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RESEARCH REVIEW

Elizabeth Foster

STUDIES SHOW THE IMPACT OF PROJECT-BASED LEARNING

▶ THE HIGH SCHOOL STUDY

Saavedra, A.R., Liu Y., Haderlein, S.K., Rapaport, A., Garland, M., Hoepfner, D., Morgan, K.L., & Hu, A. (2021, February 22). *Knowledge in Action efficacy study over two years.* USC Dornsife Center for Economic and Social Research.

▶ THE ELEMENTARY SCHOOL STUDY

Krajcik, J., Schneider, B., Miller, E., Chen, I., Bradford, L., Bartz, K., Baker, Q., Palincsar, A., Peek-Brown, D., & Codere, S. (2021, January 11). *Assessing the effect of project-based learning on science learning in elementary schools.* George Lucas Educational Foundation.

Project-based learning is popular with many parents, students, and teachers because of its focus on problem-solving, critical thinking, creativity, and real-world application (Gallup, 2019). It encourages teachers to act as facilitators while students actively engage in teacher- and student-posed learning challenges, working alone and in groups on complex tasks organized around central questions leading to a final product.

Does it work? Several recent studies from the George Lucas Educational Foundation suggest that the answer is yes — when it is implemented with intentionality and quality. High-quality professional learning is part of that equation.

Two recent randomized control trials are the focus of this column. Together, the studies involved more than 6,000 students in 114 schools with more than half the students from low-income households. They found positive impacts of two different project-based learning approaches across grades, subjects, and specific groups, and professional learning played a role in both of them.

Professional learning aligned to the Standards for Professional Learning is important for project-based learning because project-based learning is a pedagogical and philosophical shift for many educators. It is "not a simple matter of adding another tool to a teacher's toolbox" or "another way to 'cover standards' that's a little more engaging for students," according to the organization PBL Works (n.d.). Professional learning for project-based learning might include a re-examination of student and educator learning goals and new strategies for understanding student experiences and challenges — work that takes the kind of sustained, job-embedded professional learning that should be the standard.

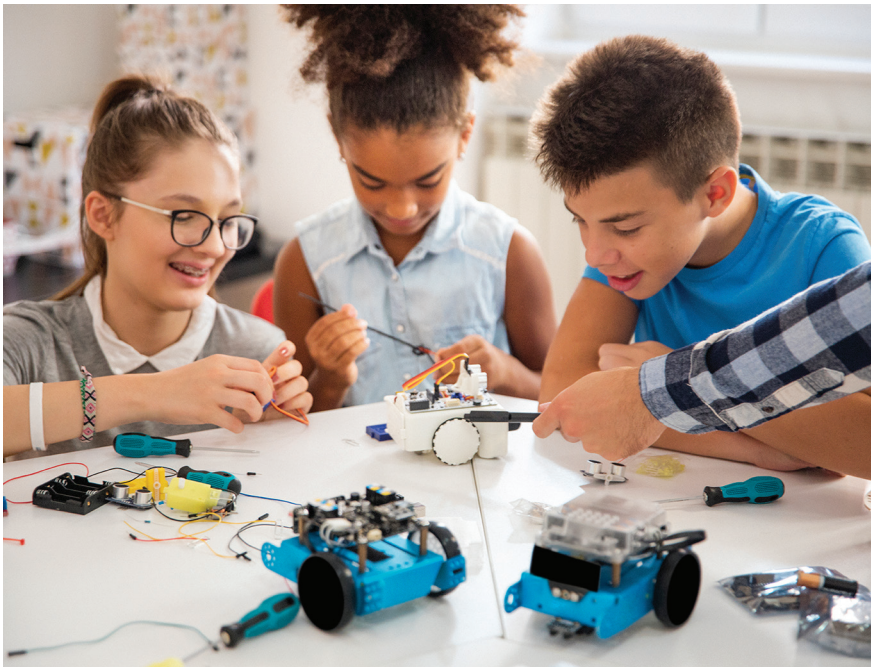
AT THE HIGH SCHOOL LEVEL

The first study, *Knowledge in Action: Efficacy Study Over Two Years,* looked at project-based learning at the high school level. The Knowledge in Action program is a project-based learning approach to advanced placement (AP) courses, developed by the University of Washington. The initial group of courses aims to develop students' civic, political, and environmental awareness and engagement.

The randomized controlled trial study, which was conducted by researchers from the USC Dornsife Center for Economic and Social Research with support from Lucas Education Research, examined Knowledge in Action's impact by looking at students' AP test scores, a well-known measure of student success but one not often used in research studies.

A high score on the AP examination can count as college credit in some cases, and these scores are correlated with college enrollment and persistence.

The study examined five districts in 2016-17 and a follow-up study in 2017-18, including



3,600 high school students in AP Environmental Science and AP U.S. Government and Politics courses.

Researchers looked not only at impact but implementation, including a broad range of project-based activities in the sciences and humanities as well as the associated resources and professional learning. PBLWorks facilitated the professional learning, which included a four-day summer institute, four full days during the year, and ongoing job-embedded on-demand virtual coaching support during the first year. During the second year, the supports were optional and the teachers did not have access to the supplemental coaching.

