Stephanie M. McConachie | Anthony R. Petrosky EDITORS
FOREWORD BY LAUREN B. RESNICK

Content Matters

A **Disciplinary Literacy** Approach to Improving Student Learning

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A DISCIPLINARY LITERACY APPROACH TO IMPROVING STUDENT LEARNING

Stephanie M. McConachie,
Anthony R. Petrosky

Editors

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To Lauren B. Resnick, founder and director of the Institute for Learning and former director of the Learning Research and Development Center

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FOREWORD

This small book may start a revolution—a revolution that ends the long and agonizing debates between "thinking skills" and "content knowledge," between "teacher expertise" and "central curriculum," between "ensuring the basics" and "reaching for the top." Arguments about these issues have been roiling the education policy world, often with little impact on the real world of teaching and teachers. Now, research has produced a new understanding of how to improve learning and build professional organizations that learn every day.

This research tells us that there is no struggle between thinking skills and content knowledge. To the contrary, we cannot effectively teach—or learn—either one without the other. Drilling on isolated bits of content knowledge, without ensuring that students use the knowledge thoughtfully, will raise test scores and keep the big, bad wolf of adequate yearly progress away from the door for another year. But the only knowledge that will stick, that will be available to build on next month or next year (or in college), is knowledge that a student has worked to understand. This is a basic principle of learning. We call it academic rigor (learning rigorous content) in the thinking curriculum (units of study in which students think and actively use knowledge on a daily basis). It's a principle you can count on.

But it is a principle that is difficult to apply alone. It calls for change in virtually every aspect of how teaching and learning occurs—from the official curriculum of a district or school, to how teachers work together to design and enact powerful teaching, to the kinds of disciplinary-specific thinking that is evidenced in well-structured student discussions. This book provides an in-depth look at

a framework for making these changes. The disciplinary literacy framework, developed over eight years in collaboration with multiple, diverse urban school districts, provides the means for schools and school systems to give students at every level of entering capacity a coherent and intellectually challenging program of discipline-specific learning in the core subject matters.

The disciplinary literacy (DL) way of working is likely to be new to many working educators, although it has deep roots in the tradition of liberal education that once guided educational thinking. For this reason, the DL team has developed strategies for initiating the program that begins with professional learning opportunities—including reflection on the experience of learning new disciplinary content and collaboration in designing and implementing DL lessons. The DL framework can also be used to support district- or school-specific curriculum development efforts.

Because all DL teaching and learning proceeds from the necessary interaction between thinking skills and content knowledge, the frameworks offer promise for taming the bear of secondary school reform. The emphasis on disciplinary knowledge and habits of mind resonates with secondary teachers who value the discipline they are teaching. Students—even those with initially limited academic language capability—are given opportunities to engage in sophisticated intellectual work. As part of the curriculum and everyday teaching, teachers attend to the literacy learning needs of students within content knowledge and habits of thinking. Students experience satisfaction and motivation for further academic work when they are treated as intelligent people who come to class with knowledge and reasoning skills. Everyone benefits from this reintellectualization of school work that moves it away from the generic and remedial and brings it back to disciplines.

Content Matters presents a practical and immediately useful way to think about curriculum, teacher development, and system change. This book is for everyone who is curious about the revolution in teaching and learning, everyone who cares about the future of education—educators, college professors who teach preservice teachers and administrators, members of school boards, legislators, and parents. As you read this book, you will start to understand how and why this way of teaching and learning is so different from business as usual and why it is so important.

Lauren B. Resnick
Distinguished University Professor
University of Pittsburgh

PREFACE

Content Matters offers teachers and instructional leaders coherent, research-based, and field-tested approaches for developing literacy in disciplinary teaching. Our vision of literacy reaches beyond reading strategies into the content areas where literacy instruction more broadly conceived involves students in reading, speaking, writing, and habits of thinking as they are practiced in each of the core disciplines: English language arts, history, mathematics, and science.

