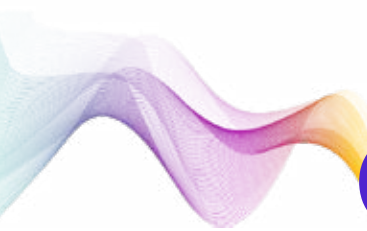




LEARNING THAT CONNECTS

DESIGNING PBL





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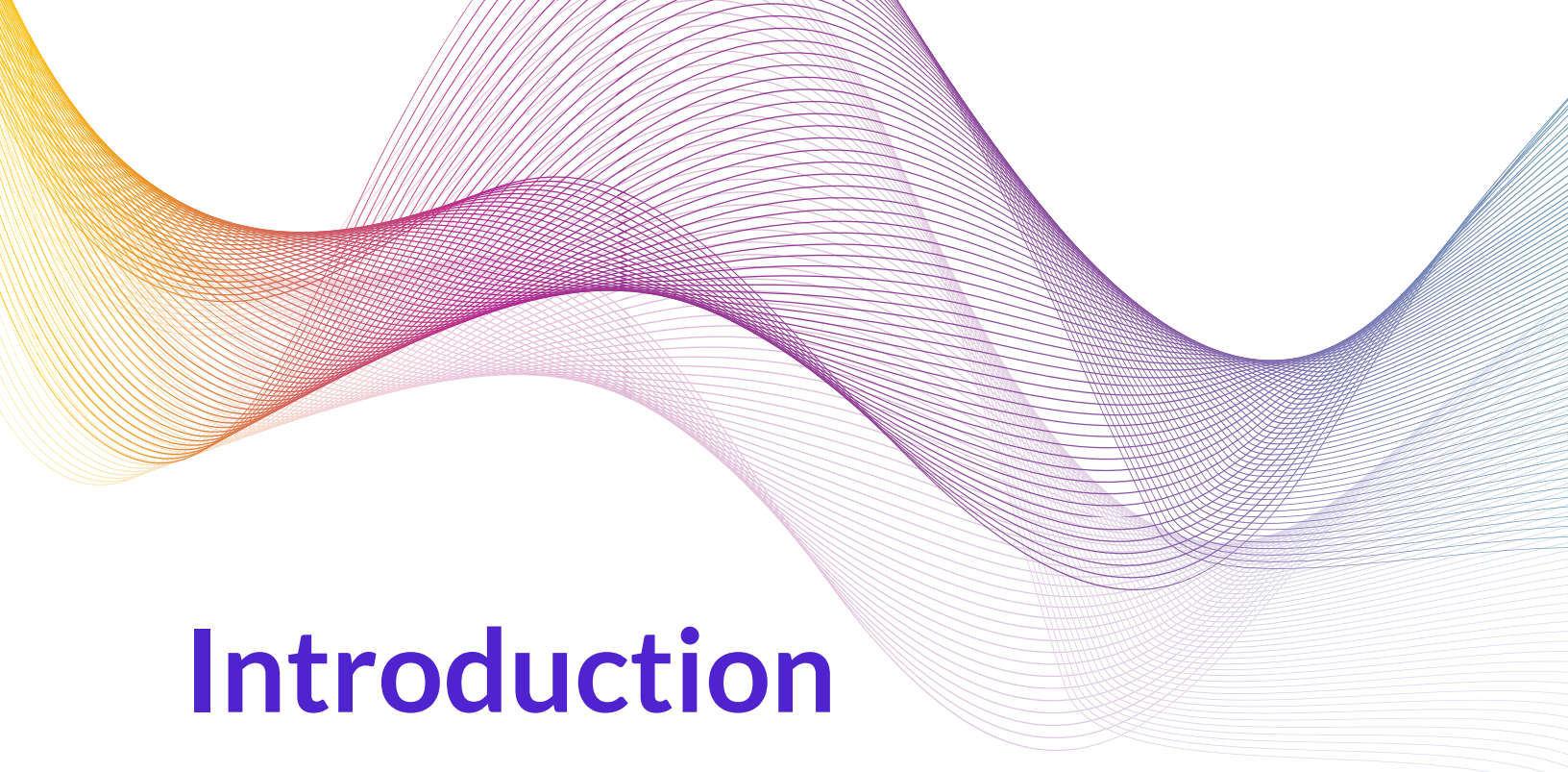
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Introduction

When the World Economic Forum identifies analytical thinking, resilience, flexibility, and agility as the most valued skills for tomorrow's workforce¹ educators need to know which teaching approaches will ensure their students are prepared not just to succeed academically, but also to be ready to capably tackle complex, interdisciplinary challenges.² And when many standards and high-stakes assessments are tethered to content, teachers need to know how they can move beyond content coverage to cultivate the deeper learning and transferable skills young people will need for a lifetime of personal, professional, and technological evolution.

One way teachers can prepare students for that future is through project-based learning (PBL). A hallmark of high-quality PBL is its focus on developing rigorous academic knowledge through authentic ways of learning, working, and innovating.³ Recent research demonstrates the significant positive impact of PBL on student outcomes^{4,5} and shows that when PBL is designed and implemented in alignment with evidence-based principles, students outperform peers on measures of academic content knowledge and report higher levels of engagement and motivation⁶. At the same time, PBL teachers demonstrate professional growth in facilitating active learning, group work, discussions, and performance assessment.⁷

Why This Framework Matters

While the PBL landscape includes several well-established frameworks that have identified sets of design principles and practices, a critical gap remains: How do the pieces fit together? After a decade of designing PBL curriculum and supporting teachers in creating and localizing their own units, the Educurious team at the National Center on Education and the Economy (NCEE) has learned that educators and curriculum designers need more than a list of guiding principles—they need a clear understanding of how these elements work together to create an effective and engaging arc of learning.

