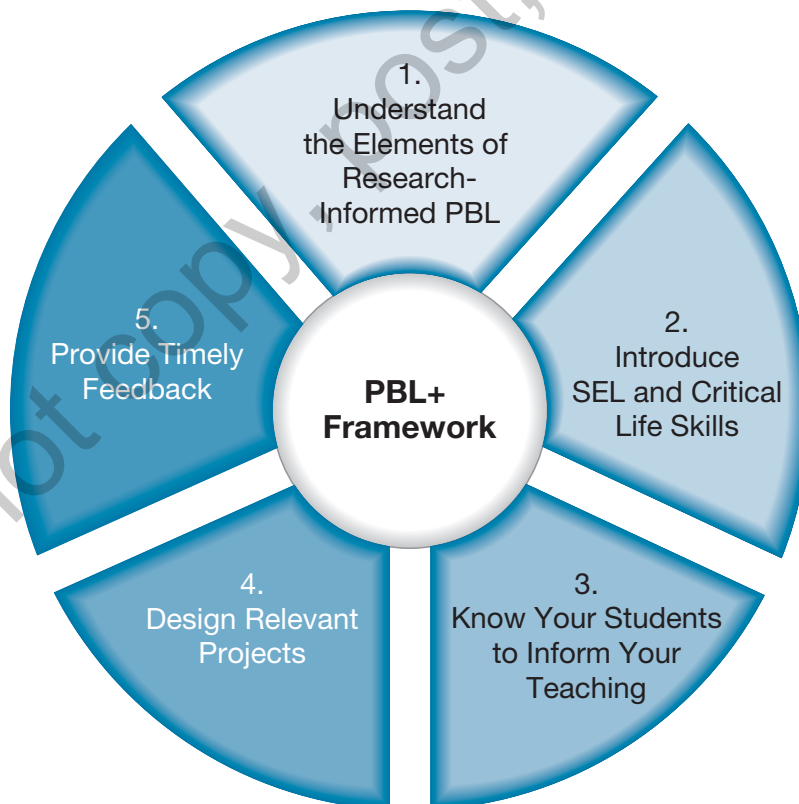


PART 1

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THE PBL+ FRAMEWORK

The following five chapters offer readers an in-depth explanation of each element of the PBL+ Framework, research supporting each element, and recommendations for actionable and equitable classroom implementation practices. Furthermore, this section also provides recommended materials educators can use to improve their PBL teaching plan by focusing on equity and enhancing the emotional intelligence skillsets of their students through SEL.

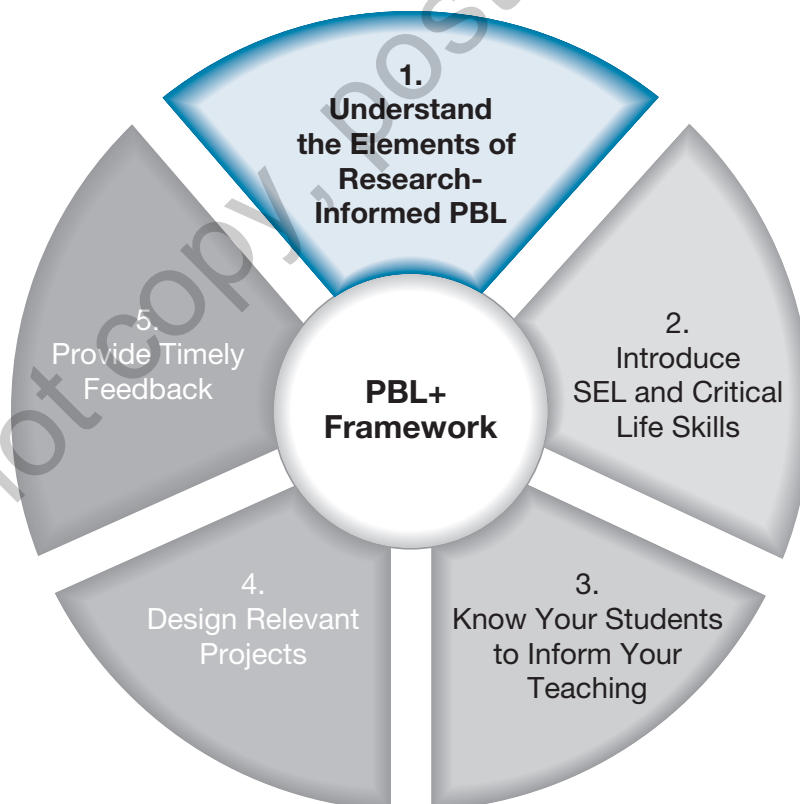


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CHAPTER 1

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ELEMENT 1: UNDERSTAND THE COMPONENTS OF RESEARCH-INFORMED PROJECT-BASED LEARNING