The study found that treatment teachers who used the Knowledge in Action curriculum and professional learning supports changed their pedagogy to place greater emphasis on deeper learning objectives, use student-centered pedagogy in ways their students felt were authentic, and spend less time on lectures or explicit exam preparation — all aspects of high-quality implementation of project-based learning.

Looking at impact, researchers found that students in the project-based learning classrooms outperformed students in traditional classrooms on AP examination pass rates by 8 percentage points. When teachers in the study taught the same curriculum for a second year, that advantage increased to 10 percentage points. Positive results occurred within and across courses, and across specific groups of students from different economic circumstances.

The fact that the results are consistent across student backgrounds has important equity implications. The researchers made an interesting observation that the student-centered approach that is embedded in project-based learning could make engagement and learning more accessible to all students, including those who are traditionally marginalized: "Students from low-income households saw similar gains compared to their wealthier peers, making a strong case that well-structured project-based learning can be a more equitable approach than teacher-centered ones."

One researcher noted that the findings provide evidence that students of all backgrounds are ready to take on increased agency and responsibility for their own learning, pushing back against the belief some educators hold that students from low-income households are not ready for such opportunities.

AT THE ELEMENTARY LEVEL

A second study, *Assessing the Effect of Project-Based Learning on Science Learning in Elementary Schools,* looked at a project-based learning intervention designed to achieve the Next Generation Science Standards. The Multiple Literacies Project-Based Learning intervention centers on inquiry related to real-world challenges and complex scientific phenomena and includes curricular and instructional resources, assessments, and professional learning.

Researchers at Michigan State University and the University of Michigan conducted a randomized controlled trial of 46 schools across Michigan that had a total of 2,371 3rd-grade students representing a range

of economic and racial diversity to determine if this project-based learning approach improved students' science learning and social and emotional learning.

Implementation measures showed the key role of professional learning in the treatment group, which was intensive and ongoing to help teachers understand and implement the pedagogical shift needed for project-based learning.

The professional learning included in-person and virtual sessions (approximately seven days' worth), a key feature of which was that it used guided, active, inquiry-based learning for educators designed to mirror what their students would experience. For example, educators practiced strategies such as encouraging students to pose questions to make sense of phenomena, engaging students in scientific and engineering practices, and facilitating students' building of artifacts.

An excerpt from the study report illustrates the ongoing nature of the professional learning: "In addition to the face-to-face meetings, team leaders (who were experienced elementary teachers) met with groups of teachers via video conferencing. These sessions occurred approximately every two weeks to solicit information from the teachers; they included discussions on what worked and what was challenging, as well as questions they and the students had while enacting the lessons."

In addition, teachers were encouraged to call the program developers' hotline with questions at any time. A team member collected the questions and reviewed them with the development team in weekly meetings.

The researchers found that on average, students in Multiple Literacies Project-Based Learning classrooms performed 8 percentage points better on the science assessment as compared with students in the control group classrooms. The project-based learning intervention also had significant positive effects on students' engagement in reflection and collaboration, two aspects of social and emotional learning that the researchers related to science learning.

As in the previous study, researchers found this positive effect across schools with differing racial and ethnic backgrounds and household-income status. The results remained consistent across reading ability levels, a finding that indicates project-based learning supported by professional learning for educators has the potential to reach and engage each student.

IMPLICATIONS

These studies highlight how project-based learning can be a powerful

classroom strategy when supported by high-quality, job-embedded professional learning. Professional learning was an integral part of both programs studied. Indeed, one of the reports notes that the impact of the professional learning could not be disentangled from the impact of the curriculum intervention overall. That shouldn't be seen as a weakness, however, because meaningful changes in practice take changes in teacher knowledge, understanding, and capacity.

The shift from traditional teaching to project-based learning teaching appears to be supported when professional learning adheres to the Standards for Professional Learning: The learning in these studies was curriculum- or content-specific, provided on an ongoing basis for substantial amounts of time, featured active learning and collective participation of teachers, and met other criteria in the standards.

Looking at specific standards, the **Data** standard came into play because establishing clear and specific measures of student outcomes contributed to the design of effective professional learning. These studies also illustrate an important concept in the **Learning Designs** standard: Learning for educators can be especially powerful when it offers them an opportunity to experience what the students will experience, such as engaging in the same kinds of questioning techniques.

The study also suggests ways that professional learning leaders can embed components or key lessons from project-based learning into professional learning about other pedagogical approaches. For instance, including student voice and choice is often something that is desired in schools and a request that professional learning is expected to meet. But findings authentic ways to include student voice and agency can be challenging.

Leaders can uncover the ways that project-based learning professional learning teaches and facilitates strategies for student voice and apply them to other interventions. That shift requires ongoing, job-embedded professional learning. These experiences could represent engaging new challenges for educators as well as an opportunity to look at professional learning from a new angle.

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