Rather than reinventing the wheel, this framework organizes research-backed elements into a coherent architecture that reveals when each element is typically introduced, how they build on each other, and why their integration creates the conditions for sustained collaborative inquiry.

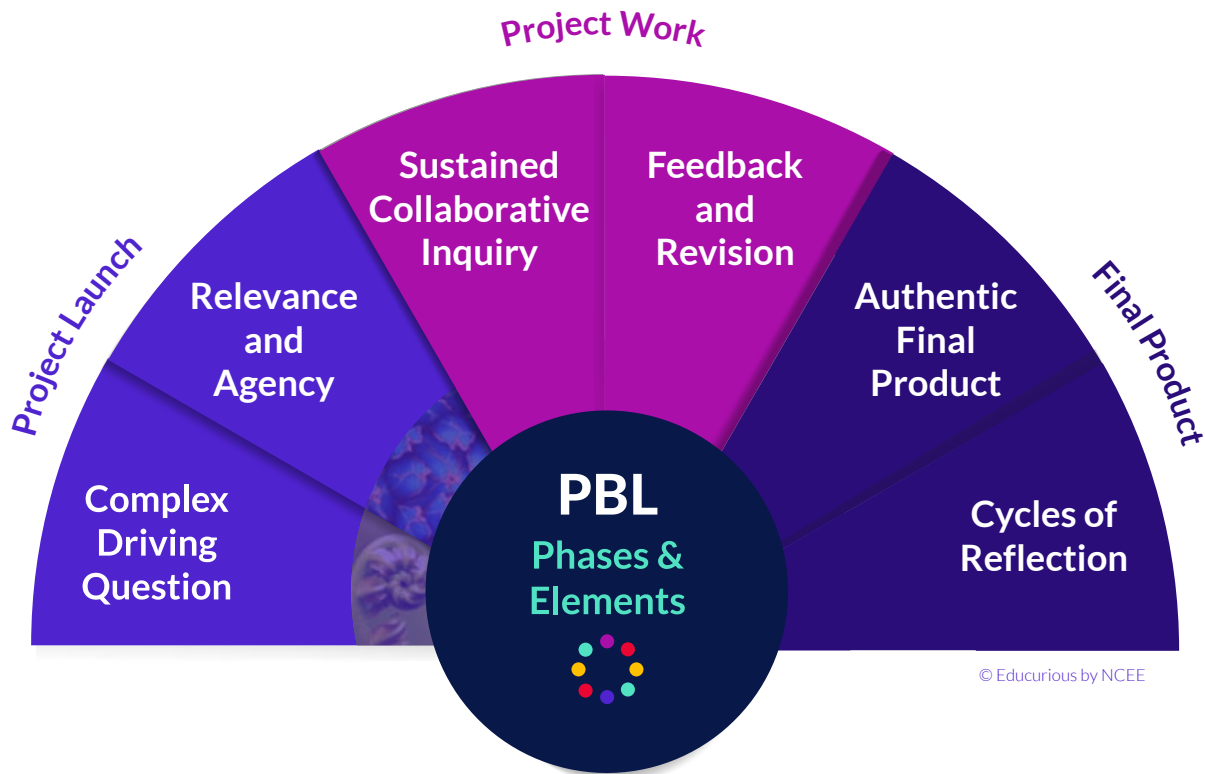


Figure 1: The PBL Design Framework

A Framework Grounded in Shared Purpose

This framework emerges from foundational research that has shaped the field and the accumulated wisdom of researchers and practitioners who have been refining PBL for decades. What this framework offers is not new principles, but a new way of seeing how these principles create a learning journey that moves students from initial curiosity to deep understanding to meaningful action. Whether you are reading this framework as a curriculum designer, teacher, school leader, and/or researcher, we hope it will support one of the following purposes:

- **Architecture that supports quality:** For designers of PBL curriculum, this framework provides a guide for ensuring every phase and element serves the larger purpose of sustained inquiry.
- **Adaptation and implementation:** For PBL teachers, the design principles offer practical guidance for two critical aspects of your role: facilitation and adaptation. This narrative highlights how PBL units can be adapted to support students' needs and reflect local contexts and community resources while maintaining the integrity of PBL design.
- **Research and school leadership:** When evaluating or studying PBL implementation and outcomes, this framework provides a lens for examining how the integration of design elements—rather than their presence alone—contributes to the learning experiences and expected outcomes.

Preparing students for shared prosperity, robust democracy, and lives of purpose requires researchers, teachers, and curriculum designers to work together with a clear, shared understanding of what quality looks like in practice. The PBL Design Framework contributes to that essential collaboration.

A Brief Overview

The aim of Educurious PBL is to engage students in learning that connects: It should feel relevant and engaging at a personal level and authentic to the disciplines being studied. The Educurious approach to PBL actively engages students in authentic projects designed to cultivate relevant and sustained inquiry that develops deeper academic knowledge and transferable skills such as problem-solving, critical thinking, communication, and collaboration.

