and practitioners work together persistently to forge common understanding. Thus, although psychologists often mention the desirability of “giving psychology away,” our emphasis here is instead on working to retune what we—researchers and practitioners—know together. Such activity is necessarily interdisciplinary, often encompasses long spans of time, and is more akin to engineering in the field than to laboratory science. The common themes that emerge from this activity—for example, the role of tools, talk, and community—belong exclusively neither to theory nor to practice, but to their intersection in commitment to specific contexts of learning and continuing contributions to practice and underlying theory.

The volume is organized into three sections that reflect different levels and kinds of learning contexts. Each of these levels has been the focus of recent cognitive and reform applications to learning and schooling. They are: Education Outside the Classroom, which gives examples of effective learning in informal settings; Learning Inside the Classroom, which introduces innovative approaches to schooling at the classroom level; and Changing Environments for Education, which explains reforms that regard the entire school as the appropriate unit of change.

## ACKNOWLEDGMENTS

There are many acknowledgments to be made in producing a work like this, and we would like to express our thanks to all who contributed to the success of the conference and to the production of this book. Leslie Salmon-Cox shouldered the responsibility for the conference arrangements. Elizabeth Rangel handled the technical editing of the volume. The content of the conference was enriched by discussant comments from Howard Gardner, Sam Gibbon, Edward Goldman, Jan Hawkins, Anthony Jackson, and Dennie Palmer Wolf, and the contributions of Diane DeFord.

—Leona Schauble  
—Robert Glaser

# *Part I*

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## EDUCATION OUTSIDE THE CLASSROOM

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Precisely because the constraints and goals of so-called “informal” learning contexts differ from those in schools, a study of these settings can shake up our assumptions about learners and learning in ways that can inspire new approaches in classrooms. Out-of-school learning environments, for example, provide opportunities to investigate the little-explored question of how children learn while pursuing goals of their own choosing.

It is evident that these out-of-school learning contexts are not simply derivative of school; instead, they have their own purposes, structure, and organizational integrity. For example, the museum environments described by Schauble, Banks Beane, Coates, Martin, and Sterling in chapter 1 and the community literacy center described by Flower in chapter 2 do not exist primarily as satellites to schools. The after-school program described by Pedraza and Ayala in chapter 4 is clearly conceptualized as a learning environment that is *value-added*, that is, something beyond what schooling provides. In many ways, these environments are not very school-like, perhaps making them more welcoming to children who do not regard themselves primarily as students. Importantly, all these contexts emphasize the centrality of joining a working, learning community of peers and supportive adults. In these contexts, children shoulder a great deal of responsibility for the design of their own learning environments to meet their purposes and goals.

Although these contexts clearly are *not* school, it is just as clear that they tend to emphasize and foster their connections with school. Perhaps the clearest case of such a connection is Family Math/Matemática Para La Familia in chapter 1. Programs intended to support children’s continued participation in mathematics instruction, Family Math and Matemática Para La Familia explicitly link formal mathematics schooling to the legiti-

macy of families' everyday experiences and intuitive knowledge. In these programs, children from diverse ethnic and socioeconomic backgrounds, their parents, and their teachers work together to become more confident and competent learners of mathematics. Similarly, the cross-age tutoring project described in chapter 3 brings university student-athletes, who themselves need help with reading and writing, into a tutoring program for early elementary school children who are having difficulties learning to read. This project, like those discussed in chapter 1, builds school skills on familiar, informal knowledge.

These projects also emphasize a third idea that cuts across the chapters, the importance of interpersonal relationships. The trust and identity that form between the student-athletes and the elementary school children seem essential in the effectiveness of the cross-age tutoring program. In chapter 1, the modeling and consistent values between family, community, and school are central in delivering the message that mathematics is approachable, useful, and fun. The museum environments described in chapter 1 are not just places; they are contexts where caring, competent adults work together with children on projects that matter to both. The after-school leaders described in that chapter are not mere providers of custodial care; they are adults working seriously on the challenge of providing educational enrichment and valuable activity during hours that otherwise might not be used in productive ways.

These relationships are perceived as having personal value, and equally important, as vehicles for enacting personal responsibility between the individual and the community. In Flower's literacy project, teenagers share responsibility for helping their peers communicate by providing clear and critical feedback. Flower and her team of university researchers engaged teenagers in a project in which the teens wrote about issues of special concern to them, such as family conflicts and drugs at school. While drafts of the writing were being prepared, pairs of teenagers worked together to engage in a process of rival hypothesis thinking to anticipate how their peers would react to the writing. An effective "rivaler" helped his or her partner by posing questions such as, "What's your point?" "How do you think your reader will react to this?" "How are you going to deal with that 'rival' idea in your text?" Thus, rather than relying on teachers or other adults, these youngsters were helping each other take responsibility for their own learning. Similarly the science and mathematics projects engaged by the "Young Scientists" in chapter 4 are not disembodied school-skills activities, but projects in which young people assume responsibility for planning and improving their local neighborhood and community. For example, while helping to plan the construction of a city park, students measured, mapped,

and marked the land for construction workers to plant flower beds. The children relied on mathematics to do this work, but it was civic and community pride that motivated them to “own” the park project.

Cumulatively, such experiences provide important opportunities for youth. They provide sources of personal and educational support that are widespread throughout communities but too seldom accounted for. In a time when resources for youth are so quickly dwindling, we as a society can hardly afford to overlook them.



# Chapter 1

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## OUTSIDE THE CLASSROOM WALLS: LEARNING IN INFORMAL ENVIRONMENTS

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When we think of learning contexts, we think primarily of families and other environments where adults are present, such as schools. When children are young, their parents take the major role in supporting learning, helping children learn about language, morality, social conventions, attributes and functions of common objects, and other basic information and skills. Consistent with this view of learning in early childhood, much of developmental psychology's research agenda has been concerned with charting and explaining how learning occurs in family contexts. In contrast, once children attain school age, it is usually assumed that schools will take on the major responsibility for guiding learning. Thus, although most would acknowledge that parents and siblings continue to play an important role, studies of children's learning beyond the preschool years focus primarily on learning in school settings or in school-like domains and tasks, such as mathematics, science, or reading. Yet an important "third leg" in the triangle of human development, along with family and school (Comer, 1992), remains largely

ignored and “vastly understudied” (Carnegie Council on Adolescent Development, 1992)—the host of out-of-school institutions and programs that provide opportunity and support for young people’s learning.

