RESEARCH BRIEF

Project-Based Learning Boosts Student Achievement in AP Courses

Introduction

Rigorous project-based learning (PBL) benefits students in many ways, including by raising academic achievement. This research brief adds to the evidence base by highlighting the findings of a study showing the impact of project-based learning approaches on student outcomes in college-preparatory courses.

The randomized study examined the impact of PBL and aligned resources and teacher professional-learning experiences on student outcomes in Advanced Placement (AP) courses. This is the first study to harness the power of a randomized controlled trial (RCT) to determine the impact of PBL on AP Exam scores. The study found that students who took the PBL courses outperformed those in traditional AP courses. Specifically, the students were more likely to earn a credit-qualifying score of 3 or higher (on a scale of 1 through 5) on the end-of-year AP tests. Qualifying scores can earn credit at many U.S. colleges and universities, lowering the cost of tuition. They also signal to colleges that high school students are prepared to do college-level work.

Researchers from the University of Southern California (USC) conducted this study. They investigated the efficacy of the Knowledge in Action (KIA) PBL approach to teaching AP U.S. Government and Politics and AP Environmental Science. A team of University of Washington education experts and high school teachers designed Knowledge in Action to deepen students' content knowledge and skills in AP courses. The curriculum includes both instructional materials and robust professional learning. As with other PBL approaches, students in KIA classrooms work on complex tasks organized around central questions leading to a final product.

Lucas Education Research, a division of the George Lucas Educational Foundation, funded the research project.

About the study

Over a two-year period, the USC researchers studied the impact of the PBL courses in five predominantly urban school districts around the country that primarily served students of color. A majority of students in four of the five districts were Black and Hispanic. In addition, a significantly higher proportion of the students in the study were from low-income households than is typical for AP test takers. 38 percent of students in the first year and 46 percent of students from the second year of the study who took the test qualified for free and reduced-price lunch as compared with 30 percent of students from the national sample of AP test takers. These student demographics are notable, as the College Board, policy makers, and

educators are making a concerted effort nationally to get more underrepresented minorities and low-income students enrolled in and earning credit for AP college-preparatory courses.

Harnessing a school-level RCT during the 2016–17 school year, researchers examined one year of Knowledge in Action AP U.S. Government and Politics and AP Environmental Science implementation and the impact of the PBL program on student achievement on the end-of-course AP test. Researchers then added a study in the 2017–18 school year to follow teachers into their second year of using the Knowledge in Action approach to teaching AP courses. In the second year, the researchers examined achievement levels for students who had teachers with two years of experience using KIA as compared with students with teachers in their first year and students whose teachers did not use the KIA curriculum and professional supports. For comprehensive information about the study methodology and analytical approach, see the researchers' report.

Results

Findings from the first year revealed that KIA increased the likelihood of earning a score of 3 or higher on the AP U.S. Government or AP Environmental Science test by about 8 percentage points. Without KIA, about 37 percent of the sampled students earned a score of 3 or higher on the AP U.S. Government or AP Environmental Science test. That percentage increased to 45 percent as a result of participation in the KIA program. The increase in AP performance and effect sizes due to KIA were similar for students from low-income and higher-income households.

About Knowledge in Action

AP U.S. GOVERNMENT AND POLITICS

The five projects in the AP U.S. Government and Politics KIA course are organized around the overarching question, "What is the proper role of government in a democracy?" Each project involves simulations in which students take on roles that help them experience, in a hands-on way, the content required by the College Board AP course framework. For example, in one lesson, students act as delegates to the Constitutional Convention and have to decide whether to ratify the new Constitution. In another, they organize and execute a presidential campaign.

AP ENVIRONMENTAL SCIENCE

The AP Environmental Science course contains five projects organized around the question, "How can we live more sustainably?" In one project, students calculate their ecological footprints and investigate the impacts of their families' consumption habits. In another, they act as farmers who design a farm with ecological and economic constraints in mind. The projects highlight civic engagement, progressing from personal explorations of the content to a focus on global issues such as climate change, and they fulfill the same content requirements as the traditional AP Environmental Science course.

Table 1. Impact of Participation in KIA on Student AP Performance

Student Cohort	Effect Size	*p* Value	Number of Students
First-Year Study Overall (2016–17)	0.457	0.002**	3,645
Low Income (2016–17)	0.386	0.028*	1,838
Not Low Income (2016–17)	0.496	0.002**	1,125
Follow-Up Study Overall (2017–18)	0.527	0.047*	2,946

*$p < .05$ **$p < .005$

STUDY DETAILS

Overall, there were no test-taking effects, which confirmed that both KIA and non-KIA students were equally likely to participate in the AP Exams. Eighty-one percent of the total sample of students took the AP Exam in May 2017, which represents 74 teachers across 68 schools and 3,645 students. Thirty-eight percent of these students were from low-income households.