High-quality PBL requires a shift toward student-centered learning in the way that it prioritizes depth (rather than breadth) of learning and what students can do with the knowledge and skills they learn.⁸ The shift from delivering content in isolation to teaching content through purposeful application represents a crucial alignment with current workforce demands. And while PBL may seem like a new trend, its pedagogical approach can be traced back to the educational theorists John Dewey and William Heard Kilpatrick,⁹ among others in the late 19th and early 20th centuries, and even further, to ancient philosophers, such as Confucius, Aristotle, and Socrates, who promoted learning through doing, dialogue, and questioning.¹⁰ Today, PBL remains rooted in those practices while being grounded in research on learning, cognitive development, motivation, and engagement.¹¹ PBL also clearly aligns with the dimensions of high-quality teaching that the Organisation for Economic Co-operation and Development (OECD) identified in research on effective teaching practices across 40 countries.¹²

The Educurious framework grew out of the PBL research supported by Lucas Education Research (LER)¹³ between 2011 and 2022. Across the research teams connected through LER, an array of PBL design principles guided the development of and research into projects such as Knowledge in Action's¹⁴ project-based redesign of high school Advanced Placement courses, the Multiple Literacies in Project-Based Learning (ML-PBL)¹⁵ elementary science curriculum, the Learning Through Performance¹⁶ courses for middle school science, and the identification of PBL's core teacher practices at Penn GSE¹⁷ (University of Pennsylvania). As part of the LER consortium, Educurious developed the first version of our middle school Early U.S. History course (previously known as Project America). In addition to this shared research base for the design of PBL, the Educurious approach has been influenced by a decade of co-designing project- and inquiry-based curriculum with teachers, scholars, districts, states, and a variety of organizations from industry to government agencies.

It is important to note that this research base also encompasses the enabling conditions for successful PBL implementation; in addition to supportive school contexts and student engagement, teacher agency and aligned professional learning¹⁸ can be directly connected to strong project design. Beyond the phases and design elements within a unit, Educurious curriculum supports teachers through embedded educative

High-quality PBL requires a shift toward student-centered learning in the way that it prioritizes depth (rather than breadth) of learning and what students can do with the knowledge and skills they learn.



features¹⁹ (e.g., framing statements, teacher tips, and supplemental resources) designed to support just-in-time professional learning for educators as they navigate PBL instructional materials for the first or fifteenth time.²⁰ In combination with sustained professional learning opportunities, we see the relationship between high-quality curriculum materials and teachers' professional growth as an interactive and dynamic two-way street when it comes to developing the mindsets, deep understanding, and agile implementation skills of PBL teachers.^{21,22} This informs both this framework and our expectations for impactful PBL implementation, of which high-quality curriculum is just one part.

Two important parts of a PBL teacher's role are facilitation and adaptation.²³ Successful PBL facilitation establishes and fosters a strong culture of inquiry, in which students are taught how to collaborate effectively and respectfully, develop habits of learning and project management, and become confident in taking risks and learning from their mistakes.²⁴

Facilitation also requires that teachers deploy teaching strategies that scaffold tasks and hold students accountable for doing the work of thinking and sensemaking. For example, a PBL teacher might ask students to rank issues in a reading by relevance to their project and explain their thinking rather than respond to comprehension questions. This kind of approach also doubles as authentic formative assessment. Adaptation is another skill teachers develop to meet specific student learning needs (such as adding support for English learners or increasing scaffolding based on evidence from student work) and localize projects to reflect student interests and contexts in ways that amplify connection and generate motivation.²⁵

