

POSITION PAPER #1

What is Rigorous Project-Based Learning?

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Lucas 
Education Research

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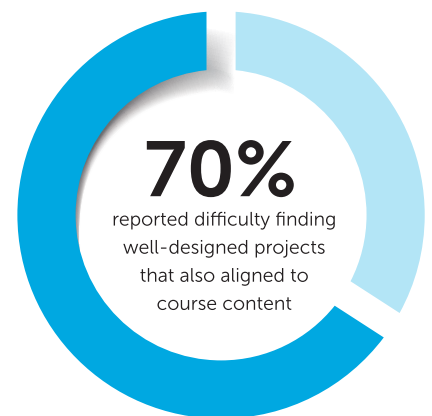
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INTRODUCTION

Project-based learning (PBL) is an increasingly popular way for teachers to facilitate academically rigorous learning experiences that also prepare students to apply content knowledge and skills beyond the classroom. In building a K-12 evidence base for PBL, Lucas Education Research (LER) aims to use research to improve teaching and learning by fostering consensus around what makes PBL rigorous. More than the passive collection of research data, LER takes a hands-on, community-based approach to studying and improving the effectiveness of PBL. Shaped by a larger PBL community of researchers, school and district leaders, teachers, and students, rigorous PBL stems from a shared need to improve PBL practice and develop capacity to spread evidence-based best practices. In this way, taking rigorous PBL to scale is more than a requirement of the research, but a product of the community that LER is intentionally building around it.

Developing shared understandings and practices for rigorous PBL should alleviate a number of the current challenges in designing and implementing projects. While many teachers regularly create high-quality projects, the complexity and time-consuming nature of curriculum design can make it a challenging endeavor to take on alone. As a result, projects tend to become fun activities separated from academically rigorous content learning as opposed to a cohesive set of project learning experiences. In a recent national survey of AP Government and AP Environmental Science teachers, **70% reported that one of the most noteworthy challenges was difficulty finding well-designed projects that also aligned to course content**. The majority of these same teachers also responded that incorporating a PBL approach would have a positive impact on student learning.



This paints a frustrating picture of the field: teachers who desire an engaging way to teach rigorous content through projects but who lack access to the resources, time, and supports to make it possible. This may be due in part to a dearth of well-designed project examples, as well as a lack of clarity among researchers and practitioners about what constitutes PBL. The lack of consensus can result in implementation with varying degrees of academic rigor, curriculum materials derived from competing design principles, and a consequently uneven evidence base for PBL effectiveness.

The important lesson is that **PBL practice should not be isolated from PBL research**. While PBL implementation does not always necessitate a dedicated PBL research network, rigorous PBL requires a supportive community that shares evidence-informed practices. LER encourages planned variation throughout a PBL research network, synthesizing lessons learned across different communities, and exploring what is required to scale and sustain effective PBL implementation. This process of building evidence for rigorous PBL aims to establish consensus around design principles and definitions while also detailing the ways in which local context informs projects. This LER position paper is a starting point for that conversation.

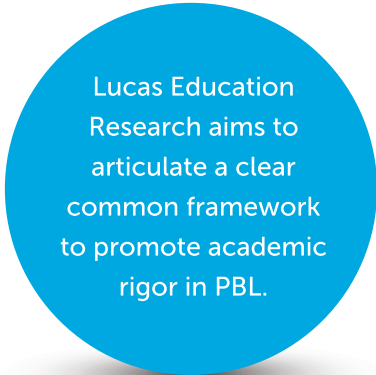
**DEFINING “RIGOR”
IN PROJECT-BASED
LEARNING**

Rigorous PBL occurs when authentic, meaningful, and coherently designed project experiences are central to deep and comprehensive content understanding. As Edutopia highlights in its “5 Keys to Rigorous Project-Based Learning” while projects should be fun and engaging, they should also be “core to learning”. For this approach to be rigorous, projects must be:

- Purposeful and authentic, both personally and to the community
- Deeply integrated with core disciplinary content and practices
- Driven by meaningful and supportive interactions
- Informed by evidence-based practices (see Figure 1)

It is not enough for students to complete project tasks related to content at the end of a course. Instead, projects should be **built backward from significant learning goals** that also involve real-world connections and a public audience. The learning process must offer an engaging, authentic context for investigating relevant questions in a way that also builds on the strengths, voices, and resources of all learners. This greatly depends on strong teacher facilitation that supports critical thinking, problem solving, language development skills, diverse learning needs, and social and emotional learning (SEL).