This is a book, then, about teaching and learning in the disciplines. It offers cases of teachers and students in middle and high schools working together in English language arts, history, mathematics, and science in purposefully sequenced lessons designed to engage them in cognitively challenging tasks. It is a book about the ways in which the careful design and use of teaching tools and rituals and routines can promote disciplinary literacy (DL) and habits of thinking that can evolve only in classrooms where students talk with each other in rich discussions of problems using the kinds of evidence and explanations that are specific to each discipline. We make our case simply: literacy is always rooted in disciplinary content. Content matters. So do the tasks with which we engage students. And so do the ways in which students engage each other.

When the Institute for Learning at the University of Pittsburgh introduced the Disciplinary Literacy Framework in 2002, literacy instruction was almost always thought of as reading instruction. The prevailing wisdom was that students should be taught generic reading strategies to apply to any and all texts and that thinking skills could be taught separately from specific content inquiries. There was very

little guidance in the field for developing lessons to engage students in the habits of reading, writing, speaking, and thinking that would help them develop content knowledge and disciplinary literacy skills. Since then, and partly through the work of the Institute for Learning in its partnerships with large urban school districts, the field has begun to shift its views about literacy development and instruction for middle and secondary school students to a disciplinary-based framework.

Content Matters presents teachers and instructional leaders with the Institute for Learning's disciplinary framework in each of the four core content areas. The chapter authors provide guidance in developing instruction and offer examples of cognitively challenging sequences of lessons grounded in the five disciplinary literacy principles:

- Knowledge and thinking—and therefore literacy development—must go hand in hand.
- Learning is apprenticeship.
- Teachers mentor students as apprentices.
- Classroom culture socializes intelligence.
- Instruction and assessment drive each other.

All of our work proceeds from these principles and the notion that disciplinary knowledge always coexists with habits of thinking—and therefore literacy skills—particular to each discipline. Teaching and learning in the disciplines, then, involves students in doing the work of the disciplines. In the mathematics chapter, for example, you will meet students in DL classrooms who are engaged in solving a cognitively challenging problem to understand the benefits of different cell phone calling plans by using mathematical habits of thinking such as drawing on prior knowledge, looking for patterns, conjecturing, and creating different representations of their solution paths—tables and equations, for instance—in purposeful ways. They propose and test ideas, tinker with calculations, try easier problems or known problems before trying the harder problem, and talk with others about their ideas, calculations, solutions, and misunderstandings. In order for this kind of disciplinary learning to occur, teachers structure and arrange students' participation through cognitively challenging tasks, carefully designed and sequenced, that reach across days and weeks of class time. Students' talk with each other to test their thinking, to share their analyses and explanations of data and sources, as well as each other's perspectives, conjectures, and interpretations,

is at the heart of DL teaching and learning. Disciplinary literacy, in other words, is inquiry, and inquiry proceeds through Accountable Talk.

If, as we believe, disciplinary literacy stands as an example of an approach to teaching and learning that challenges students to participate in the intellectual work of the disciplines, and if, as we know, it invites them to engage in cognitively challenging problems through carefully designed and sequenced lessons, then in a real sense, DL asks students to apprentice to academic work and habits of thinking that they cannot yet do well. Teachers, then, have to develop the lessons and units, the tasks, and the intellectual scaffolds that provide students with the tools and the pedagogical rituals and routines that give them access to this work. Principals and other district leaders also provide teachers with the supports they need to engage students in DL. They lead by understanding the teaching and learning that is disciplinary literacy in the core disciplines. They establish communities of practice in their schools and carve time out of the days for teachers to meet, develop and redevelop lessons, observe and discuss their practice, and engage others as learners in DL lessons through networks of distributed leadership.