Indeed, researchers have begun to turn their attention to out-of-school learning, especially in apprenticeship situations, learning of traditional practices and crafts, and workplace environments (e.g., Chaiklin & Lave, 1993; Resnick, 1987; Saxe, 1988; Schliemann & Acioly, 1989). However, comparatively little analysis has been devoted to the learning that occurs in the wide range of informal learning environments and programs at the neighborhood and community level that exist to support children’s learning and development (although for exceptions, see Gelman, Massey, & McManus, 1991; Heath, 1991; Heath & McLaughlin, 1993; Nicholson, Weiss, & Campbell, 1994). Youth-serving institutions and programs are significant because they provide a web of community-based learning resources, including the guidance and companionship of adults and peers, avenues for learning and practicing new skills, encouragement to pursue goals and interests that are personally meaningful, and opportunities for work and community service.

The level of knowledge and skills that children must master for successful initiation into adult society continues to rise, yet recent changes in the role and structure of families and schools mean that these institutions may no longer be able on their own to provide the levels of support necessary to help children meet the increasing needs (Carnegie Council on Adolescent Development, 1992). It is thus more important than ever for children to have available an array of educative contexts that can supply overlapping and reinforcing opportunities for learning, practicing, and applying skills and knowledge in supportive and positive surrounds. Yet, the potential of youth-serving institutions and programs is often overlooked, perhaps because each kind of program serves a different niche, so none of them command the universal enrollment that schools do. Youth-serving programs differ widely in organization, intended audience, and function, varying from national organizations such as Boy Scouts and Girl Scouts to local grassroots organizations; from 4-H clubs and hobbyist societies to local sports leagues; from religious organizations to theatre groups; and from club-like activities organized around specific subject-matters to libraries and museums.

A premise of this chapter is that careful analysis of such out-of-school contexts can both challenge and expand our notion of what is at stake in children’s learning. Moreover, such an analysis can also inspire reexamination of our assumptions about the necessary forms and constraints of school learning by reminding us that typical classrooms are not the only effective ways of organizing children and adults for the task of learning. In some

instances, out-of-school learning contexts are designed specifically to sidestep the constraints and connotations of formal, school-based education—for example, to engage children who do not have a strong identity of themselves as learners or to entice children to exploring subject-matter, like science or mathematics, that youngsters often find unappealing in school instruction.

In the remainder of this chapter, we sketch some of the important dimensions of difference between out-of-school and in-school learning. Next, we briefly describe three examples of effective informal learning programs—projects chosen primarily because they are ones in which the authors of this chapter have been directly involved. Finally, we review the implications of these learning contexts for cognitive research and formal education.

## LEARNING WITH A DIFFERENCE

Here, we take a closer look at informal learning in contrast to classroom learning. What assumptions about learning underlie out-of-school learning contexts, and how do they differ from assumptions about learning in school? How do these ways of regarding learning both complement and challenge what goes on in classrooms?

First, the goals or purposes of most informal learning contexts tend to be broader than those emphasized in traditional schooling. Strange as it may seem, informal education projects may not regard learning as their first priority. Similarly, they do not by-and-large aim exclusively for improvement on classroom-oriented measures, but instead tend to emphasize wider goals better captured by terms like enculturation, development, attitude, and socialization. The goal of helping young people develop self-identities that are consistent with desired values is often central in informal learning (e.g., Fine, 1988), for example, enhancing the young person's sense of self as contributor to community life, self as valued member of a working team, self as effective learner. Although the development of identity is considered important in school as well, it rarely takes center stage in the planning of administrators or teachers. Such objectives are not usually addressed directly in the curriculum and the success of teachers and classrooms is not evaluated with respect to these broader goals.

In many out-of-school settings, learning is explicitly tied to other agendas. For example, social interaction among peers or among adults and children is often regarded as an important value. Productive organizations for youth offer the “group cohesiveness necessary to frame and sustain social

identity in terms of group norms, values, and goals” (McLaughlin & Heath, 1993, p. 220). Moreover, participation in out-of-school programs is usually voluntary, so engagement, fun, or entertainment are often of specific concern in the design of these contexts—whether a child enjoys the experience is likely to determine whether or not participation continues (Mielke & Miller, 1995). The context must first and foremost be engaging, and it is assumed that affective and cognitive learning are intertwined (Leichter, 1979). In many informal learning programs, social interaction, entertainment, or attitudinal agendas may be regarded as primary; learning is regarded as following from these more primary outcomes. In contrast, schools more often take the opposite perspective, treating learning as the primary concern and often regarding motivation as an individual difference or as a secondary concern.

The boundaries between informal learning contexts and the rest of daily life seem more permeable than they are in schools. These boundaries are fluidly crossed by parents, other adults in the community, and children of different ages. As we show later in the example about museums, adult experts—weather forecasters, veterinarians, attorneys, video producers, flamenco dancers—bring their expertise into the museum and work hand-in-hand with children to collect data about the atmosphere, learn about bats, explore the implications of changing laws concerning search of citizens, film claymation movies, and develop choreography for dance performances. In the Family Math Project, a mathematics equity program that we describe later, parents and children work together on mathematics problems that are related to the everyday life of the family. In after-school settings, family needs for quality child care intersect with providers’ opportunities to offer activities that enrich children’s understanding of school subject matter and skills. Rather than being segregated into same-age peer groups, as they are in schools, children in out-of-school contexts typically accomplish their learning in groups of mixed age, who have different expertise and knowledge about the activity at hand.

Out-of-school learning is much more supportive than schools typically are of individual differences in interests and talents. Because so many informal learning contexts focus on encouraging children’s personal interests, it is taken for granted that the path of learning in these contexts will vary substantially from individual to individual. This view stands in contrast to the expectation that in school, every child should master a uniform curriculum. Informal learning also exemplifies a related view of teaching: Instead of relying on a teacher whom children are encouraged to regard as all-knowing, out-of-school contexts more often put learners into contact with an array of teachers, each with knowledge of a particular kind of

domain or skill. The implicit message is that nobody knows everything, and different kinds and levels of contributions from different participants are the norm. The emphasis is not on being told the answers by somebody who already knows them, but on finding out together how to get the job done. Accordingly, locating the right information and resources—learning how to learn—is an important part of the game.