The multidimensional nature of extended, collaborative projects builds in multiple opportunities for deepening content understanding, revisiting concepts through different scenarios, and demonstrating knowledge in varied ways. While many of these elements are part of general best practice, LER aims to articulate a **clear common framework to promote academic rigor in PBL**. This focus on rigor is complementary with related efforts that articulate essential project design and instruction elements (such as the Gold Standard PBL model by Buck Institute for Education). There is also great synergy between rigorous PBL and “deeper learning,” which the William and Flora Hewlett Foundation defines as “a set of competencies students must master in order to develop a keen understanding of academic content and apply their knowledge to problems in the classroom and on the job.”



Lucas Education Research aims to articulate a clear common framework to promote academic rigor in PBL.

A rigorous PBL framework requires synthesizing the PBL landscape, which is described in a recent LER-commissioned literature review (Condliffe et al, 2016). The review updates the well-cited Thomas (2000) paper, highlighting the curriculum, instruction, and assessment principles for PBL research and design, and clarifying the distinction between “doing projects” (Thomas, 2000) and learning through projects. Condliffe and colleagues report the need for flexible, dynamic principles that are adaptable to local contexts, and clear PBL models that can be used to assess the integrity of PBL implementation. LER frames the conversation to connect PBL practice with PBL research, explicitly investigating and supporting how elements of the PBL model are adapted through high-quality implementation.

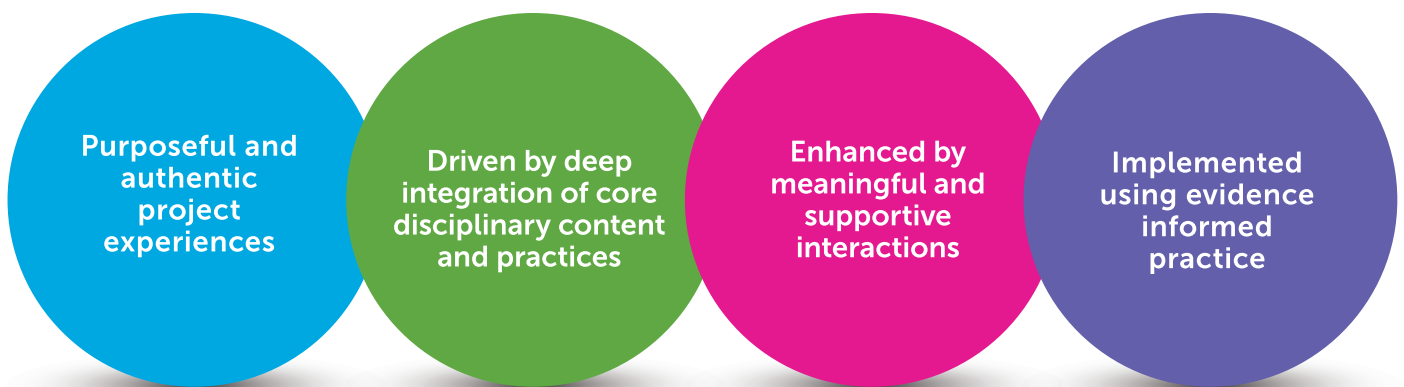
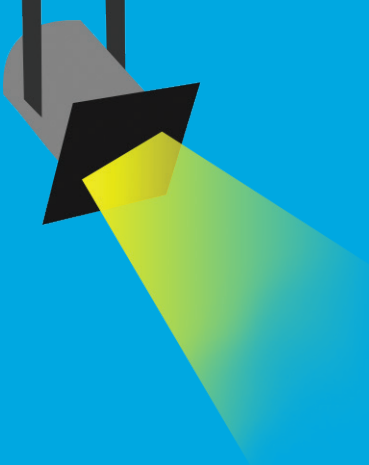