This chapter provides the foundational knowledge required for understanding research-informed project-based learning (PBL) and is an actionable guide for helping you define your students' PBL experience. We begin by making PBL accessible to all teachers by demystifying common PBL hurdles and providing practical recommendations for pacing and teaching structure that doesn't neglect academic rigor. We then explore recent research by Lucas Education Research showing that PBL is a proven effective teaching methodology in various educational contexts, including for historically underserved students.

To further provide PBL structure and guidelines, we delve into the elements of the High-Quality Project-Based Learning (HQPBL) framework. The HQPBL framework is Do-It-Yourself (DIY), research-based, and developed in consensus with PBL experts. This chapter will unpack this framework used in the project examples in Part 2 of this book. Furthermore, the concepts and tools uplifted in this chapter can be applied across any curriculum and are required to successfully implement the following elements in the PBL+ Framework.

LEARNING INTENTIONS

- ▶ Readers will be able to
 - accurately define projects,
 - confront common PBL hurdles,
 - review research that supports PBL in various educational contexts,
 - understand the six elements in the HQPBL framework and how they define the student experience, and
 - develop the multiple skillsets associated with each of the HQPBL elements.

When we say projects, what exactly do we mean? This is an important question that I've asked participants at the very beginning of our PBL workshops for years. Teachers need to understand the instructional approach they're attempting to use. Take a moment to answer it yourself—write it down if you'd like. Responses to this question vary from person to person, and many say a variation of the following:

- Real-world learning and application
- Kids working together to create something useful
- Learners solving an open-ended problem
- Authentic learning experiences

If your answer(s) included any of the above, you're definitely on the right path. But there are a few things I want you to consider as you delve into the content

in this book and plan to facilitate your own projects with students. *Project-based learning is a research-based instructional approach teachers can use to engage learners over an extended period to solve compelling real-world problems and acquire the skills and dispositions needed for successful lives.* Although there's a lot you can glean from this definition of PBL, here are two critical things I want you to genuinely consider as you reflect on your identity as a PBL teacher or coach:

1. PBL is a research-based instructional approach—a teaching methodology—a way to teach that has been proven to impact student learning and achievement positively (Lucas Education Research [LER], n.d.-a).
2. Learners will need to engage in projects over an extended period. This means that intended learning in projects doesn't occur in one or two days—that's because kids need to engage in intellectual challenges to explore new concepts and skills, wrestle with ideas, and present solutions to an authentic audience. This will take time. Two to three weeks tops is a suitable amount of time for a high-quality project.

If you're like most teachers or me, the abovementioned two items will bring you comfort and probably some discomfort too. On the one hand, many find comfort in knowing they are attempting to implement a valuable approach to learning which will require some time for young people to master. On the other hand, where do I begin with all of this? If that's your primary concern—no worries. It takes time to master facilitating PBL well for students. This book provides the playbook leveraging evidence for PBL with diverse student populations and research-informed frameworks and tools you'll need to begin and take your PBL coaching to the level you want to achieve.

USING EVIDENCE TO IMPROVE PBL PRACTICE

PBL is a constructivist teaching approach. Constructivist teaching says that learning occurs when learners actively engage in knowledge construction and the learning process to make deep meaning and connections to other branches of knowledge (A. Gray, n.d.). Constructivism is a paradigm for teaching and learning and is an amalgamation of the behavioral and cognitive learning theories and also shows up in other theories like general systems theory and communications theory (Valenzuela, 2019c).

As elements of constructivism inform the theory for PBL, PBL practitioners should understand why and how such practices help students learn along with ways of leveling up their own PBL teaching practices to enhance the experience of their learners. As we begin to test and evaluate what works in our classroom, having a trusted source for getting our knowledge is critical. If you're unsure where to go or how to start unpacking the right resources—here are some recommendations that guide my own PBL action research.