Content Matters, then, is also a book about instructional leadership in disciplinary literacy. It offers district leaders examples and testimonials of the ways in which our tools support administrators as instructional leaders and situates their experiences within a model of nested learning communities. Our tools offer instructional leaders methods to ensure district and school readiness for long-term engagement with all aspects of DL, including the professional learning that leads to the establishment of district and school learning communities. These communities, composed of teachers and instructional leaders, collaboratively analyze and design tasks, lessons, and units in the core disciplines. They study artifacts, professional texts, and student work samples, and they participate in observations of teaching. They design school improvement plans for DL teaching and learning, and they ensure that DL curricula and assessments align. Our book tells these leadership stories as well as those of teachers and students engaged in DL in the core subjects.

Our work in disciplinary literacy in the Institute for Learning at the Learning Research and Development Center of the University of Pittsburgh began in 2002. Since we began the DL Project, we have worked with teachers, coaches, and district leadership in over twenty-five school districts, including most recently large urban districts such as Prince George's County, Maryland; Austin, Dallas, and Fort Worth, Texas; Los Angeles Unified; New York City Region 10; Providence

and a consortium of other Rhode Island districts; Bridgeport and Hartford, Connecticut; Denver, Colorado; Richland County One, South Carolina; and Saint Paul and Minneapolis, Minnesota. One of the pleasures of this book for us is that it represents our collaborative work on the DL projects and tells the stories of that work with the voices of those who conducted and participated in it.

Content Matters is divided into three sections. The first, Chapters One and Two, make the cases, respectively, for changing current practices and for the foundations of our work in DL. The second section, comprising the discipline chapters—history, mathematics, science, and English language arts—provides classroom scenarios from urban schools along with examples and explanations of DL instructional tools that teachers and students use. Finally, Chapter Seven explains how DL supports instructional leadership and provides examples of professional development models and tools. The appendixes set out the DL design principles by core academic area and the DL observation protocol and provide a summary of selected DL tools.

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This is a book built on the ideas, experiences, and wisdom of many people. We are grateful to the talented teachers, administrators, and students who gave us ideas and validated approaches through their disciplinary literacy (DL) work. We particularly thank the teachers and administrators of current and former partner districts who gave credence to DL practice and ideas. Following are the districts and their superintendents at the time of their Institute for Learning (IFL) work: Austin Independent School District, Pascal Forgione Jr.; Baltimore City Public Schools, Bonnie Copeland; Bridgeport Public Schools, John Ramos Jr. and Sonia Diaz Salcedo; Dallas Independent School District, Michael Hinojosa; Denver Public Schools, Jerry Wartgow; Fort Wayne School District, Thomas Fowler-Finn; Fort Worth Independent School District, Melody Johnson; Hartford Public Schools, Robert Henry; Grand Rapids Public Schools, Bernard Taylor; Kenton County School District, Kentucky, Susan Cook; Los Angeles Unified School District, Roy Romer; Minneapolis Public Schools, William Green; New York City Region 10, Gale Reeves; Pittsburgh Public Schools, Mark Roosevelt; Prince George's County Public Schools, John Deasy and William Hite; Providence Public Schools, Diana Lamm, Fran Gallo, and Melody Johnson; Richland County School District One, South Carolina, Ronald Epps; Rhode

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the history chapter and is dearly missed as the DL team's resident historian; Donna Micheaux, whose advocacy for equity and excellence for every student influenced DL approaches; Luise Caster, videographer extraordinaire; and Kristen Hecker, who managed everything from content development to one-hundred-person dinners. In addition, many thanks to former DL team members for their creativity and integrity as this project grew: Harold Pratt, Doug Fleming, Mary Lou Metz, Lorraine Plasse, Cheryl Parshall, John McMillan, Karen Hollweg, Dorothy Geary, Heather Nelson, and Hedi Baxter, and to Joseph Taylor and Jodi Bintz, who are also authors of the science chapter.