Figure 1: Rigorous Project-Based Learning Framework

PURPOSEFUL AND AUTHENTIC PROJECT EXPERIENCES

Rigorous PBL is purposefully designed to consist of a cohesive and coherently sequenced set of experiences that are both core to learning and authentic and relevant to students. In rigorous PBL, “projects carry the full subject matter load of the course. They are not sporadic activities or culminating activities that come at the end of an instructional sequence, nor are they lively interludes inserted periodically into traditional recitation” (Parker & Lo, 2015, p. 4). The Buck Institute for Education differentiates purposeful project experiences from “dessert projects” that are easily completed with little planning or research (Larmer, Mergendoller, & Boss, 2015). This is aligned with recent moves toward standards and assessments where students must deeply understand concepts and apply knowledge in different scenarios. The rationale for the project must also be authentic in terms of making **explicit connections to real-world practices** used by the disciplinary community and by the wider community where students live, as well as personally meaningful to the student (Polman, 2012).

In this way, authentic projects can promote a sense of civic purpose and engagement, which can be especially powerful when projects result in genuine products for an authentic audience. This is consistent with research demonstrating that students learn most effectively when learning takes place in authentic, real-world contexts (Bransford, Brown, & Cocking, 1999).

A graphic of a spotlight with a grey body and a black lens, casting a yellow and green beam of light onto the blue background.

SPOTLIGHT ON PURPOSEFUL AND AUTHENTIC PROJECT EXPERIENCES

KNOWLEDGE IN ACTION

The Knowledge in Action (KIA) Project, designed by a team of researchers and teachers at the University of Washington, includes **three Advanced Placement (AP) PBL courses where 5-7 projects structure all the content**. Purposeful mapping to challenging questions such as, “How can we live more sustainably?” creates a coherent flow of information that emphasizes the “why” behind student learning.

Students investigate content ideas in a “looped” fashion, intentionally revisiting concepts and skills through multiple scenarios to emphasize depth and transfer of significant ideas. This helps students practice connecting ideas in an authentic manner. In contrast to traditional linear approaches, the curriculum design encourages **meaningful, deep learning through deliberative content selection** about what ideas and skills are worth revisiting (Parker & Lo, 2016). For instance, answering the KIA AP Environmental Science course question of living more sustainably necessitates addressing the topic of global water resources through a project on a student’s personal ecological footprint, as well as three additional projects on global and community issues.

While the driving questions make learning relevant in these courses, roles and simulations encourage students to take on multiple perspectives. Taking on the role of a delegate to the Constitutional Convention of 1787 allows students to deeply deliberate about Federalist and anti-Federalist sentiments, just as they might uncover nuances of political parties as they take on roles in a presidential campaign. As students take on roles and then intentionally drop those roles to reflect on their personal perspectives, they make connections that are key to becoming civically engaged.

Similarly in the KIA AP Physics course, engagement in project simulations through authentic roles like Hollywood science advisors and accident investigators set up an authentic problem and “need to know” complex content. Purposefully sequencing lectures and direct delivery of content information to follow engagement in project work encourages motivation and transfer of content knowledge, as found in *How People Learn* (Bransford, Brown, & Cocking, 1999).

AP U.S. GOVERNMENT AND POLITICS

What is the proper role of government in a democracy?

