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# Introduction

**P**roject-based learning (PBL) is an instructional model based on having students confront real-world issues and problems that they find meaningful, determine how to address them, and then act in a collaborative fashion to create problem solutions (Barell, 2010; Baron, 2011; Belland, French, & Ertmer, 2009; Larmer & Mergendoller, 2010). As schools in the United States, Canada, and around the world struggle with the implications of developing more effective instructional models in a period of shrinking budgets, many educational advocates have recommended PBL as an effective instructional approach that results in high levels of student engagement and achievement (Barell, 2007; David, 2008; Ghosh, 2010; Laboy-Rush, 2011; Mergendollar, Maxwell, & Bellisimo, 2007).

Project-based learning has become a topic of interest as the emphasis on effective education has increased in recent years. In fact, many educators foresee rather drastic disruptions in the teaching/learning process, brought about by ever-changing technologies, the increasing demands of struggling students, and various changes now underway in education such as increased emphasis on differentiated instruction and the response-to-intervention initiative (Barell, 2010; Bender & Waller, 2011; Bonk, 2010; Laboy-Rush, 2011; Partnership for 21st Century Skills, 2009). In that context, the PBL instructional approach seems very well situated to become the primary model of instruction in the next century, and educators are well advised to get on board with this innovative approach to teaching.

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While project-based learning is not new (Bransford, Sherwood, Vye, & Rieser, 1986), it has recently received increased emphasis as educators and business leaders look for ways to move education forward and

develop students' skills in 21st-century technologies, problem solving, and collaboration (Partnership for 21st Century Skills, 2007, 2009). PBL originated in the early decades of the 1900s (Dewey, 1933) and was originally applied in medical education rather than in public schools (Cote, 2007). However, current applications of PBL look decidedly different from those early applications of the concept, since modern instructional technologies have matured and today play such a definitive role in PBL instruction (Bender & Waller, 2011; Cote, 2007).

## About This Book

Today, project-based learning (PBL) is one avenue for differentiated instruction that is strongly recommended for 21st-century classrooms (Barell, 2010; Bender & Waller, 2011; Ghosh, 2010; Laboy-Rush, 2011; Partnership for 21st Century Skills, 2009). Teachers are increasingly applying PBL instruction across the grade levels and are exploring how this instructional approach works in real classrooms. This book will address that question and present practical guidelines on how to use PBL across the curriculum.

However, this book goes much further than earlier efforts. This is one of the first books to explore PBL as an approach to differentiated instruction, one that bases that discussion in modern applications of technology in the classroom. Because many of the earlier books on PBL did not take into account either the concept of differentiated instruction or the ever-evolving technologies that are available for instructional application today, this book is really unique in that approach. Of course most classrooms do not offer all

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of the modern technologies that can be used in education, so practical implementation guidelines are provided throughout the book for classes with somewhat limited technology resources.

Thus, this book interfaces several critical instructional techniques for 21st-century classes—PBL, differentiated instruction, and literacy in 21st-century technology skills. Not only will this book be one of the first modern books on PBL, it will also be the first book to thoroughly explore that cross-fertilization of instructional practices and concepts. While some research is presented and discussed, the primary emphasis of this book will be on modern, practical instructional strategies for elementary grades and in middle and secondary subject areas.

### **Who Should Read This Book**

The book is intended to be a professional development resource book for many in education including the following:

- Practicing teachers,
- Administrators,
- School district personnel,
- Educational leaders,
- College faculty, and
- School board members.

Specifically, the book is intended to assist an individual teacher's move into PBL instruction within his or her class, and while the focus of this book is on an individual teacher's effort, PBL is often undertaken as a schoolwide instructional effort (Barell, 2007). For that reason, the professional learning community or educational leadership team within a school should also feel free to undertake this professional development effort jointly.

### **Contents and Organization of the Book**

Each chapter in this book provides a great deal of information on how PBL works in real classrooms, and multiple examples of actual projects from real schools are provided. Also, much information is highlighted in the boxed sections of the chapters such as guidelines for certain tasks within PBL, steps in the PBL instructional process, research evidence on PBL, assessment options within PBL, and other critical information. Specific strategies are described at length, as are the undergirding theoretical issues, but the major emphasis is on how PBL actually works. Thus, implementation suggestions comprise the key components of this text.

Chapter 1 describes PBL as best-practices instruction, since PBL engages students in their learning tasks so completely. The chapter presents an overview of PBL and various model projects ranging from kindergarten up through high school. An initial discussion of what project-based learning is will be followed by a discussion of several sample PBL projects. Two example projects, a middle school example and an elementary school example, are discussed at length, and one of these involves a webquest and a rubric that is frequently used in evaluation of PBL projects. The chapter also presents many brief descriptions of PBL projects across the grade levels.

Chapter 2 presents a discussion of PBL in the context of the classroom. Teachers must initially consider how PBL fits within their instruction, as either an adjunct to unit-based instruction or as a replacement for unit-based instructional planning. Next, a short section summarizing research on PBL is presented, including research that shows not only the efficacy of this technique relative to traditional instructional models but also the efficacy of PBL for improving students' academic performance on standards-based assessments. Finally, sections on technology within PBL and challenges teachers face as they move into PBL are included.