Lucas Education Research is the research arm of the George Lucas Educational Foundation (LER, n.d.-b) and a trusted source for PBL research. For the past 30 years, the foundation has worked to transform education—including a niched design-based research approach focused on teachers' needs and participation in

a variety of education settings targeting and showing positive impacts on student achievement in science, social studies, social and emotional learning (SEL), literacy, numeracy, and advanced placement (AP) by using PBL. In 2021, Lucas Education Research published six research briefs summarizing the findings of peer-reviewed studies examining the impact of PBL across disciplines and grade levels (LER, 2021). Insights gleaned from the briefs can be used to help education stakeholders improve their understanding of new empirical evidence uplifting the effectiveness of PBL to learners with diverse needs (including the underserved) and across multiple academic settings.

Here are some of the most significant findings from the research brief titled *Rigorous Project-Based Learning Is a Powerful Lever for Improving Equity* (LER, 2021)—along with data points that make a powerful case for using PBL, including for students at risk of academic failure due to socioeconomic challenges and attending low-performing schools. It's important to note that the research brief discusses findings from four recent and rigorous studies.

- Integrating PBL in AP US Government and Politics and Environmental Science courses increased the probability of students achieving a passing score on AP exams by about eight percentage points in the first year and ten percentage points after teachers had two years of experience teaching high-quality PBL units (Saavedra et al., 2021).
- Middle school students in high-poverty, diverse California schools that learned science with PBL outperformed peers who received traditional instruction by 11 percentage points on science testing. They also made achievement gains on the state's end-of-year math and English language arts assessments (Deutscher et al., 2021).
- Using PBL, English learners from low-income families outperformed peers on a language proficiency test (Deutscher et al., 2021).
- Third-grade students in Michigan engaged in an interdisciplinary project-based science curriculum performed eight percentage points better on a key science assessment than peers receiving traditional instruction. Additionally, the positive effect of PBL on academic achievement held across racial and ethnic groups and socioeconomic levels regardless of prior reading proficiency—showing that struggling readers outperformed struggling readers receiving traditional instruction (Krajcik et al., 2021).
- Second-grade Michigan students in low-income, low-performing schools learning social studies and literacy in a project-based curriculum achieved five to six more months of learning gains in social studies and two to three more months in informational reading than peers receiving traditional instruction (Duke et al., 2020).
- The four studies improved the SEL of students in collaboration, problem solving, sound decision making, and effective communication (LER, 2021).

These findings and data points are encouraging for using PBL—especially with disadvantaged and underserved students. Furthermore, using the knowledge obtained in these resources (LER, 2021) can be very helpful in providing the theory and framework(s) that both individual and teaching teams will need to begin implementing and refining their use of PBL within their unique context.

That is how an initiative like PBL becomes sustainable in schools: taking what's been done—tweaking and adapting it—finally collecting data for informing and revising future practice. Don't let data collection throw you if it's a new concept. You can learn how to use data to guide your work by surveying participating teachers for confidence and self-efficacy for teaching using PBL. You can also monitor student engagement and achievement before and after exposure to PBL. Pre- and post-survey instruments are available on the companion website, resources.corwin.com/ProjectBasedLearning+. Feel free to revise and edit these surveys to meet the needs of your unique school context.



COMMON HURDLES TO IMPLEMENTING PBL

The previous section informs us that PBL works to improve learning—especially for underserved kids who may be struggling to keep up with their grade level. However, data is variable, and the same PBL treatment that works for one class may not work precisely the same for yours. That's because hurdles to success, kids' readiness to learn, and teacher understanding vary from place to place. PBL has been definitely shown to have a high influence on student engagement and achievement. But even with the research-informed framework(s) introduced and elaborated on in this book, we need to closely monitor how our students are experiencing our facilitation. Remember, teaching pedagogy is part science but it's also part art. The art is our personal style and how we facilitate and carry out our pedagogical strategies. I can't stress monitoring our own impact enough.

I've learned a lot from the thousands of teachers I've met through my coaching work, and many do not like it when professional development providers and authors do not acknowledge their pain points. Therefore, you'll find in this book that we will not avoid the elephant in the room when it comes to any item that may challenge the teacher confidence and self-efficacy needed for implementing any of the proposed strategies—beginning with PBL. Before diving into the elements of high-quality PBL, let's quickly dispel three of the biggest misconceptions and roadblocks to attempting PBL that I've heard from educators.

