



Los Angeles City College's STEM Pathways Program

Participation and Impact

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Introduction

Los Angeles City College (LACC) launched the STEM Pathways (STEMP) program in 2016 with funding from the U.S. Department of Education. The college conceived the STEMP program as a comprehensive suite of evidence-based supports working together to improve STEM outcomes for Hispanic or Latinx (Latinx) and low-income students. LACC engaged SRI Education as the independent evaluator for the STEMP program to assess the program's impact on student outcomes. This research brief summarizes the findings from SRI's evaluation of the STEMP program from fall 2017 through fall 2019.

During the study period, the program offered a variety of supports, including peer tutoring, a book and technology loan program, specialized support from a STEM counselor, and an undergraduate research program. Although STEM students could apply and be accepted into the STEMP program, acceptance was only required for two programs: the undergraduate research experience and the book and technology loan program. Students could otherwise participate in as many or as few components as they chose.

Research Questions

SRI used LACC administrative data containing the demographic, coursetaking, and enrollment patterns of LACC STEM students combined with STEMP program participation data to address two overarching research questions:

To what extent did the STEMP program serve the student populations targeted by the grant: low-income and Latinx students?

How did STEMP program participation impact student outcomes, including STEM course success, grades, continuation in STEM, and degree attainment?

We examined outcomes for students who participated in any program component over the study period as well as outcomes for students who participated in each of the two largest program components, Supplemental Instruction (SI) and the STEM Learning Center (SLC).

LACC's STEM Pathways Program

- **STEM Supplemental Instruction:** The program used grant funds to expand SI to STEM courses, targeting gateway courses with low pass rates such as Calculus I, II, and III, Introduction to General Chemistry, and Chemistry 101. The program hired and trained students who had already passed a class to offer in-class and supplemental support sessions in select course sections based on faculty interest.
- **STEM Learning Center:** The program offered peer drop-in STEM tutoring for higher-level math courses (trigonometry and above), as well as chemistry, biology, physics, and computer science courses.
- **Undergraduate research experience:** During summer 2017 and 2018, the program provided opportunities for students to conduct original research under the supervision of an experienced faculty advisor at LACC or a local university.
- **Book and technology loan program:** Starting in fall 2018, the program loaned STEM textbooks to ensure students had the resources they needed to succeed in their courses and added tablets in fall 2019.
- **STEM counseling:** The program hired a dedicated STEM counselor to help students understand and navigate the requirements for a STEM degree. This position was staffed in fall 2017 and in summer 2018 through spring 2019.
- **Math boot camps:** The program offered intensive, short-term math instruction in winter intersession terms for students who needed to pass introductory math courses.

In addition to these components, the program sponsored several events and trainings geared towards STEM students and faculty. Because these events were quite general in nature, we did not consider STEM event attendance as program participation when examining proportionality and impact for students who participated in any program component.

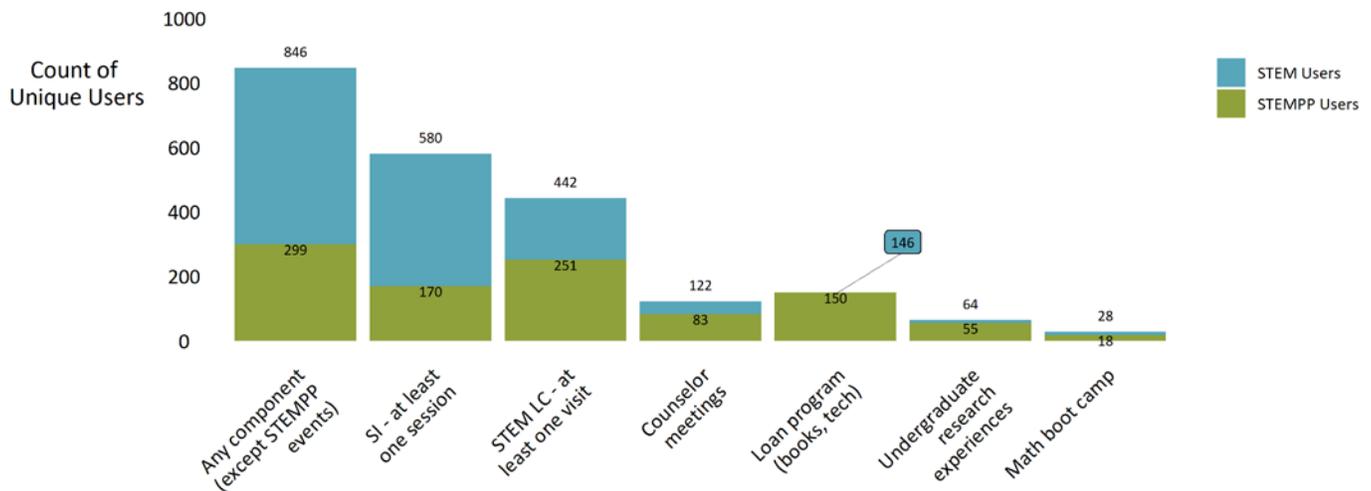
STEMP Program Participation and Proportionality

Between summer 2017 and fall 2019, 846 STEM students participated in a STEMP program component at least once. Of these, 35% (299) were STEMP program members (STEMPP users). More than half of STEM users accessed SI and/or the SLC at least once, making these the largest program components in terms of students served.

