

## Article New Research for PBL

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### THE RESEARCH IS IN

#### New Research Makes a Powerful Case for PBL

Two new gold-standard studies provide compelling evidence that project-based learning is an effective strategy for all students—including historically marginalized ones.

By [Youki Terada](#)

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When Gil Leal took AP Environmental Science in his junior year of high school, he was surprised by how different it was from his other AP classes. Instead of spending the bulk of the time sitting through lectures, taking notes, and studying abstract texts, his class visited a strawberry farm in the valley nearby.

It wasn't just for a tour. Leal and his peers were tasked with thinking about the many challenges that modern farms confront, from water shortages to pest infestations and erosion. More surprising to Leal: Students were asked to design their own solutions, incorporating what they had learned about things like soil composition, ecosystem dynamics, and irrigation systems.

Now an environmental science major at UCLA—and a first-generation college student—Leal sees the visit as a pivotal moment that led to his decision to pursue science in college. He had never visited a farm before, and was used to a traditional sit-and-listen learning model.

“In other classes, it was lecture, readings, test,” said Leal, “but in AP Environmental Science we worked on projects with other students, discussed our ideas, considered different perspectives—and I learned so much more this way.” Leal's AP class, taught by Brandie Borges, is part of a new generation of classes that transform traditional teacher-led instruction into a more student-centered, project-based approach—requiring students to work together as they tackle complex, real-world problems that emphasize uncertainty, iterative thinking, and innovation. Proponents of project-based learning (PBL) argue that it fosters a sense of purpose in young learners, pushes them to think critically, and prepares them for modern careers that prize skills like collaboration, problem-solving, and creativity.

[Critics](#) say that the pedagogy places too much responsibility on novice learners, and ignores the evidence about the effectiveness of direct instruction by teachers. By de-emphasizing knowledge transfer from experts to beginners, the critics suggest, PBL undermines content knowledge and subject fluency.

While project-based learning and direct instruction aren't incompatible, evidence that might settle the deeper controversy over PBL's effectiveness has been sparse. Only a handful of studies over the last decades have established a causal relationship between structured project-based learning and student outcomes—in either direction.

But two major new gold-standard studies—both funded by [Lucas Education Research](#), a sister division of Edutopia—conducted by researchers from the University of

Southern California and Michigan State University, provide compelling evidence that project-based learning is an effective strategy for all students, outperforming traditional curricula not only for high achieving students, but across grade levels and racial and socioeconomic groups.

## **REIMAGINING ADVANCED PLACEMENT COURSES**

The two studies involved over 6,000 students in 114 schools across the nation, with more than 50 percent of students coming from low-income households.

In [the AP study](#), which included Gil Leal’s class along with over 3,600 students in both AP Environmental Science and AP U.S. Government and Politics courses from five districts serving a diverse student body, researchers looked at a broad range of project-based activities in the sciences and humanities.

In one example, students in Amber Graeber’s AP Government class took part in a simulation of an electoral caucus. Meanwhile, instead of simply reading about Supreme Court cases, students in Erin Fisher’s class studied historic cases and then took on real-world roles, arguing the cases in mock court, acting as reporters, and designing campaign ads and stump speeches to make their case.

Researchers found that nearly half of students in project-based classrooms passed their AP tests, outperforming students in traditional classrooms by 8 percentage points. Students from low-income households saw similar gains compared to their wealthier peers, making a strong case that well-structured PBL can be a more equitable approach than teacher-centered ones. Importantly, the improvements in teaching efficacy were both significant and durable: When teachers in the study taught the same curriculum for a second year, PBL students outperformed students in traditional classrooms by 10 percentage points.

The study results nudged at entrenched ideas about how to best teach students from different backgrounds. “There’s a belief among some educators and some policymakers that students from underserved backgrounds... aren’t ready to have student-centered instruction where they’re driving their own learning,” said USC researcher Anna Saavedra, the lead researcher on the AP study. “And so there’s this idea, and the results of this study really challenged that notion.”

Nationally, the researchers concluded, 30 percent of students from low-income households take AP tests, but that number jumped to 38 percent for students in PBL classrooms—there are more low-income students taking AP tests using project-based learning, and more are passing as well.

It may seem counterintuitive that a student-centered approach is effective in an environment that’s so focused on high-stakes testing, but the results suggest otherwise.

“Students felt like the work was more authentic,” said Saavedra, suggesting a possible explanation for the improvements. “There were more connections to their real lives. For example, in the AP Environmental Science course, they were learning about their ecological footprint and thinking: How do my behaviors affect the health of my community and of the larger world?”

## AUTHENTIC LEARNING

But project-based learning isn't just for high school kids. In Billie Freeland's third-grade class, PBL not only builds students' interest in science but also helps them make more connections with the world around them, generating a deep understanding of—and appreciation for—science, she says.

“Third-grade students work on the ‘Toy Unit,’” said Freeland. “But don't let the name fool you.... Third graders learn the concepts of gravity, friction, force, and direction by designing toys from simple objects such as water bottles, straws, and recycled milk cartons. The unit ends with them designing their own toys that use magnetic or electrical force,” she told researchers, while emphasizing that the projects are aligned with Next Generation Science Standards (NGSS).

Freeland's class was one of dozens involved in the [large-scale study examining the effectiveness of PBL in elementary science classes](#). In the study, researchers from Michigan State University and the University of Michigan studied 2,371 third-grade students in 46 schools who were randomly assigned to a business-as-usual control group or a treatment group. The schools selected for the study were diverse: 62 percent of the schools' student bodies qualified for free or reduced-price lunch, and 58 percent were students of color.

Like the high school students in the AP study, elementary students in PBL classrooms outperformed their peers, this time by 8 percentage points on a test of science learning. The pattern held across socioeconomic class and across all reading ability levels: In the project-based learning group, all boats rose on the tide—and both struggling readers and highly proficient readers outperformed their counterparts in traditional classrooms.

“The beauty of all of this, which is really quite lovely, is that we have PBL in science, a progression of it, from elementary through high school,” said Barbara Schneider, a professor of education at Michigan State University who worked on the study. “Our findings are consistent all across elementary and secondary school, which is really quite remarkable. And in both cases, we're looking at substantial increases in science achievement.”

The Takeaway: In two gold-standard, randomized, controlled trials of thousands of students in diverse school systems across the U.S., project-based learning significantly outperformed traditional curricula, raising academic performance across grade levels, socioeconomic subgroups, and reading ability.

*To learn more about the AP courses and the research, watch the videos [Reinventing AP Courses With Rigorous Project-Based Learning](#) and [A Project-Based Approach to Teaching Elementary Science](#).*