FOUNDERS' INTENT



U.S. ELECTIONS



SUPREME COURT



U.S. CONGRESS



GOVERNMENT IN ACTION



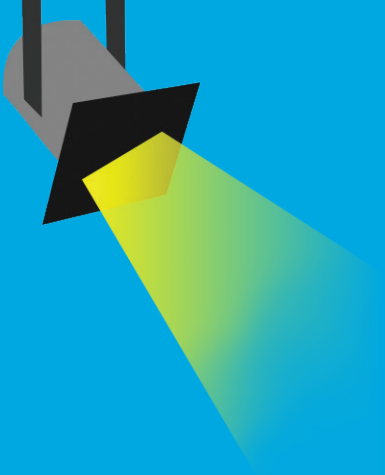
DEEP INTEGRATION OF CORE DISCIPLINARY CONTENT AND PRACTICES

Design principles cited in the PBL literature highlight the need for projects to be inseparable from content, targeting significant learning goals and promoting the construction of knowledge (Condliffe et al, 2016; Thomas, 2000). Projects provide the coherent experience through which disciplinary content and practices are learned. In contrast to other common approaches, such as inquiry activities inserted throughout a unit or makerspaces supporting the creation of artifacts that do not inform solutions to a driving question or challenge, rigorous projects integrate disciplinary content and practices to support a coherent learning experience. Projects can help students learn how to think like a historian or create scientific models that explain how the world works because they have **frequent opportunities to revise, reflect and improve ideas**.

Thus, the notion of rigor in PBL encompasses disciplinary core ideas as well as attention to how content is applied in authentic practice of multiple disciplines such as science and social studies. Integrating this knowledge-in-use stance not only provides a richer experience, but can also motivate student interest in learning (Blumenfeld et al, 1991, Krajcik & Czerniak, 2013). Moreover, rigorous PBL can be an opportunity to combine content and skills across multiple academic subjects, preparing students for interdisciplinary applications where information is increasingly integrated. This is challenging for students, so PBL experiences should be intentionally designed to give students opportunities to revisit questions, designs, and solutions. This process of iterating and improving on ideas and approaches within a project “is key to deepening [students’] evolving understanding of course topics” (Parker et al, 2013, p. 1433).



Photo courtesy Tinkering Labs



SPOTLIGHT ON DEEP INTEGRATION OF CORE DISCIPLINARY CONTENT AND PRACTICES

MULTIPLE LITERACIES IN PBL

The Multiple Literacies in PBL Project developed by Michigan State University and the University of Michigan is designing, developing, and testing rigorous interdisciplinary PBL curricula for the upper elementary grades. This interdisciplinary focus is, in many ways, a natural fit for PBL. Authentic projects require making connections among the different disciplines of science (physical, life, Earth, engineering) and students' lived experiences. For example, in the project **How can we grow plants for food in our community?**, students learn that different locations provide environmental conditions (climate) that affect plants' traits and how well they grow. Scientific investigations in projects create a compelling, authentic context and motive for purposeful reading, writing, and mathematics.

At the same time, literacy and mathematics instruction and activities can support knowledge building and engagement in scientific practices. Through design-based research, the team is developing principles to guide the integration of literacy and mathematics within science projects. An area of continued interest is considering the depth and breadth of conceptual understanding that is developmentally appropriate.



DRIVING QUESTION:

HOW CAN WE GROW PLANTS FOR FOOD IN OUR COMMUNITY?



Science Learning Goals

Making observations and measurements to track and describe the stages of plants' lifecycles. Explaining and predicting how environmental conditions determine where and when plants grow.

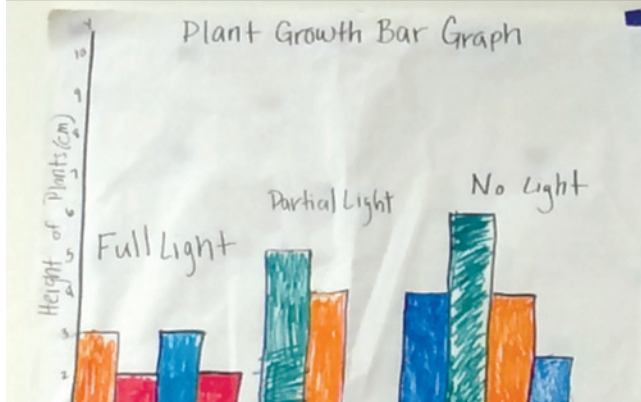
Here are some things apple trees need water, air and cold temperatures. Here are some things that are bad for apple trees extremely hot temperatures lots of water and storms.

Here are some of the solutions Dr. Jim Flores came up with. Solution 1 is a sprinkler system. The good thing is it prevents budding too.



Literacy Learning Goals

Developing written and oral explanations to demonstrate understanding of text and illustrations and to synthesize information.