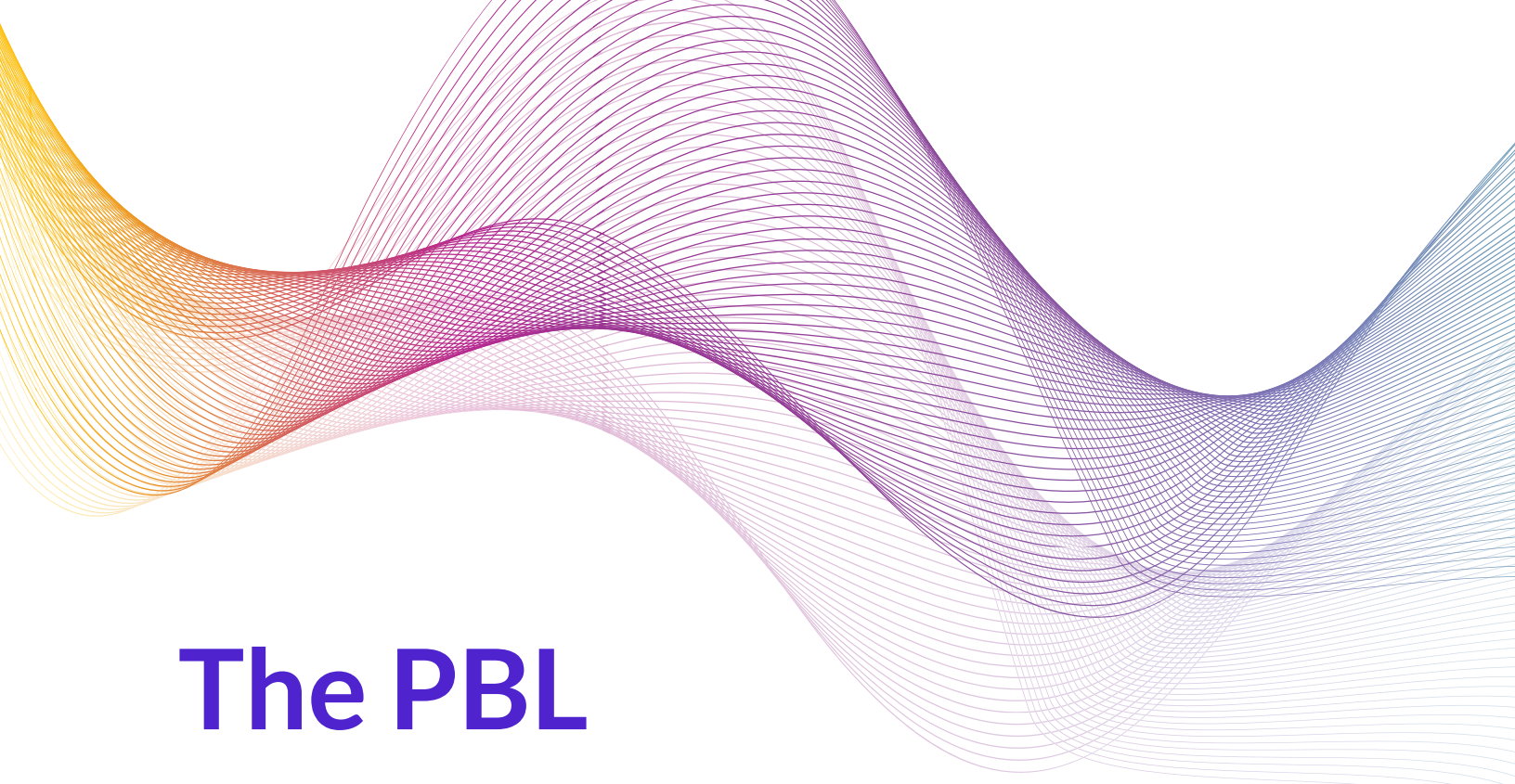
What does it mean to localize?

The goal of localizing curriculum is to make it authentic and relevant to students and their communities. For a unit about plate tectonics and the Ring of Fire, a middle school teacher in the Pacific Northwest might choose to focus on local volcanoes such as Mount St. Helens and Mount Rainier, while another teacher might decide to highlight Pompeii and Mount Vesuvius because students are learning about ancient civilizations in social studies. These kinds of adaptations uphold the PBL design elements described in this framework while ensuring both teachers and students see meaningful connections to the content.

"Localizing curriculum makes what students learn in the classroom more relevant, and relevancy increases engagement for students and helps them connect what they learn in the classroom directly to their lives." —*Teacher at Chief Umtuch Middle School, Washington*

"It just really makes our students connect what they learn to where they are and it makes them become stewards of our island [by] being culturally educated and solving local issues."
– *Teacher in the Guam Department of Education*





The PBL Design Framework

To support different applications of the PBL Design Framework, there are three ways to represent or explore it. The first is through the graphic (Figure 1) on page two of this document. When presented as a table, as seen on page fifteen of this document, the framework describes the roles of teachers, students, and a project's design in bringing a PBL unit to life in the classroom. Finally, the narrative you are reading now goes further in describing the vision for each element and anchoring it in both research and practitioner resources.

Regardless of format, the PBL Design Framework is structured by the three phases in every project: the project launch, project work, and the final product. If illustrated to scale, the project launch and final product would be much smaller in size in terms of instructional time than the project work section, which is where the bulk of learning, sensemaking, and synthesizing takes place.

Within each phase, the six design elements are represented:

- a complex driving question
- relevance and agency
- sustained collaborative inquiry
- feedback and revision
- authentic final products
- cycles of reflection

All six key elements are threaded throughout a PBL unit. Their placement in the framework graphic (Figure 1) shows when they are typically introduced (or amplified) and their relationship to the other elements. Two examples help illustrate this:

- The driving question is introduced in the project launch so that it can operate as a driver for the rest of the unit.
- Reflection is shown in the final product phase, where it is especially valuable for bringing the unit to a close. However, students will have multiple opportunities to reflect on their learning and receive feedback and support throughout the unit.

The sections that follow unpack each phase and the corresponding elements of the framework to make explicit the relationships and timing that experienced PBL practitioners intuitively understand. This clarity is essential for scaling quality PBL by helping educators facilitate the kind of learning experiences that prepare students to be innovative, curious, and impactful.

Phase 1: The Project Launch

Intriguing. Open-ended. Active. Because PBL frames learning core academic content through the lens of a compelling issue or problem, the first day or two of a unit is designed to immediately engage learners in the big ideas or challenges they will explore more deeply in the inquiry ahead. An effective launch lesson is guided by the concept of “engagement first,”²⁶ which in learning science research refers to the importance of priming learners for learning by engaging them with the topic and thereby generating a “need to know” more about it. In theory, establishing this context ensures that learners perceive the information that follows as purposeful and meaningful, rather than as rote information to be learned for future recall. In practice, this means stoking curiosity, which fires up the human brain’s innate affinity for sensemaking and problem-solving, and in turn, generates interest and motivation.^{27,28} This is why it’s critical that launches invite all students into the unit and its problem space regardless of their incoming level of content knowledge.

