

Rigorous
Project-
Based
Learning
An Inquiry-
Based
Educational
Approach



Enabling Conditions for Scaling Project- Based Learning



Lucas Education Research
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Research across projects revealed that common enabling conditions critical to the success and scaling of project-based learning include teacher agency, aligned professional learning, and student engagement.



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Researchers offer insights into what works

Project-based learning (PBL) is an inquiry-based approach to education in which students investigate authentic problems and build knowledge about subject-matter content. Projects involve complex tasks typically organized around challenging questions that result in reflection, iteration, and the creation of a final public product.

When implemented well, high-quality project-based learning improves student outcomes. However, it is underused in schools. They typically rely on teacher-led forms of instruction rather than focusing on student-led learning supported by direct instruction, when appropriate, and by high-quality practices that build knowledge and enable students to solve real-world problems. To better understand what is needed for rigorous PBL to take hold on a broad scale, this paper explores some of the key enabling conditions that support project-based learning.

Recent findings from [multiple studies](#)  have contributed in important ways to the evidence base for the efficacy of project-based learning. A [study](#)  on the impact of a curriculum that embedded PBL in Advanced Placement (AP) courses found students in those courses outperformed students in traditional AP classes. Findings from the first year of the study showed PBL curriculum increased the likelihood of earning a score of 3 or higher on the AP U.S. Government or AP Environmental Science test by 8 percentage points. At the elementary level, a randomized controlled trial found that an interdisciplinary approach to project-based learning improved second graders' social studies knowledge and informational reading scores (Duke et al., 2020). And a [study](#)  into the effects of a PBL science program found that third-grade students using the project-based approach outperformed their peers on a science assessment. Furthermore, sixth graders who participated in a PBL science course developed at Stanford University also showed higher levels of engagement and greater learning on a science assessment and English language arts and math assessments as compared with a matched sample of students who did not complete the PBL course (Holthuis et al., 2018).

These studies, funded by Lucas Education Research, build on a growing PBL evidence base, including a review of published research by MDRC, a social-policy research organization, that highlighted studies finding positive associations between PBL and students' development of knowledge and cognitive skills (Condliffe et al., 2017).

So what does it take to increase the uptake and scaling of PBL in schools? Some answers lie in the research literature on the complex nature of making big, innovative instructional changes. Harvard University professor Richard Elmore noted that significant shifts require clear models and norms of practice. For instance, he maintained there should be a broad distribution of leadership in schools and systems organized around areas of expertise and held together by common culture and shared goals (Elmore, 2000). No doubt, this kind of organized support and access to resources would benefit a range of interventions.

To shed light on some of the vital conditions that help project-based learning flourish, Lucas Education Research brought together four project teams from higher education institutions around the country that have been studying the effects of project-based learning on K-12 students, as well as on teacher practices. Some of these scholars were members of the research teams that led the studies highlighted at the start of this introduction.

This group of four research teams, called the Enabling Conditions Collaboratory (ECC), used Coburn's (2003) framework for reconceptualizing scale to identify common enabling conditions that allow project-based learning to succeed. Among the most consistent of these conditions were teacher agency and strong, aligned professional learning. The ECC also found that teachers viewed student engagement as critical to the success and scaling of PBL.

This paper relies on interviews with members of the Enabling Conditions Collaboratory and their research and writings, including a paper summing up the group's findings, along with other evidence from the field. Lucas Education Research seeks to share insights from this effort to support policy makers, administrators,



educators, and others interested in making rigorous project-based learning available to more students and ensuring that the conditions are in place to allow it to flourish.

Teacher agency

Teachers have agency when they are empowered to make important teaching and learning decisions and can create change, departing from the typical way of doing things. The ECC researchers found that across the PBL programs they studied, teacher agency was a critical condition for supporting high-quality project-based learning. In a paper outlining their findings, the researchers wrote that schools that had successfully adopted rigorous PBL were those in which “teachers felt agentic, making instructional decisions and adapting PBL curriculum in their classrooms to support the needs of their students” (Potvin et al., 2021).