Mathematics Learning Goals

Using fractions to measure plant growth and cloud cover. Using bar graphs to represent data.



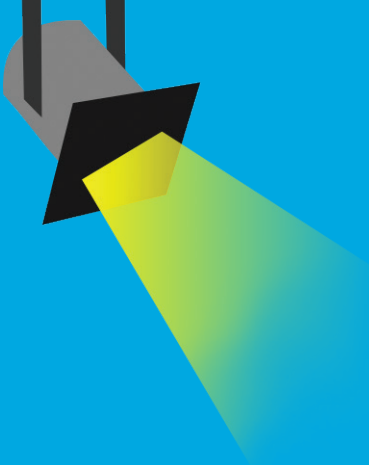
Photo courtesy Brightworks School

ENHANCED BY MEANINGFUL AND SUPPORTIVE INTERACTIONS

Rigorous PBL also relies on social interactions that connect to who students are as people and facilitate their continuing learning and development; in short, interactions in PBL must be both meaningful and supportive. While there may be some merit in focused programs that support SEL, rigorous PBL promotes a cohesive, embedded thread of these important habits and routines that promote the production of consequential work.

In the PBL context, meaningful and supportive interactions move beyond positive encouragement and instead **facilitate authentic scenarios where students can feel safe, productively struggle, and take intellectual risks**. Doing so requires a positive school and classroom culture that values student and community expertise. Within such a culture, rigorous PBL environments provide students with the opportunity and space to leverage their strengths, speak their minds, act on their ideas, and make decisions that are relevant to them.

As Darling-Hammond (2008) states, “Students should be encouraged to be authors and producers of knowledge” (p. 216). Families and larger communities are important contexts and interconnected networks where learning occurs, and classroom learning is enhanced when there is space to develop and exchange diverse “funds of knowledge” (Gonzalez, Andrade, Civil, & Moll, 2001).

A graphic of a spotlight with a grey body and a black lens, casting a yellow and green beam of light onto the blue background.

SPOTLIGHT ON MEANINGFUL AND SUPPORTIVE INTERACTIONS

COMPOSE OUR WORLD

Through a yearlong, project-based approach to ninth-grade English language arts, the Compose Our World course provides a progression of structured opportunities for students and teachers to become authentic makers and designers. Developed by a researcher-practitioner team from University of Colorado at Boulder and Stanford University, the course emphasizes social and emotional learning competencies and skills as essential to the interactive and reflective process of developing literacy practices through projects.

During the year, **each of the four projects encourages students to use multiple modes and tools to express their evolving ideas and communicate with varied audiences.** These composing experiences position students as multimodal designers and explicitly tie to a “spine” of key habits and routines for the collaboration, empathy, reflection, and revision skills necessary for PBL. For instance, students develop the habit of reflective writing as they investigate the essential questions of “What does it mean to be human? What will be preserved?” in a unit focused on the hypothetical scenario of Artificial Intelligence becoming more intelligent than humanity. Regular blogging and journaling opportunities encourage students to curate useful artifacts that allow

them to reflect on their understanding of the essential questions and produce a museum exhibit of humanity. By framing the social and emotional process as a key driver in developing literacy practices and navigating Common Core standards, **students are also able to have a “brave space” for communicating ideas, revising work, and designing public products.** In this way, social and emotional learning is not a non-academic component, but a central piece of learning rigorous English language arts content.

This brave space for creative design work extends to the professional learning experiences for teachers, where effective PBL implementation relies on the involvement of teachers as co-designers of PBL curriculum. Driven by the belief that teachers need

opportunities to experience what they are asking from students, the “Compose Our World” PBL professional development encourages teachers to practice social and emotional habits and routines, and reflect on best ways to collaborate and share ideas. While teachers note the messy nature of co-design work, the collective experience of authentic creation engages teachers as professionals who are driven by a sense of belonging to an innovative community of like-minded educators.

In turn, building a meaningful and supportive culture amongst teachers extends to a strengthening the broader PBL community that includes students and allows for mutual dialogue, reflection, and ongoing revision and refinement of ideas.