STEM Student Definition

Any student enrolled at LACC during the study period who declared a STEM major or took trigonometry or a higher math course by fall 2019

STEMP Program Participant Counts



We compared the percentage of low-income STEM students and Latinx STEM students overall to the percentage of low-income or Latinx students who participated in any program component to examine the extent to which the program served the target student population. We found:

The program was successful in reaching low-income students, who were slightly overrepresented among program participants compared with the LACC STEM student population (4 to 8 percentage point gap).

The program was slightly less successful in reaching Latinx students, who were underrepresented among program participants compared with the LACC STEM student population (-2 to -9 percentage point gap).

Low-income Latinx students participated in the program at close to parity to the percentage of low-income Latinx students in the LACC STEM student population with some variation by term (-4 to 6 percentage points).

These trends were similar for SI and SLC student participation.

This research brief summarizes the evaluation results from three SRI technical reports:¹

- [Impacts of STEM Pathways program participation on student outcomes](#)
- [Impacts of the STEM Learning Center participation on student outcomes](#)
- [Impacts of the Supplemental Instruction program on student outcomes](#)

Impact of STEMP Program Participation

We calculated the effect of STEMP program participation in each term using propensity score weighted regression and averaged the effects across the terms using meta-analysis (see “All Terms” column of the effect size plot). We found:

Students who participated in at least one program component in a term earned slightly more STEM credits (0.37 to 0.75 more credits by term) and were more likely to continue in STEM than similar peers who did not participate.² Findings were similar for SLC participants.

SI participants earned higher grades (0.30 to 0.33 more grade points by term), were more likely to pass a course, and were more likely to continue in STEM than similar students enrolled in the same STEM courses.³

The effect sizes for the combined cross-term estimates are small, with the exception of course passing and continuation in STEM for SI participants, which are medium in magnitude.⁴

These cross-term averages mask variation in the impact estimates by term. Notably, effect size estimates for participation in any program component are smaller in spring and fall 2019 than in earlier terms, and program participants in these terms have, on average, substantially more prior program interactions. Based on this pattern, we hypothesize that at some point the benefits of additional program interactions may diminish with greater use. We also note that the effect size estimate for STEM GPA is negative in fall 2019, when placement policy changes resulting from AB 705 may have altered coursetaking, grading, or staffing patterns in ways that affected program impacts.

Finally, we examined two longer-term outcomes for students who participated in any program component in fall 2018: STEM certificate or degree attainment and STEM transfer degree attainment, both by spring 2020. The analysis results were promising but did not meet the conventional level of statistical significance, meaning there is a higher than usual probability that they arise by chance. The odds of earning a STEM associate for transfer degree were 83% higher for students who had at least one program interaction in spring 2018 than similar peers who did not, with an effect size of 0.37 ($p = 0.11$).