Activities in out-of-school contexts are often, although not always, organized around generating a product or a performance rather than acquiring an organized body of subject matter. In general, the emphasis is on what you do, rather than on deriving knowledge and skills. Rather than mastering content knowledge for some unspecified reason that will presumably coalesce in the future, children who participate in informal learning environments are often learning to make progress toward a meaningful goal—for example, to be able to explain a museum exhibit to a younger child. Strong orientation toward achieving recognizable goals has been identified as a crucial element in successful youth organizations (Fine & Mechling, 1993). Evaluation is targeted toward the product or performance and is used to guide the ongoing activity, rather than to rank individuals. Rather than a separate activity, evaluation is an integral component of participation and often takes the form of the development and application of consensually negotiated critical standards. The response of an audience may frequently be taken into account, but it is up to the participating group to decide how well things are going, not the test norms.

Although we have described the foregoing attributes as characteristic of out-of-school learning contexts, they could be applied effectively in school as well. In fact, several chapters in Part II of this volume describe in-school experimental programs that are incorporating some of these principles into classrooms. For example, the Cheche Konnen, QUASAR, and Schools for Thought Projects focus on social interaction, project- or performance-based learning, concern with motivation, explicit attention to students' personal identities of themselves as learners, and establishing closer ties to community and parents. Many classroom researchers have found it instructive to rethink the design of classrooms in light of what works in out-of-school learning environments. Because the constraints of these environments are somewhat different from those that operate in schools, informal learning contexts can serve as laboratories for testing innovative approaches to learning. Many of these approaches are difficult to implement in school settings because they challenge strong expectations held by parents and other citizens about the desirable forms and structures of schooling. Such expectations may be difficult to dislodge because they are based on adults' memories of their own experiences as students. Hence, existence proofs and

exemplars that embody new principles of learning in an effective way can serve a valuable role in discussions about school restructuring (Nicholson et al., 1994). It is to such examples of promising informal learning contexts that we turn now.

### EXEMPLARS: INFORMAL LEARNING ENVIRONMENTS

In this section, we briefly describe three different informal learning contexts for children—museums, after-school settings, and family learning programs. We might have used other programs as examples—for instance, the projects described in Part I of this volume—Project ARGUE, the cross-age tutoring project at the University of Virginia, or the Young Scientists' Club. Here we describe informal learning programs that we know well from our own experience. In the final section of this chapter, we draw on these examples to discuss the research issues that emerge in informal learning.

#### Museums

When people come to a museum, they have an idea of a museum. That is, they have a concept of museum built on personal experience or reputation. This concept involves a set of expectations about who they are in relation to the building, the staff, the collections, and the exhibitions. These initial expectations may be reinforced or challenged when people come to a particular museum and encounter inviters or disinviters that signal whether this place is really there for them.

Perhaps no category of potential invitees has felt more alienated from the idea of museum than adolescents. Attendance at museums by teenagers is extremely low, except for school outings. Yet, museums can be the instrument of change for teens by providing opportunities for meaningful participation that are not available in schools and other institutions. Museums and museum staff, who over the past decades have accomplished a shift from regarding their role primarily as curatorial to one devoted to education and outreach, have access to an impressive array of material and personal resources that can support these opportunities.

For example, YouthALIVE! is an initiative of the DeWitt Wallace-Reader's Digest Fund, administered in partnership with the Association of Science-Technology Centers, to support more than 40 diverse science and children's museums across the U.S. in developing programs that involve young people in museum-based learning and service activities. The

YouthALIVE! initiative provides both financial and technical support to help participating museum staff become more thoughtful and knowledgeable about designing programs consistent with the developmental needs of adolescents. Participating museums make special efforts to identify and target underserved youth groups in their community. Staff receive training to work with adolescents, and community and youth advisors are involved in program planning and implementation. Each participating museum plans for the long-term involvement of a core group of adolescents, and over the longer term, for institutionalization of the programs, which vary from enrichment learning programs, such as science clubs and camps, to service learning programs, in which adolescents serve as volunteers or paid interns.

One notable program participating in the YouthALIVE! initiative is the Eli Lilly Center for Exploration at The Children's Museum of Indianapolis. The Center for Exploration is an example of a museum gallery organized around providing opportunities for adolescents to shape their own museum experience and designed to develop apprenticeship and mentoring relationships between youth and skilled adults. The Center was designed by teenagers, and the activities that take place within it are inspired by conceptual themes selected by the participants. For example, one theme, about the environment, was titled "Waste Not, Want Not"; another was "What's Law Got to Do with Me?" The purpose of the center is to engage young people in examining issues critical to their lives, and to provide them places—dark-rooms, computer workshops, a theater stage, woodshops, video studios—and people with whom to explore those issues. For example, during the environmental issues theme, one group choreographed a "Trash Dance," while another made public service videos for television about recycling. Yet another disassembled old computers and other electronic devices and made jewelry for sale from the components.

Within the Center is a Children's Express news bureau where each week more than 100 young people write and edit a page of *The Indianapolis Star*, Indianapolis' main newspaper, and submit their stories to other Children's Express sites. Four of the Children's Express staff went to Kuwait after the Gulf War to interview Kuwaiti and Palestinian youngsters about the war and its consequences on their lives. More than 25 of these youngsters attended the 1994 Democratic and Republican conventions.

In addition to such specialized programs and projects, young people in the Center also play a role in the museum at large. They conceive, plan, and install exhibits; design videos, training programs, collections management procedures, and programs to help visitors interpret museum exhibits; and build bridges into the surrounding community.

One key to retaining adolescents' interest and involvement in youth-based organizations is opportunities for employment (McLaughlin & Heath, 1993), such as paid internships or positions as "explainers." Because it provides an entry, a museum can bring the invisible adult world of work sharply into focus for teenagers, especially when they serve as part of a team responsible for goal setting, deadlines, rules of engagement, and the resolution of disagreements. In these roles, young people come to understand more about the importance of clear communication, tradeoffs, solid preparation, group decision making, budget compromises, and the reasons for attending to voices within the community.

More than 600 youngsters volunteer at The Children's Museum as interpreters in the galleries, as junior curators, on the Youth Advisor Council, and as program assessors. Each young person has a staff mentor responsible for training, job assignment, and career development. For many youngsters, these responsibilities are of major importance, and the long waiting list for available volunteer spots testifies to the fact that adolescents believe The Children's Museum is a place that invites them into meaningful experiences.