- 1. I have to prepare my students for exams (or cover lots of content) and can't dedicate an entire school year or semester to planning or teaching this way.** I agree—do not abandon the teaching practice you have carefully honed. Instead, implement one project a semester, connect it to learning in your area as best as possible, and implement it for no more than two to three weeks at a time.
- 2. I'm a content teacher and am not exactly sure how to make real-world projects.** I admit this can be tricky the first time around. Focus on important problems in the community (e.g., health, financial inclusion, environment). Let the students pick the issue(s) they want to tackle and develop a plan for knowing their topic inside and out, along with solutions. I curated resources for various topics of interest (see Figure 1.1) that you can use to help provide compelling inspiration to engage your kids.

FIGURE 1.1 PBL+ RESOURCES FOR SPECIAL INTERESTS AND PASSION PROJECTS

1. Art
2. Environmental
3. Financial Literacy
4. Health and Medical
5. Law
6. Music
7. Technology

For more details on these special interests, see <https://bit.ly/3TbYoU2>

3. I typically teach my students the required content; after learning, they use their new knowledge to make a project. What do the teaching process and pacing look like in PBL, and how is it different from what I already do? Think of the project you are teaching the same way you would a unit of study. Students engage and participate in projects (the unit)—not necessarily make them. More specifically, they learn throughout the project while developing and creating products (not projects) to transfer and showcase their learning. In coaching learners of all ages, I have found a greater impact on student learning when they complete their products in drafts and receive feedback using a straightforward protocol. This practice will be fully explained in Chapter 5.

For now, let’s examine the pacing chart in Figures 1.2 and 1.3 to understand better the progression of learning in projects along with pacing and teaching structure as students develop their products.

PACING AND TEACHING STRUCTURE IN PBL

FIGURE 1.2 ELEMENTARY SAMPLE PACING CHART FOR A TWO-WEEK PBL UNIT. THIS TEACHER SEES STUDENTS DAILY.

WEEK	MON	TUES	WED	THURS	FRI
One	Compelling Hook	Mini-Lesson, Work Time, and Reflection	Feedback Protocol and Work Time	Quiz and Work Time	Mini-Lesson, Work Time, and Reflection
Two	Feedback Protocol and Work Time	Mini-Lesson, Work Time, and Reflection	Discuss Draft With Teacher	Final Work Time and Reflection	Public Product and Reflection

FIGURE 1.3 SECONDARY SAMPLE PACING CHART FOR A THREE-WEEK PBL UNIT. THIS TEACHER SEES STUDENTS EVERY OTHER DAY.

WEEK	MON	TUES	WED	THURS	FRI
One	Compelling Hook and Guest Expert Speaker		Mini-Lesson, Work Time, and Reflection		Feedback Protocol and Work Time
Two		Mini-Lesson, Work Time, and Reflection		Feedback Protocol and Work Time	
Three	Discuss Draft With Teacher		Final Work Time and Reflection		Public Product and Reflection

In PBL, we launch projects with an exciting, compelling hook to inform students about the purpose of the unit and the products they'll be creating. We will learn more about creating compelling hooks in Chapter 9 on page 107. A good practice is to invite experts as guest speakers to make projects more compelling and authentic. But of course, this practice isn't only limited to the launch of projects. After the compelling hook, I like to manage lessons, activities, and learning in the following four-step process within a workshop model-inspired structure:

1. Mini-lesson (10–15 minutes)
2. Work time and reflection (35 minutes)
3. Feedback protocol (10–15 minutes)
4. More work time for either revision or continuing to the next draft and reflection (35 minutes).

These timings are for two class periods at 50 minutes each. Adjust time frames depending on the length of your teaching block.

The four teaching steps and teaching structure are not perfect, but it's a structure I've used successfully to keep learning organized and evaluate students' work as they use feedback to revise their drafts systematically. I suggest skimping a bit on lengthy whole-group lessons and choosing to work with smaller groups during periods of ample work time to model, remediate gaps in previous learning, and reteach vital concepts as needed.

A SIMPLE, EFFECTIVE FRAMEWORK FOR PBL

The previous sections in this chapter provided us with the supporting research for PBL and the pacing and teaching structure we can use for facilitating projects. Still, teachers trying their hand at PBL may be uncertain as to how to strengthen their project ideas and make them the best possible learning experiences for students. A research-informed framework for PBL and a few strategies for defining and organizing the student experience can considerably improve outcomes. When executed effectively, the HQPBL framework provides elements like authenticity, project management, and public products for educators to create the conditions for learning to stick and continue after projects (Valenzuela, 2022a).

