Problem: STEM Degrees Unaligned with Workforce Demands

Solution: Scaling High Impact Practices at the California State University System

The demand for graduates with degrees in science, technology, engineering and mathematics (STEM) disciplines has grown over the last few decades. Indeed, economic projections indicate that one million more STEM professionals will be needed if the United States is to remain competitive globally (President's Council of Advisors on Science and Technology, 2012). Determining ways to boost completion in STEM areas is crucial for economic reasons, and it poses a unique challenge to higher education. According to data from the National Center for Education Statistics (NCES, 2012), of 2003-2004 beginning bachelor's degree students, nearly half (48.3%) of students who majored in STEM left their major field. Students who were beginning associate's degree programs in STEM majors in 2003-2004 were even less likely to graduate; 36.5% of those students left higher education without a degree or credential. Further, Black and Hispanic students and low-income students had the lowest chance of seeing their STEM degree programs through to completion. Credit accumulation in their STEM major and success in first-year college math courses were prominent reasons for their lack of persistence (NCES, 2012).

In recognition of this problem, the California State University System (CSU) has begun testing a model for "bringing high-impact practices ('HIPs') to more students" by following a successful model first developed at CSU Fullerton (Preparing to Scale High Impact Practices, 2014, p. 2; Taxonomies of High Impact Practices, 2014). The purpose of this project is to expand the diversity and scope of the STEM workforce pipeline. For this effort to be successful, challenges—including a lack of incentives and scaling and funding issues associated with HIPs—needed to be overcome. In response, CSU has launched several initiatives to improve learning, engagement, and persistence:

- Transforming course design: faculty development, specifically in high-enrollment courses with high levels of failure.

- The graduation initiative: efforts to bring HIPs such as undergraduate research, service learning, and learning communities to the students who stand to benefit most from them.

- STEM service learning: cross sector collaborations aimed at developing experiential learning.

- Early start: required enrollment in developmental education prior to the start of freshman year for low-performing students through summer bridge programs.

During the experimentation phase, these initiatives were housed at specific institutions. For example, CSU Fullerton undertook efforts to assess HIPs and student participation, while CSU Northridge focused on summer bridge programs. Evidence of progress has taken different forms. CSU Fullerton is in the process of building the required infrastructure to be successful, including taking an inventory of HIPs, developing plans to scale up, creating a culture around HIPs through campus education, pilot programs, and developing methods of assessment (Bonsangue et al., 2013). At CSU Northridge, preliminary results suggest dramatic improvements in performance for students who participated in the Summer Bridge program vs. those who opted out (Huber, 2010).

As evidence that supports these intervention strategies builds, CSU has been active in securing a more diversified funding base, including providing new system funding. In 2014, CSU received $4.6 million from the Helmsley Charitable Trust to create STEM collaboratives that aim to close achievement gaps in STEM fields for underrepresented and low-income students, in addition to creating standardized language

and data that can promote continuous improvement and a better understanding of these interventions across the system and its campuses (CSU Garners $4.6 MIL Grant to Support Students in STEM Fields, 2014). To accomplish these goals effectively, the CSU is experimenting at the individual campus level by organizing networks based on coalitions of willing campuses; promoting transparency, accountability, and learning within and across campuses; and continuously assessing to promote reinvention (Taxonomies of High Impact Practices, 2015; Relevant Findings, 2015). The steps undertaken represent a holistic approach to innovation that increases the likelihood of scaling, diffusion, and adoption across the entire system.

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