IMPLEMENTED USING EVIDENCE-BASED TEACHING AND ASSESSMENT PRACTICES

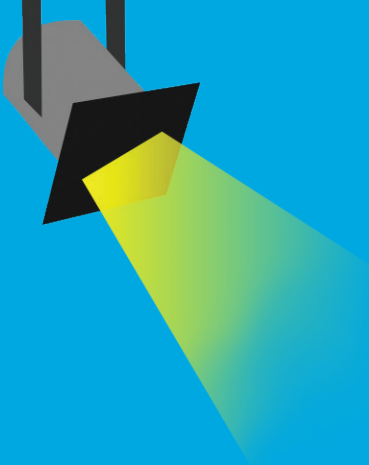
The multifaceted components of rigorous PBL are only possible when instruction is regularly informed by evidence of student learning. Deep understanding is facilitated when students generate and revise artifacts, guided by feedback and critique from their teachers, peers, and community. **High-quality projects offer multiple and varied opportunities for students to demonstrate understanding.**

These can include project artifacts, performance-based and diagnostic conceptual assessments, and individual and group assessments. The important point is that more than one type of evidence is needed, and opportunities to evaluate student progress should be frequent. Learning opportunities and tasks also must be universally designed to stimulate interest and motivation and to provide well-differentiated ways for students to express what they know (Meyer, Rose, & Gordon, 2014).

In contrast to the common use of projects as a one-time, culminating assessment, instead projects can serve as a window into the depth of student learning, especially when students have regular opportunities to self-assess and reflect on their progress. In particular, when “the appropriate distinctions have been made by learners...learners are better able to grasp the significance of what the expert has to say” (Schwartz & Bransford, 1998, p. 511). In rigorous PBL, students learn through these multiple opportunities to connect and elaborate ideas while discovering distinctive features of concepts (Schwartz & Bransford, 1998).

Facilitating deep content understanding requires mindful attention to students’ experiences and readiness to learn new information. Implementation of evidence-based practices also requires strong teacher facilitation skills. As students express their emerging understanding, teachers provide feedback strategically and use formative assessments to improve instruction.



A graphic of a spotlight with a grey body and a black lens, casting a yellow and green beam of light onto the blue background.

SPOTLIGHT ON EVIDENCE-BASED TEACHING AND ASSESSMENT PRACTICES

LEARNING THROUGH PERFORMANCE

In PBL, intentionally integrated assessments can provide a rich understanding of the student learning that takes place over time. The Learning Through Performance Project led by the Understanding Language - Stanford Center for Assessment, Learning and Equity (UL-SCALE) includes **two sixth-grade courses — math and science — that integrate performance-based assessment (PBA) within PBL**. PBA requires the articulation of clear performance outcomes, student products, and rubrics to evaluate student learning.

In the Learning Through Performance project, PBA is woven throughout a unit, as students revisit their learning and understanding to address the driving question. PBA provides an opportunity to reinforce key elements of PBL, such as **student voice/choice in demonstrating learning, revision and reflection, and communication to an authentic audience**. PBA also can enhance the PBL experience by explicitly encouraging group and individual accountability and promoting students' generation of products that provide evidence of important learning outcomes. By using student evidence to inform teaching, PBL assessment and

instruction are deeply interconnected, ensuring that purposeful, authentic, and meaningful project experiences do in fact result in learning rigorous content.

In each math or science unit, students engage in authentic learning tasks that prepare them for a culminating project. Tasks are designed to be open ended and incorporate groupwork strategies to encourage equitable participation among students. For example, in the Energy unit, students design, construct and test a device to minimize or maximize thermal energy. During each task, students use their project organizer to capture important evidence to inform their culminating project.

These project organizers are an **important formative assessment opportunity** for teachers to check in on student progress. Students then demonstrate what they have learned in the culminating project, which includes both group and individual components.

Common PBA rubrics across units also help to document and track students' growth in disciplinary practices. During professional development, these rubrics can serve as a tool to norm teachers' conversations about the quality of student work when teachers present samples of student work and discuss how students are able to demonstrate understanding.



