

Engagement in Engineering Pathways "E-PATH" An Initiative to Retain Non-Traditional Students in
Engineering
Summative External Evaluation Report

ABSTRACT

The summative external evaluation report described the program's impact on faculty and students participating in recitation sessions and active teaching professional development sessions over two years. Student persistence and retention in engineering courses continue to be a challenge in undergraduate education, especially for students underrepresented in engineering disciplines. The program's goal was to use peer-facilitated instruction in core engineering courses known to have high attrition rates to retain underrepresented students, especially women, in engineering to diversify and broaden engineering participation.

Knowledge generated around using peer-facilitated instruction at two-year colleges can improve underrepresented students' success and participation in engineering across a broad range of institutions. Students in the program participated in peer-facilitated recitation sessions linked to fundamental engineering courses, such as engineering analysis, statics, and dynamics. These courses have the highest failure rate among women and underrepresented minority students. As a mixed-methods evaluation study, student engagement was measured as students' comfort with asking questions, collaboration with peers, and applying mathematics concepts. SPSS was used to analyze pre-and post-surveys for statistical significance. Qualitative data were collected through classroom observations and focus group sessions with recitation leaders. Semi-structured interviews were conducted with faculty members and students to understand their experiences in the program.

Findings revealed that women students had marginalization and intimidation perceptions primarily from courses with significantly more men than women. However, they shared numerous strategies that could support them towards success through the engineering pathway. Women and underrepresented students perceived that they did not have a network of peers and faculty as role models to identify within engineering disciplines. The recitation sessions had a positive social impact on Hispanic women. As opportunities to collaborate increased, Hispanic women's social engagement increased. An analysis of quantitative survey data in the three engineering courses revealed a significant effect of race and ethnicity on comfort in asking questions in class, collaborating with peers outside the classroom, and applying mathematical concepts.

A follow-up ANOVA for comfort asking questions revealed that Asian women reported feeling excluded in the classroom. However, it was difficult to determine whether these differences are stable given the small sample size for students identifying as Asian. Gender differences were significant for comfort in communicating with professors and peers. Overall, women reported less comfort communicating with their professors than men. Results from student metrics could inform faculty professional development efforts to increase faculty support and maximize student engagement, persistence, and retention in engineering courses at community colleges. Summative results from this project could inform the national STEM community about recitation support to further improve undergraduate engineering learning and educational research.

Cite this report

Blackmon, A.T. (2020, July). Engagement in Engineering Pathways "E-PATH" An Initiative to Retain Non-Traditional Students in Engineering Summative External Evaluation Report; Atlanta, GA, Innovative Learning Center, LLC, 2020. Grant No. 1712009. Supported by the National Science Foundation. <https://doi.org/10.52012/TYOB9090>