For example, content or elective teachers can increase authenticity in projects by bringing in industry experts (e.g., engineers, environmental scientists, computer programmers, activists) at the launch to introduce the type of work students will be learning to do (Adams-Stafford, 2019). Teachers can also help students improve their work by having them develop public products with a call to action advocating for causes they care about, and instructing audiences of community members on the next steps to take (Valenzuela, 2021d). Before diving further into the framework, let's quickly learn about its development.

Established in 2018, the HQPBL framework is the consensus of the research and the accumulated practice of PBL leaders and experts worldwide (see Figure 1.4). The work to devise the framework was led by the Buck Institute for Education (now PBLWorks) in partnership with the Project Management Institute Educational Foundation (PMIEF) and the William and Flora Hewlett Foundation. The process was guided by a 27-member steering committee and supported by a 90-member advisory team (Mergendoller, 2018). Other essential partners included Google, High Tech High, EL Education, Southern Regional Education Board, and the International Society for Technology Education (ISTE). An important project's goal was to provide teachers and schools with no access to formal PBL training with resources that enable them to enact PBL practices independently by having research-informed guidelines at their disposal for designing the student experience.

FIGURE 1.4 HQPBL FRAMEWORK

1. Intellectual challenge and accomplishment
2. Authenticity
3. Public product
4. Collaboration
5. Project management
6. Reflection

SOURCE: hqpbl.org.

The HQPBL framework can be used with learners of all ages, but it's particularly well suited to middle and high school students who are passionate about solving meaningful problems. Furthermore, the framework advises that for PBL to be "high quality," six minimal criteria must be present throughout projects (see the following section).

USING THE HIGH-QUALITY PBL FRAMEWORK

My time in my PhD program taught me that knowledge is created through action research, which is why it's integral to my coaching work and also my own learning. Whenever you're studying something new, it's essential to explore what's already been done on that particular topic. Chances are someone has already developed a framework, model, or system we can learn from by adapting and tweaking it for our specific academic context. Therefore, "framework first, mindset second" is a powerful principle I use to help colleagues understand that having good general guidelines for doing something new is the prerequisite to developing second-nature expertise. Learning to design and implement projects is no different. The HQPBL framework can be an excellent place to start using PBL as a research-informed instructional approach.

This book doesn't jump straight into designing projects because we need to know the elements of a high-quality project before attempting to develop one. In my coaching work, I meet many educators who need just a little assistance in understanding what elements should be present in the projects they facilitate with students. I find that most are set to begin their PBL journey with a bit of guidance using a tool like the HQPBL framework. The framework helps educators define the student PBL experience and can be an authentic starting point for designing and implementing projects for any educator. Furthermore, we can use the following six elements from the HQPBL framework to frame what students should be doing, learning, and experiencing (Valenzuela, 2022a).

- 1. Intellectual challenge and accomplishment.** Students investigate challenging problems or issues over an extended period of time. To keep the process and student learning manageable, I recommend two to three weeks for teachers new to PBL (see Figures 1.2 and 1.3). Two to three weeks is enough time for kids to develop a couple of solid products—one written and one they construct, design, or create (see #3 for the public product). Throughout the project, they should develop the essential content knowledge and concepts central to academic disciplines. Therefore, I encourage teachers to have students use the thinking routines and problem-solving strategies they typically use (e.g., Bloom's taxonomy, design thinking, scientific inquiry, computational thinking) to think critically in their content area.
- 2. Authenticity.** Projects focus on real-world connections that are meaningful to students—including their cultures and backgrounds (Seidel, 2014). Framing a compelling project context for students is critical to having them care and get their buy-in about doing the work. Additionally, the tools and techniques they employ should mimic those used by career professionals. By inviting experts (Wolpert-Gawron, 2019) into the classroom and having students assume authentic career roles (e.g., engineer, doctor, auto technician), they can learn valuable career pathway options and see how their work and the solutions they develop impact others.
- 3. Public product.** The students' final products are presented to the public as a culminating event. This means the work they produce is seen and discussed with the broader community, including parents, industry professionals, other classes, administrators, and community members. When students know that others will see their work, this may motivate them to put their best foot forward. Public products are not limited to

presentation nights. Student work can be displayed as public art, as exhibits, or online via social media, YouTube, and safe school websites.

