

Developing a Diverse Regional Engineering Talent Ecosystem

BUSINESS AND HIGHER EDUCATION PARTNERING ON AN ALTERNATIVE ENGINEERING PATHWAY FOR COMMUNITY COLLEGE TRANSFER STUDENTS

Challenges in St. Louis' Engineering Ecosystem

Employers, higher education institutions, and talented students in the St. Louis, Missouri area faced significant challenges.

EMPLOYER CHALLENGES FINDING ENOUGH ENGINEERS IN THE AREA TO MEET THE HIGH DEMAND

HIGHER EDUCATION CHALLENGES PROVIDING ACCESSIBLE PATHWAYS TO DIVERSE STUDENTS WHO HAVE AN INTEREST IN BEING AN ENGINEER BUT NOT THE OPPORTUNITY

STUDENT CHALLENGES STRUGGLING TO FIND PATHWAYS INTO ENGINEERING AT AFFORDABLE, ACCESSIBLE LOCAL INSTITUTIONS

The Solution: Joint Engineering Programs

In 1993, Washington University in St. Louis (WashU) and the University of Missouri-St. Louis (UMSL) formed the Joint Undergraduate Engineering Program. WashU is a leading private university with an outstanding engineering program. UMSL is a large public university in suburban St. Louis that provides excellent learning opportunities.

This joint program provides UMSL students access to WashU's engineering program for similar tuition to UMSL. Students typically complete two years of coursework at UMSL before transitioning to WashU to complete upper-level engineering courses.

"This is an example of how to enhance cooperation between institutions."

Thomas George, Former Chancellor, University of Missouri-St. Louis

This program reaches into highly diverse communities in St. Louis to offer a pathway into engineering. Since its inception, more than 900 students have received bachelor of science degrees in civil, electrical, or mechanical engineering. About 75 percent of alumni remain in the St. Louis area, where they are in high demand by companies such as The Boeing Company (Boeing), which employs the most program graduates.

Joint Engineering Leadership Development Program (JELDP)

In 2013, BHEF received a five-year grant from the National Science Foundation to develop models for industry engagement with higher education. The goal was to increase STEM student persistence, graduation, and community college transfer, particularly among veterans, women, and underrepresented minorities.

This NSF grant allowed two BHEF members—WashU and Boeing—to build on their previous collaboration by creating and launching JELDP. JELDP focuses on developing the leadership potential of a special cohort of students in the Joint Undergraduate Engineering Program.

Enhanced Learning Experience

JELDP provides a broad array of enriched learning opportunities. These opportunities are consistent with BHEF's U.S. STEM Undergraduate Model®, which found that multidimensional programs are significantly more effective than discrete interventions for STEM student retention.¹

Many students begin the program by completing two years of foundational coursework at either UMSL or a local community college before transitioning to WashU to complete their upper-division engineering courses, which then lead into competitive positions at companies like Boeing.



In addition to curriculum co-designed by WashU and Boeing, JELDP is composed of high-impact, hands-on, work-based learning interventions. “[Graduates] need to know their technical material, but also need to be prepared to succeed in the engineering profession,” said Jody O’Sullivan, dean of the UMSL/WU Joint Undergraduate Engineering Program at Washington University.

JELDP Focus Area	Description
Seminar Courses	Foster meaningful connections to the engineering profession. One example is Engineering Studio where students engage with practicing engineers on ethics, leadership, and diversity.
Mentoring	Students are paired with engineers at Boeing who serve as mentors.
Internships	A part-time internship enables students to gain real-world work experience
Scholarships	Make it possible for students to graduate with little or no debt.
Capstone Projects	Challenge students to engage in applied problem solving and practice working in teams.

JELDP’s philosophy is that students’ most engaging, meaningful learning experiences often take place outside of the classroom. All JELDP courses are in the evenings, allowing for internships, co-ops, and work-based learning experiences during the day. These real-world experiences better prepare students for successful engineering careers. This program also helps Boeing address the company’s need for exceptional and diverse engineering talent.

“We need talented people. . . . This program will pay off as we continue to hire qualified graduates from its ranks.”

Shelley Lavender, Senior Vice President of Strike, Surveillance and Mobility, St. Louis Senior Executive of Boeing Defense, Space & Security, The Boeing Company

Insights

Developing and launching JELDP has yielded important insights that others can learn from.

- **Focus partnerships on developing a sustainable regional talent ecosystem.** The partnership of a four-year public university, four-year private institution, community college, and major employer focused on developing a regional talent ecosystem is unique.
- **Engage with external entities and develop infrastructure to support and scale partnership.** BHEF helped bring the parties together. The NSF grant helped expand the scope of JELDP. The partners have developed infrastructure to enable collaboration and scale.
- **Capitalize on existing business-higher education relationships.** Many relationships already exist and can be built upon, including more partners such as community colleges.

- **Use partnership development as a catalyst for aligning internal priorities and practices.** Forming JELDP caused WashU and Boeing to revisit their practices and priorities. Boeing has accelerated hiring initiatives.
- **Develop programs with a student-first mentality.** Non-traditional students come to higher education with complex needs. Program design must address these needs.
- **Build high-impact practices into program design.** High-impact practices are educational strategies—like internships and experiential learning—that impact student engagement, learning, and retention.

“The St. Louis region can only continue to grow and succeed through innovative partnerships between the business community and its higher education and research institutions, both public and private.”

Mark Wrighton, Former Chancellor, Washington University in St. Louis

Implications

- Leadership by business, higher education, and policymakers is an essential catalyst.
- Policymakers must ensure that public institutions have the resources to meet evolving middle- and high-skill workforce demands and that access is affordable to students.
- Businesses need to grow local talent and promote diversity by choosing the right educational partners to ensure regional economic growth.
- Higher education must create partnerships that tap new talent pools and build high-demand skills for the regional economy.

Early Returns

JELDP provides promising students from the St. Louis area with a pathway to a career in engineering. Dozens of students have received scholarships, worked with Boeing engineers, and had internships. These students are more diverse than in most engineering programs. Boeing and many other local companies anticipate recruiting from JELDP’s pool of engineering talent for years to come.

Additional Resources

See the full case study of [The Boeing-Washington University Joint Engineering Leadership Development Program](#).

Also, see the [BHEF website](#) and [BHEF’s many publications](#).

¹ Business-Higher Education Forum, *The U.S. STEM Undergraduate Model: Applying System Dynamics to Help Meet President Obama’s Goals for One Million STEM Graduates and the U.S. Navy’s Civilian STEM Workforce Needs*. Washington, DC, 2013. Available [here](#).