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Stephanie M. McConachie
Anthony R. Petrosky

THE EDITORS

Stephanie M. McConachie is a Fellow at the Institute for Learning (IFL), Learning Research and Development Center, University of Pittsburgh. She currently coleads the English language arts disciplinary literacy (DL) work at IFL. As part of this project, she has designed and led professional learning and curriculum development in English studies for school and district educators in ten urban school districts and a state consortium. She has worked most intensively in the Austin Independent School District, supporting the development of teacher-led, academic-area professional learning communities to fully implement DL systemic practice. Prior to this, she coordinated IFL's development team in all four academic areas of DL. She was instrumental in developing the DL framework, design principles, and collaborative protocols. As part of IFL, she has served as a site liaison to the Springfield Public School District in Massachusetts and the Kansas City Missouri School District. In both districts, she worked with district and school leaders to improve principal instructional leadership and support the development of coherent district instructional systems and routines. Her most important work in these districts was facilitating principal-led Learning Walks. She has presented professional learning sessions at the National Staff Development Council, National Association of Teachers of English, and the Association of Supervision and Curriculum Development. She is currently coteaching the Instructional Leadership course for the University of Pittsburgh.

Before coming to IFL, McConachie led a variety of educational initiatives. She taught English and English education to students from middle school through graduate school. She has also been a middle school principal, a high school assistant principal, and an English language arts coordinator. As part of her

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Anthony R. Petrosky, associate dean of the School of Education at the University of Pittsburgh, holds a joint appointment as a professor in the School of Education and the English Department. Along with Stephanie McConachie, he codirects the English Language Arts Disciplinary Literacy Project at the Institute for Learning at the Learning Research and Development Center. He was the principal investigator and codirector of the Early Adolescence English Language Arts Assessment Development Lab for the National Board for Professional Teaching Standards, which developed the first national board certification for English teachers. He is past chair of the National Council of Teachers of English (NCTE) Committee on Research and a past elected member of the NCTE Research Foundation. His first collection of poetry, *Jurgis Petraskas,* published by Louisiana State University Press (LSU), received the Walt Whitman Award from Philip Levine for the Academy of American Poets and a Notable Book Award from the American Library Association. Petrosky's second collection of poetry, *Red and Yellow Boat,* was published by LSU in 1994, and *Crazy Love,* his third collection, was published by LSU in fall 2003. Along with David Bartholomae, Petrosky is the coauthor and coeditor of four books: *Facts, Artifacts, and Counterfacts: Theory and Method for a Reading and Writing Course; The Teaching of Writing; Ways of Reading: An Anthology for Writers;* and *History and Ethnography: Reading and Writing About Others.*

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Victoria L. Bill has been a Fellow at the Institute for Learning, Learning Research and Development Center, University of Pittsburgh, since it was formed in 1995. As cochair of the disciplinary literacy mathematics team, she is responsible for guiding the development and dissemination of professional development

resources and tools to large urban school districts around the country. She has worked closely with mathematics teachers, coaches, directors of mathematics, and principals to study and implement disciplinary literacy-based lessons in classrooms. She and her DL mathematics team have developed, piloted, and published a set of algebra 1 replacement tasks, lesson plans, and segments of taped lessons that illustrate the practices of disciplinary literacy mathematics. She has also published articles in *Mathematics Teacher* and *Educational Leadership* and presented at the National Council of Teachers of Mathematics and the National Council of Supervisors of Mathematics. In addition to working with the Institute for Learning, she teaches elementary math methods and an instructional leadership course for aspiring principals. She also supervises middle and high school master-level student teachers at the University of Pittsburgh.

Jody Bintz joined BSCS in 2004 and is primarily working in the Center for Professional Development. She serves as the director of the BSCS National Academy for Curriculum Leadership, a three-year professional development program designed to improve districts' capacity to design, implement, and sustain an effective high school science education program. Other areas of specialty include helping teachers improve their classroom practice, supporting districts' selection and implementation of instructional materials, and working with partner organizations to develop local school leadership in science education. Bintz has coauthored a number of articles and books in the areas of improving teaching and learning and developing leadership. Prior to joining BSCS, she served as an instructional services consultant with Loess Hills AEA 13 in southwest Iowa, where her responsibilities included school improvement and professional development planning. She served on the Iowa Support Team for Schools in Need of Improvement. Prior to her more general work with districts, she served as a science education consultant and worked with science teachers to integrate technology; align curriculum, instruction, and assessment with standards and benchmarks; create more inquiry-based classrooms; and incorporate literacy strategies.