Making these experiences work requires changes in the traditional roles of museum staff, from researcher, exhibition designer, or program planner to collaborator, mentor, guide, and friend. Young people and adults can become fellow explorers on a path to discover what objects, science, history, the arts, and other cultures might reveal, with no textbooks and no simple answers. Yet these changes in roles require careful consideration and training. Many young people have had few positive relationships with adults. Their skills at negotiating the adult-youth world may be minimal, and they may even behave in ways that threaten and challenge adults. Yet it is worth working to overcome this tension, because interaction with peers and adults is one of the major assets that museums have to offer.

Museums need a firm, long-term commitment by trustees and staff to policies and practices that invite adolescents into the full life of the museum. Such a commitment runs counter to good business practice, because activities for adolescents are expensive, staff-intensive, and disruptive of "normal" museum operations. Moreover, the kinds of activities that work best with adolescents are often difficult to explain to visitors, potential donors, volunteers, or other important constituents.

In spite of these difficulties, museums have been enthusiastic about embracing what they perceive as their responsibility to become a vital part of the educative community. Much of the educational promise of museums resides in the resources and programs that they control and can marshal institutionally. Next, we turn to a very different kind of learning context,

after-school programs. In contrast to museums, these sites tend to be relatively sparse in learning resources. We consider a program that brings educational resources and materials into after-school sites to help transform them into environments where learning can occur.

### After-School Programs

As increasing proportions of parents enter the workforce, increasing numbers of children participate in some form of organized after-school care. There is no way to know for sure the numbers of children who attend after-school programs. States, school districts, national organizations, and community networks do not track how many programs are in place, and enrollment probably varies considerably from day to day. Yet one study estimated that 13 million children under the age of 12 have parents who work, that is, parents who cannot be home when children are not in school (cited in Rogan & Graves, 1989). More and more of these children are spending their afternoons in child care. A child who spends an average of 3 hours per day in after-school care may during the 6 years of elementary school spend more than 3,000 hours, or the equivalent of 3 school years, in an after-school program.

The Children's Television Workshop (CTW), a nonprofit company best known for developing educational television programs such as *Sesame Street*, has been investigating how educational video materials, activity guides and manuals, activity kits, and training for adult caregivers can enhance the educational potential of after-school programs. CTW's work with after-school program leaders and administrators indicates that these programs are shifting from an emphasis on mere custodial care toward a recognition that their mission should include education. In particular, leaders and administrators have begun to recognize that after-school programs have the potential to reach children who may be alienated in school environments, to develop human resources in communities, and to deal with issues that are difficult to cover in schools, such as sex education, self-esteem, and appreciation of diversity (Katz, 1990).

However, interviews with policymakers in the field suggest the wisdom of approaching these objectives with caution (Martin, 1990). In general, these experts fear that too much structure after school may have the potential to stifle creativity and to interfere with the social and emotional issues that children work out in social interaction and in pursuit of their own goals and projects. In particular, policymakers recommend avoiding the temptation to recreate a school-like environment during after-school hours. In spite of these constraints, after-school leaders express a great need for

ideas and materials that would help them create positive learning experience for their charges. Because of concerns about heavy-handed education after school, however, the CTW staff concluded that before beginning their own development work for after-school programs, it would be useful to chart the educational opportunities and barriers in these after-school settings. Accordingly, a series of studies investigated the range of activities that typically occur in after-school programs and the preferences of adult leaders and children (Hezel Associates, 1992; Inverness Research Associates, 1991; Katz, 1990; KRC Research & Consulting, 1991).

Not surprisingly, the studies found wide variability in the kinds of activities that typically occur across the spectrum of child-care settings. However, the vast majority of programs provide opportunities that are primarily recreational, partly because youngsters come to the programs having just completed a full school day. Research findings about after-school care leaders' expectations for learning materials and activities are consistent with the general emphasis that informal learning programs place on engagement over education (Hezel Associates, 1992; Inverness Research Associates, 1991; Katz, 1990; KRC Research & Consulting, 1991).

For example, when leaders were asked for their preferred themes for new materials, they chose multicultural relations, health and safety, and conflict resolution rather than school-like topics such as geography or social studies. Both leaders and children rejected activities that have the potential to embarrass children by touching on sensitive topics (such as children's home lives) or by demanding public display of emerging skills that are still shaky. It is evident that these preferences are somewhat inconsistent with the objective of promoting learning in specific school curricular domains. Rather than dividing time by subject matter, after-school leaders tend to divide it by niche, such as sports, arts and crafts, and club time. In the predevelopment research, leaders reported doing very little with school subjects like mathematics or science.

Considering these factors, CTW developed three kits based on popular CTW programs, such as *3-2-1 Contact*, a program that focuses on 8 to 12-year-olds' appreciation of science; *Square One TV*, which targets children's understanding of mathematics and problem solving; and *Ghostwriter*, a program that supports literacy in 7- to 10-year-olds. Kits include videotapes organized around an educational theme, leader guides or tapes, games, hands-on activities, puzzles, and magazines. These materials are distributed on a low-cost or no-cost basis.

Interestingly, when mathematics or science activities could be regarded as games or crafts, the leaders were very willing to try them. They also readily used literacy activities, as long as they were embedded in collabo-

rative, functional frameworks for reading, writing, listening, and speaking, rather than framed as literacy or language arts. Moreover, when they were introduced noncoercively, the CTW researchers saw children happily and readily engage in math games, simple problem solving, and science explorations.

Studies of how children and adults use the CTW after-school materials emphasize that to be successful, materials must be flexible. They need to be appropriate for children with a range of skills and of different ages, preferably without depending on adult guidance. They also need to be adaptable for the variable time slots that are available, typically ranging from 15 minutes to 1 hour. It is desirable to include activities for children in a variety of groupings and settings. For example, the *Square One* math kit provides large group games, small group activities, activities for individuals, puzzles, and hands-on explorations. The materials support multiple use, offering the opportunity for children to extend and deepen their mastery over time. For example, a carefully designed game includes varying levels of difficulty to make entry into the game easy and yet to lure more practiced children into increasingly challenging experiences.