**BUILDING CAPACITY
FOR PROJECT-BASED
IMPLEMENTATION**



Given the multifaceted nature of the rigorous PBL framework's four components (Figure 1), strong curriculum materials and project exemplars are necessary but not in themselves sufficient for making a rigorous PBL a reality. Rather, rigorous PBL attends to the continuous and gradual process of student and teacher development that makes it possible to learn and teach through projects. Tools and resources, in addition to curriculum materials, are needed to enhance and supplement PBL implementation and skill development.

These resources can be particularly powerful when they are integrated within structured learning experiences that are purposeful and extended over time. Research can help to establish the effectiveness of rigorous PBL with these supports, thus contributing to an evidence base by investigating: **Under what conditions is PBL most effective?**

PROVIDE A CONTINUOUS ARC OF OPPORTUNITIES TO PRACTICE AND IMPROVE

Learning experiences over time emphasize the need to promote a continuous process of learning, acting, and reflecting on new content and ideas. Rigorous PBL attends to these learning opportunities explicitly for teachers and students. To make this process of development possible for both students and teachers, integrated supports and community-building opportunities should develop the skills, capacities, and strengths that facilitate a shift in practice.

For teachers, **professional development experiences must move beyond one-time workshops and be embedded throughout the school year** with supports that strategically address “just-in-time” teacher needs. These needs may be related to specific projects or to specific teaching practices that they are aiming to improve. Eliciting teacher expertise and voice about how and in what ways they want to improve their PBL practice is key to ensuring that teachers drive their own development process with their goals and existing strengths, which they build upon as they gradually learn more about PBL.

For students, learning how to lead, express their voices, and apply content to multiple scenarios is often an unfamiliar experience. It requires intentional, structured guidance and clear routines to release responsibility to students over time. Rather than launching into public presentations of learning, for instance, **students build from low-stakes practice experiences** with multiple opportunities for peer feedback, clear examples of what success “looks like”, and the flexibility to incorporate their own interests and choices about content. As opposed to isolated and disconnected opportunities to express their ideas, rigorous PBL articulates a cohesive process for students to formulate ideas, practice communicating them, revise based on reflection, and feel a sense of value and success over time as they exercise their voice.

Improving capacity for PBL adoption and deepening the quality of PBL experiences requires creating spaces where teachers, districts, and students can take ownership through enactment. One such space is **Sprocket, an online curriculum platform** that LER has developed to advance the goals of community-building, teacher ownership over curricular adaptation, and professional support (see Figure 2).



Figure 2 Teachers can customize Sprocket curriculum materials for their context.

In addition to facilitating virtual community about PBL practice, Sprocket acts as a teacher tool for first visualizing the purpose for learning and the connective thread of a full PBL course, and then customizing curriculum materials for their context. The ability for PBL teachers to use Sprocket to share materials, adjust lesson plans, and converse with other teachers and coaches in district and national groups exemplifies how **teachers can have a voice in improving PBL practice when they have a supportive community of practice**. Facilitating this kind of enduring community of PBL educators enables rigorous PBL to be more than an educational trend, but a living, sustainable practice.

SUPPORT CORE PRACTICES AND PROCESSES

Beyond promoting continuous development opportunities to improve the PBL experience, LER is working to elaborate on the core elements, practices, and processes that define and support the PBL experience. The social and emotional learning process of learning through projects, for instance, necessitates **explicit attention to the inter- and intrapersonal skills and cultural conditions that amplify the voices of students and teachers**. Building a culture that is conducive to implementing PBL means moving away from traditional power dynamics where the teacher is the sole expert in the classroom to a culture of agency that promotes and emphasizes the value of active contributions from the entire classroom community. Creating such a culture is an intentional process where clear social and emotional habits and routines must be in place to facilitate positive and productive peer-to-peer and student-teacher relationships. LER's integration of SEL in PBL research and practice therefore examines how student and teacher expression, collaboration, reflection, and ownership within a culture of agency help create the conditions necessary for generating consequential work.