A project launch (sometimes referred to as the launch lesson or an entry event) can accomplish those goals in many ways.²⁹ The launch is one of the most creative opportunities in the PBL design or teacher localization process. This is because project launches are at their most powerful when they incorporate student interests and local perspectives, resources, and issues Aragaki and Kirstin Milks;³⁰ that is, when they feel highly relevant to learners.³¹ Depending on content and grade level, the project launch can present young people with a perplexing phenomenon or scenario that invites explanation of student current thinking and understanding, modeling, or hypothesizing, or by asking students to examine and engage with compelling information about a social issue or problem. A project launch, in other words, constructs an opportunity for engagement first by asking learners to think about something new with everything they bring to the table: their observations, prior knowledge, and innate skills of sensemaking. In contrast,



The launch is one of the most creative opportunities in the PBL design or teacher localization process.

traditional instruction often begins with “front-loading,” or providing background information, vocabulary, and skills instruction before students encounter a new topic or task.

Two important PBL design elements are introduced during an effective project launch. First, a complex driving question is introduced as the guiding construct for the project.³² The launch lesson’s job is to engage students with the big ideas contained within the driving question in an accessible way (for example, through thought-provoking video, data, images, or artifacts). All of the activities and conversations through the launch are an opportunity for diagnostic assessment of students’ prior knowledge, misconceptions, interests, and options for leveraging relevance.

After grappling with a complex, relevant problem, students should leave the launch lesson wanting to learn more and feeling confident that the upcoming inquiry will guide them from their initial understanding and interest to the final product, all while allowing them to make choices about how to focus their investigation and present their learning to an authentic audience. This is the second part of the project launch’s purpose: to establish and support the relevance of the driving question to learners and provide a foundation for fostering agency by showing how students’ personal interest in the matter will be useful in guiding their approach to the inquiry and its outcome.

Complex Driving Question

Most questions that can be answered with an online search or an AI tool can’t sustain inquiry; that’s why complexity is an important part of a driving question that is both student-friendly and multifaceted. In order to answer a complex driving question, a student needs to learn core content, weigh evidence, and consider different priorities and perspectives. An AI chatbot might be helpful for providing a summary of an issue, but it should not be able to generate a fulfilling answer to the driving question, which will require students to apply information to a specific context, stakeholder perspective, or local problem while assessing the credibility of their sources and gathering evidence to support their proposed solution.

Effective driving questions are rich enough to sustain an entire unit and also to generate module-level supporting questions that focus on smaller chunks of learning. Complex driving questions aim to be elegantly simple and inviting to students, but that doesn’t mean they’re simple to develop.³³ One reason they can be difficult to compose is that they serve as a gateway to academic subject matter that is rarely presented as an important issue to investigate, understand, and address. Creating a complex driving question begins by asking how standards-aligned content can be reframed by asking: *Why is this important to know? In what situations would we need to care about and use this information?*

Relevance and Agency

Learning feels meaningful to people when it is relevant to their interests, lives, and communities. The goal of an effective PBL launch is to construct a setting in which learners find themselves making connections and generating a sense of personal relevance, even if they didn’t walk in the room thinking the topic was something they cared about. In turn, the goal of an effective PBL unit is to sustain that relevance and motivation for learning over time.³⁴ When students perceive what they learn as relevant, they are more likely to transfer knowledge and skills into their daily lives.³⁵

Some PBL frameworks include “voice and choice,” which encompasses part of what agency means without getting at its potential depth. Agency is fostered when a PBL unit “allows students to make substantive and consequential choices in their projects as well as to apply the work and learning to their daily lives.”³⁶ Agency is also about being part of a community in which students feel a sense of ownership about their learning and that they are empowered to make decisions about their academic work, personal goals, and how they might connect those elements in the broader community. Agency may start with a choice between a digital or paper presentation, but it should culminate in the skills needed to become a responsible and active participant in civic life.

Phase 2: Project Work

Project work comprises the majority of time in a PBL unit. Its primary purpose is to sustain the collaborative inquiry sparked in the project launch by engaging students with complex and (appropriately) challenging project tasks that require application of their content learning. This kind of work is essential because research shows “cognitive engagement is consistently positively associated with student achievement. It can also lead to greater student motivation, self-esteem, and interest in learning.”³⁷ In consideration of attention spans, assessment, and pacing, PBL units are typically broken into two to four modules (sometimes referred to as learning sets, tasks, or subunits), each of which has its own supporting question (sometimes called a module driving question) that build on each other to support an in-depth response to the more complex unit driving question. Each module should conclude with a formative assessment opportunity tied to the supporting question. Learning activities in each module are developed to guide and support the content and skill objectives, drawing on quality resources, collaboration, and disciplinary ways of working.³⁸

Students are likely to engage with a wide variety of sources, including primary and secondary sources, portions from the textbook, videos, labs and/or simulations, guest speakers, field trips, direct instruction through mini-lectures, and independent research. The key difference is that all learning is undertaken in service of answering the driving question and contributing to the final product.³⁹ Purposeful inquiry, in other words, is supported through purposeful reading, research, writing, analysis, synthesis, innovative uses of technology, classroom discourse, and group work. Regardless of grade level or subject, sustained collaborative inquiry includes some combination of these elements.⁴⁰