Bintz began her career in education as a high school science teacher and coach in Treynor, Iowa. She received her bachelor of arts degree in biology and her

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Idorenyin Jamar is a Fellow at the Institute for Learning, Learning Research and Development Center, University of Pittsburgh. As a member of the disciplinary literacy mathematics team, she has designed and facilitated professional development for teachers, coaches, and administrators in twelve urban districts around the country. Prior to working at the Institute for Learning, she was an assistant professor of mathematics education at the University of Pittsburgh and Bayero University in Kano, Nigeria. She has taught secondary mathematics in urban schools for eight years. She served on the editorial panel of *Mathematics Teaching in the Middle School* and has served on advisory boards for WestEd and the Pittsburgh Council on Public Education. She holds a Ph.D. and M.Sc. in cognitive psychology and a B.A. in applied mathematics, all from Brown University.

Deborah L. Jordan is a science educator working with BSCS in Colorado Springs, Colorado. Her work currently includes serving as a Fellow for the Institute for Learning (IFL) at the University of Pittsburgh. As a member of the IFL Disciplinary Literacy Science Team, she works primarily with Austin Independent School District and Minneapolis Public Schools. In addition, she works with the Ministry of Education in Singapore developing inquiry-based elementary science lesson packages. Her past work at BSCS has allowed her to direct the revisions to *BSCS Science TRACKS: Connecting Science and Literacy* and to provide literacy strategies for essays in *BSCS Biology: A Human Approach.*

Jordan began her career in science education as a classroom teacher. She served as a district science coordinator for six years, providing professional development and facilitating the alignment of curriculum to state standards. During her seven years as an educational consultant with Mid-Continent Research for Education

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Nancy M. Landes is the director of the BSCS Center for Professional Development. She began her professional career as a classroom teacher and completed a master of arts in curriculum and instruction and a Ph.D. in science education at Michigan State University. She joined the BSCS staff as a curriculum developer in 1983. Since then, she has served as the project director of two major curriculum development projects—*Science for Life and Living: Integrating Science, Technology and Health* and BSCS Science TRACKS, both in elementary science education. In her role as the director of the Center for Professional Development, Landes oversees the professional development efforts at BSCS, which include work with the Institute for Learning of the University of Pittsburgh; the BSCS National Academy for Curriculum Leadership, a National Science Foundation–funded program in science education reform, most recently in partnership with Washington State LASER; numerous state and regional initiatives; and district-based science professional development. Landes is particularly interested in helping teachers make the connections between curriculum implementation, professional development, and student learning and in establishing the conditions that make possible the successful implementation of meaningful instructional materials and strategies in science classrooms.

Vivian Mihalakis is a Fellow at the Institute for Learning, Learning Research and Development Center, University of Pittsburgh, working with the disciplinary literacy English language arts team since 2005. She works with districts to design and present English language arts units for secondary school classrooms and develop professional development to improve the teaching and learning of English language arts classrooms. Before coming to the institute, Mihalakis worked in both public and private and urban and rural schools as an English

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Anita K. Ravi is the high school social studies curriculum specialist for Pittsburgh Public Schools. She was a Fellow at the Institute for Learning at the University of Pittsburgh from 2001 to 2008, where she served as the disciplinary literacy history team cochair and worked with teachers and administrators from fifteen urban school districts around the country on professional development in the teaching and learning of history as a discipline. Prior to moving to Pittsburgh, she was a high school humanities teacher at School of the Future, an alternative school in the former District 2, New York City.

