Preface

When Jane was a high school student, her history class took a field trip to a historical Western town located about 50 miles from her school. At the local museum, she and her classmates followed a docent from exhibit to exhibit. They wandered among Native American artifacts, a display about Chinese miners and gold prospecting, and collections of 19th-century housewares, toys, and farming implements. After the tour, students were free to stroll the city's wooden boardwalks, visit tourist shops, and buy treats at an old-time soda fountain. The day stands out as a fond high school memory when Jane looks back, but not because of any academic content she learned. The field trip was disconnected from what was happening back in the classroom.

As an adult and veteran teacher, Jane happened to revisit the same town. This time, she and her friends wandered off the beaten path and found themselves at the local pioneer cemetery. Many aspects of that place piqued their curiosity. They noticed how graves were organized into separate sections depending on religious affiliation, with one particular section sporting the largest and most ornate headstones. They wondered why so many gravestones were inscribed with 1918 as the year of death. Even though Chinese laborers made up a large part of the population in the town's early years, there was a dearth of Chinese graves. Why was this so?

Wearing her project-based learning hat, Jane couldn't help but imagine what a different experience she and her classmates might have had if they had started their tour at that cemetery. They would have been full of questions by the time they arrived at the museum. Chances are they would have ended their visit with a deeper understanding of pioneer history and a desire to learn more. They would have been primed for an engaging and academically meaningful project-based learning experience.

LEARNING THAT STICKS

At the start of workshops we lead on PBL—project-based learning—we often ask teachers to recall a significant memory from their school days. As you launch into this book with us, take a moment to conjure up your

own recollections. Think back to your school days and quickly (without filtering!) focus on an especially vivid, "sticky" memory.

How would you classify your memory—was it academic, social, extra-curricular, or interpersonal in nature? Perhaps it involved a field trip, guest speaker, performance, or other novel event? Maybe it was purely social. In hindsight, can you tell whether this experience contributed to any enduring understanding? What did you take away from it?

Take another moment to imagine your current students, years from now, looking back on their K–12 education. Which of today's experiences do you expect will have staying power for them? Will they remember events that were fun because they were a break from the regular school day or experiences that whetted their curiosity and engaged them as thinkers and learners? Can you imagine any of their experiences becoming a springboard for lifetime of curiosity about the world around them?

FINDING AND FILLING THE GAPS

We know from experience that project-based learning has the potential to create powerful—and memorable—learning experiences for students. We also recognize that it can be hard to extract the full benefits of PBL. In our previous book, *Reinventing Project-Based Learning,* we focused on helping teachers *prepare* for projects that connect to real-world issues and integrate technology to maximize learning. Since that publication in 2007, our interactions with many educators—in the United States and internationally—have convinced us that there's a need to go deeper with advice about *doing* projects.

This book is designed to support teachers, school leaders, and professional learning communities that are looking for strategies to guide the implementation of projects. We know this is a fast-growing audience, including both PBL veterans and newcomers to the project approach.

A number of factors are helping PBL to gain traction as a key teaching and learning strategy, including:

- New standards that set more challenging learning goals than those of the "inch-deep, mile-wide" traditional curriculum. In the United States, Common Core State Standards present learning objectives that address "big ideas" in a more holistic and interdisciplinary way. This new approach to standards aligns with the philosophy and best practices of project-based learning.
- Continuing call for students to develop 21st-century skills that will prepare them for college, careers, and future life challenges. The Framework for 21st Century Skills calls for students to develop mastery in the 4 Cs: communication, collaboration, creativity, and critical thinking. We can't expect students to master these essential skills for

the future if they don't start gaining experience with them during their K–12 years. PBL offers arguably the best way to develop these 21st-century skills.

- Growing networks of schools that are adopting PBL as a wall-to-wall strategy for teaching and learning. These schools have been serving as laboratories for developing best practices in PBL. Many are eager to share field-tested resources and classroom success stories, paving the way for others to get a faster start with project-based learning.
- New networks of educators driving their own professional learning. Connecting via Twitter, Skype, and a host of other tech tools, teachers are coming together around shared interests, including project-based learning. Many meet weekly on Twitter for a #PBLChat, while others focus on subject-area innovation. Across these contexts, teachers are stepping into new leadership roles as influencers and experts. Many are natural collaborators who bring good thinking to project design teams.