Threaded throughout the project work phase are opportunities for embedded formative assessment, feedback, and revision. The science of learning is clear: Metacognition and intentional revision, extension, and growth of one’s thinking, especially in a social context, are critical components of deeper learning.^{41,42} This is why PBL pedagogy incorporates many strategies that require students to compose their thoughts on a topic (i.e., make their thinking visible and shareable), get feedback on their thinking, and then revise their explanation, physical or conceptual model, or proposed experiment or solution. Engaging in cycles of informal assessment, feedback, revision, and reflection at strategic points in the learning ensures students learn that the quality of their thinking matters as much as their awareness of how their understanding deepens and evolves over time. As students develop a sense of ownership for their learning, they also learn that working collaboratively and persevering through challenges and uncertainty is part of the process. Taken together, the elements of project work create the conditions for deeper learning, in which students not only understand the purpose for developing in-depth knowledge of core concepts and content, but are also able to apply their learning and skills to other issues and contexts.^{43,44}



**“Cognitive engagement is consistently positively associated with student achievement. It can also lead to greater student motivation, self-esteem, and interest in learning.”
–OECD, 2025**



Sustained Collaborative Inquiry

Foundational research on PBL describes a project as the “main course,” whereas a stand-alone project is akin to “dessert”—a treat after a large meal of content delivered over a series of lessons.⁴⁵ In order for the project to be a substantive, sustained source of rigorous learning, it must incorporate purposeful activities and resources that move students from their initial puzzlement at the launch toward the development of a robust product that demonstrates the depth of their learning.⁴⁶ Two aspects are especially important in our definition of this design element. The first is deeper learning of standards-aligned content: “Projects should feature deep integration with course content and be rooted in core subject areas, helping to deepen and build student knowledge of important topics.”⁴⁷ This kind of learning takes time. As teachers facilitate learning over the course of a project, they continually bring students back to the driving question and final product to make connections, assess and reflect on progress, and provide feedback. This rich learning environment should establish high expectations for building strong literacy and/or numeracy skills needed for analyzing, applying, and synthesizing information. Teachers should use evidence of student thinking and learning to inform their next instructional moves and guide adaptation and scaffolding.

The second critical aspect is collaboration: Deeper learning and stronger academic achievement happens when students construct meaning together.^{48,49} To foster the conditions for this, PBL teachers establish group norms and expectations to ensure that classroom talk and group-worthy tasks⁵⁰ are productive and engage all students in asking questions, interrogating ideas, supporting thinking with evidence, and applying their learning to meaningful tasks that serve project goals. To scaffold collaborative work and effective communication, teachers can move beyond management-based roles (e.g., materials manager, timekeeper) to include process-based (e.g., facilitator, grapher, synthesizer) or project-based (e.g., assigning each group member a different stakeholder perspective) roles.⁵¹ Students who are learning to collaborate benefit from ongoing support through protocols, discourse strategies, accountability measures, and reflective assessment of their individual and collective strengths and goals. Beyond group work, collaboration extends to self- and peer-review of evidence-based writing, speaking, and final product development.⁵²



Feedback and Revision

Feedback and revision provide a critical counterbalance to sustained inquiry because assessment of (and for) learning is both motivating for learners⁵³ and necessary for teachers and gradebooks. Self- and peer-review, in addition to other collaborative evaluation protocols, are important ways to assess student progress toward measures of excellence and rigor; they also take assessment pressure off teachers.⁵⁴ Working collaboratively ensures students see multiple models of work and learn to view it with a critical eye for what a classmate is doing well (e.g., providing evidence from a text) and what can be improved (e.g., the sequencing or sourcing of that evidence).

Assessment in PBL is authentic and performance-based, and it should take place throughout a project with frequent formative checks on learning as students progress through project activities⁵⁵—not just at the end with the final product, as is sometimes assumed.⁵⁶ For the benefit of both teachers and students, performance assessments should be evidence-based and aligned to standards. Clear rubrics that convey expectations for content knowledge and the construction of effective explanations as well as disciplinary (or interdisciplinary) guidelines for how scientists, historians, mathematicians, journalists, etc., present their findings help students develop the skills they need to give and receive feedback that is clear, kind, and specific.⁵⁷ Regular opportunities for young people to assess their own work and that of their peers, in addition to teacher feedback, ensure students understand that drafting, revising, and learning from mistakes are all natural parts of the inquiry process.

Phase 3: Final Product

Along with the unit driving question, the final product is a key driver of authentic learning and a platform for civic engagement. In PBL units, students should be building and contributing to the final product all the way through the project work phase.⁵⁸ As the unit draws to a close, students may need to finalize some parts and consider how it will be presented to their selected audience, but (unlike a stand-alone “dessert” project), students have been actively thinking about the content and format of the final product since the project launch. They understand it’s a showcase (via debate podium, podcast microphone, social media campaign, or shark tank pitch, among other options) for sharing their response to the driving question by way of informing, persuading, or engaging an authentic audience.⁵⁹ Agency is an essential element of the final product phase because it ensures learning aligns to students’ interests, feels meaningful, and is worth their cognitive investment.⁶⁰ To these ends, students should be able to focus their cumulative learning through the final product in a way that will reflect their learning with craftsmanship and creativity. Individual and group choices should ensure no final product looks alike while a rigorous, standards-aligned rubric still allows students and teachers to assess all final products against the same expectations. In other words, students are responsible for meeting the same criteria (taking a position or specific perspective, providing essential disciplinary context, etc.), supporting their thinking with evidence, and communicating their conclusions, all while making purposeful choices about how to execute and present their work within the product format.