Teacher agency thrives in schools that have a strong and positive culture and climate and where there are trusting relationships between adults. Teacher agency depends on relational trust, which is an essential characteristic of successful school communities and one that makes it more likely innovations will spread since trust reduces the sense of risk associated with change (Bryk & Schneider, 2003).

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The ECC researchers who examined the implementation of [Multiple Literacies in Project-Based Learning](#) (ML-PBL), the third-grade science curriculum that led to gains in science learning, said teacher agency drove the successful implementation of the program in schools in Michigan and Wisconsin. In particular, researchers cited teachers’ ability to adapt the ML-PBL curriculum to their local context and their ability to shape their professional-learning experiences. For example, the ML-PBL team found that teachers’

implementation of PBL improved as they felt they had more autonomy over creating classroom observational tools that they used with their students.

Los Angeles Unified School District teachers using the [Knowledge in Action \(KIA\) curriculum](#), the program that embedded PBL in AP courses, also pointed to teacher agency as a key condition of their successful implementation of the curriculum. In response to a survey administered by ECC researchers, the Los Angeles teachers said they were empowered by their district and schools to adapt the KIA curriculum to meet their own classroom needs, rather than feeling as though they were handed a script that had to be used in a lockstep fashion.

University of Colorado Boulder researchers who studied Compose Our World, a ninth-grade PBL English language arts curriculum, found that teachers developed agency over time through their involvement in codesigning the project-based program with their higher education colleagues. In addition, teachers reported feeling most successful with the curriculum when they were able to adopt leadership roles and when administrators and peers valued their expertise and trusted them to take instructional risks.

University of Pennsylvania researchers who participated in the Enabling Conditions Collaboratory studied a charter school network that adopted high-quality PBL instruction. In that case, researchers also found that teacher agency was integral to the success of PBL instruction. The charter schools prioritized hiring teachers with project-based learning expertise, which helped them to rapidly shift to the student-centered approach. As such, these teachers were given a lot of leeway to teach PBL as they saw fit.

In whatever manner school and system leaders choose to go about fostering it, teacher agency is essential for rigorous PBL to succeed.

High-quality professional learning

The ECC researchers found that strong professional learning, like teacher agency, was essential to supporting and scaling rigorous PBL. According to Condliffe et al. (2017), the shift to high-quality PBL is complex and requires thoughtful, sustained professional learning and coaching. Features of effective professional-learning programs typically involve initial in-depth



professional learning followed by ongoing support during implementation.

“One-shot workshops do almost nothing,” said Sarah Schneider Kavanagh, a University of Pennsylvania researcher who was a member of the ECC and a coinvestigator on the team that studied the practices of experienced PBL teachers.

Alison Boardman, a researcher at the University of Colorado Boulder and one of the principal investigators who studied Compose Our World—the ninth-grade project-based learning English language arts curriculum—agreed: “There is a minimum amount of time to learn this well. It should be ongoing and sustained, and teachers need just-in-time support.” She noted that the professional-learning program linked to the curriculum she studied included four days of professional learning at the start of the school year, three full days during the year, and monthly coaching.

Survey responses from teachers and administrators from the Los Angeles Unified School District revealed that the overall quality of Knowledge in Action professional learning, the expertise of the coaches, and the ongoing support throughout the school year were critical to transitioning to PBL. University of Southern California researchers who surveyed the Los Angeles teachers stated, “Teachers and administrators referred to the professional development as the best they had ever attended.” The Los Angeles teachers also told the researchers that [Sprocket](#), an online resource that provides KIA instructional materials, supported educators’ depth of implementation and sustained use of the curriculum. In addition, the teachers cited opportunities to collaborate with other educators using the curriculum as critical to their success (Saavedra & Rapaport, 2021).