In addition to informing the development of the CTW after-school kits, the studies of after-school projects also raised a number of more general questions concerning how best to support learning in informal environments. For example, it is somewhat ironic that after-school providers asked for activities designed to last from 10 to 30 minutes, given that school reformers are moving away from short time blocks like these so that students can become deeply involved in projects. The implication is that one challenge in after-school settings is to develop curricula that are modular, yet can be cumulative in their effects.

The studies also suggested that after-school settings afford a good opportunity to examine the role of the adult as coach because in these settings, adults adopt roles that are more coach-like than teacher-like. But what are good ways of helping adults become effective coaches? In general, after-school leaders have little or no specific training in domain content, and good coaching usually presumes a solid foundation of knowledge of the game. Thus, it may be desirable for program and materials developers to design activities in which adults can learn along with children, perhaps in adult-child dyad configurations. This possibility raises the question of how best to develop skills in math, science, and literacy at several levels simultaneously. After-school programs are good places for adults to model what it is to be an effective learner and to become effective collaborators with children.

Another challenge is to introduce new information into the after-school system without being school-like. Experts and leaders want help in finding relaxing activities for children after school; children, too, are resistant to school-like activities after school hours. However, relaxing does not mean lying on the couch, it means no serious adult judgment being passed on a child, no obligation to exert oneself in stressful ways, and activities motivated by challenge or curiosity rather than duty. And relaxing does not necessarily mean activities that elicit automatic as opposed to more effortful processing. With the math and science kits, there is clearly a lot of practice, strategizing, and planning that occurs, although children draw the line when things become too tough to think through. In after-school settings, video, television, and other mass media like magazines and records can help introduce information in interesting ways, because in our culture, they are associated with informal learning. As social objects, these media belong more to the voluntary information-intake domain—that is, home. Hence, activities in these formats are more easily tolerated in informal settings. The use of video in after-school programs seems to fill a need to motivate, illustrate, and inspire children's own explorations of the physical and social worlds.

It seems that in after-school programs, the best way of engaging children in learning is to rely on activities and media that are associated with fun, choice, and play, rather than with accountability, coercion, and work. A similar strategy is used in the final informal program that we describe, a program developed especially to address learning of school subject matter—specifically, mathematics. Here the emphasis is on showing how mathematics can be a commonsensical, socially conducted activity that is connected to everyday experience and the familiar worlds of work and family.

### **Family Learning Programs**

Two programs at the Lawrence Hall of Science (University of California at Berkeley) coordinate the efforts of classroom teachers and families to foster mathematics learning of students from diverse ethnic and socioeconomic backgrounds, especially girls. Equals is a mathematics equity program designed to help classroom teachers retain underrepresented students in mathematics. A related program, the Family Math program (and its Spanish-language counterpart, *Matemática Para la Familia*), helps parents learn how to experience mathematics with their children in a positive and supportive manner. These programs have resulted in improved communication and relationships between children, parents, and instructors.

Although there are links between family involvement and student success, little systematic attention has been given to structural approaches to enhance family involvement in the education process. To address this need, Family Math was developed to help foster understanding, encouragement, and involvement in mathematical learning among parents and other family members. Family Math classes, which are usually taught by grade levels (K–2, 3–5, 6–8), focus on concepts covered throughout the kindergarten through eighth grade mathematics curriculum. An important ingredient of Family Math classes is a nonthreatening atmosphere. This tone is achieved by helping families understand that mathematics includes guessing and estimating, generating suppositions that may prove incorrect, breaking mindsets, and finding alternative solutions.

The program explains how and why content is mathematical, why certain concepts are taught at certain ages, and how concepts are interrelated. These explanations are important, because for many parents, mathematics did not look, sound, or feel like this. For example, before participating in the program, parents expected school mathematics to be a very difficult subject made up of drill, practice, and memorization (Sloane, 1990). A premise of the program is that parents' expectations and attitudes are likely to be shared by students, as well, and that changing students' attitudes toward mathematics is partly a matter of helping the community in general develop a view of mathematics that is more consistent with contemporary goals of mathematics teaching and learning.

In Family Math classes, leaders use a teaching style that parents can profitably adopt with their children as they work on reinforcement activities introduced by the program. This style includes providing experiences that guarantee early success, encouraging students to move at their own pace, and providing invitations to further exploration and understanding. For example, class members might be posed the problem of determining how many small candies there are in a 5-pound bag. Different approaches to this problem are possible and are encouraged. Some students may count the number of candies in a cup, then try to determine how many cups are required to make up larger volumes. Others may determine the number of candies in an ounce, then make inferences about the number of candies in a pound and then in 5 pounds. Invitations for further exploration might involve asking students to determine which of these alternative approaches will result in the greatest measurement variance and why. Students are encouraged to develop strategies for finding patterns, organizing or illustrating information, working with others, and systematically testing and eliminating possibilities. Manipulatives and models are included to help learners and to reinforce the expectations that students should have access to many avenues for learning.

The program also introduces links to careers and the future. Because many adults believe that you are not doing mathematics if you are not computing with numbers and algorithms, parents are reminded that models and concrete materials are used in work situations by most adults. To help make this point, professionals from the community are invited to bring their mathematical tools of the trade to share with the class. For example, a contractor might bring a blueprint and discuss issues of representation and scale, or a delivery person might discuss the mathematics in a customer order form that lists products by cases of different sizes. These discussions help to emphasize that one does not need to be a professional teacher or an expert in mathematics to do Family Math with others.

The purpose of Family Math is to influence how people view mathematics and to help parents help their children to do mathematics. Many of the activities require teamwork and communication between parents and children, generating new understanding not just about mathematics, but about each other as well. Parents recognize abilities and strengths in their children, and children see their parents as colearners and teachers.

Devaney's (1986) interviews with teachers who conducted Family Math courses revealed that parents taking the program are more likely to become advocates for their children by speaking up for change in the mathematics programs at their children's schools. Follow-up surveys (Kreinberg, 1989) found that 90% of parents attending Family Math courses reported regularly playing math games with their children at home. More than 80% talked with teachers about their children's math progress, and 75% said they were better able to help their children with mathematics homework.

Family Math programs have served 400,000 parents and children across the U.S., and the *Family Math* book has been translated into three languages. Over the longer term, the program works for effects that extend beyond local influences on individual students and parents. It is important for parents and students to feel confident about taking a more central role in helping to shape the programs that serve them. As mathematics instruction evolves, parents need to become more active participants in conversations about curriculum, content, and policy. One objective of Family Math is to help parents become interested in and prepared for these conversations.