LER's work also will examine how assessment integration in projects can promote equitable participation in PBL. For example, projects should provide multiple and varied opportunities for students to demonstrate sensemaking of core concepts and practices through the creation of artifacts and during classroom conversations. Additionally, equitable assessment practice means that teachers practice responsiveness by eliciting and authentically building on **students' lived experiences in lessons**.

Effective integration and support for SEL and for assessment practices requires sophisticated coordination by the teacher. For this reason, LER is also greatly interested in identifying core teaching practices that are heightened in the PBL context and needed to facilitate opportunities to apply disciplinary content, help students exercise control over their learning process, and assess their progress toward meaningful goals. Additional LER position papers elaborate further on how rigorous PBL integrates SEL, assessment, and core teaching practices.



Photo courtesy Tinkering Labs

PARTNERSHIPS WITH RESEARCHER AND PRACTITIONER COMMUNITIES

LER aims to further the community-driven, ground-up approach embodied by the researcher-practitioner partnerships that regularly inform the research, design, and support for rigorous PBL experiences. While traditional research methods may advocate for separating the work of researchers and practitioners, LER believes that coordinated partnerships facilitate simultaneous attention to building an evidence base while scaling best practices. The complex and iterative nature of PBL implementation is best informed by **sharing and building on past expertise and experiences from a variety of sources**, where a focus on specific teacher and student needs will drive improvement.


Throughout the design of Sprocket, for instance, the LER team conducted 12 focus groups with teachers who contributed ideas and feedback about each feature. The culmination of this process not only helped make the components of Sprocket relevant and useful to teachers, but also gathered teachers' perspectives about what would best promote and sustain a supportive community of practice among PBL educators. As a result, the design of a PBL teacher tool like Sprocket not only **facilitates teacher community**, but also **explicitly derives from teacher experiences and PBL enactment**.

This spirit of community among researchers and practitioners is essential in the design of PBL curriculum. Specifically, research-practice partnerships and improvement science methodologies capture systematic evidence about the processes and outcomes of PBL enactment and how educators are localizing PBL. These approaches, driven by a joint need shared by all partners, promote processes that use data to provide timely feedback to the field and develop capacity for long-term, continuous improvement. By employing a community-driven view toward all research, PBL studies can more systematically describe evidence for what is needed to support the expansion of PBL in new settings.



MOVING FORWARD

Given the multifaceted nature of the rigorous PBL framework's four components, such a framework will help establish consensus around design principles that shape authentic, content-driven project experiences while also articulating how and under what conditions rigorous PBL can be effective at scale. The framework contributes to the development of a common language that defines PBL and describes what rigorous PBL entails. In doing so, the framework is intended to create and foster a shared community around PBL research as linked to practice. By gathering evidence that continuously improves implementation, it moves beyond traditional outcomes and builds a PBL community to support a substantial shift in practice.



All students can become active citizens, sensemakers and leaders of productive change in their communities.

The framework aims to support shifts in practice both in terms of PBL curriculum design and enactment in the classroom. It can inform the design of high-quality PBL materials for practitioners who are eager for well-designed projects aligned to course content, while also building capacity through integrated tools and strong communities that sustain ongoing development of PBL practice. The framework **supports a vision of teaching and learning in which teachers and students not only drive the projects, they also own the work** because they are encouraged to localize projects to their strengths and needs.

Realizing this vision of PBL requires a comprehensive program that expands upon how research-practice partnerships can make PBL curriculum, instruction, and assessment more rigorous and also explicitly integrates technology and SEL supports to enhance the student and teacher experience. While each of these areas stems from a wealth of research literature, they all remain under-researched in the context of PBL. By developing a community that documents and shares best practices informed by research evidence, LER aims for a more robust and multifaceted approach to taking rigorous PBL to scale. And perhaps, most important, we learn how to **create spaces where all students can become active citizens, sensemakers, and leaders of productive change in their communities.**

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GEORGE LUCAS EDUCATIONAL FOUNDATION

Founded in 2013, Lucas Education Research operates as a division of the George Lucas Educational Foundation, a nonprofit operating foundation founded by filmmaker George Lucas in 1991. Our work focuses on the design and evaluation of innovative practices in K-12 schools, including many of the core strategies described by our sister division at Edutopia.org.

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