WHY WE EMPHASIZE INQUIRY

A central feature of this book is our focus on developing students' inquiry skills during projects so that they can make deep investigations into big and enduring ideas. The double entendre of our title—*Thinking Through Project-Based Learning*—is deliberate. We want to help you think through all the aspects of planning and implementing projects so that you can guide your students to the deeper thinking that PBL affords.

Inquiry is the engine that drives learning in PBL. By understanding more about how inquiry works, teachers can engage and sustain students' curiosity across the arc of a project. We will offer suggestions to help educators retool how they teach so that they can harness the full power of inquiry with their students. We'll also suggest ways to redesign classroom environments (without extensive resources) and create new traditions so that students learn more deeply.

We also recognize the challenge of getting at and shaping covert acts of thinking. That's why we take readers into an exploration of new research in cognitive science and brain-based learning. By applying insights from these fields, educators can improve questioning strategies and make students' thinking less mysterious—and more effective.

One of the appealing promises of PBL is the opportunity to engage students in authentic, real-life projects (hence, the subtitle of our previous book: "Your Field Guide to Real-World Projects in the Digital Age"). Unless teachers are career changers from fields outside education, however, they are unlikely to have had much exposure to other professions. How are they expected to guide real-world inquiry into fields that they have never explored? To help readers think outside the classroom, we offer insights from experts in a variety of professions for whom inquiry is

central to their work. By knowing more about the thinking strategies of scientists, authors, artists, and mathematicians, teachers will be in a better position to help students tackle projects from diverse perspectives.

A development we have followed with interest is the potential for projects to "take off," having an impact that spirals far beyond the classroom in which they started. For instance, when compelling student work is shared publicly or published online, it can engage much larger audiences than students (or teachers) ever expected to reach. Don't be surprised if other teachers or schools ask to join your efforts, turning a single-class project into a connected learning experience.

WHAT TO EXPECT

The book is organized in two sections.

Section One, Inquiry: The Engine of Deep Learning, builds a foundation to help readers see how theory and concepts translate to better thinking in PBL. It includes five chapters:

Chapter 1, The Whys and Hows of PBL, offers an overview of project-based learning, distinguishes the project approach from other instructional strategies and explains the critical role of inquiry in PBL.

Chapter 2, The Inquiring Human Animal, turns to human development, cognitive science, and brain-based education to draw lessons about learning, particularly the deep kind that has students inquiring to construct their own meaning.

Chapter 3, Making the World Safe for Thinking, explores critical factors that influence inquiry, including features of the learning environment, design of learning experiences, and interactions that maximize children's development toward mature inquiry.

Chapter 4, The Thinking-Out-Loud-and-in-View Classroom, focuses on PBL teaching methods, including discussion and questioning techniques and "thinking routines" that can be applied across grades and subject matter.

Chapter 5, Designing Rich Learning Experiences, summarizes our approach to effective project planning with a step-by-step guide for developing inquiry-rich projects.

Each chapter in Section One is illustrated with project examples and advice from teachers.

Section Two, Taking a Page from the Experts, makes connections between core content areas and the ways in which experts in affiliated professions approach problem solving. In each chapter, we contrast how subject matter is typically approached in school with "real-world" applications of knowledge by historians, scientists, journalists, community

activists, and other capable people. We consider the language, tools, and methods professionals use in their investigations and draw lessons for classroom practice.

Chapter 6, Thinking Across Disciplines, sets the stage for this section by comparing disciplinary and interdisciplinary thinking.

The next four chapters focus on PBL in core content areas:

- Chapter 7, Language Arts
- Chapter 8, Social Studies
- Chapter 9, Science
- Chapter 10, Math

Because chapters are organized by traditional content areas, a reader might be inclined to focus on the subject matter he or she teaches. We encourage readers to read beyond their subjects to become familiar with the big ideas and real-life applications of other disciplines. With this familiarity, they will be better able to plan interdisciplinary projects that more closely mirror authentic work. Each subject-area chapter includes an assortment of interdisciplinary project examples. Readers might be inspired to collaborate with teachers from other disciplines, a practice we repeatedly recommend.