Students of teachers in the second year of using a KIA curriculum had a 10-percentage-point boost in the probability of earning an AP Exam score of 3 or higher.

Results from the follow-up study suggested that students continued to benefit from KIA as teachers gained experience. Students of teachers in the second year of using a KIA curriculum had a 10-percentage-point boost in the probability of earning an AP Exam score of 3 or higher. Researchers noted that many schools in the study did not offer the same AP course consistently for two years in a row, and therefore nearly one-third of the KIA teachers were reassigned to other AP courses during the follow-up study year or moved to another school. The study sample included teachers who participated in the RCT, taught AP U.S. Government and Politics or AP Environmental Science during the 2016–17 and 2017–18 school years, and continued teaching the course in their original school. Overall, 78 percent of the total sample took the AP Exam in May 2018, which represents 53 teachers across 50 schools and 2,946 students. Forty-six percent of these students were from low-income households.

Test-taking effects were reported for students of teachers in their second year of KIA practice, revealing that participation in the KIA program during the follow-up study resulted in a greater likelihood to take the AP Exam.

Table 1 provides more-specific information about the impact estimates, statistical significance, and sample size for each analysis. Note that in the chart above, "effect size" is a simple way of quantifying the difference between groups. Additionally, the *p* stands for "probability." A *p* value helps to determine the significance of the results.

The researchers' report provides full details for all analyses.

In addition, the researchers collected implementation data that included surveys, interviews, and instructional logs showing that teachers using KIA changed the way they teach. Compared with other teachers, KIA teachers lectured and conducted test prep less frequently. They used student-centered teaching practices more frequently and in ways students felt were authentic, according to survey data. Students using the project-based curriculum reported feeling prepared for their AP Exams. The majority of teachers recommended the approach and cited benefits for them and their students.

Discussion

This study adds to the research landscape in important ways. Previously, researchers had not conducted a randomized controlled trial, the gold standard in research, examining the impact of project-based learning on AP test scores.

The findings have important policy implications for practitioners and policy makers. School and system leaders and educators have reported that a barrier to adopting PBL can be the perception that the approach doesn't prepare students for end-of-year or other high-stakes tests, including AP Exams. This research challenges that view. The deep knowledge and skill building found in KIA classrooms, and aligned teacher professional learning, support student achievement as measured by AP tests.

The findings also support the KIA approach for students from low-income and higher-income households. KIA students outperformed control groups in both household-income subgroups, which provides clear evidence that rigorous project-based learning approaches are valuable for all students. This finding is important as districts work toward providing greater access to AP courses and other college-preparatory course work for underserved students. All five districts involved in the KIA research have a stated goal of increasing access to AP courses, particularly among underrepresented student groups, while also increasing exam participation rates and scores.

It is also important to recognize that the teachers who used the KIA curriculum received high-quality and sustained professional learning related to the AP content they were teaching. Shifting from primarily direct instruction, such as lecturing and relying on textbooks, to PBL instruction is a significant change for teachers in any content area, but it is especially true in high-stakes contexts like AP classrooms. During teachers' first year with KIA, professional-learning supports included four full days of summer learning, four full days of in-person learning during the school year, and on-demand coaching. In teachers' second year using KIA, these professional-learning supports were optional and the on-demand coaching wasn't available. It is interesting to note the sustained impact of KIA for students whose teachers were in their second year of the program, despite the fact that few of these teachers reported attending professional-learning sessions. While it is not uncommon to report an implementation dip with the release of professional learning, in this case, KIA teaching practices appear to have been maintained and potentially strengthened, as demonstrated by student outcomes on the AP Exam.

Conclusion

This research into the effects of high-quality PBL and aligned professional learning on student outcomes in AP courses points to the need for greater access to such approaches for all students and teachers.

The fact that the proportion of students receiving a score of 3 or higher on the AP test was about 8 percentage points higher among students in PBL classrooms than for those in traditional classrooms is important. And it's notable that the growth happened during the first year of the teachers' engagement with the KIA curriculum and professional supports. While nearly one-third of all teachers could not be included in the follow-up study because they were reassigned to other classes or schools, researchers calculated that the students of KIA teachers in their second year of implementing the PBL curriculum outperformed students who did not receive PBL instruction by about 10 percentage points.

The KIA program improved the performance of students from families with both lower and higher socioeconomic statuses, which reinforces the view of many education and civil rights advocates that underrepresented students should get more-equitable access to rigorous college-preparatory course work.

This research should spur the development of additional programs that promote the use of project-based learning in rigorous high school courses. As with KIA, careful review and study of those approaches would benefit the field by building the evidence base for high-quality project-based learning and providing further information about effective teaching and learning.

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