Photo: Penn GSE

In general, the ECC’s findings echoed research that has shown the essential role that professional-learning communities of practice play in fostering building capacity within schools (Stoll et al., 2006) and how valuable they are in supporting complex, instructionally focused innovations (Andrews & Lewis, 2007; Little, 2002). Strong professional-learning communities foster an improvement in teacher practices through a sense of shared responsibility for colleagues’ development as professionals (Borko, 2004).

PBL is a significant change for most teachers, and educators benefit from peer learning opportunities that allow them to engage in inquiry-based problem solving.

Professor Schneider Kavanagh said building sustained professional-learning communities in schools and districts helps PBL take root. She further explained that project-based learning is more likely to persist when districts build system-level capacity to deliver professional learning and spread PBL practices rather than relying largely on external providers of professional learning.

PBL is a significant change for most teachers, and educators benefit from peer learning opportunities that allow them to engage in inquiry-based problem solving. Just as is the case for students, teachers’ participation in active learning and making sense increases their learning and their ability to transfer new information to their classroom (Gulamhusein, 2013). When teachers, in a supportive professional-learning setting, ask themselves how they can create a learner-centered classroom through projects, they are mirroring the active inquiry used with their students.

Finally, the ML-PBL researchers also found that teachers strengthened their fidelity to PBL practices and adoption of the science curriculum when strong coaching and professional learning accompanied their practice. “Teachers need good materials that are engaging, fun to do, motivating for students, and connected to the real world and disciplinary content,” ML-PBL’s lead researcher Joseph Krajcik said. “But really effective professional learning is needed too.”



Student engagement

While student engagement in PBL looked different across contexts, ECC researchers found it was an important enabling condition for project-based learning. As educators saw student engagement flourish in PBL environments, teachers felt empowered to support the growth and sustainability of project-based learning. Across projects, the ECC team found that student engagement supported the adoption and implementation of PBL and motivated teachers to deepen their change in practices in positive ways.

Key features of rigorous project-based learning include an emphasis on empowering students to play an active role in their learning and to apply what they know and can do toward solving problems in their communities or the larger world. This knowledge-in-use approach creates rich, engaging classroom experiences and motivates student interest in learning (Blumenfeld et al., 1991; Krajcik & Czerniak, 2013).

Design principles of rigorous project-based learning curricula highlight a number of strategies teachers can use to develop student engagement, from using meaningful and authentic driving questions to asking students to immerse themselves in role-playing (Condliffe et al., 2017). In the Knowledge in Action AP U.S. Government course, for example, students have opportunities to take on roles as delegates to the Constitutional Convention and as U.S. Supreme Court justices considering landmark cases.

One teacher noted that the Compose Our World project-based curriculum helped him provide students

with greater choice and creativity in how they learned and how they demonstrated their thinking. The teacher said this allowed students to successfully follow their own curiosity. He added that as he saw student engagement increase, he became more committed to sustaining and spreading PBL.

The ECC team found that public performances associated with rigorous PBL played a strong role in boosting student engagement, as did having authentic audiences.

The ML-PBL researchers who participated in the Enabling Conditions Collaboratory noted that when projects were rooted in solving problems in students' own communities, such as how to grow food in students' neighborhoods and how to strengthen local ecosystems for birds, they enhanced student engagement by encouraging students to see school not just as a building but as a variety of contexts where learning can take place.

ECC researchers found high-quality PBL created a more engaging and inclusive educational environment for learners of different backgrounds and abilities. Krajcik, ML-PBL's lead researcher, noted that with high-quality PBL, students design and build artifacts using multiple skills and strategies, which is engaging and effective for more learners. "They're using their hands and expressing their knowledge in more than one way. That does allow more students to participate. So often in the classroom, everything is text based. We have students reading interesting texts, but it's not the only mode of learning," he explained.





SUPERINTENDENT'S CORNER



Michael McDowell is the superintendent of the Ross School District in Northern California and an author and expert on project-based learning. The LER team asked him for his thoughts on the ECC's findings and on enabling conditions he believes support rigorous PBL.