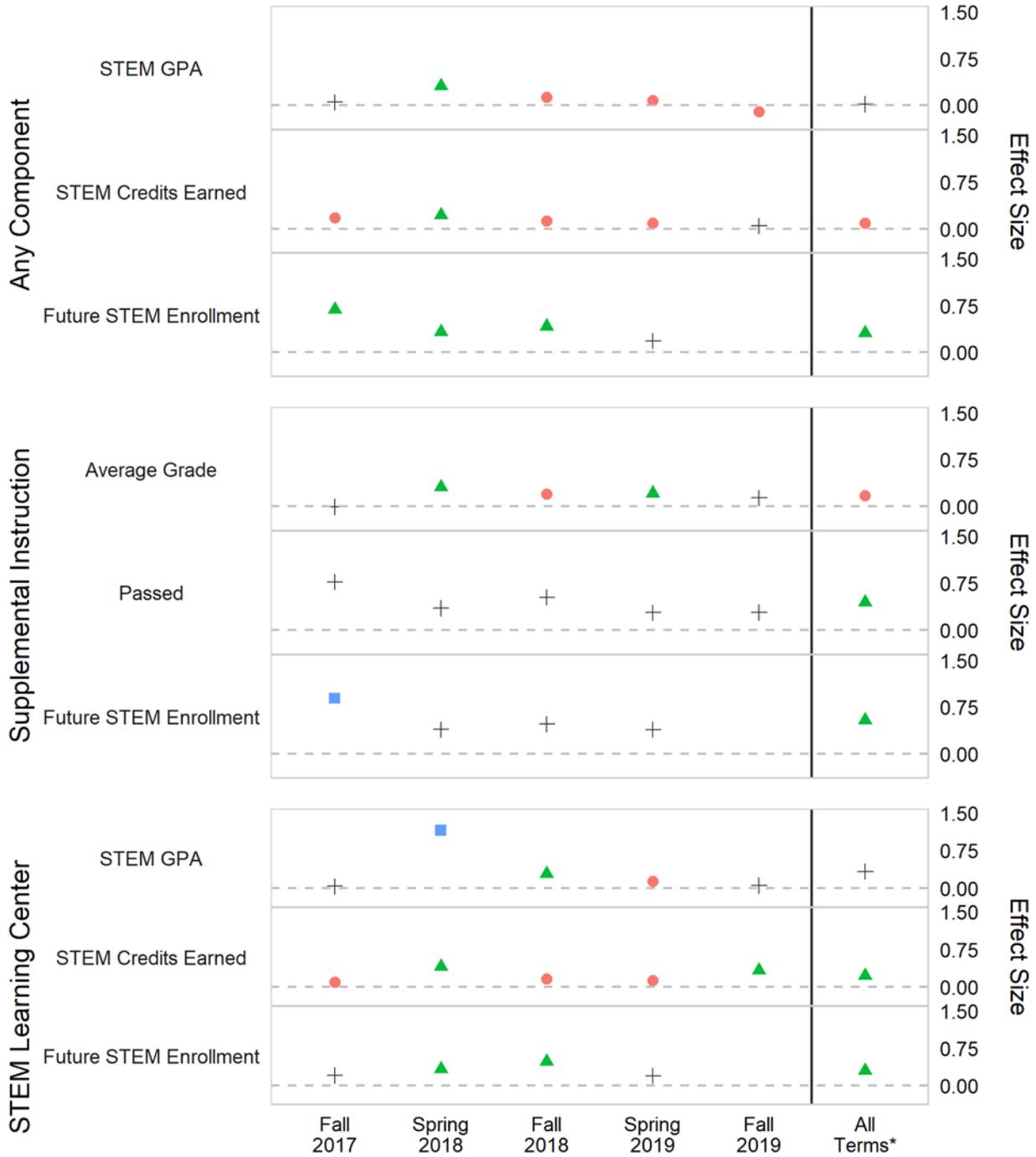
Impact Analysis Methodology

Analytic Sample: We limited the analytic sample to STEM students who were enrolled in at least one class at LACC in the focal term and were not dual enrolled in a high school course. For the SI analysis, we limited the sample to students enrolled in STEM courses that had at least one section offering SI in that term.

Approach: We employed a quasi-experimental design using propensity-score weighted regression. The propensity score weighting ensured that the treatment and comparison groups were equivalent on all observed student demographic characteristics, including gender, race and ethnicity, eligibility for a California Promise Grant, and California residency status, as well as prior coursetaking and GPA, both overall and in STEM. This methodology reduces bias due to these observable characteristics; it does not, however, eliminate bias due to unobserved differences in treatment and comparison groups, such as differences in prior educational opportunities, access to outside supports, or the nature of peer relationships.

Outcomes: To ensure tight alignment with the intervention, we examined three primary outcomes tied to the focal term: grades, credits, and future STEM enrollment. Grades and credits are continuous outcomes, defined as GPA and credits earned in STEM courses in the focal term. For the SI analysis only, we used grade points in courses offering SI sections and defined credits as a dichotomous variable indicating passing at least one of these courses. Future STEM enrollment is a dichotomous variable indicating enrollment in a STEM course in the subsequent two terms (including winter or summer intersession terms).

STEMP Program Effect Sizes



● Small [0, .2] ▲ Medium (.2, .8] ■ Large > .8 + Not significant

* The combined all terms estimate for participation in any STEMP program component includes summer and winter intersession terms.

Endnotes

¹ The full citations for these reports are:

Sosina, V., Wei, X., Milby, A., Caspary, K., & Goetz, R. (2021). *Evaluation of Los Angeles City College's STEM Pathways program: Impacts of the STEM Learning Center on student outcomes*. SRI International.

Caspary, K., Milby, A., Sosina, V., Wei, X., & Goetz, R. (2021). *Evaluation of Los Angeles City College's STEM Pathways program: Impacts of the Supplemental Instruction program on student outcomes*. SRI International.

Sosina, V., Caspary, K., Milby, A., Wei, X., & Goetz, R. (2021). *Evaluation of Los Angeles City College's STEM Pathways program: Impacts of STEM Pathways program participation on student outcomes*. SRI International.

² The combined estimates for any component participation include summer and winter intersession terms; participation in these terms was too small to estimate effects for SLC and SI participation.

³ For the SI analysis, we excluded students who participated in SI for at least one but not all courses.

⁴ Cohen suggested that 0.20 be considered a “small” effect size, 0.50 represents a “medium” effect size and 0.80 a “large” effect size. Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.

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