Just as the project launch creates an opportunity for inspiration and local context, so does the final product. Teachers who are new to PBL or limited on time may wish to work with more accessible authentic audiences (e.g., another class or school staff rather than elected officials), or they may prefer to identify an abbreviated version of the final product (e.g., sketch a proposal for a mural rather than apply for funding or permission for full installation). Teachers need to choose the right final product depth, but they must ensure the product and its presentation maintain authenticity along with the other PBL design elements.⁶¹

Finally, the culmination of a project brings closure to earlier cycles of reflection by looking back at how one’s thinking has changed over the course of the unit, how well students worked collaboratively (and how they could continue to improve), how impactful the final product was and what lessons were learned, and, importantly (because learning doesn’t stop at the end of a project), what new questions students have about the central phenomenon, issue, or problem.⁶² Just as the driving question is present throughout a PBL unit, so is reflection. It is a key task of the final module to focus those earlier moments of reflection into a forecast of the future, illuminating how students are becoming stronger and more strategic, innovative, and collaborative learners who can navigate across learning contexts. It’s also a time for students to reflect on their experience with the project as a whole in



Agency is an essential element of the final product phase because it ensures learning aligns to students’ interests, feels meaningful, and is worth their cognitive investment.



order to help their teacher understand both what worked well and what could be refined to better engage, support, or challenge future students.

Expansive Assessment in PBL

A common misconception about PBL is that assessment occurs only at the end of a unit through the final product. In fact, PBL offers abundant formative assessment opportunities that provide insight into students' evolving thinking, questions, understanding, and development.

Ongoing, low-stakes assessments allow teachers to adjust instruction, provide targeted support, and ensure students are progressing toward learning goals while empowering them to reflect on and revise their thinking and work.

In PBL, the final product is a comprehensive summative assessment and typically involves several components—a culminating presentation, group evaluation, and personal reflection. These elements enable teachers to assess content mastery and skill development on both collaborative and individual levels.

PBL incorporates both assessment for learning (formative feedback that guides instruction) and assessment as learning (student self-monitoring and metacognitive reflection). When students engage in self-assessment and peer feedback throughout the project, they develop agency over their learning process.



Authentic Final Product

While authenticity is often presented as its own criteria for high quality PBL, we have aligned it with the final product because it directly reflects the outcome of a complex driving question that culminates in an authentic product for the benefit of an authentic (and sometimes present) audience.⁶³ PBL design involves strategic tradeoffs because young people are not (yet) expert scientists, historians, engineers, mathematicians, or novelists who have had years of training and experience. This means young people are engaging in disciplinary ways of learning and sharing that provide opportunities to test-drive a variety of career paths while learning how subject matter content and creative, critical thinking is the foundational stuff of all workplaces and societies. This is why PBL teachers would rather have students design an exhibit for visitors that includes extensive explanatory writing about selected artifacts rather than write a five-paragraph essay about the same content.

Authentic products are grounded in performance assessment. At the culmination of every PBL unit there is some kind of exhibition of learning in which final products are displayed, presented, and discussed. In several PBL frameworks, the phrase “public product” is used. Public can mean many things; it can be both liberating and challenging to consider just how public a project could be given teacher, school, and community constraints of time, networks, and permissions. Whether students present to an audience that includes professionals or community members,⁶⁴ contribute to authentic public platforms such as newspapers or open resources like Wikipedia,⁶⁵ or communicate directly with local, national, or global leaders, the authenticity is motivating for both students and teachers and provides valuable opportunities for leadership and civic engagement.

In their role as responsive adaptors, teachers need to dial in the right level of authentic product and audience.⁶⁶ This means that the first project of the year might be presented entirely inside the classroom while students are still building a strong community. A step further would be presenting to another class or a group of school staff or administrators. Coordinating presentations with a planned family night takes it further. Inviting guests from relevant careers, industries, or the community levels it up. With inspiration, networking, and a PBL mindset, teachers can make these kinds of community connections happen—and even more easily with strong school site support and over time as PBL practices take root.

Cycles of Reflection

Throughout the arc of a PBL unit, students are asked to reflect on their knowledge, insights, questions, reactions, and growth as a way to sustain high levels of cognitive engagement.⁶⁷ Reflection serves as a bridge across diagnostic, formative, and summative assessment, helping students and teachers track learning and outcomes. Routine protocols and structures often support the development of these metacognitive skills. Such cycles of reflection culminate in the final product, which is itself a rich source for reflection about how well the group worked together, how the audience reacted, which questions were thoroughly supported and which ones remain open, and how students might pursue remaining lines of inquiry or integrate what they've learned into their lives and communities.

One key tool for supporting both inquiry and reflection in PBL is the *Know & Need to Know* chart. While similar in structure and function to a Know-Wonder-Learn (KWL) chart, the *Know & Need to Know* format evolved to tap directly into the “need to know” generated by the project launch and sustained by the subsequent inquiry.^{68,69} The chart is typically introduced in the launch lesson, where it serves as an informal diagnostic assessment of what students already know and think they know about the issue at hand—as well as what they need to know in order to construct the final product. Student-generated questions develop a sense of ownership of and investment in the inquiry ahead, especially when the process allows teachers to identify and integrate points of relevance or trends of interest into the course of learning. Revisiting the chart periodically throughout a unit creates a cycle of reflection that helps students track their developing knowledge and skills and provides a place to record new questions and concerns. At the end of a unit, the chart provides a valuable record of just how far students have come. Prompts like, *I used to think and now I know...* support student reflection on the impact and value of their learning, invite suggestions for project tweaks the teacher might make next year, and help students set goals for the next project.