Hence, among the informal learning contexts we describe in this chapter, Family Math occupies a unique position. Although it is the most closely tied to school, in that its ultimate goals are to enhance students' performance in school subject matter, it accomplishes these objectives by "deschooling" mathematics, that is, lending it some of the advantages of informal learning

contexts. These advantages include emphasis on meaningful goals, social interaction across age groups, motivation, personal identity, and ties to community.

The learning contexts we have described—museums, after-school programs, and family learning classes—differ in mission, scope, and locale. They also differ with respect to their orientation toward schools and schooling. Although each of these programs has a clearly articulated stance about its role with respect to schooling, these roles vary considerably, from complement to enhancement to enrichment. Yet equally clearly, each of these programs differs from school in important ways. We discussed how these differences complement what happens in school, and Part II of this volume illustrates how many of these same ideas are now being implemented in school-based instruction. As we describe in the following section, these differences also have implications for the kind of research that is appropriate for studying children's learning in these contexts.

## RESEARCH WITH A DIFFERENCE

It can be challenging to study learning in informal environments. In this section, we review both the challenges and some possible strategies for tackling them.

If the primary purpose of the research is assessment of learning outcomes, one concern is how to account for the considerable variability in what gets learned. As suggested earlier, in out-of-school learning contexts, individuals often choose their own path through a menu of resources and opportunities. For example, richness and choice are definitive of experiences in museum. After-school programs offer a variety of activities, some structured and some self-selected. The purpose of Family Math is to help parents become more capable and interested in helping children mathematize their own experience, whatever form that experience takes, suggesting that children's learning about mathematics can be as variable as their experiences. In all these programs, therefore, what gets learned and how much time is spent in learning is far more variable than in school settings; hence, researchers must struggle with the problem of deciding what kinds of learning to look for.

Second, informal educators are more likely to consider their programs to be catalysts of or supplements to learning, rather than having a direct effect on measurement outcomes like standardized achievement tests in science or mathematics (Mielke & Miller, 1995). Thus, standard evaluation procedures that target traditional educational outcomes may very well under-

estimate the value of informal learning. The broader agenda of informal learning, which often focuses on changes in values, attitudes, and motivation, is difficult to assess because values and attitudes change very slowly, are diffuse and difficult to measure, and are almost certainly contributed to and mediated by many experiences and influences in children's lives. Although it is acknowledged that it may be overly simplistic to expect straightforward cause-effect relations between informal learning experiences and broad outcomes such as values, attitudes, or literacy, there is as yet no consensus about what kinds of assumptions and models would be more appropriate. Learning effects may emerge only over the long term and in circumstances quite different from those where the learning originally occurred. For example, a child who serves as a junior curator in the Natural Science Gallery at the local science museum and becomes fascinated with insects may be developing the origins of a long-term interest that could eventually steer the individual toward later choices in schooling and career. Establishing this chain of influence for a particular individual would be a formidable research task, even though existing research suggests that in general, enduring interests can steer children toward different experiences, which in turn cumulate in different kinds of knowledge (Renninger, 1992).

One way of tackling these research challenges is deliberately to shift attention from studying outcomes of learning as if they were context-free and situation-free products to studying processes of learning in the contexts and situations where they take place. Matusov and Rogoff (1994), for example, suggested that instead of applying a factory metaphor, in which learning contexts are assumed to have value only for the learning that they manufacture, it might be more beneficial to acknowledge these contexts as important parts of children's day-to-day environments, places where valuable forms of interaction are supported and encouraged. Learning is conceived less as an outcome associated with individuals and more as an ongoing activity that occurs in social interaction. From this perspective, it is valuable to study people's changing roles in the learning settings where they are participants (Matusov & Rogoff, 1994). Such a perspective inspires research questions such as, what kinds of support do individuals require to participate flexibly and effectively? Is it possible to track the emergence over time of initiative and leadership within the group? What features of the learning context seem to encourage their appearance? How do participants come to take responsibility for evaluating and revising the ongoing practices within the community and for their own performance and learning (Heath, 1991)? How do children's personal identities change, and how do their conceptions of the learning process evolve? In summary, rather than

narrowly focusing on what is acquired at the level of the specific content domain, research in informal learning needs to look broadly enough to account for the mixed agendas of the out-of-school programs, including the support for positive social interaction, the fostering of healthy attitudes and values, and the development of personal identities.

Research also needs to address how informal learning environments are nested within surrounding contexts, and how learning contexts reciprocally influence each other. For example, families play an especially important role in screening and interpreting the meaning of settings of all kinds, including those where learning occurs. Family Math is a good example of a program designed directly to target such interpretations; its objective is to help both parents and their children reinterpret the meaning of mathematics. Even though this agenda is less explicit in museums, there, too, parents help negotiate children's understanding of the materials and exhibits and play an important role in introducing their children to "the specific skills used in reading, interpreting, and learning from objects, visual materials, and print, and the broader skills needed in searching for, selecting from, and attending to museum displays and programs" (Leichter, Hensel, & Larsen, 1989, p. 27). Because there is typically a cyclical flow in which family members physically move from the home to the outside world at the beginning of the day and then back again at the close of the day, the family becomes a critical locale for the discussion and interpretation of experiences that take place elsewhere (Leichter et al., 1989).

How do families and other institutions mediate and interpret learning? One important mechanism is conversation. People in different contexts talk in different ways; for example, the role and form of talk between family participants is likely to be quite different from the functions and structure of talk that occur in schools. Because families share long histories, their conversation may seem terse and elliptical to an observer. Essential background meaning can be presupposed and hence need not be elaborated because conversations build on a foundation of common experiences that can be taken for granted by the participants to the conversation (Leichter et al., 1989). In contrast, detailed explanations and presentational talk may be more characteristic of schools. Minick (1993), for example, discussed how classroom teachers shape children's growing understanding of the distinction between what speakers intend or mean, and what their speech actually represents, a distinction important to school learning but not in everyday communication. Like families and schools, informal learning environments may also encourage forms of talk that have special meaning within the context and that may influence who feels a member of the in-group and who does not. Heath

(1991) traced the role of language in the learning of a Little League baseball team, suggesting that learning to be a baseball player is partly a matter of learning to talk baseball (an account similar to Lemke's 1990 claim that one central task for science students is to learn to "talk science").

