



Intel STEM Center
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Recent independent studies from the American Association for the Advancement of Science (AAAS 2001) and Egan, Hurtado, and Chang from the University of California, Los Angeles (Egan et al., 2010) have shown the best predictors of success in undergraduate science, technology, engineering and mathematics (STEM) degree programs are the quality of students' pre-college STEM education and the level of achievement students have attained by the time they begin their college coursework. Specific factors from these studies that show strong correlations to student success in STEM bachelor degree programs include:

- The intensity and quality of the secondary school curriculum
- Class rank/grade point average
- Taking mathematics courses beyond Algebra II
- Teacher effectiveness
- School resources
- Access to out-of-school opportunities

This trend is even more pronounced for students from under represented minority populations. In addition the AAAS study reports that African American and Hispanic college students who do attain high grade point averages and SAT scores above 600 typically do not pursue STEM college majors for reasons including poor teaching in STEM courses, lack of encouragement from teachers or parents, and self-perception of their own inability to be successful in STEM majors

I am writing to provide testimony in support of pending legislation that would enable investments to transform science, technology, engineering, and mathematics (STEM) education in Oregon's K-12 schools. I am the Director of the Center for Science Education at Portland State University. I came to Oregon 30 years ago as a member of the PSU Department of Chemistry. Early in my career as a chemistry researcher and educator I became aware of the important relationship between the quality of pre-college STEM education and the success of my students in higher education. In 1991 PSU established the Center for Science Education (CSE) and I became its founding Director. The mission of the CSE is to enhance science teaching and learning through innovative education, research and community outreach programs. Over the past two decades my colleagues and I have worked with Portland area educators to bridge the divide between K-12 science education

and colleges and universities. During this time we have come to realize the best way to bring about improvements in pre-college STEM learning environments is through partnerships and collaborations in which classroom teachers work with STEM professionals, community members and each other to design and implement strategic initiatives that transform classroom learning at the point of instruction.

In October of 2011 Aubrey Clark, Intel's Northwest Region Education Relations Manager, and I had a conversation about Intel's considerable investments in STEM education. She expressed her anxiety about the efficacy of these investments and absence of measurable improvement in K-12 student achievement in STEM. We also discussed the importance of an Oregon educated STEM workforce to achieving economic growth and prosperity for our state. As a result of these conversations we convened a series of monthly meetings with STEM education stakeholders from our region's K-12 schools, higher education, businesses and out-of-school STEM providers. Our exploration led us to research on collective impact partnerships as an organizational structure to address large-scale complex social issues. Successful collective impact partnerships have five common characteristics: a common agenda, a shared system to measure success, mutually reinforcing activities, continuous communication, and a backbone support organization.

In April 2012 we launched the Portland Metro STEM Partnership as a collective impact partnership. The goal of our partnership to increase the capacity of partnering schools and districts to transform student-learning environments in STEM classrooms and to achieve STEM college and career readiness for *all* high school graduates. Our founding partners included Beaverton, Hillsboro, Portland and Forest Grove School Districts. The higher education partners were Portland State University and Oregon Health and Science University. Intel, Vernier Software and Technology and JPMorgan Chase led our business partners. Our initial out-of-school STEM partners included Outdoor School, OMSI, and the Oregon Zoo. Presently our partnership engages over 40 organizations that have committed time, funding and resources to our shared STEM transformation agenda.

Our partnership's theory of action is to invest in teachers as change agents who transform school-based STEM learning cultures to promote engagement in active learning and the acquisition of successful STEM learning identities for *all* students.

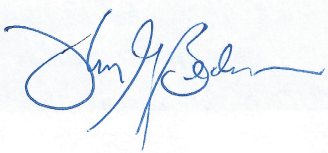
The operational backbone for the partnership is the Intel STEM Center. Our STEM Center includes four program offices: the Office of Partnership Development, the Office of Research and Assessment, the STEM Collaboratory and the STEM Teachers Academy. The STEM Center is located in the Capital Center, a repurposed industrial park that is owned by the Beaverton School District and is the location of Beaverton's Health and Science School, a grade 6-12 magnet school that serves the district's under represented student population. The STEM Center is staffed with cost-shared teachers on special assignment (TOSA) from each of the partnering school districts who work side-by-side with university researchers, community-based STEM professionals and local business volunteers. We consider the Intel STEM Center to be a prototype of a regional center or network hub that is called for in House Bill 3233.

We are approaching the end of our first year of development and programming and have already demonstrated the proof of concept for our collective impact partnership and the Intel STEM Center. Our Office of Partnership Development has engaged seven schools in an asset mapping and visioning process that has resulted in STEM investment plans for each school. The Office of Research and Assessment has worked with partners to create a framework of student, teacher and partnership outcomes and an assessment scheme for our shared measurement system. The STEM Teachers Academy has already enrolled over 200 teachers in PSU professional development courses that are co-designed and co-taught with TOSAs and STEM professionals from partnering institutions. Our STEM Collaboratory has recently launched a free of charge checkout portal for Vernier Software and Technology equipment. On June 1st we will be convening our first STEM Saturday at Boise-Eliot/Humboldt School in Portland. STEM Saturday is an opportunity for out-of-school providers to join forces to deliver thematic programming that aligns with targeted learning outcomes.

I believe investments in regional STEM hubs or networks that support classroom teachers through professional development and community partnerships is a cost effective and scalable strategy to raise STEM achievement for *all* Oregon students.

Thank you for the opportunity to provide my testimony in support of Oregon House Bill 3233 and accompanying legislation that would fund strategic investments in STEM education in Oregon.

Sincerely,

A handwritten signature in blue ink, appearing to read "William Becker", is placed over a light blue rectangular background.

William Becker, Ph.D.
Professor Science Education
Director, PSU Center for Science Education
Acting Executive Director, Portland Metro STEM Partnership

American Association for the Advancement of Science (2001). In pursuit of a diverse science, technology, engineering and mathematics workforce: Recommended research priorities to enhance participation by underrepresented minorities. http://ehrweb.aaas.org/mge/Reports/Report1/AGEP/AGEP_report.pdf

Egan, M. K., Hurtado, S., and Chang, M.J. (2010). What matters in STEM: Institutional contexts that influence STEM bachelor's degree completion rates. Presentation at the 10th Annual Meeting of the Association for the Study of Higher Education, Indianapolis, IN. <http://www.heri.ucla.edu/nih/downloads/ASHE%202010%20-%20Egan,%20Hurtado,%20Chang%20-%20What%20matters%20for%20STEM%20Completion.pdf>