Student-generated questions develop a sense of ownership of and investment in the inquiry ahead.





Next Steps

PBL is a powerful and complex practice. This narrative has expanded upon and unpacked each element in the PBL Design Framework to convey our understanding of PBL as designers and educators as clearly as possible, but this is just a starting point. To get where you want to go, consider building your personal road map from some of the following milestones.

- **Deepen foundational understanding:** Review and teach from high-quality PBL units to internalize PBL practices and project design structures. Read about PBL pedagogy, watch videos of PBL practices in action, and explore research on topics like inquiry, authenticity, student agency, and collaborative work. Follow PBL organizations and thought leaders.
- **Study model classrooms:** Observe colleagues who have already implemented PBL or participate in learning walks or video-based classroom studies that highlight facilitation moves, support for student discourse, and formative assessment strategies. Analyze student artifacts from completed projects to look for evidence of learning.
- **Engage in PBL-specific professional learning:** Attend a PBL design workshop or engage in a professional learning experience that supports your exploration of PBL through action research in your own classroom. Join professional networks or PLCs focused on PBL or inquiry-based instruction. Look for programs that offer sustained support over time and build a professional community.
- **Adopt, adapt, and innovate:** Start small with a PBL unit or course you can teach “out of the box” to build confidence and operational understanding. Collect ongoing formative data and evidence, debrief with students and colleagues, and use what you learn to guide your refinement of the project(s). When you’re ready to innovate, design an original unit with colleagues that meets specific learning goals and topics for your teaching site.
- **Build community networks:** Use exhibitions and showcases to demonstrate project outcomes and communicate how PBL assessments reflect authentic standards-aligned learning and future-ready skills. Begin building connections with community members who are excited and willing to share their knowledge, expertise, and academic, industry, or career insights with young people.

- **Engage colleagues to build reflective practice and expertise:** Form a PBL study group for the purpose of creating momentum and collaborative support for problems of practice. Share design decisions, challenges, student feedback, and examples of project work. Set specific growth goals related to questioning, collaborative work, feedback, revision, assessment, reflection, etc.
- **Strengthen system-level support for PBL:** Work with school and district leaders to ensure clarity on how PBL supports existing instructional priorities, accountability structures, and alignment to schoolwide standards and learning expectations. Encourage leadership to endorse a common PBL framework or criteria for high-quality PBL to build coherence and a shared language. Request protected planning time to design or refine projects and develop a shared resource base of exemplar rubrics and other tools.

Embrace PBL to be curious, think differently, and join forces with young people and communities to learn today with the leaders of tomorrow.



PBL Design Framework at a Glance

Project Launch

Students:

- Immediately grapple with a complex, relevant problem.
- Draw on their lived experiences and background knowledge to deepen and expand inquiry.
- Engage in collaborative discussions to express ideas and build on the thinking of others.

Teachers:

- Facilitate collaborative learning that prioritizes and leverages students' ideas, prior experiences, and problem-solving approaches.
- Ensure the launch is relevant to students by incorporating local connections.
- Orient students to the arc of learning in the project and help them connect to what they already know and will need to know.

The project launch phase is designed to:

- Spark students' motivation by creating a need to know about the **complex driving question**.
- Ground academic work in authentic contexts that build **relevance and agency** for learners.

Project Work

Students:

- Investigate topics and issues through a wide range of primary and secondary sources that offer multiple perspectives.
- Examine sources for credibility, reliability, and perspective.
- Build strong numeracy and literacy skills as they analyze, apply, and synthesize knowledge.
- Build capacity for using technologies, including AI, in innovative ways.
- Track the development of their knowledge, both individually and with peers.

Teachers:

- Provide purposeful and rigorous content instruction aligned to standards.
- Facilitate sensemaking activities as students engage with high-quality resources.
- Build skills and stamina for revising project work while promoting ownership of learning and project progress.
- Build in strategic support and high expectations for literacy, numeracy, and productive collaboration skills.

The project design phase is designed to:

- Structure and **sustain collaborative inquiry** that was sparked in the project launch with high-quality instructional materials and learning experiences.
- Intentionally revisit student *Need to Knows* at significant milestones to support student pacing and progress on project outcomes.
- Incorporate **feedback and revision** to deepen understanding over time as students develop responses to the project's driving questions.
- Ensure authentic connections to disciplines and the workforce.

Final Product

Students:

- Showcase their understanding and application of core content knowledge.
- Present evidence-based reasoning with craftsmanship and creativity.
- Draw connections to the world beyond the classroom.
- Strengthen civic engagement and leadership.
- Clearly communicate findings and conclusions to an authentic audience.

Teachers:

- Create meaningful opportunities for sharing the culmination of the project with the broader community.
- Prepare students to clearly and effectively communicate their work.
- Empower students to strengthen personal and civic engagement.
- Facilitate connections to local contexts, interdisciplinary and subject-specific practices, and career pathways.

The final product phase is designed to:

- Provide a culminating assessment of students' content learning and skill development through an **authentic final product** guided by a standards-aligned rubric.
- Build on **cycles of reflection** throughout the unit by prompting students to assess how their thinking has evolved, how they worked together, and how effectively their product communicates a response to the complex driving question.



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