In addition to talk, other tools and notations play a central role in learning contexts, whether in-school or out-of-school. Tools, construed broadly, run the gamut from the games and activity kits provided for after-school leaders, to the carpentry materials provided by The Center for Exploration, to the calculators and manipulatives used in the Family Math program. These tools both enable and constrain practices and hence play an important role in shaping learning contexts. Notations, a specialized form of tool, include museum labels, notations for recording choreography, newspaper type fonts, tables for keeping scores for games and activities, Dienes' Blocks, and Arabic numeral systems. Notations play an important role in promoting the fixation, composition, abstraction, and mobility of thought (Latour, 1990). The right notational system can make learning more likely, or in some instances, can even determine whether certain forms of learning are possible at all.<sup>1</sup>

In summary, understanding the nature of out-of-school learning will require research that focuses on the processes of learning that occur in informal learning settings. One potentially fruitful strategy for such research is to track how children enter these environments, become increasingly effective participants, and especially, learn how to learn in them. We have also suggested that it is useful to pay close attention to the mechanisms whereby families, museums, after-school centers, and other institutions mediate children's learning. This mediation often occurs between interacting spheres of influence, such as families, television, museums, neighborhood after-school programs, and schools. Especially important among these mechanisms are conversation, tools, and notations.

Children spend the great majority of their time outside the classroom, so the domain of informal education is vast, not only in the amount of time children potentially spend in it, but also in the variety of activities that it includes (Mielke & Miller, 1995). It is therefore essential to understand more about learning in these settings, not only because of their large, mostly uncharted influence on children, but also because such work may also provide seeds for understanding lifelong learning—conducted mainly outside formal school settings—that will continue to be increasingly important throughout adulthood.

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<sup>1</sup>The insight that conversation, tools, and notation are central mechanisms for mediating learning is generally consistent with Vygotskian theory, but the discussion here was more directly influenced by Richard Lehrer's (Lehrer & Jacobsen, 1995) analyses of second-grade mathematics classrooms.

## REFERENCES

- Carnegie Council on Adolescent Development. (1992). *A matter of time: Risk and opportunity in the nonschool hours*. New York: The Carnegie Corporation of New York.
- Chaiklin, S., & Lave, J. (Eds.). (1993). *Understanding practice: Perspectives on activity and context*. Cambridge, England: Cambridge University Press.
- Comer, J. (1992). A growing crisis in youth development. In Carnegie Council on Adolescent Development, *A matter of time: Risk and opportunity in the nonschool hours* (pp. 18–19). New York: The Carnegie Corporation of New York.
- Devaney, K. (1986). *Interviews with nine teachers* (Report of the EQUALS Project). Berkeley, CA: Lawrence Hall of Science.
- Fine, G. A. (1988). Good children and dirty play. *Play and Culture*, 1, 43–56.
- Fine, G. A., & Mechling, J. (1993). Child saving and children's cultures at century's end. In S. B. Heath & M. W. McLaughlin (Eds.), *Identity and inner-city youth: Beyond ethnicity and gender* (pp. 120–146). New York: Teachers College Press.
- Gelman, R., Massey, C. M., & McManus, M. (1991). Characterizing supporting environments for cognitive development: Lessons from children in a museum. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 226–256). Washington, DC: American Psychological Association.
- Heath, S. B. (1991). "It's about winning!" The language of knowledge in baseball. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 101–124). Washington, DC: American Psychological Association.
- Heath, S. B., & McLaughlin, M. W. (Eds.). (1993). *Identity and inner-city youth: Beyond ethnicity and gender*. New York: Teachers College Press.
- Hezel Associates. (1992). *Evaluation of the Ghostwriter leader activity guide*. New York: Children's Television Workshop.
- Inverness Research Associates. (1991). *A study of CTW kits in after school settings*. New York: Children's Television Workshop.
- Katz, B. M. (1990). *Report on phone interviews among after school program leaders*. New York: Children's Television Workshop.
- KRC Research & Consulting. (1991). *Ghostwriter in-home test show study, Volumes I–III*. New York: Children's Television Workshop.
- Kreinberg, N. (1989). The practice of equity. *Peabody Journal of Education*, 66, 127–146.
- Latour, B. (1990). Drawing things together. In M. Lynch & S. Woolgar (Eds.), *Representation in scientific practice* (pp. 19–68). Cambridge, MA: MIT Press.
- Lehrer, R., & Jacobson, C. (1995, April). *Classical and classroom views of the development of spatial thinking*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.
- Leichter, J. J. (1979). Families and communities as educators: Some concepts of relationship. In H. J. Leichter (Ed.), *Families and communities as educators* (pp. 3–94). New York: Teachers College Press.
- Leichter, H. J., Hensel, K., & Larsen, E. (1989). Families and museums: Issues and perspectives. *Marriage and Family Review*, 13, 15–50.
- Lemke, J. S. (1990). *Talking science: Language, learning, and values*. Norwood, NJ: Ablex.
- Martin, L. M. W. (1990, April). *Administrators' and curriculum specialists' meeting*. New York: Children's Television Workshop.
- Matusov, E., & Rogoff, B. (1994). *Evidence of development from people's participation in communities of learners*. Unpublished manuscript.