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Samuel A. Spiegel is a science educator in the Professional Development Center at BSCS and the Disciplinary Literacy Science Chair at the Institute for Learning. Prior to joining BSCS, he served as director of research and development for a multimedia development company and as director of the Center for Integrating Research and Learning at the National High Magnetic Field Laboratory, Florida State University, which has been recognized as one of the leading National Science Foundation laboratories for activities to promote science and technology education. While at Florida State, Spiegel also directed the Science FEAT program, an award-winning teacher enhancement program for middle grade science teachers. His background in science education includes

experiences as both a middle school and high school science teacher, conducting and supervising educational research, working with high-risk youth in alternative education and living centers, working in science museums, designing distance learning courses, and multimedia curriculum development, as well as working with the professional development of teachers. He was honored for his efforts in teacher education by the Association for the Education of Teachers of Science with the Innovation in Teaching Science Teachers award in 1997.

Joseph A. Taylor has been directing the BSCS Center for Research and Evaluation since 2007. This appointment followed a one-year tenure as assistant director of the center. He joined the BSCS staff in 2001 as a specialist in research and science teacher professional development. Taylor taught high school physics and mathematics before completing a doctoral degree in science education at Penn State University.

chapter
ONE

Engaging Content Teachers in Literacy Development

Stephanie M. McConachie
Anthony R. Petrosky

For the past twenty-five years, reading experts and educational policymakers have pressed for increased attention to adolescent literacy. There have been mandates and actions at all levels of the educational system. As an educator, you probably have taken courses or engaged in professional development on reading. Most likely you also have been part of action plans to address the reading needs of adolescent students in your community. It has also been routine for those of us in education to see whole faculties coming together to talk about reading and writing approaches in order to implement literacy strategies across the curriculum. Behind these actions has been the idea that secondary teachers can and should teach reading and writing skills as part of teaching their own subject matter. We admit that focusing every middle and high school course on literacy is appealing on a couple of fronts. For one thing, it suggests a way to extend reading and writing instruction beyond the primary grades. For another, it links literacy instruction to academic content. Both are worthy objectives.

But these general approaches to reading and advancing literacy have not worked for several reasons. One is that science and math teachers do not see themselves as reading and writing teachers. In addition, many secondary teachers quite reasonably resist the across-the-curriculum solution because they are already expected to teach more biology or American history or algebra than time permits. They do not want to add basic reading and writing skills to the list of things they need to cover (Shanahan & Shanahan, 2008; O'Brien, Stewart, & Moje, 1995; Vacca & Vacca, 1993). And they have a legitimate point: across-the-curriculum literacy instruction poses the danger of diluting disciplinary rigor if the two are set side by side in a de facto competition for time and attention.

At first, many educators and policymakers believed that improving the reading scores for younger students could be the foundation for continuing the growth in reading performance of older adolescents. However, it has not worked out that way. As Shanahan and Shanahan pointed out in their review of the 2005 National Assessment of Educational Progress (NAEP) (Grigg, Donahue, & Dion, 2007) data (2008), inoculating early in reading has not been so successful: "Apparently, strong early reading skills do not automatically develop into more complex skills that enable students to deal with the specialized and sophisticated reading of literature, science, history, and mathematics. . . . Most students need explicit teaching of sophisticated genres, specialized language conventions, disciplinary norms of precision and accuracy, and higher-level interpretive processes" (p. 3).

Despite these false starts, there are perspectives that hold promise for improving literacy supported by a growing body of research and an emerging classroom experience base. Taken seriously, the findings call on us to undertake challenging reforms that require major changes in school culture, curricula, and pedagogy. We will look at the findings first, then return to what we know from the classroom experience base.

APPROACHES FOR IMPROVING ADOLESCENT LITERACY

In the past three years, there has been a multitude of published reports, articles, and ongoing updates proposing multifaceted approaches for improving adolescent literacy (Moje, Overby, Tysvaer, & Morris, 2008; Slavin, Cheung, Groff, & Lake, 2008; Deshler, Palincsar, Biancarosa, & Nair, 2007; Schleppegrell, 2004; Graham & Perrin, 2007; Biancarosa & Snow, 2006). The reports have pointed out that we need to understand better what we mean by adolescent literacy in order to