Additionally, products can also be assessed as performance tasks. A performance task is a learning activity or assessment that students perform to transfer their knowledge, understanding, and skillsets. Performance tasks produce a tangible product or performance that is evidence of learning. I created this nifty table categorizing different products and performance tasks into five types (see Table 1.1).

TABLE 1.1 EXAMPLES OF PRODUCT AND PERFORMANCE TASK TYPES

DESIGNED AND DEVELOPED	TECHNOLOGICAL	MAPPING AND PLANNING	PRESENTATION AND DEMONSTRATION	COMPOSED
Art Gallery Exhibit	Animation	Blueprint	Debate	Analysis
Garden	App	Building Floorplan	Lesson Facilitation	Article
Machine	Computer Program	Business Plan	Mock Trial	Blog
Mode of Transportation (air, land, and water)	Digital Story/Comic	Business Proposal	Newscast	Brochure
Prototype	Infographic	Competitive Bid	Oral Defense	Call to Action
Scale Model	Invention	Computer Program Flow Chart	Panel Discussion	Design Journal
Structure (tower, bridge, etc.)	Photo Album	Customer Estimate	Performing Arts (acting, singing, and dancing)	Field Guide
Tiny House	Podcast	Design Sketch	Pitch	Letter
Woodwork (benches, chairs, shelves, etc.)	Robot	Project Management Plan	Public Demonstration	News Editorial
Working Model	Simulation	Project Timeline or Timetable	Public Service Announcement	Product Review
	Social Media Campaign		Speech	Research Report
	Video		Spoken Word	Scientific Journal
	Virtual Museum			Script
				Training Manual



Available for download at resources.corwin.com/ProjectBasedLearning+

4. **Collaboration.** Working with others is a PBL hallmark where students collaborate with adults and their peers in many different ways. Adults serve as mentors and guides and can include teachers, community members, or outside experts. In teamwork between students (Valenzuela, 2019a), each learner contributes their unique skills and talents to add to the whole group. Author Simon Sinek (2012) once tweeted, “A team is not a group of people who work together. A team is a group of people who trust each other.” Learners of all ages need good collaboration tools to establish and maintain trust. Creating shared agreements, team contracts, and task lists is an excellent start. You can see these resources and more on the companion website, resources.corwin.com/ProjectBasedLearning+.

To weave literacy throughout projects for all learners, I recommend having students create two products per project: (1) something they make, and (2) something they write.



5. **Project management.** Students help manage the project process, using tools and strategies similar to those used by adults. I’ve seen teachers using several tools for assisting learners in keeping their work organized—good ones for PBL include

- scrum boards (LaVogue, 2020),
- using design thinking during the ideation process (Rochester, 2019), and
- maintaining important documents in a learning management system (e.g., Google Classroom or Schoology).

I’ve also found that some learners benefit greatly from keeping a daily schedule before attempting to help manage projects. As students’ capacity for self-management increases, teachers take on the role of facilitator, helping guide students through the process rather than directing it.

6. **Reflection.** The learning process is enhanced by frequent reflections that help students think about their progress and how to improve their work. To hit this point home, I share this quote from John Dewey (1933, p. 78) with teachers: “We do not learn from experience. We learn from reflecting on experience.” To bring Dewey’s quote to fruition, we can have learners complete products in drafts and jump-start reflection through critique protocols (Edutopia, 2016). This type of process can help learners retain content and skills longer and gives them the awareness of how they learn best by using reflection for metacognition. Other methods for reflection can include journaling, the 3-2-1 strategy (Garmston & Wellman, 2009), and the one-minute paper (Center for Excellence in Teaching and Learning, n.d.).

SUMMARY

For teachers new to PBL, doing projects can seem daunting, overwhelming, and perhaps outright tricky. Whether you teach in person, remotely, or in a hybrid model, PBL can be an important teaching strategy for producing high influences on student engagement and achievement in your ever-evolving classroom. I hope you consider the elements of HQPBL along with the pacing and teaching strategies proposed in this chapter. You will find these resources helpful whether you're beginning or enhancing your teaching using PBL. It just takes practice and patience to build your expertise and know-how. Now that you better understand what high-quality and research-informed PBL is, we will move into *Understanding the CASEL 5 and Emotional Intelligence*, the second element of the PBL+ Framework.