

PROOF POINTS: Four new studies bolster the case for project-based learning

Trials were accompanied by big investments in teacher training and coaching

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Project-based learning, a popular practice that uses lots of poster boards and student presentations, is billed as an antidote to boring classrooms where teachers drone on. Advocates say that hands-on projects motivate students to learn, think critically, solve problems and work collaboratively with their peers. But it's an open question whether students can learn every subject this way.

Four new studies released in February 2021 are helping to fill this void. Each concluded that students who learned science and social studies through a detailed project-based curriculum over the course of a year posted higher achievement scores than those who learned those subjects the way teachers in their schools usually taught them. Better results for project-based learning were documented on a variety of tests, from Advanced Placement exams in high school to annual state assessments in math and reading in sixth grade.

The George Lucas Foundation financed the four studies. Project-based learning is a personal passion of “Star Wars” director George Lucas, who has often described how he was **bored in school** until he learned to use a camera and started to make films.

“Naysayers may think that project-based learning is progressive and it’s chasing butterflies in the backyard,” said Kristin De Vivo, executive director of Lucas Education Research, a unit of the Lucas foundation that commissioned outside researchers to conduct the evaluations. “The thing that we’re trying to debunk with this research is to actually show that project-based learning is a rigorous form of teaching and learning. And that when done *well*, it allows for each and every student to benefit from the experience.”

Four new studies on project-based learning

- 3rd grade science. Developer: Michigan State University [Research.Curriculum](#).
- 2nd grade social studies. Developer: University of Michigan and Michigan State University [Research.Curriculum.Related 2018 Hechinger coverage](#).
- 6th grade science. Developer: Stanford University [Research.Curriculum](#).
- High school Advanced Placement. Developer: University of Washington [Research.Government and Politics curriculum.Environmental Science Curriculum](#).

The project-based lessons, or curricula, used in all four of the evaluations were developed by academic experts at universities over many years and teachers were extensively trained and coached to implement them properly. Students worked on multi-stage projects over an extended period of time throughout a unit of study. In some cases, the lessons were almost scripted and specified exactly which projects students should select along with which tasks students should complete along the way, not leaving those choices entirely up to students or their teachers. Limiting choice helped to make sure students covered the content they otherwise would have learned through lectures, textbooks and worksheets.

For example, in a sixth grade science unit on energy, students worked in groups to design a device that controls thermal energy transfer to keep something warm. Students had to document their learning process as they added their ideas and built a device. For the final product, each student submitted an individual patent application for their group's device, explaining how it worked and what they learned.

This middle school project-based instruction was tested on more than 100 students in high-poverty schools in California. The students not only scored 11 percentage points higher on a science assessment but also performed 8 to 18 percentage points better on state math and reading tests than similar students who learned science the traditional way. The positive spillover effects for other subjects are noteworthy. Students who didn't speak English as their primary language and were classified as English language learners scored higher on a California test that tracks language proficiency.

The other three evaluations were much larger randomized controlled trials, involving hundreds or thousands of students each, all of which were conducted before the pandemic. The results for student achievement were similarly positive. One study also documented that students who learned through projects scored higher on social emotional measures.

Not every attempt at project-based learning worked. The Lucas foundation originally tried to finance the development of a project-based curriculum to teach math. But it was "put on ice," De Vivo said, and never evaluated. De Vivo explained that it's much harder to come up with good projects for teaching abstract math concepts and skills. The foundation is planning to try math again as a data science and statistics class, where projects are more feasible.

The four studies don't amount to proof that project-based learning is the best way to teach or that every teacher should teach this way.

"There's nothing wrong with project-based learning," said Chester Finn Jr., a senior fellow at the Fordham Institute, a conservative education think tank. "Kids like it. It's obviously more fun than being talked to by a teacher, or being given a bunch of worksheets or just told to read a textbook. When it's done well by a competent teacher, it can cause kids to learn good, important stuff."

The problem, according to Finn, is that both students and teachers are prone to getting sidetracked. Students can spend a month becoming arts-and-crafts experts while building an irrigation system in ancient Egypt, but learn little about the ancient civilization. Similarly, teachers might follow their own passions, spending months on the Amazon rainforest in a biology class, say, while giving short shrift to mitochondria, chromosomes and evolution.

“You can have a master chef produce an incredible meal,” said Finn, “and then you can put an amateur into that same kitchen and given them the same menu, and what comes out is barely edible. In the hands of experts, project-based learning can work beautifully. But we have four million teachers and 100,000 schools. You’ve got to deal with the challenge of going to the mass application of it.”

The structured curriculum in the four trials helped avoid common project-based learning pitfalls. Most importantly, teachers were given ample training and coaching to make sure they were doing it right. In one of the trials, teachers worked with researchers for three years to refine and implement the curriculum properly before it was evaluated. In others, teachers went to summer training institutes, attended extra professional development days during the school year and were given monthly coaching sessions. It was a big investment.

The project-based learning materials used in these evaluations are open and freely available for other schools to use, but the teacher training and coaching to implement it properly cost money. For some of the project-based learning curricula, the training programs don’t yet exist and the Lucas foundation is working to launch these.

It’s an open question whether large numbers of teachers will enjoy teaching detailed lesson plans created by curriculum designers. Part of the appeal of project-based learning is the perception that there’s more freedom, a welcome break from the pressures of test prep and meeting Common Core standards. This version could feel like a restrictive straight jacket.

Before the release of this collection of four studies, Barbara Condliffe at MDRC, an independent research organization, **reviewed the existing research on project-based learning** in 2017, also at the request of Lucas Education Research. She said it has been difficult to assess whether there is good evidence for project-based learning because there’s so much confusion over what project-based learning is.

The label is often used to describe things that good teachers have long been asking of students, such as problem-solving and learning by doing. Inquiry — another education buzzword — is a close cousin because project-based learning typically begins with a question that students need to answer. For some advocates, it’s important that students produce a final work product for a real audience, not just the teacher’s eyes and red pencil. The biggest controversy is over choice. Many say that the ability of students to choose their own projects is essential to motivate students. Others disagree, believing that students can get excited about a clever project that a curriculum designer has chosen and covers the essential content. In a February 2021 presentation of the new project-based learning studies, speakers said that there are even times

when it's appropriate for teachers to stand in front of the classroom and explain things to the whole class in a traditional lecture style.

To me, it often seems like the academic experts were drawing from a variety of teaching approaches in writing their curricula, using the best one for the particular circumstance. That's a good thing. But it feels odd to label a whole curriculum "project-based learning" when projects are one ingredient of many.

One of the most important contributions of these studies was to target low-income and low-achieving children and show that the achievement gains for them were just as strong as for high-income and high-achieving children. Some educators had questioned whether students who are behind grade level might thrive in a less structured classroom or miss learning essential skills while working on projects.

"We used to restrict project-based learning to a very tiny minority of students who were in gifted-and-talented or advanced courses, and we would give them what we would call 'thinking work'," said Linda Darling-Hammond, president of the California State Board of Education who led President Joe Biden's education transition team after the election. "That has exacerbated the opportunity gap in this country."

"What we really need is project-based learning of this kind for all students," added Darling-Hammond, who is also president of the Learning Policy Institute and professor emeritus at Stanford University, where the middle school science curriculum was developed. "We know it works. It's the kind of learning that's going to propel students who have been further from opportunity forward at a more rapid rate with the kinds of critical thinking and problem solving skills that they need."

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