The main text concludes with Chapter 11, The Project Spiral. Here we describe how projects can expand in scope, complexity, and impact as teachers and students gain familiarity with PBL. We close with suggestions for building traditions for PBL that can lead to stronger connections between school and local community and, perhaps, connect students with the wider world.

At the back of the book, we include a Discussion Guide to help teacher teams, school leaders, instructional coaches, and others use the text to guide teacher learning. The guide summarizes key concepts from each chapter and advises on facilitating group and individual activities. It also helps facilitators know what to look for and respond to during class visits to encourage high-quality PBL.

The Appendices include a Project Library, with more than 80 short descriptions of all projects featured in the book, plus a few more projects we admire, too. There is also a companion Professional Development Guide, with suggestions for using the Project Library as a resource for professional learning or discussions by professional learning communities. Finally, we include a Resources Guide with suggestions of books, videos, and websites to round out your learning of PBL.

SPECIAL FEATURES

Whether you are reading alone or reading along with colleagues, whether you are new to project-based learning or a PBL veteran, we hope the book inspires you to reflect deeply on your own practice.

These special features are included throughout the book to encourage deeper engagement and reader interaction:

- *Project Signposts:* These just-in-time tips alert readers to try out tools and strategies that are useful at key points during the PBL process.
- *Exercises:* These do-it-yourself suggestions in Section One are intended to help readers connect what they are learning to their own practice. Mini-exercises are building blocks for the ultimate exercise, which is planning a standards-based, inquiry-rich project that causes students to operate as experts would when tackling a challenge or investigation.
- *Tech Spotlights:* Technology spotlights are presented in the subject-specific chapters of Section Two, highlighting useful technologies teachers and students can adopt to maximize learning opportunities in PBL.
- *Project Library:* Appendix A features a library of project sketches, including projects featured throughout the book. You can scan them quickly to find ones that match your grade level or subject area and then borrow or adapt them to meet your context and learning goals. Project sketches can also be useful in professional development to give teachers a wide range of project ideas to discuss and consider for their own classrooms.
- *Discussion Guide:* Appendix B supports shared reading, summarizing key concepts, and advising on group and individual activities.
- *Professional Development Guide:* Appendix C is a resource for facilitated professional development or professional learning community (PLC) work, this guide outlines five discussion starters for teachers or instructional leaders.
- *Resources Guide:* Appendix D supports further exploration. As noted before, this book is not a PBL primer but instead delves deep into project implementation. For those new to PBL, we include a resource guide with a wealth of books, readings, websites, and experts to help you understand and get started with PBL.

BETTER WITH PRACTICE

This book is intended to appeal to a wide range of readers.

If you are new to project-based learning, you will find examples and teaching strategies to give you a strong foundation. The many project illustrations will help you envision PBL so that you can plan and manage projects more effectively. Guided exercises will help you apply new ideas to your own practice and develop a more critical eye for quality projects.

If you are already somewhat familiar with PBL, we hope the book will challenge you to reflect on your previous project experiences and imagine

how you might guide your students into deeper inquiry. After all, revision and reflection are important aspects of the project experience. That's equally true for students and for educators.

Wherever you are starting, we hope you will be inspired to take project-based learning in new directions. That might mean planning your first interdisciplinary project, connecting your students with community experts, or planning for projects that spiral out of your classroom and into the local neighborhood—or into the wider world.

For school leaders, instructional coaches, and other decision makers who are interested in project-based learning as a route to school improvement, we hope you will come away with a clear understanding of how to support teachers—and students—as they make the shift to PBL. Developing your critical eye for quality projects will help you know what to look for when you visit PBL classrooms or offer feedback on projects. Understanding the right environment for inquiry projects will help you plan for changes that will allow PBL to flourish in your learning community so that teachers and students alike can do their best thinking.