Chapter 3 presents specific implementation steps for planning and instruction using a PBL model. PBL projects include various elements or components that make up the project assignment, and while various PBL proponents differ on what these are, most agree on the basic overall structure of PBL. This chapter presents those critical PBL components and then describes a step-by-step PBL planning procedure. Another example of a model PBL project is presented as the basis for this discussion.

Chapter 4 focuses on instructional technologies and strategies that facilitate PBL in the classroom, and it describes the most up-to-date teaching tools, such as alternative reality gaming or Ning in the context of PBL. Whereas many teachers are using class blogs, and online webquests today, applications of social networking technologies and emerging mobility technologies are more recent, and these will be discussed in terms of how they might apply for PBL instruction. PBL has long emphasized gaming and simulations as one option for PBL instruction, and those will be described here. Finally, another model PBL project on Civil War studies in middle and high school is presented, with an emphasis on technology applications within PBL instruction.

Chapter 5 describes various nontechnological instructional strategies that fit extremely well within the PBL framework. For example, instruction in strategies that students can repeatedly use in PBL units,

strategies such as brainstorming, timeline planning strategies, or metacognitive support strategies are critical in PBL, as are minilessons on specific content that students will find essential in completing the PBL unit. Teaching strategies such as cooperative learning and scaffolded instruction are described in the context of PBL instruction, since PBL is founded on collaborative problem solving. Thus, teachers should maximize the use of these strategies in order to emphasize cooperative tasks within the overall PBL-based curriculum.

Chapter 6 discusses assessment options within PBL. One of the issues teachers face in moving into PBL involves a perceived mismatch between standards-based, direct instruction and project-based learning, though research has demonstrated that students in PBL instructional approaches do better at statewide standardized assessments than their counterparts in more traditional instruction (Geier et al., 2008; Gijbels, Dochy, Van den Bossche, & Segers, 2005; Mergendollar, Maxwell, & Bellisimo, 2007). Still, assessment of student progress is critical in today's classes, and this chapter focuses on the use and application of several assessment tools for PBL, including rubric-based assessment, self-evaluation, peer evaluation, group grading, and portfolio assessment. While there is no specific assessment practice that must be incorporated into PBL, most of the research and practitioner guidelines stress these rather innovative assessment options, either individually or in conjunction with more traditional assessment options, and the advantages and concerns for each approach will be highlighted. A model PBL project is described as the basis for discussion of assessment practices within PBL instruction.

Finally, while the relationship between PBL instruction and the Common Core State Standards ([www.corestandards.org/the-standards](http://www.corestandards.org/the-standards)) is described throughout the text, the appendix presents a discussion of how educational standards in other states likewise correlate with PBL instruction. The appendix uses educational standards from the Texas Educational Agency, specifically, the Texas Essential Knowledge and Skills Standards (TEKS) as an example of a state that did not adopt the Common Core Standards (see <http://ritter.tea.state.tx.us/rules/tac/chapter113/ch113b.html#113.18>).

## Conclusion

As schools struggle to teach all students in a world of limited motivation, poor problem-solving skills, extremely limited budgets, and ever-changing instructional technologies, PBL has emerged as an



option for 21st-century classrooms (Baron, 2011; Belland, French, & Ertmer, 2009; Larmer & Mergendoller, 2010; Partnership for 21st Century Skills, 2009). The proponents of PBL are marshalling their resources in an effort to reform schools along these lines, and the evidence does indicate that students respond quite well to this form of instruction.

Further, PBL is now seen by many as the best approach for emphasizing problem-solving skills in a world in which knowledge itself is outdated by the time it is printed in a textbook (Barell, 2010; Belland, French, & Ertmer, 2009; Larmer & Mergendoller, 2010; Partnership for 21st Century Skills, 2009). Thus, teachers are wise to embrace this instructional approach and explore the possibilities it brings for the students in their classrooms. We owe our students the very best education we can provide, and much research indicates that PBL represents best instructional practice today. This is, in every sense, teaching for the 21st century!

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# 1

## Engaging Students Through Project-Based Learning

### What Is Project-Based Learning?

Project-based learning (PBL) is one of the most effective ways available to engage students with their learning content, and for that reason, PBL is now recommended by many educational leaders as a best instructional practice (Barell, 2010; Baron, 2011; Cole & Wasburn-Moses, 2010; Larmer & Mergendoller, 2010). PBL is an exciting, innovative instructional format in which students select many aspects of their assignment and are motivated by real-world problems that can, and in many cases will, contribute to their community.

PBL may be defined as using authentic, real-world projects, based on a highly motivating and engaging question, task, or problem, to teach students academic content in the context of working cooperatively to solve the problem (Barell, 2007, 2010; Baron, 2011; Grant, 2010). Student inquiry is heavily integrated into project-based learning, and because students typically have some choice in selecting their group's project, and the methods they would use to solve that