Photo: Mamee Laufer

In Michael McDowell's experience, **student engagement** is a big draw for education leaders considering adopting project-based learning. "They want high levels of engagement and for kids to do well on measures of core content knowledge," he said, adding that school leaders also frequently look to PBL to help students apply their learning to addressing real-world issues and to learn to collaborate well.

Rigorous project-based learning also helps build student agency. And when visiting classrooms, McDowell listens for clear language from students showing that they can articulate what they are learning, where they are in the process, what their goals are, and how they are going to meet them.

Similar to the findings of the ECC, McDowell considers **teacher agency** to be critical to a school's success with project-based learning. He defines agency as the measure of choice and flexibility teachers have in making key decisions in the classroom to impact student learning, enhance a classroom culture, and deepen or change their practice.

McDowell advises school and system leaders to leverage their interactions with staff to help build teacher agency. "What leaders do sets the tone for teachers being able to engage in their own empowerment and develop agency," he said.

For example, when McDowell advises principals, he urges them not to try to be a school's chief problem solver. "It's not incumbent on us as school leaders to solve the problem, but it is incumbent on us to bring

the problem forward and frame it for the team," he explained, adding that teachers must be partners in problem solving. "Bringing teachers in that way builds their capacity."

McDowell suggests that rather than coming into a staff meeting with a set agenda, administrators can start the meeting with a driving question, just as a teacher would typically do in a PBL lesson. He noted, "Leaders should be expected to model what they expect to see in classrooms." Examples of the kinds of driving questions a school leader can start a staff meeting with include the following:

- To what extent are students transferring learning across different contexts?
- Where are we finding success in developing student agency, and how can we scale that success across the school?
- Where are we finding opportunities for growth in our project-based learning practices?

As was noted by the ECC, building teacher agency and competency related to PBL instruction requires supporting teachers with high-quality and sustained **professional learning**. In McDowell's experience, for teachers to make the shift to rigorous PBL, they need strong professional-learning experiences that are generally inquiry based. That helps teachers better understand PBL practices and gain insights into the student experience in a PBL classroom. McDowell also recommends that coaches or facilitators model PBL best practices and provide teachers with time to practice what they learn and the opportunity to reflect on that in the professional-learning setting.

McDowell also reminds education leaders to remember that for PBL to be successful, it's vital to closely tie projects to subject-matter content. He stressed, "Remember, the purpose of rigorous PBL is to make sure that students really do understand core content and then are able to apply their knowledge to lots of situations and real-world problems."



Conclusion

The Enabling Conditions Collaboratory brought to light critical factors that support the success of rigorous PBL in schools. Lucas Education Research looks forward to learning more from its partners and welcomes further insights from researchers and practitioners about the conditions that support the implementation and scaling of high-quality project-based learning.

The research is clear that well-implemented, rigorous PBL improves student learning. And the studies highlighted in this paper show that PBL benefits students across grades and subjects. It also improves teacher job satisfaction and prepares today's youth for life outside of school. Yet the move from a more teacher-centered, traditional approach toward PBL, in which students play a highly active role in their learning, is complex. Evidence points to significant challenges in shifting to PBL practices that foster collaboration, support reflection and iteration, and

ensure students have authentic learning experiences. To meet these challenges, schools and districts must support and empower teachers to lead these changes and provide teachers with high-quality instructional resources aligned to effective and sustained professional-learning opportunities.

These are investments worth making and changes worth pursuing. Enter a classroom where high-quality project-based learning is taking place, and you'll see students deeply engaged in meaningful work, designing and creating artifacts for public audiences, working with authentic tools, and solving real-world problems.

While we know that high-quality PBL can make important differences in students' learning, it's also clear that certain enabling conditions must be in place for this approach to take root and scale. School and system leaders, as well as policy makers, should work to establish these conditions and leverage them to expand access to project-based learning so more students can benefit from its impact.

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