- McLaughlin, M. W., & Heath, S. B. (1993). Casting the self: Frames for identity and dilemmas for policy. In S. B. Heath & M. W. McLaughlin (Eds.), *Identity and inner-city youth: Beyond ethnicity and gender* (pp. 210–239). New York: Teachers College Press.
- Mielke, K. W., & Miller, J. D. (1995, February). *The influence of informal science education on the development of scientific and mathematical literacy*. Paper presented at the annual conference of the American Association for the Advancement of Science, Atlanta, GA.
- Minick, N. (1993). Teacher's directives: The social construction of "literal meanings" and "real worlds" in classroom discourse. In S. Chaiklin & J. Lave (Eds.), *Understanding practice: Perspectives on activity and context* (pp. 343–373). Cambridge, England: Cambridge University Press.
- Nicholson, J. N., Weiss, F. L., & Campbell, P. B. (1994). Evaluation in informal science education: Community-based programs. In V. Crane (Ed.), *Informal science learning: What the research says about television, science museums, and community-based projects* (pp. 61–106). Dedham, MA: Research Communications Ltd.
- Renninger, K. A. (1992). Individual interest and development: Implications for theory and practice. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), *The role of interest in learning and development*. (pp. 361–395). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Resnick, L. B. (1987). Learning in school and out. *Educational Researcher*, 16(9), 13–20.
- Rogan, B., & Graves, S. (1989). *Who's watching the kids?* (Report to the Alabama Department of Education). Birmingham, AL: University of Alabama.
- Saxe, G. (1988). Candy selling and math learning. *Educational Researcher*, 17(6), 14–21.
- Schliemann, A., & Acioly, N. (1989). Mathematic knowledge developed at work: The contribution of practice versus the contribution of schooling. *Cognition and Instruction*, 6, 185–221.
- Sloane, K. W. (1990). *Families in Family Math* (Report to the National Science Foundation). Berkeley, CA: Lawrence Hall of Science.

# Chapter 2

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## COLLABORATIVE PLANNING AND COMMUNITY LITERACY: A WINDOW ON THE LOGIC OF LEARNERS

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You are an African American teenager at an inner-city high school where drugs are a fact of life; you pass the pushers on Federal Street every afternoon; someone in your family has a problem with drugs or alcohol. A brochure to help you, written by someone who has apparently not visited your neighborhood, suggests some snappy answers you could make if someone offers you drugs. One is, "I'd rather not. I'm too special." This brings howls of incredulous laughter from your group. Another is "No thanks, I'm all American. I'll stick to milk."

You are reading this drug-education brochure because you have joined a project called ARGUE at the Community Literacy Center, where you and other students have signed on to create a document *by teens, for teens* to talk to a friend about drugs. The first day you learn a strategy called rival hypothesis thinking and start to imagine alternative responses people could have to this brochure and to its "snappy answers" (your group feels that many of these snappy answers would make a person look foolish, if they did not get beaten up first for "having an attitude"). By the second day you are doing collaborative planning with a mentor from the university across town. The mentor encourages you, both in the group and alone, to think out your plan, explain your key points, and imagine how a reader would respond if you said that. You tell her you do not usually plan, you just sit down and write whatever occurs to you, but she is persistent. Moreover, every time ARGUE meets, on Tuesdays and Thursdays, the two of you and a tape

recorder spend at least 10 minutes “rivaling” the other voices and positions in this discussion about drugs, which even means speaking for teens who use drugs. With the mentor as a supportive collaborative planning partner, and you as the expert on what a friend might think, you generate as many alternative responses and supporting reasons as you can to the sappy brochure, to the cynical young addict Benjy in an Alice Childress novel, to an ex-addict and to a cop you interview. Eventually you will even rival your own text, imagining ways your readers might disagree with or dismiss you. All the time your collaborative planning partner keeps asking you to think like a writer: “What’s your point?” “How might your reader respond?” “How are you going to deal with that ‘rival’ idea in your text?”

## OVERVIEW

This chapter is an account of students in the midst of an instructional experiment—learning to become planners and problem solvers, learning to do rival hypothesis thinking, and coming to see themselves as writers within a community/university context. It begins with a brief introduction to collaborative planning as a theory-based instructional practice and with a description of this unusual instructional program at Pittsburgh’s inner-city Community Literacy Center (CLC). However, the focus of this chapter is neither on the practice nor on the program per se. Instead of looking at them, this chapter represents a look through them, at the logic of the learner, and in pursuit of a more contextually sensitive theory of how writers learn. What is interesting about these innovations is not only that they offer students an effective kind of literacy instruction, but that they offer a revealing window on cognition and on the strategic negotiations of the learner.

## COLLABORATIVE PLANNING AND COMMUNITY LITERACY: BACKGROUND AND RATIONALE

How do you teach literate action? Traditional literacy instruction has focused on either cultural literacy, knowing the great books and ideas of the Western tradition, or on textual literacy, producing a text that meets certain standards for correctness, convention, or style (Brandt, 1990). Textual literacy may define itself in terms of the academic paradigm Olson (1977)

called “autonomous text,” or in terms of certain venerable modes or genres: argument or description, the essay, or research paper. However, traditional teaching of this sort has come under criticism for two kinds of myopia. One is its focus on individual performance to the exclusion of collaborative problem solving, and the other is its preoccupation with the manipulation of abstract, symbolic information, which ignores the application of contextualized, usable knowledge (Resnick, 1987). “Academic” training with its focus on textual literacy rather than socially embedded literate practice, the argument goes, is giving our students a limited preparation for the workplace or civic life (Erickson, 1988).

The long-standing alternative to such schooling has been apprenticeship which immerses the learner in a social practice and in productive collaborative action (Rogoff, 1990). However, traditional apprenticeship, associated with crafts and the production of goods, is a limited model for general education. Focused on the task rather than on the learner, it offers little direct instruction and does not encourage learners to generalize, question, or reflect. In response, the practice of cognitive apprenticeship has tried to create the best of both worlds by the explicit teaching of intellectual strategies within a social scaffold that models thinking and that supports and shapes the learner’s efforts to join in the process (Collins, Brown, & Newman, 1989). Within the study of rhetoric and composition, cognitive rhetoric has argued for a similar change in literacy instruction that would shift from the school-based analysis of textual conventions to the cognitive and social practice of making texts, supported by explicit instruction in the problem-solving strategies a writer brings to a rhetorical situation (Flower, 1993). The educational challenge, then, is to go beyond teaching conventions to teaching literate actions. How do you help students to not merely control important literate practices, such as essay writing, but to embed those practices in literate action—in a planful, social, and cognitive process of using writing to do something?

The instructional practice described here, called *collaborative planning*, is an example of cognitive apprenticeship that takes its design from recent work in cognitive rhetoric. That is, it introduces students to problem-solving strategies for planning based on research that models expert/novice differences and argues for the power of reflective, strategic instruction (Bereiter & Scardamalia, 1987; Brown & Palincsar, 1989; Emig, 1971; Flower & Hayes, 1981; Flower et al., 1990; Hayes, Flower, Schriver, Stratman, & Carey, 1987). At the same time, it takes the strong social perspective of cognitive rhetoric, which envisions writing as a transaction among people, motivated by a rhetorical situation, in which textual conventions and